Market Rental Revitalization Study | Project 12216.000

City of Victoria, Victoria, BC

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Executive Summary

Victoria currently has a large number of market rental apartments built prior to 2000 (approximately 16,400 units), a high proportion of renters (60% of city population)[1], and a very low vacancy rate (0.7%)[2]. The majority of the purpose built rental buildings were constructed in the 1960s and 70s, and many of these will need significant repair and/or re-investment in the next 20 years. The City has identified a potential opportunity to incentivize owners of these buildings to improve energy and seismic performance at the time of re-investment, while simultaneously ensuring tenant safety and stability.

The Victoria Housing Strategy 2016-2025 outlines four supporting actions under the overarching action of "Protect existing rental stock." These actions include: the creation an inventory of existing affordable rental stock; consideration of the regulations, policies and incentives to protect and support regeneration of existing affordable rental stock; a review of the Property Maintenance Bylaw to improve tenant housing quality, and an examination of the legislative authority for a municipal role in maintaining rental tenant stability. The identified actions led directly to the initiation of this revitalization study.

At the November 23rd, 2018 Committee of the Whole meeting, Council directed the project team (including City staff) to prepare a Standard of Maintenance Bylaw and Tenant Relocation Policy (renamed Tenant Assistance Policy) and seek feedback on these drafts in focus group sessions. The project team also incorporated elements of energy and seismic considerations based on previous Council direction and associated City goals related to climate action. As per Council direction, the team undertook targeted engagement using focus group sessions, surveys, and one-on-one meetings, between January and April of 2018.

The key deliverables resulting from this study are the following:

- → A market rental building inventory for the City of Victoria,
- → A recommended Standards of Maintenance (SOM) Bylaw,
- → A recommended Tenant Assistance Policy (TAP), and
- → Analysis to support the development of a Market Rental Energy and Seismic Upgrade incentive program.

Building Inventory

Prior to this project, the City did not have a database of quantifiable information about its market rental housing. The purpose of establishing a complete inventory of rental buildings in the city was thus two-fold:

- → Create a current, updatable, and publicly accessible database to integrate into the City's GIS-based data system for future reference and analysis.

[1] Statistics Canada. 2017. Victoria, City [Census subdivision], British Columbia and Canada [Country] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E.

[2] CMHC, Housing Market Information – Rental Market Report – Victoria CMA. 2017. https://www03.cmhc-schl.gc.ca/catalog/productDetail.cfm?cat=117&itm=5&lang=en&sid=pXu6vY6wcNthPRAqiNCCy5JfZEzivSXrtfcdVhXtrkk9rFPyWqCqeTEVSEkAW7os&fr=1524619016768

- → Characterize the older (pre-2000) existing rental building stock and identify the best opportunities for a city-led revitalization program.

The complete inventory has been provided to City staff for incorporation into its GIS and other information management systems.

The inventory shows 16,773 total rental suites in 679 rental buildings of various types within the City of Victoria, including:

- → Townhouses and row houses
- → Hi-rise concrete apartments
- → Apartments over commercial buildings
- → Low-rise wood-frame walk-up apartments
- → Low-rise wood-frame apartments with elevator
- → Residential conversions (e.g., multi-plex houses) [3]

The building stock inventory identifies construction in the 1960s and 1970s as a major contributor to the current existing rental building stock. There were 311 rental apartment buildings constructed in Victoria from 1960 through 1979, accounting for 46% of the total current rental buildings and 78% of the current rental suites. Nearly all of these are low-rise walk-ups, low-rise apartments with elevators, or high-rise apartments. Because of their high concentration of suites (compared to, say, residential conversions or rowhouses), consistent construction methods, and their likely need for renewal, these building types provide the highest potential impact for a city-driven revitalization program.

Standards of Maintenance Bylaw

Victoria's current Property Maintenance Bylaw provisions are concerned largely with exterior building condition and cosmetic aspects of property maintenance (e.g., lawn care and refuse collection), rather than with the interior condition of the building and dwelling units. Rather than amending the current Property Maintenance Bylaw, the project team was directed to develop a stand-alone Standards of Maintenance (SOM) Bylaw that would address basic life-safety and indoor housing quality elements.

If enacted, the Standards of Maintenance bylaw will set minimum requirements for landlords and property owners to maintain a basic standard of repair for the interior of residential rental properties (which may include multi-unit buildings, secondary suites, and detached houses).

The intent is that this bylaw will be implemented in parallel but independent of any incentive program that is ultimately developed to encourage energy and seismic upgrades to existing rental buildings.

[3] The analysis excluded all buildings that had a 'blank' occupancy category in the BC Assessment data.

Following stakeholder consultation, review of precedents in other municipalities, and a jurisdictional review, it is recommended that the following elements be contained within the SOM Bylaw:

- Impacts of leaks from plumbing or water ingress
- Functioning heat and hot water
- Fire safety concerns such as alarm systems and means of egress
- Integrity/functionality of housing elements such as doors, windows, sanitation facilities, and electrical facilities
- Pest Control
- Ventilation
- Other life safety considerations

The complete draft bylaw can be found in the Appendix.

Tenant Assistance Policy

The Tenant Assistance Policy (TAP) has been developed to help mitigate the potential impacts of displacement on tenants. Tenant displacement and relocation is of particular concern when the vacancy rate is low and finding alternative, affordable housing options may prove challenging – particularly for vulnerable tenants.

The intent of the revitalization program is to encourage and incentivize upgrades that can be completed without displacing tenants. However, in the rare occasion when tenants must vacate to complete the work, adherence to the TAP would be a prerequisite for participating in the program.

The TAP will supplement, rather than replace, existing protections outlined in the Residential Tenancy Act. Its goal is to mitigate the potential impacts of displacement on tenants by providing guidelines for supports offered by the landlord/developer/property owner.

Informed by stakeholder consultation and a municipal best practice review, the following are recommended elements of the TAP:

- Notice to Tenants
- Compensation
- Relocation Assistance
- Moving Expenses and Assistance
- Right of First Refusal

The complete draft policy can be found in the Appendix.

Energy and GHG Analysis and Key Findings

In addition to being an important component of the city's housing stock, aging market rental apartment buildings also represent a large proportion of the city's buildings-related GHG emissions and, in some cases, are seismically deficient. While energy performance

upgrades require capital expenditures, there are also associated benefits, including lower operating expenses, improved tenant comfort and indoor environmental.

Energy modeling and analysis was completed to quantify potential energy and GHG savings that may result from upgrading typical 1960s and 1970s purpose built rental buildings within the City of Victoria.

Economic analysis was also completed to quantify both the expected return on investment and the level of incentive that would be required to motivate building owners to take on this type of work. Based on this work and the stakeholder engagement, key incentive program elements are recommended.

For this analysis, ECMs were grouped into three bundles representing different feasible upgrade scenarios. The purpose of defining bundles is to facilitate an analysis of possible upgrade scenarios.

- → **Bundle 1 – Good** – Reflects basic asset replacement with code-minimum equipment requirements and enclosure renewal. Some energy/GHG improvements result from these standard renewals (incidental airtightness and windows to code minimum).
- → **Bundle 2 – Better** – Reflects moderate changes that improve energy/GHG performance of systems above the status quo at the time of regular renewals.
- → **Bundle 3 – Best** – Reflects a change in the intent of the renewals to have a focus on energy improvements, choosing very high performance equipment and materials at the time of regular renewals.

The ECMs chosen were intended to illustrate the potential for a revitalization program that prioritized energy and GHG savings, using currently widely available products and approaches. ECMs that go beyond those modeled in the three bundles may include achieving Passive House level airtightness, using Passive House window products, or fuel switching measures to high efficiency electric equipment (e.g. heat pumps). These additional ECMs could achieve even higher energy savings than those modeled above, and are worth further consideration beyond the pilot stage of a City incentive program.

Energy and GHG Key Findings

Based on the energy analysis, key findings from the energy modeling results are as follows:

- → Moderate energy efficiency (up to 22%) may be achieved through business-as-usual basic asset replacement. Energy savings up to 50% over the baseline may be achieved by implementing “energy as a priority” ECMs at the time of asset renewal. The greatest absolute savings opportunities are presented by buildings currently heated using natural gas.
- → Further reductions could be achieved by considering fuel-switching strategies, which are not modeled here.
- → The **all-gas low-rise with elevator** has the highest baseline energy consumption (232 kWh/m2/yr) and the highest baseline greenhouse gas emission intensity (32 kg CO2e/m²/yr). It consequently **has the greatest potential absolute energy and greenhouse gas emissions savings.** When further factoring in the fact that this building type makes up the largest component of older rental apartment

buildings (190 buildings with 8400 total units), these data suggest that, were the City to further focus its program efforts on one building type, or initially target one building type, this one would present the greatest opportunities.

Based on the economic analysis presented above, key findings from the results are as follows:

- → Buildings with electric space heating yield the greatest cost savings from energy upgrades due to the higher cost of electricity per unit of energy.
- → However, buildings utilizing natural gas as a heating fuel yield the greatest carbon emissions reductions, and the lowest cost per ton of GHG emissions abated. It is also estimated based on survey and anecdotal input that there are considerably more buildings that are heated using natural gas than electricity.
- → If the primary goal is to reduce carbon emissions, the two gas heated archetypes (including the **low-rise with elevator** recommended in the energy analysis) present the lowest cost per ton of GHG emissions abated, and should be the primary focus for a City incentive program.

Seismic Key Findings

The typical low-rise apartment buildings that are the focus of this study are two- to four-storey wood frame structures. Traditionally, buildings with light wood frame construction have performed relatively well under seismic loading due to their inherent ability to dissipate energy using conventional construction details. However, buildings that were designed to meet resistance requirements specified in building codes in the 1960s and 1970s will not have the capacity to meet current (and near future) code specified forces due to earthquakes.

The previously completed Victoria Seismic Vulnerability Study overlaid seismically vulnerable building typologies with existing soil conditions, finding that the southeast and southwest corners of the city are vulnerable areas where many older wood frame buildings and concrete buildings are located on soft soils.

These existing buildings may be improved by enhancing existing seismic resisting elements, or by reducing the demand on existing elements through the introduction of new structural components that contribute to the overall seismic resistance of the building. This work would most effectively be implemented when completed at the same time as other renewal work; for example, adding a new shear wall during cladding renewal.

With the goal of encouraging Building Owners to improve the seismic resiliency of the existing building stock, several potential seismic program elements are proposed as part of the revitalization program. These program elements focus on feasible upgrades for the low-rise wood frame buildings.

Minimum Life Safety Requirements

It is recommended that the City first set a target for the level of seismic performance it would like to see achieved in these older low-rise wood frame apartments. A suggested starting point would be to upgrade the building to meet minimum life safety

requirements. This is generally achieved when the upgrade design meets 60% of current seismic design level forces. Structure damage would still be expected if the structure is subjected to a Code level seismic event, but life safety is improved.

100% of Current Seismic Design Level Forces

A better seismic upgrade design level, i.e., to meet 100% of current seismic design level forces, would not only improve life safety, it would likely increase the overall performance of the building during a seismic event. While structure damage may still occur due to an earthquake, the building would likely require less repair to return it to an occupiable state compared to a lower level of seismic improvement or compared to the original design capacity. This would be considered a best case scenario, but is potentially infeasible or prohibitively costly to implement on these buildings. It may be that some elements of the structure can be economically improved to meet 100% of current seismic design level forces (above ground components such as wood frame shear walls for example) while other components, such as buried concrete foundations, could cost significantly more to improve. However, once improvement steps are taken, in many cases the incremental increase in cost to move from 60% to 100% of current design level forces would not be significant.

Market Rental Energy and Seismic Incentive Program

The intent of a City-developed incentive program is to improve energy performance and seismic resilience of the city's aging rental apartment buildings, while retaining tenant stability. The program will be deemed successful if it supports building owners to improve their buildings beyond like-for-like replacement, and it is done in a way that is supportive of tenants and does not inadvertently lead to tenant displacement.

The program is therefore focused on incentive options that would be attached to the incremental energy and seismic improvements, with a pre-requisite to comply with the TAP in the rare cases that require tenant displacement.

Prerequisites

Applicants would be required to meet program prerequisites to access the incentive program, including:

- → No tenant displacement. In exceptional circumstances where displacement is required, adherence to Tenant Assistance Policy
- → Conduct energy, condition, and seismic assessment
- → Share energy consumption data over time with City of Victoria through Energy Star Portfolio Manager

After meeting the prerequisites, it is proposed that incentives be offered on a tiered basis according to the number of measures implemented and/or on their relative energy, greenhouse gas and/or seismic impact.

The City would aim to offset a portion of the incremental cost through one or more of the following incentive strategies:

- → Facilitated access to existing rebates/retrofit programs

- → Funding for enclosure, energy, seismic needs/potential evaluation (~$20k)
- → Expedited permitting
- → Building permit rebates
- → Property tax holiday

The program is recommended to be designed to be accessed as projects are implemented over time, to reflect the phased manner in which most building owners complete upgrades. One proposed strategy is to offer the energy and seismic upgrades in a checklist format, prioritized according to level of impact. The more, higher impact measures a building implements, the greater the incentive. Also, prescriptive incentives could be offered for "best in class" upgrades, such as Passive House certified windows, or CO_2 heat pumps. This list may evolve over time as new technologies and product options are developed and become more locally available.

Recommended Next Steps and Future Work

With respect to the policy aspects, it is recommended that the City proceed with the implementation phase, which includes resource allocation. The SOM and TAP should also be monitored after implementation to evaluate effectiveness and update as needed. The Market Rental Inventory should be incorporated into City systems such as VicMap and should be updated on an ongoing basis.

With respect to the incentive program, it is recommended that the City proceed with testing and refining the program through several pilot buildings. Based on the analysis results, the pilot should target the low-rise apartments (with elevators) that use natural gas for heating and hot water. A geographic area of focus should be defined that contains a high proportion of these building types.

The City may consider additional modeling and costing to quantify a "net-zero", "net-zero ready", and/or Passive House retrofit (EnerPHit) scenario for one or more of the targeted building types. It could then seek out the most pro-active building owners to pilot and showcase a 'best in class" deep energy retrofit for rental apartment buildings.

Emerging from both the policy development work and the energy and seismic incentive work was a common desire to have a resource available to guide building owners and tenants through the policy and incentive processes. This resource person or people could keep abreast of complementary incentive programs being offered through utilities, the province or other sources, assist building owners with benchmarking, as well as direct stakeholders through the TAP and/or SOM process. This need would likely best be met with one resource person dedicated to TAP and SOM questions and another person for energy and seismic incentive program related questions.

The City may also consider dedicating resources to tenant advocacy and support, whether it is grants or funding to existing tenant advocacy group or developing an advocacy role within the City itself.

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1 Introduction

Victoria currently has a large number of market rental apartments built prior to 2000 (approximately 16,400 units), a high proportion of renters (60% of city population)[4], and a very low vacancy rate (0.7%)[5]. The majority of the purpose built rental buildings were constructed in the 1960s and 70s, and many of these will need significant repair and/or re-investment in the next 20 years. The City has identified a potential opportunity to incentivize owners of these buildings to improve energy and seismic performance at the time of re-investment, while simultaneously ensuring tenant safety and stability.

In this context, the purpose of the Market Rental Revitalization Study (Revitalization Study) is to characterize the existing rental housing stock in Victoria, and then to develop and recommend municipally-applicable regulations, policies, and financial or other incentives to:

- → Preserve and revitalize the current supply of aging market rental housing in Victoria;
- → Provide a unified expected standard of care for all rental properties (via a Standards of Maintenance Bylaw);
- → Provide best practice protections for existing tenants as aging rental stock is revitalized (via a Tenant Assistance Policy);
- → Promote and support the implementation of energy efficiency and greenhouse gas (GHG) emission improvements at the time of building renewal; and
- → Promote and support the implementation of seismic improvements at the time of building renewal.

These outcomes are achieved through exploration of four distinct yet inter-related topic areas, which dictate the organization of this report:

1. Inventory and Condition of Existing Rental Buildings
2. Maintaining Tenant Stability
3. Energy and GHG Opportunities
4. Seismic Opportunities

The overall project methodology includes the following key elements:

- → Literature scan to understand the broader context regionally, provincially, and federally, as well as to understand the current local government policy environment.
- → Inventory of the current rental building stock in the City of Victoria.

[4] Statistics Canada. 2017. Victoria, City [Census subdivision], British Columbia and Canada [Country] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E.

[5] CMHC, Housing Market Information – Rental Market Report – Victoria CMA. 2017. https://www03.cmhc-schl.gc.ca/catalog/productDetail.cfm?cat=117&itm=5&lang=en&sid=pXu6vY6wcNthPRAqiNCCy5JfZEzivSXrtfcdVhXtrkk9rFPyWqCqeTEVSEkAW7os&fr=1524619016768

- → Development of a proposed Standards of Maintenance Bylaw
- → Development of a proposed Tenant Assistance Policy
- → Stakeholder engagement: As part of the targeted engagement undertaken for this project, staff and the consultant team have conducted a variety of engagement activities with relevant stakeholders, including landlords and tenant representatives/advocates, as follows:
    - o Online landlord survey (43 participants) to establish a sense of current maintenance and upgrade practices (January 23 – February 18, 2018)
    - o Focus group with landlords and property owners/managers (January 24, 2018)
    - o Focus group 1 with tenants and tenant advocacy groups (February 7, 2018)
    - o Survey Questionnaire to tenant focus group members
    - o One on one meetings with Landlord BC, BC Housing, individual landlords and property-managers, other municipalities, internal city staff in other departments (e.g., Legislative and Regulatory Services, Permits & Inspections, Finance)
    - o Focus group 2 with tenants and tenant advocacy groups (March 28, 2018)

Each key task is described in greater detail in the relevant sections that follow.

1.1 Context

This study was completed within the context of several broader federal and provincial initiatives, including the following:

- → ***National Housing Strategy.*** Canada's first National Housing Strategy was launched in November 2017. It is a 10 year, $40-billion plan (joint investment with provinces and territories) with investments in a variety of initiatives and programs. There are several initiatives to support affordable rental housing, including:
    - o National Housing Co-Investment Fund, to ensure existing rental housing is not lost to despair, and to develop new affordable housing;
    - o Affordable Rental Innovation Fund, an investment of $208.3 million over five years to support the construction of affordable rental housing to encourage new funding models and innovative building techniques in the rental housing market;
    - o Rental Construction Financing Initiative, encouraging the construction of affordable rental housing low-cost loans, available to municipalities and housing developers during the most at-risk phases of development.
- → ***Provincial housing affordability plan.*** The Provincial housing affordability plan, "Homes for B.C.: A 30-Point Plan for Housing Affordability in British Columbia", was released in February 2018 as a part of the Provincial budget. It is a comprehensive plan to support housing affordability throughout the province, including measures for increasing the supply of affordable housing. There is an overall investment of more than $6 billion in a variety of affordable housing

initiatives. Specifically, with regard to rental, there will be an investment of $378 million over three years and more than $1.8 billion over the next 10 years to building rental units for the "missing middle," middle income earners who are having difficulty finding quality affordable housing. According to the BC Government, this will involve the building of more than 14,000 units for individuals, working families, and seniors. Furthermore, the plan includes incentives, in the form of property tax exemption (both municipal and provincial) for purpose-built rentals, in order to support local governments to encourage the preservation and construction of rental housing.

→ ***Retrofit Code.*** The federal government committed to develop a model code for existing buildings by 2022 in the Pan-Canadian Framework on Clean Growth and Climate Change with the goal that provinces and territories adopt the code. This code will provide a framework for energy efficiency improvements that can be implemented during a building renewal.

→ ***Residential Tenancy Act.*** The Residential Tenancy Act (RTA) is provincial legislation that regulates residential tenancies in British Columbia. Under the RTA, landlords are responsible for maintaining their rental units in a good state of repair. The Act also gives permission to landlords to issue a notice to end tenancy if work on the unit is required that necessitates the unit being vacant.

There is some question as to whether the RTA is sufficiently protecting tenancies in instances of eviction resulting from renovation and redevelopment. As a result, several municipalities in British Columbia have adopted supplementary policy and bylaws to improve tenant housing quality and housing stability beyond the measures identified in the RTA. The Victoria Housing Strategy identifies exploring whether the City of Victoria should follow suit as a supporting action item. Both the proposed Standards of Maintenance Bylaw and the Tenant Assistance Policy are intended to provide provisions that are supplemental to those found in the Residential Tenancy Act (RTA) and related pieces of Provincial Legislation.

→ ***Recent and proposed changes to the RTA***. Municipal policies to support tenant stability are being developed in context of recent and emerging changes to the RTA. Provincial action may require the City to revisit these policies. Recent and proposed provincial changes include:

- **Increased funding for Residential Tenancy Branch (RTB).** Introduced in the budget in 2017, the BC Government added $6.8 million in new funding for the Residential Tenancy Branch to reduce wait times for tenancy disputes as well as to provide additional measures to take action against landlords who are serious or repeat offenders.
- **Closing the fixed-term tenancy 'loophole'**. Introduced in October 2017 and effective in December 2017, the province has limited the use of the vacate clause in fixed-term tenancy agreements (allowed only in special circumstances), as well as limited the rent increases between fixed-term tenancy agreements with the same tenant.[6]

[6] https://www2.gov.bc.ca/gov/content/housing-tenancy/residential-tenancies/news

- **Establishment of a Rental Housing Task Force**. In April 2018, a Rental Housing Task Force was formed to advise on how to improve security and fairness for renters and landlords throughout the province.[7] This will be the first full review of BC's residential tenancy laws in 16 years. The Task Force will report findings and make recommendations in fall 2018.
- **Improving security for tenants facing eviction**. Changes to the Residential Tenancy Act that relate to providing stronger protections for renters affected by demolition, renovation, or conversion of their rental unit were introduced in the Legislative Assembly on April 12, 2018. These changes are presented as a bill (Bill 12, *Tenancy Statutes Amendment Act, 2018*) to the Legislative Assembly and will require Royal Assent before changes to the RTA take effect. These changes include:
  - "providing tenants with **more time to find alternate housing** if their landlord ends a tenancy to demolish or renovate a unit and requires the unit to be vacant;
  - "providing tenants with **more time to dispute a notice** to end a tenancy for demolition, conversion or renovation;
  - "**increasing the amount of compensation,** a landlord must pay to a former tenant **if they end a tenancy for renovation/demolition and then do not follow through on their plans.** This compensation would also apply in situations where the landlord used a vacate clause because they had plans to move back in, but then re-rented the unit to someone else; and
  - "including a **first right-of-refusal** for tenants in multi-unit buildings who are evicted because of renovation or repair. The requirement to offer units to the original tenant will also help address improper uses of this provision by allowing the tenant to confirm that the renovations did occur."[8]

→ Other legislation applicable to residential property includes the Fire Services Act, which contains provisions related to the maintenance and safety of property, and the Health Act, which regulates sanitary and health issues. Any new regulations created by the City would therefore serve to supplement existing provincial legislation and provide a locally enforceable set of rules.

This research is also completed within the context of several other city-driven policies, studies and initiatives, most notably the following:

→ ***The Victoria Housing Strategy 2016-2025.*** The Housing Strategy outlines four supporting actions under the overarching action of "Protect existing rental stock." These actions include: the creation an inventory of existing affordable rental

[7] "Premier appoints Rental Housing Task Force to improve tenancy laws." BC Government News. https://news.gov.bc.ca/16811
[8] "Improved security for tenants facing eviction." BC Government News. https://news.gov.bc.ca/16821

stock; consideration of the regulations, policies and incentives to protect and support regeneration of existing affordable rental stock; a review of the Property Maintenance Bylaw to improve tenant housing quality, and an examination of the legislative authority for a municipal role in maintaining rental tenant stability. The identified actions led directly to the initiation of this revitalization study.

→ ***City of Victoria's 2018 Climate Leadership Plan***.[9] According to this plan, 50% of the City's GHG emissions in 2015 are generated by the operation of existing buildings. As part of its overall commitment to reduce community GHGs, the City aims to reduce GHG emissions city-wide by 80% by 2050, with 100% of energy needs met by renewable sources.

With respect to existing buildings, the plan identifies "…deep energy retrofits and efficiency gains, and other strategies that incent owners and tenants to reduce energy use, each year." The plan also references harmonization with the Federal government's commitment to define a model code for existing buildings by 2022. At the provincial level, an existing building code is also reportedly in the works.

While efficiency measures are prioritized for existing buildings, conversion to renewable sources will also be encouraged via this plan.

As a priority action, the City has committed to develop and implement a 'Deep Energy Retrofit Strategy'" by 2020. This revitalization study is a direct outcome of that commitment.

→ ***Victoria Seismic Vulnerability Study.*** This study overlaid seismically vulnerable building typologies with existing soil conditions, finding that the southeast and southwest corners of the city are vulnerable areas where many older wood frame buildings and concrete buildings are located on soft soils. The Executive Summary notes that "…pre-1972 construction including low-rise buildings (concrete, steel, and reinforced masonry), unreinforced masonry (of all heights), and *3-4 storey wood apartment buildings*; and pre-1960 single family wood homes are at a high seismic risk. Soft soil and vulnerabilities such as cripple walls and sub-floors in single family wood homes, and *tuck-under parking in wood apartment buildings* make these buildings even more vulnerable to severe levels of ground shaking. Additionally, *pre-1972 mid- and high-rise buildings*; post-1972 unreinforced masonry; and concrete/steel/masonry low-rise and *3-4 storey wood apartment buildings constructed from 1972-1990* on soft soil are also at a high seismic risk."[10] The italics highlight building types and conditions relevant to this study's targeted buildings.

→ ***City of Victoria's Official Community Plan (OCP), Items 13.23 – 13.31 – Market Rental Housing.*** The low availability of rental housing is exacerbating situations where a major renovation or redevelopment does occur or is desired, and the existing tenants face displacement with few options. This section of the

[9] http://www.victoria.ca/assets/Departments/Engineering~Public~Works/Climate%20Leadership%20Plan%20Public%20Draft.pdf

[10] VC Structural Dynamics, Citywide Seismic Vulnerability Assessment of the City of Victoria, 2017. Executive Summary available at: https://www.documentcloud.org/documents/3477641-Citywide-Seismic-Vulnerabilities-Assessment.html

OCP sets out the City's intention to streamline and prioritize the addition of new purpose built rental housing stock. A few of the strategies most relevant to this work include the following:

13.23 Support the retention of existing rental units in buildings of four units or more by considering higher density redevelopment proposals on these sites only if, as a voluntary amenity:***13.23.1*** The same number of rental self-contained dwelling units is maintained on-site, and the general rent level identified, through a housing agreement; or,***13.23.2*** An equivalent cash in-lieu contribution is made to the City's Housing Fund.

13.24 Support the regeneration or redevelopment of older ground-orientated rental and cooperative housing developments by considering higher density redevelopment proposals on these sites if the same number, size, and tenure of units is maintained on-site, and the general rent level identified.

13.28 Develop strategies to support the ongoing upgrade and regeneration of the city's rental housing stock, including strategies to address tenant housing security, as part of the review and update of the City's Comprehensive Housing Strategy.

13.29 Encourage senior governments to continue programs to assist landlords with residential upgrades and rehabilitation to upgrade the existing rental housing stock.

2 Inventory and Condition of Rental Buildings

Prior to this project, the City did not have a database of quantifiable information about its market rental housing. The purpose of establishing a complete inventory of rental buildings in the city is thus two-fold:

- → Create a current, updatable, and publicly accessible database to integrate into the City's GIS-based data system for future reference and analysis. Such a database will be a vital resource for the development of targeted regulations, policies, and incentives, as well as to help inform other ongoing work such as neighbourhood planning and housing planning efforts.
- → Characterize the older (pre-2000) existing rental building stock and identify the best opportunities for a city-led revitalization program.

2.1 Rental Building Inventory

2.1.1 Methodology

BC Assessment 2016 data was the primary data source for the inventory. The list was cross-referenced with the City of Victoria's business licence list in order to retrieve information about owner/operators. The Citywide Seismic Study's project database was also cross-checked to ensure all of the relevant buildings from that study were included.

Properties on BC Assessment were sorted based on primary occupancy category, and included all buildings classified as "Apartments", i.e.:

- → Apt-Walk-up
- → Apt-Over Commercial
- → Apt Townhouse or Row House
- → Apt-Concrete Hi-Rise
- → Apt-with Elevator
- → Residential conversions

The following buildings were excluded from the inventory:

- → Strata-titled properties
- → Buildings operated by Non-Profit Societies and Government
- → Secondary suites, duplexes, or triplexes

2.1.2 Inventory Summary

The inventory shows 16,773 total rental suites in 679 rental buildings of various types within the City of Victoria, including:

- → Townhouses and row houses

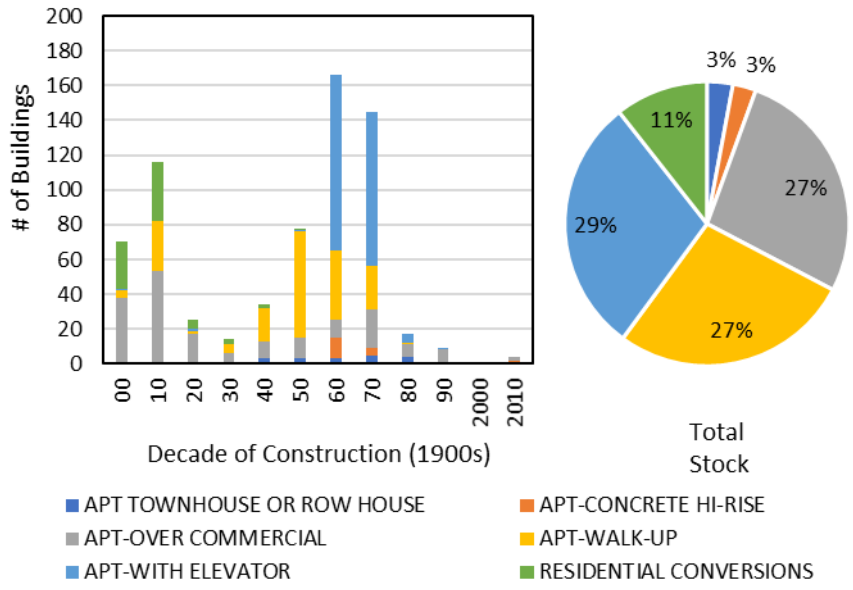
- → Hi-rise concrete apartments
- → Apartments over commercial buildings
- → Low-rise wood-frame walk-up apartments
- → Low-rise wood-frame apartments with elevator
- → Residential conversions (e.g., multi-plex houses) [11]

Descriptions of the building types were determined by analysis of the average size, the average number of suites, and the average number of storeys. The table below provides a description of the average characteristics of each of the building types.

TABLE 2-1 SUMMARY OF AVERAGE BUILDING CHARACTERISTICS BY BUILDING TYPE FOR ALL DECADES OF CONSTRUCTION

Building Type	Floor Area (ft^2)	No. of Storeys	No. of Suites
APT TOWNHOUSE OR ROW HOUSE	15,500	2	32
APT-CONCRETE HI-RISE	120,000	12	142
APT-OVER COMMERCIAL	9,500	3	10
APT-WALK-UP	13,500	2-3	14
APT-WITH ELEVATOR	47,000	3-4	44
RESIDENTIAL CONVERSIONS	5,500	N/A	6

Figure 2-1 shows the number of buildings constructed in each decade[12] broken down by building type (left) and the total existing rental building stock breakdown (right).



[11] The analysis excluded all buildings that had a 'blank' occupancy category in the BC Assessment data.

[12] Building decade is determined using the original year of construction, not the "effective year", where these differ.

Figure 2-1: Summary of the Number of Buildings by Building Type and decade (left) and total building stock breakdown (right)

Figure 2-2 shows the number of suites within buildings constructed in each decade[13] broken down by building type (left) and the total existing rental building stock breakdown (right).

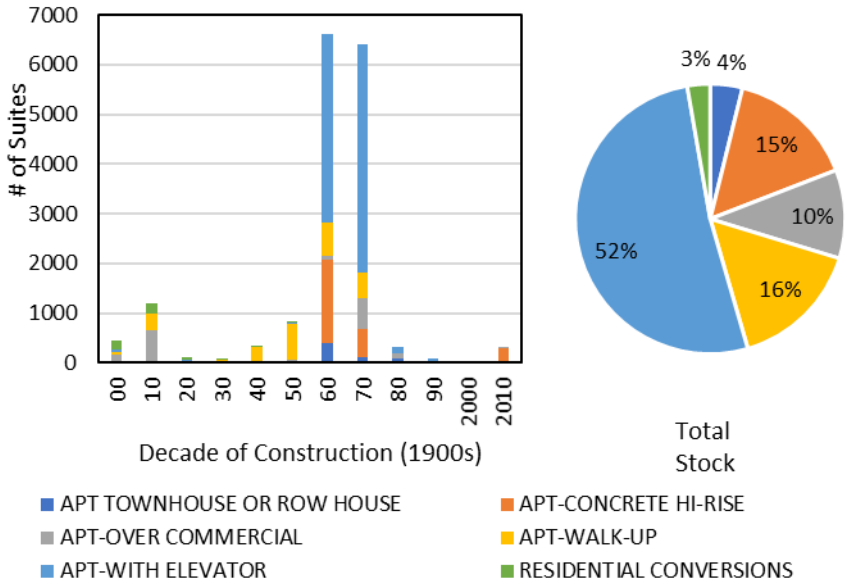


Figure 2-2: Summary of the Number of Suites by Building Type and decade (left) and total building stock breakdown (right)

Figure 2-3 below shows the distribution of rental buildings throughout the city, colour coded by year built.

[13] Ibid.

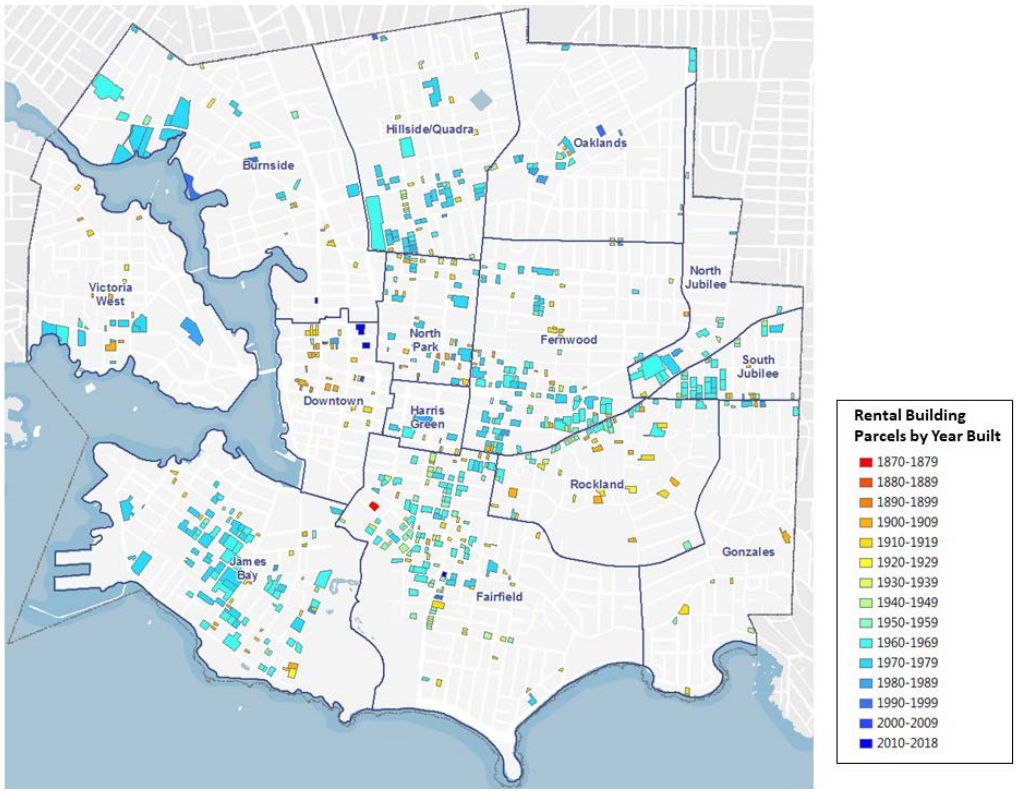


Figure 2-3: Rental Building Parcels by Year Built

Below shows the distribution of suites throughout the city, colour coded by number of units.

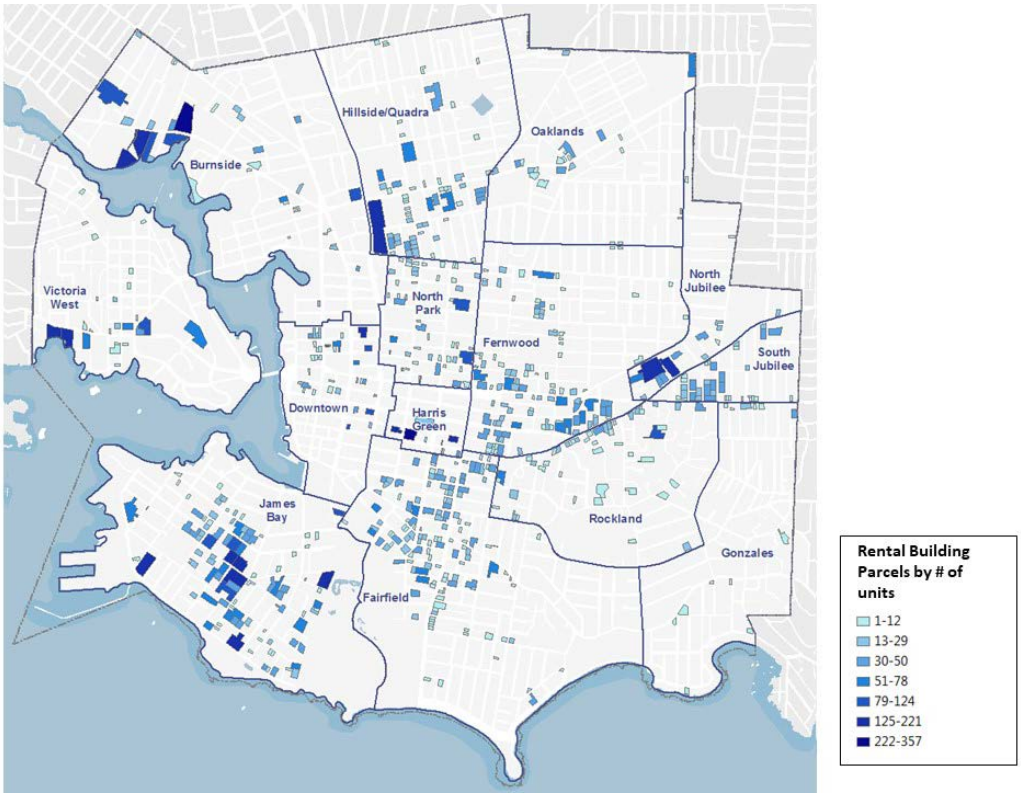


Figure 2-4: Rental Building Parcels by Number of Units

Key insights that can be drawn from these figures and the inventory include the following:

- → Walk-up apartment buildings comprise a significant number of the total buildings (27%) and the total number of suites (16%). These are typically smaller two- or three-storey buildings with no elevator.
- → Apartments with elevators comprise the largest classification of buildings (29%) and house the majority of the number of suites (52%). These are typically larger, three- or four-storey buildings.
- → High-rise concrete apartments make up a small fraction of the total number of buildings (3%, which represents 18 buildings) but a more significant portion of total suites (15%).
- → Townhouses and rowhouses make up a small number of the total buildings (3%) and total rental suites (4%).
- → Apartments over commercial space make up a significant number of buildings (27%) but a smaller portion of the total suites (10%).
- → Residential conversions make up 11% of the total buildings, but only 3% of the total number of units.
- → 674 of the total inventory buildings and 16,404 of the building units were built prior to 2000.
- → The majority (78%) of all market rental building units were constructed in the 1960s and 70s.

2.2 Target Buildings for Revitalization Study

Low-rise walk-ups, low-rise apartments with elevators, and high-rise apartments represent approximately 400 buildings and nearly 13,900 units (for all years of construction).

The building stock inventory identifies construction in the 1960s and 1970s as a major contributor to the current existing rental building stock. There were 311 rental apartment buildings constructed in Victoria from 1960 through 1979, accounting for 46% of the total current rental buildings and 78% of the current rental suites. Nearly all of these are low-rise walk-ups, low-rise apartments with elevators, or high-rise apartments. Because of their high concentration of suites (compared to, say, residential conversions or rowhouses), consistent construction methods, and their likely need for renewal, these building types provide the highest potential impact for a city-driven revitalization program.

The typical building characteristics for the three targeted building types are summarized in Table 2-2 below.

TABLE 2-2 SUMMARY OF TYPICAL BUILDING CHARACTERISTICS

Building Type	Typical Characteristics
Low-Rise Walk-Up	

TABLE 2-2 SUMMARY OF TYPICAL BUILDING CHARACTERISTICS	
	2-3 storeys Wood frame Constructed in the 60s or 70s No elevator ~14 suites ~13,000 SF
Low-Rise with Elevator	
	3-4 storeys Wood frame Constructed in the 60s or 70s Elevator ~45 suites 45,000 SF
High-Rise	
	12-13 storeys Concrete Constructed in the 60s Balconies ~140 suites 60,000-225,000 SF

2.3 Condition of Older Purpose Built Rental Apartments

The majority of the purpose built rental buildings and suites of primary interest to the revitalization study were constructed in the 1960s and 1970s, namely:

- → 65 of the low-rise walk-up apartments, representing 1199 units (plus another 61 buildings built in the 1950s)
- → 190 of the low-rise apartments with elevators, representing 8400 units
- → 16 of the high-rise apartments, representing 2262 units

Because these building are older, they tend to present more affordable rental options in the city. One of the stated concerns motivating this study was that these buildings are aging and possibly in need of considerable reinvestment to preserve them as a vital component of the rental housing stock in the city. If allowed to degenerate, they may become more attractive for redevelopment, putting the most vulnerable of the city's tenants at risk of losing their housing.

2.3.1 Property Owner and Manager Input

Input gathered from rental property owners suggest that local economics and policy (e.g. density/height limits) currently favour maintenance of existing properties over redevelopment, and that most property owners do maintain their buildings over time.

A landlord survey was distributed to Landlord BC and Urban Development Institute members to gauge the level to which owners invest in their properties and what factors influence those decisions. 42 surveys were completed. A summary of the full survey results is included in Appendix A: Landlord Survey Results.

Figure 2-5 below summarizes landlord and property manager assessments of the current condition of their rental building components.

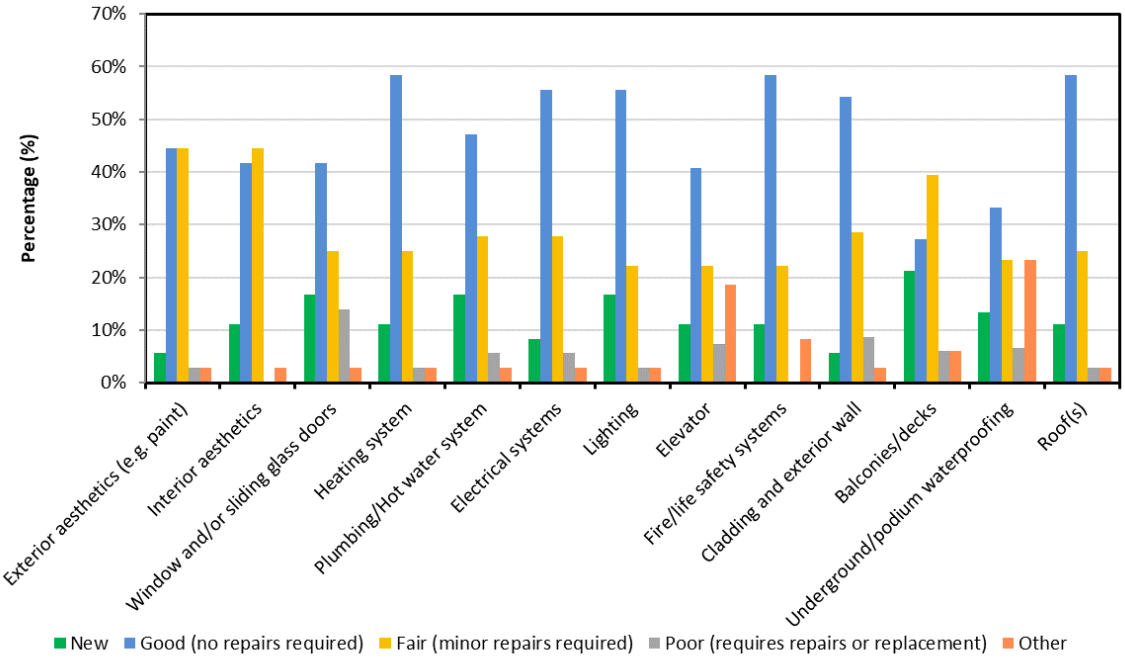


Figure 2-5: Survey respondents' rating of current building component condition

Figure 2-6 below summarizes the types of capital projects landlords and property managers report having completed within the last 10 years. These data support anecdotal reports that most property owners do invest in their properties over time.

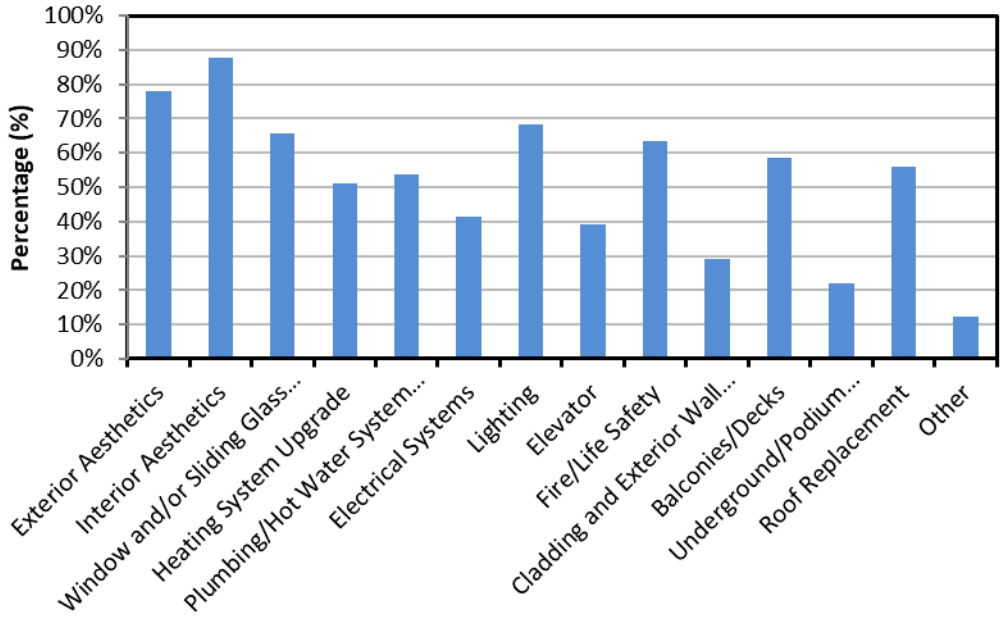


Figure 2-6: Survey response to the question: What types of capital projects have you completed at your rental property/properties in the last 10 years (check all that apply)?

Figure 2-7 below summarizes the capital projects landlords and property managers expect to complete in the next 10 years. These data suggest that there are good opportunities to pair energy and seismic upgrade work with upcoming planned building renewals.

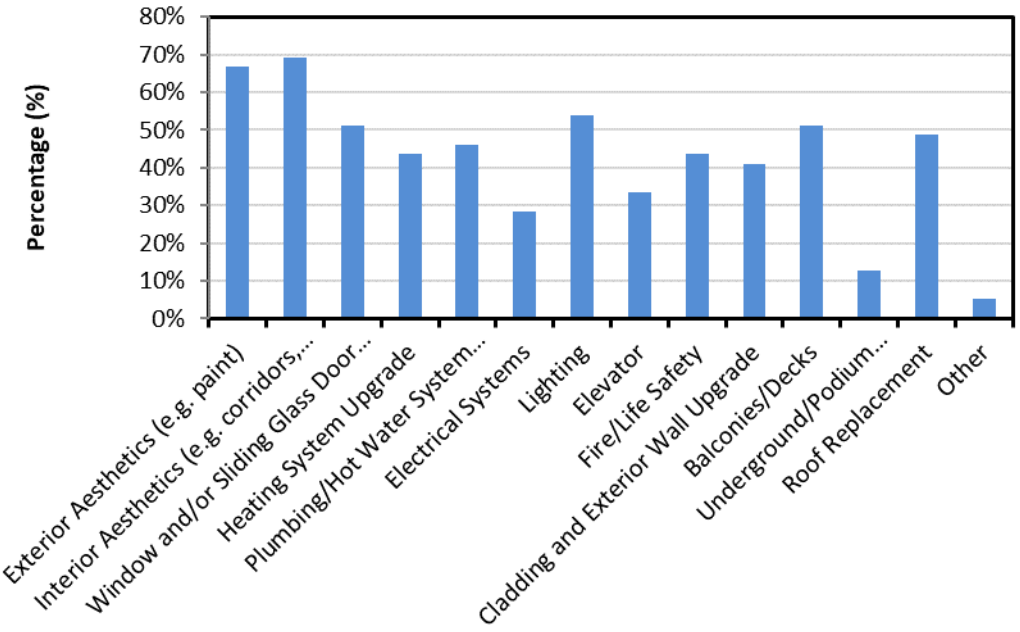


Figure 2-7: Survey response to the question: What types of capital projects are you most likely to complete in the next 10 years (check all that apply)?

2.3.2 Visual Review

The project team also conducted a high level visual review of 54 buildings from the inventory, representing the three target building types (15 high rises; 19 low-rise walk-ups and 20 low-rises with elevators, all built in the 1960s and 70s). The purpose of these reviews was to validate the survey responses and to specifically look at the building types of interest (the landlord survey invited responses from landlords and property managers of *all* rental building types within the City of Victoria).

Figure 2-8 below summarizes the percentage of each building type that showed evidence of building enclosure renewal work. Enclosure renewal work includes full or partial windows/sliding glass door upgrades, cladding renewal, full or partial balcony renewal, and/or roof upgrades. These results suggest that while there is evidence of capital investment, there remains a considerable opportunity to further improve these buildings and to encourage owners who have completed minimal renewal work to date to consider taking on more.

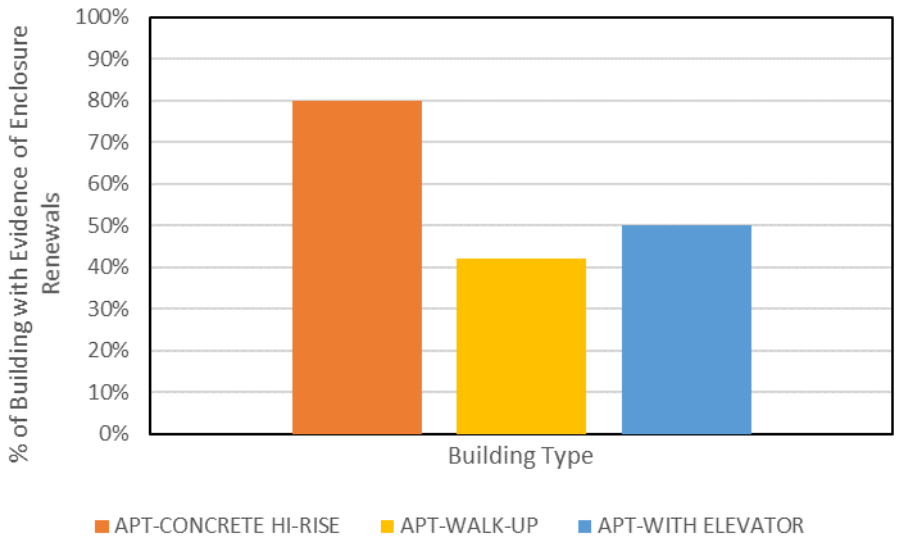


Figure 2-8: Percentage of each building type showing evidence of enclosure renewals

3 Maintaining Tenant Stability

This research was designed to achieve four supporting actions outlined in the Victoria Housing Strategy 2016-2025 under the overarching action of "protect existing rental stock." The two actions that closely relate to maintaining tenant stability are: reviewing and updating the *Property Maintenance Bylaw* to improve tenant housing quality and examining legislative authority for a municipal role in maintaining rental tenant stability.

The recommended Tenant Assistance Policy (TAP) and Standard of Maintenance Bylaw (SOM) have been developed to fulfill these actions and have been informed by a jurisdictional review of best practices and policies (presented to Council on November 23, 2017), local stakeholder engagement, and consultation with City staff.

The intent of the revitalization program is to encourage and incentivize upgrades that can be completed without displacing tenants. However, in the rare occasion when tenants must vacate to complete the work, adherence to the Tenant Assistance Policy would be a prerequisite for participating in the program.

Tenant displacement and relocation is of particular concern when the vacancy rate is low (it has been under 1% in recent years) and finding alternative, affordable housing options may prove challenging – particularly for vulnerable tenants. Tenants who may be particularly vulnerable include:

- Long-term tenants who may be paying significantly below-market rent, and for whom entering the current market may present financial challenges;
- Tenants with specific housing needs due to a disability;
- Seniors, who may be long-term tenants and living on a fixed income.

3.1 Methodology

The methodology followed to develop policy recommendations involved three key steps:

- Jurisdictional Review and Policy Scan, seeking out best practices within British Columbia and beyond to support tenant stability.
- Stakeholder Engagement, including engagement with City staff, landlords, and tenant representatives.
- Informed by the first two steps, drafting of the recommended elements of the Standards of Maintenance Bylaw and the Tenant Assistance Policy.

3.1.1 Jurisdictional Review

The goals of the jurisdictional review were to contextualize the efforts of this project within the existing policy landscape, to clarify the City of Victoria's legislative authority, and to seek out best practices within British Columbia and beyond.

The actions and tools that led to this work involved:

- → Reviewing provincial legislation;
- → Informal interviews with staff at the Residential Tenancy Branch;
- → Reviewing policy in other jurisdictions in British Columbia; and
- → Informal interviews with staff in these jurisdictions (including: City of North Vancouver, City of Burnaby, City of New Westminster).

The initial policy research lead to the production of a report ("Market Rental Revitalization Study (MaRRS): Policy research on tenant protection policies and rental stock protection policies"), which was presented to the Committee of the Whole (CoTW) on November 23, 2017 along with the Staff Report (see Appendix B: Council Report).

The policy review, along with feedback received from Council at the CoTW meeting, set the foundation and direction for the next phases of the work.

3.1.2 Stakeholder Engagement

The development of both the SOM and TAP were informed by stakeholder engagement and input, including consultation with City staff (Development Services, Bylaw, Licencing and Inspections, City Solicitor); with landlords and property managers; as well as tenant representatives and advocates.

Tenant engagement

On November 23rd, 2017 Council directed staff to prepare a Standard of Maintenance Bylaw and Tenant Relocation Policy (renamed Tenant Assistance Policy) and seek feedback on these drafts in focus group sessions. The project team made a targeted outreach effort to reach tenants and representatives of tenant advocacy groups to generate interest in applying to be members of the tenant focus group. An effort was made to identify and represent particular demographics at this session, with attention to the following:

- → Persons living in different COV neighborhoods
- → Youth
- → Seniors
- → Visible minorities
- → First Nations
- → Persons with Disabilities
- → Persons with young children
- → Representatives of organizations focused on issues important to City of Victoria renters

All applications for membership were accepted.

The goal of the Tenant Focus group was to provide constructive advisory feedback into the development of the policy and bylaw.

Two tenant focus group sessions were held at the City of Victoria (February 7 and March 28, 2018) to solicit feedback on the Standards of Maintenance Bylaw and the Tenant Assistance Policy. 11 participants attended the first focus group session and 8 participants attended the second.

Landlord and property manager engagement

Landlords and property managers were also engaged to provide feedback on these policy elements via the Landlord Focus Group (held January 24, 2018) and the landlord survey.

Specific feedback relevant to the Standard of Maintenance Bylaw and Tenant Assistance Policy are included in the subsequent sections.

3.2 Standards of Maintenance Bylaw

Victoria's Housing Strategy 2016-2025's identifies the need to review and update the city's current Property Maintenance Bylaw to improve tenant housing quality.

Victoria's Property Maintenance Bylaw provisions are concerned largely with exterior building condition and cosmetic aspects of property maintenance (e.g., lawn care and refuse collection), rather than with the interior condition of the building and dwelling units. Rather than amending the current Property Maintenance Bylaw, Council directed staff to develop a stand-alone Standards of Maintenance Bylaw that would address basic life-safety and indoor housing quality elements.

If enacted, the Standards of Maintenance bylaw will set minimum requirements for landlords and property owners to maintain a basic standard of repair for the interior of residential rental properties (which may include multi-unit buildings, secondary suites, and detached houses). These standards can help to ensure the health and safety of occupants as well as neighbours. They can also be seen as a useful tool to preserve affordable rental housing stock by ensuring upkeep and preventing so-called 'demolition by neglect'.

This bylaw will be developed and implemented in parallel but independent of any incentive program that is ultimately developed to encourage energy and seismic upgrades to existing rental buildings. A complete list of recommendations can be found in **Error! Reference source not found.** to be included in the proposed Rental Premises Standards of Maintenance Bylaw.

3.2.1 Jurisdictional Authority and Standards of Maintenance

The intent of the Standards of Maintenance (SOM) Bylaw is to supplement existing Provincial legislation (e.g., Residential Tenancy Act) and to provide minimum standards for housing quality and life safety issues in rental housing.

The Residential Tenancy Act, which regulates the relationship between landlords and tenants in British Columbia, includes limited regulations that relate to property maintenance. As of 1994, the Province also allows municipalities the authority to develop their own Standards of Maintenance bylaws and offers a suggested template.

According to the RTA, both the landlord and the tenant have obligations that relate to residential property maintenance and repair (Section 32). The RTA specifies that a landlord "must provide and maintain residential property in a state of decoration and repair that

"(a) complies with the health, safety and housing standards required by law, and

"(b) having regard to the age, character and location of the rental unit, makes it suitable for occupation by a tenant."

The tenant, too, is responsible to maintain "reasonable health, cleanliness and sanitary standards" in the rental unit and residential property.

The landlord is also responsible for ensuring emergency repairs are completed. The RTA defines emergency repairs as repairs that are:

(a) urgent,

(b) necessary for the health or safety of anyone or for the preservation or use of residential property, and

(c) made for the purpose of repairing:

(i) major leaks in pipes or the roof,

(ii) damaged or blocked water or sewer pipes or plumbing fixtures,

(iii) the primary heating system,

(iv) damaged or defective locks that give access to a rental unit,

(v) the electrical systems, or

(vi) in prescribed circumstances, a rental unit or residential property.

While the RTA provides two sections that relate to maintenance and repairs, its provisions are not exhaustive in providing for comprehensive regulations that address the standards of residential unit and building maintenance. A municipal SOM bylaw, detailing particular regulations of building aspects and maintenance standards, can help ensure residential rental premises are safe for inhabitancy. The SOM regulations can be useful for both municipal enforcement and as well as in provincial Residential Tenancy Branch arbitration.

3.2.2 Feedback on Standards of Maintenance Bylaw

Through the stakeholder engagement activities, the project team gathered the following input regarding the Standards of Maintenance Bylaw:

TABLE 3-1: FEEDBACK ON SOM BYLAW

AREA OF FEEDBACK	PARTICULAR COMMENTS	IMPLICATIONS FOR POLICY IMPLEMENTATION
General – content and enforcement	Importance of finding balance between simple, straightforward regulations that are easy to enforce and comprehensively cover aspects that relate to tenant health and safety	Policy has been drafted to cover basic life safety issues, while other ambiguous or difficult to enforce health areas are not included
Jurisdiction	Concerns around jurisdiction and the City's role versus the Province's Residential Tenancy Branch and other jurisdictions with authority in	Implementation process suggests necessity of tenant filing complaint to RTB

	these matters	
Unintended consequences - displacement	Concerns that the Bylaw could trigger "renoviction" by providing justification for landlords to undertake more intensive renovation work, which may lead to displacement	The basic nature of the suggested regulations should not encourage much intensive renovation work, requiring displacement
Unintended consequences - displacement	Concerns that the SOM Bylaw could lead to housing loss of currently unlicensed secondary suites, leading to tenant displacement	Enforcement of SOM policy should not be used to identify unregulated suites -Suggestion that a program be offered to incentivise/expedite licencing of currently unlicensed secondary suites
Content – health regulations	Desire to include health related minimum standards in the Bylaw with regard to pests.	Provisions concerning pests have been included, however, enforcement will involve additional resource implications for the City.
Content – health regulations	Desire to include health related minimum standards in the Bylaw with regard to mould.	Provisions concerning mould have not been included. Mould is a challenging area for municipal enforcement and so it is suggested this is left within the jurisdiction of the Health Act.

3.2.3 Recommended Standards of Maintenance Bylaw Elements

It is recommended that the City review and approve the following elements to be contained within the SOM. A complete list of recommendations can be found in **Error! Reference source not found.** to be included in the proposed Rental Premises Standards of Maintenance Bylaw.

TABLE 3-2: RECOMMENDED STANDARD OF MAINTENANCE BYLAW ELEMENTS

Issue	**Possible Regulation**
Impacts of leaks from plumbing or water ingress	All plumbing, including plumbing fixtures, drains, vents, water pipes, toilets and toilet tanks and connecting lines to the water and sewer system, shall be maintained in good working order and repair, free from leaks or other defects and protected from freezing.
Functioning heat and hot water	Every hand basin, bathtub, shower, and sink shall have an adequate supply of hot and cold running water and every toilet and toilet tank shall have an adequate supply of running water. Hot water shall be supplied at minimum temperature of 45C (113F) and a maximum of

TABLE 3-2: RECOMMENDED STANDARD OF MAINTENANCE BYLAW ELEMENTS	
	60C (140F). Water provided must be potable. Heating: Every dwelling unit shall be equipped with adequate heating facilities properly installed and maintained in safe and good working condition. Portable room heaters shall not be used as a primary source of heat. Heating facilities shall be capable of maintaining a minimum indoor air temperature of 21 degrees in a dwelling unit.
Fire safety concerns such as alarm systems and means of egress	Walls, floors and roof constructions, including fire protective closures, sprinkler systems, fire alarm and detection systems and other means of fire protection, shall be maintained so that they continue to provide the fire resistive properties and protection for which they were designed. Each dwelling unit shall have a working smoke detector in accordance with the current National Fire Code of Canada. Means of egress: Every building shall have a means of egress so as to provide a safe, continuous and unobstructed exit from the interior of the building to the exterior at street or grade level. Every means of egress shall be maintained in good repair and free of obstructions which constitute a fire hazard. Functioning hand rails (interior and exterior) shall be securely fastened to provide for a safe means of egress. Hallways, stairwells, and exterior areas shall be adequately illuminated to allow for safe passage.
Integrity/functionality of housing elements such as doors, windows, sanitation facilities, and electrical facilities	Doors, windows, sanitation and electrical facilities and appliances identified in the Tenancy Agreement shall be maintained in good working order and repair
Pest Control	If pests have infested any building or rental unit, the owner of the land must eliminate the infestation and occupants of the rental unit shall cooperate with city and building owners in removal of pest if required to do so.
Ventilation	Unless a satisfactory alternative means of ventilation is provided, every habitable room shall have at least one window which can be easily opened.

TABLE 3-2: RECOMMENDED STANDARD OF MAINTENANCE BYLAW ELEMENTS	
Other life safety considerations	Every elevator in any building used for residential purposes shall be maintained in an operational condition at all times. Elevators shall be out of service for no more than 1 month. The building owner must provide notice to tenants of the plan for repair of the elevator within one week of an elevator being out of service, including a plan for accommodating tenants with mobility challenges.

3.2.4 Exclusions from the Standards of Maintenance Bylaw

Significant feedback was heard with regard to the need for health standards related to mould and mildew. While the health of tenants in relation to their rental units is a concern, there are several reasons why these health issues in particular have not been specifically noted in the Standards of Maintenance Bylaw:

- → The Standards of Maintenance Bylaw deals with the conditions in the building itself that may result in issues such as mould (i.e. water ingress, etc.). However, the presence or removal of mould falls under provincial jurisdiction – and there have been a variety of rulings of the Residential Tenancy Branch with regard to mould removal responsibility.
- → The Public Health Act (Provincial legislation) provides regulation around public health issues, which sets out the municipal role in maintaining public health standards.
- → Issues such as mould and pests present difficulty in determining the level of hazard (requires certified mould inspector), causation, and responsibility. Health issues of tenants that relate to aspects of the building are difficult to gather evidence of and prove responsibility and causation. These are issues that are beyond municipal jurisdiction and capability to pursue.

3.2.5 Risks

A risk analysis was completed in consultation with the City solicitor. Potential risks were identified in several key areas:

- → Content of the SOM
- → Application of the SOM
- → Complaints Process
- → Enforcement
- → Penalties for Non-Compliance

Potential risks and strategies to mitigate risk in each of these areas are summarized in below.

TABLE 3-3: SOM RELATED RISK EVALUATION		
CONTENT		
CURRENT DIRECTION	POTENTIAL CONSEQUENCES	MITIGATION STRATEGIES
Standards for: water ingress, heat and hot water, pest control, fire safety, functionality of housing elements (doors etc.) and ventilation	Enforcement of standards will result in a degree of displacement as landlords may indicate they require the unit be vacant to undertake repairs. Concerns that the SOM is bringing the City into areas of jurisdiction that is beyond its ability to appropriately enforce. Unclear and subjective terminology may complicate compliance and enforcement. (e.g. "State of good repair", "good working order", etc.). The lack of clarity may also invite an increase in the number of complaints that pertain to small or superficial issues.	Keep Standards focused on basic life safety standards. Ensure a reasonable clarity of language within regulations. Set out a process of receiving and triaging complaints to minimize the receipt of smaller/superficial complaints.
APPLICATION		
All Rental Units including unlicensed/ unauthorized suites	Application of SOM to unlicensed suites will result in enforcement activity in residences that may contravene other regulations/laws (building bylaw/zoning etc.). This will result in a degree of displacement. Bylaw Enforcement have indicated that they would have difficulty only focusing on SOM issues during inspections. Considerable risk to City in terms of liability: major concern if there was a loss of life and the City was made aware of the issue. Leaving out a significant portion of the rental stock would be problematic.	Include specific language around evictions in Bylaw. Do not include secondary suites in Bylaw. Allow for a grace period where property owners can bring their units up to compliance. Potential opportunity to create a program that allows expedited legalization of currently unauthorized suites. Legalizing suites, however, will come at a considerable cost and will not be possible for all suites.
COMPLAINTS		
Complaint procedure consistent with current practice (i.e. written or via call)	COST TO ADMINISTER: Right now, Bylaw can turn away investigating complaints of Bylaw violations if there is no Bylaw that provides regulations around that area. There is concern on part of Bylaw Officers that including new regulatory areas (interior of buildings) would sharply increase	A complaint form could aid in: ▪ Ensuring the Tenant understands that communication with their landlord is the first step and of the potential consequences of enforcement.

	the number of complaints that require investigation.	▪ Triaging and prioritizing complaints. ▪ Directing complainant to the Residential Tenancy Branch where appropriate.
ENFORCEMENT		
Enforcement to be undertaken on a complaint basis.	DISPLACEMENT OF RENTERS Enforcing a Standards of Maintenance Bylaw may result in unit loss – whether on a temporary or permanent basis – due to units being unauthorized (without appropriate permits) or not complying with all new current Standards of Maintenance. Could justify property owners in triggering evictions, to complete 'required' renovations, and increase the rent considerably after renovations are complete. COST AND COMPLEXITY TO ENFORCE Bylaw Enforcement Officers may not have the technical expertise to be able to inspect and enforce particular standards. Renovation work requires many decisions, can be approached in different ways, and if City makes a decision that has a consequence or if the property owner disagrees at the time or in the future, this could increase the City's liability. LIABILITY Considerable risk to City in terms of liability: major concern if there was a loss of life following the City being made aware of the issue. Concerns that the SOM is bringing the City into areas of jurisdiction that is beyond its ability to appropriately enforce.	It is not recommended that City take on the responsibility and cost of bringing units up to standard. Regulations should be focused on life safety issues in proposed SOM, minimizing the complexity of enforcement. SOM is within the municipality's appropriate legislative authority.
PENALTIES		
The Offence Act Municipal Tickets Licence Remedies Notice on Title	LIMITS OF MUNICIPAL POWERS FORLACK OF COMPLIANCE Fines are unlikely to be effective with property owners who may consistently be keeping properties in a poor state of repair, according to Bylaw Enforcement Officers	Enforce a Standards of Maintenance Bylaw through Business Licencing. As a part of Business Licence renewal, could agree to compliance with SOM. This could lead to the withdrawal of Business Licence for non-compliance

3.2.6 Implementation Considerations

Adoption and implementation of a new Standards of Maintenance Bylaw has implications for City staff and resource needs in terms of enactment and enforcement. Since enforcing SOM will require additional resources, it will be of prime importance that there is a system for triaging complaints so Bylaw Enforcement is not overwhelmed. The effectiveness of SOM will rely on a system that ensures enforcement does not become impractical and cost prohibitive, and can pursue and enforce complaints that relate to the SOM regulations.

With these resource limitations in mind, the following are recommendations for consideration as the city develops its implementation and enforcement plan:

- → Issues should be pursued on a complaint-basis only. The Bylaw should clarify this process for all tenants. The suggested process could proceed as follows:

    1. Tenant advises landlord of complaint in writing.
    2. If complaint is not resolved, the tenant contacts the Residential Tenancy Branch and files a grievance.
    3. If the landlord has not taken action in the manner and time prescribed by the RTB, then the tenant may contact the City to investigate potential contravention of the Standards of Maintenance Bylaw.

    This process positions the City as a last resort, after making use of existing processes, to help ensure City resources are deployed only when necessary. We have heard feedback, however, that the RTB arbitration processes may rely on documentation and evidence generated by authorities at the municipal level and that allowing municipal inspection before filing an RTB grievance could strengthen the effectiveness of resolution processes.

- → All residential rental premises should be subject to complying with basic minimum standards of maintenance.
- → Build time into the implementation period to develop intake paperwork and external communication materials, to train bylaw officers, etc.

3.3 Tenant Assistance Policy

At the direction of Council, the Tenant Assistance Policy has been developed to help mitigate the potential impacts of displacement on tenants by providing guidelines for developers and property owners to provide additional supports for tenants who are displaced.

The recommended policy is one measure to address the concerns of tenant instability; however, given the complex nature of the issue the policy will not be sufficient to address all of the attendant concerns. This document will review some of the considerations and concerns with regard to the current recommended policy, and future iterations of the policy may involve mechanisms which take further steps toward e addressing some of these concerns.

The intent of the Tenant Assistance Policy (TAP) is to supplement, rather than replace, existing protections outlined in the Residential Tenancy Act in cases where tenants are

displaced (displacement is typically due to redevelopment). Its goal is to mitigate the potential impacts of displacement on tenants by providing guidelines for supports offered by the landlord, developer or property owner. The complete draft policy can be found in Appendix D: Draft Tenant Assistance Policy.

3.3.1 Feedback on Tenant Assistance Policy

Through the various stakeholder engagement activities, the project team gathered the following input regarding the Tenant Assistance Policy:

TABLE 3-4: FEEDBACK ON TENANT ASSISTANCE POLICY

AREA OF FEEDBACK	PARTICULAR COMMENTS	IMPLICATIONS FOR POLICY IMPLEMENTATION
Intent	Earlier iterations of title policy did not accurately reflect the intent: "Tenant Relocation Policy" seemed to give a sense that Relocations were being encouraged; "Tenant Protection Policy" seemed to falsely promise protecting tenants from relocation.	"Tenant Assistance Policy" is the current suggested policy name, as the focus is on providing tenants with assistance in the case of relocation.
Intent - effectiveness	Seen as very valuable to provide attention to and particular stipulations for vulnerable tenants.	Identification of vulnerable tenants may not always be straight forward
Effectiveness – Jurisdictional authority / limited applicability	Concerns that there may be many tenants who will experience displacement and will not be provided support or assistance. Concerns about limitations to the City of Victoria's jurisdictional authority in placing conditions on Development and Building Permits. Specific lack of protection for tenants in cases of: - Renovation that isn't related to the MaRRS project. - Renovation or redevelopment that doesn't require rezoning.	Importance of gathering some information regarding displacements not requiring TAP. Revisiting and re-evaluating policy within a year of implementation to review its effectiveness.
Effectiveness - intent	Right of first refusal with no measures to limit rent amount is of no use to tenants; right of first refusal at the same or heavily discounted rent will make it difficult for developers to finance renovations (i.e. no new revenue).	Proposed policy includes a rent reduction of 10% from starting market rates.
Effectiveness – Compliance	Concerns from tenants that the volunteer/incentivized nature of the TAP would render it ineffective.	Importance of gathering some information regarding displacements not requiring TAP. Revisiting and re-evaluating policy within a year of implementation to review its

		effectiveness.
Effectiveness – Compliance	Viewed largely as a reasonable measure to attach to rezoning applications and demonstrated good practice with regard to tenant-landlord relationships.	
Effectiveness – compliance	Concerns from tenants that measures could be fulfilled in a superficial way (e.g. relocation assistance – could provide all tenants with same three options).	Need for City to ensure that measures are all fulfilled together, as part of a comprehensive whole, and in a meaningful way.
Compliance - enforcement	Questions about who will ensure landlords are properly complying with the TAP measures, and where tenants can go with complaints in they are not.	Potential need for the City to dedicate resources to ensure compliance/provide mediation.
Effectiveness – education and information	Important to ensure tenants and landlords are aware of existing legislation that regulates tenancies.	Suggested potential role for the City in ensuring Tenants have access to information on tenant rights and tenant advocacy groups.
Resource demands on City	Comments that the policy will increase the amount that City staff will be directly interfacing with tenants, which will place an increased administrative load on City resources.	Suggested potential Ambassador role could assist with this.
Housing affordability - supply	Supply of affordable housing remains a foremost concern for stakeholders, both tenants and landlords alike, and this policy in itself is not sufficient to provide for that. Comments from stakeholders that even if there are measures to provide assistance to tenants, if there is not rental housing stock to move into, it renders these measures ineffective.	Importance of ensuring this policy is accompanied by other initiatives to increase and protect the supply of affordable rental market housing.

3.3.2 Recommended Policy

These recommended elements were landed upon following a municipal best practice review, feedback from landlords and tenants, and discussions with various pertinent staff at municipalities with similar policies. The complete draft policy is included in Appendix D: Draft Tenant Assistance Policy.

TABLE 3-5: RECOMMENDED TENANT ASSISTANCE POLICY ELEMENTS

CONTENT	CURRENT RTA REQUIREMENTS	BASIC RECOMMENDED ELEMENTS	ENHANCED ELEMENTS (FOR VULNERABLE TENNANTS)
Notice to Tenants	2 months	3 months	Additional notice

TABLE 3-5: RECOMMENDED TENANT ASSISTANCE POLICY ELEMENTS			
Compensation	Equivalent of one months' rent	3 months	Additional compensation based on length of tenure and other identified vulnerabilities
Relocation Assistance	None	Appoint tenant relocation manager as primary point of contact. Identify 3 Relocation options (min. 1 in same neighbourhood) at tenant request	Identify vulnerable tenants and provide additional assistance at tenant request
Moving Expenses and Assistance	None	Hire a moving company or provide monetary compensation	Actively coordinate move
Right of First Refusal	None	Right of first refusal with 10% reduction in starting rent	Additional reduction in starting rent

3.3.3 Implementation Considerations

This policy is particularly targeted toward vulnerable tenants, for whom the impact of displacement may be more acute. Vulnerable tenants may include:

- → Long-term tenants who may be paying significantly below market-rent, and for whom entering the current market may present financial challenges.
- → Tenants with specific housing needs due to a disability
- → Seniors, who may be long-term tenants and living on a fixed income
- → Other individuals who self-identify as vulnerable

Vulnerable tenants will be provided with an enhanced compensation and relocation assistance.

Tenant assistance measures will be considered by Council in Rezoning applications (in cases of redevelopment)

The Tenant Assistance Policy will be a prerequisite for participation in the MaRRS incentive program for significant upgrades to an existing building (see section 4 below for information on the incentive program)

The Tenant Assistance Policy provides voluntary guidelines for landlords/developers/property owners in other cases of redevelopment and renovation

3.3.4 Risks

A risk analysis of the Tenant Assistance Policy was completed, in consultation with the City Solicitor. Potential consequences, as well as mitigation strategies, were identified in several key areas:

- → Content
- → Application
- → Administration
- → Compliance

These potential consequences, as well as mitigation strategies, are summarized in the table below.

TABLE 3-6: RECOMMENDED TENANT ASSISTANCE POLICY ELEMENTS

	CURRENT DIRECTION	POTENTIAL CONSEQUENCES	MITIGATION STRATEGIES
CONTENT	Notice to tenants Compensation Moving assistance (costs) Moving assistance (relocation assistance) Right of first refusal	Relocation assistance may prove very difficult to fulfil where there is a shortage of affordable housing options and a low vacancy rate.	Province may be coming in with new regulations in the Residential Tenancy Act. Importance of setting TAP in the context of other municipal measure and initiatives to increase the supply of affordable housing.
APPLIC-ATION	All Re-zonings/redevelopment scenarios in multi-unit market rental apartment buildings. All MaRRS incentivized renovations in multi-unit market rental apartment buildings.	Does not offer enforceable protection to tenants in the case of renovations outside of MaRRS or redevelopments. Does not apply to Building or Development permits.	Revisit and evaluate effectiveness of policy within a year of implementation.
ADMINIS-TRATION	Would require the City to collect information (Tenant Assistance Plan) from landlords.	Increased administrative load on City.	Recommended Concierge position could assist with this.
COMP-LIANCE	City would be responsible to ensure compliance in cases of rezoning and incentive upgrades.	Policy will increase the amount that City staff will be directly interfacing with tenants, which will place an increased administrative load on City resources.	Recommended Concierge position could assist with this.

4 Energy & GHG Opportunities

This section describes the analysis that was completed to quantify potential energy and GHG savings that may result from upgrading typical 1960s and 1970s purpose built rental buildings within the City of Victoria. It also quantifies the economic implications of this added investment for prototypical buildings as a means of informing both the expected return on investment and the level of incentive that would be required to motivate building owners to take on this type of work. Finally, it defines key program elements related to energy and GHG upgrades as illuminated by stakeholder input and the analysis results.

4.1 Methodology

Leveraging existing modelled multi-family archetypes, whole building energy models were customized to represent the major existing rental building types in the City of Victoria. The archetypes were informed by the inventory and past project experience.

Three energy upgrade scenarios were defined for each building archetype, representing 'basic asset renewal', 'some energy upgrades', and 'energy as a priority' scenarios. This provided absolute and relative energy and emissions savings along with associated cost savings.

The utility cost savings and incremental capital costs were then used to carry out a high level economic analysis of the energy upgrade scenarios, including investigation of the net present value, internal rate of return, return on investment, and cost of carbon abatement.

4.1.1 Definition of Archetypes

Three archetypal buildings of focus were defined based on the building inventory: low-rise wood-frame walk up; low-rise apartment with elevator, and high-rise concrete. Key building characteristics were further defined or verified using the following methods:

- → Brief exterior site visits to document key building characteristics such as window type and enclosure upgrades,
- → Review of internal RDH project database of similar building types to verify the mechanical system and fuel type distribution, and
- → Survey responses, focus group, and one-on-one discussions with rental building owners and managers.

In addition to form characteristics, it was important to identify the predominant system characteristics, and more specifically, the fuel type used for heating and domestic hot water. The system types determine upgrade options, as well as the potential program impact in terms of both energy and greenhouse gas emission reductions. An electrically heated building typically results in higher cost savings from energy upgrades, due to the higher per unit cost of electricity compared to natural gas, whereas a building that uses natural gas for heating has greater potential to reduce greenhouse gas emissions.

Table 4-1 below summarizes the typical building characteristics and system types identified for the three archetype buildings.

TABLE 4-1 SUMMARY OF TYPICAL BUILDING CHARACTERISTICS

Building Type	Typical Characteristics
Low-Rise Walk-Up	
	2-3 storeys Wood frame Constructed in the 60s or 70s No elevator ~14 suites ~13,000 SF Electric baseboard heat + electric in-suite hot water, or Electric baseboard heat with central gas fired domestic hot water (most common)
Low-Rise with Elevator	
	3-4 storeys Wood frame Constructed in the 60s or 70s Elevator ~45 suites 45,000 SF Electric baseboard heat + electric in-suite hot water, or Central gas-fired hydronic heat with central gas fired domestic hot water (most common)
High-Rise	
	12-13 storeys Concrete Constructed in the 60s Balconies ~140 suites 60,000-225,000 SF Central gas-fired hydronic heat with central gas fired domestic hot water

Five whole building energy models were thus customized to represent the three major building types and two major system types, as follows:

- → Wood-frame 3-storey low-rise walk-up without balconies, with electric baseboard heat and electric domestic hot water
- → Wood-frame 3-storey low-rise walk-up without balconies, with electric baseboard heat and central gas-fired domestic hot water
- → Wood-frame 4-storey low-rise with elevator and balconies, with electric baseboard heat and electric domestic hot water
- → Wood-frame 4-storey low-rise with elevator and balconies, with central gas-fired hydronic heating and central gas-fired domestic hot water
- → Concrete and steel-stud high-rise with balconies, with central gas-fired hydronic heating and central gas-fired domestic hot water

Further archetype details and model inputs are provided Appendix E: Energy Analysis Results.

4.1.2 Selection of Energy Conservation Measures

Potential energy conservation measures (ECMs) for retrofits were selected. These include measures that are readily available and currently feasible to include in the targeted building types. These do not represent the complete list of available ECMs and additional possibilities are discussed in subsequent sections.

The selected ECMs include:

- → thermal upgrades to the enclosure (e.g. adding insulation to walls or roof, upgrading windows, improving airtightness);
- → increasing the efficiency of mechanical equipment (e.g. upgrading gas-fired boilers to condensing efficiency >90%);
- → improving ventilation systems (e.g. adding heat recovery ventilation and lowering corridor make-up air flow rate), and
- → upgrading auxiliary equipment and fixtures such as lighting, controls, and domestic how water (DHW) fixtures.

For this analysis, ECMs were grouped into three bundles representing different feasible upgrade scenarios. The purpose of defining bundles is to facilitate an analysis of possible upgrade scenarios.

4.2 Energy Modeling Results

The five models were used to estimate energy savings and emission reduction potential for typical, older market rental housing in the City of Victoria. Groups of ECMs were modelled together as retrofit scenarios, reflecting the implementation of energy upgrades at the time of regular renewal projects. The baseline consumption, ECM bundles, modelled energy savings, and emission reduction potential are summarized in this section.

4.2.1 Baseline Performance

The summary of baseline performance for the five models is presented in Table 4-2 below. The archetypes that use natural gas for space heating (MURB 04 and MURB 05)

have significantly higher greenhouse gas emission intensity (GHGI) and thus present excellent opportunities for GHGI reduction. In contrast, the archetypes with higher electricity consumption will benefit from greater utility cost savings by implementing energy efficiency measures, due to the higher cost of electricity compared to natural gas.

TABLE 4-2 SUMMARY OF BASELINE ARCHETYPE PERFORMANCE

ARCHETYPE MURB [heating fuel; DHW fuel]	BASELINE TOTAL ENERGY USE INTENSITY (TEUI, kWh/m²/yr)	BASELINE GREENHOUSE GAS EMISSION INTENSITY (GHGI, kg CO_2e/m²/yr)
01 - Low-rise walk-up [elec.-heat; elec.-DHW]	170	2
02 - Low-rise walk-up [elec.-heat; gas-DHW]	174	6
03 - Low-rise [elec.-heat; elec.-DHW]	194	2
04 - Low-rise [gas-heat; gas-DHW]	232	32
05 – High-rise [gas-heat; gas-DHW]	184	24

4.2.2 Energy Conservation Measure Bundles

In this analysis, ECMs were grouped into three bundles representing different upgrade scenarios: Good: basic asset replacement, Better: some energy upgrades, and Best: energy as a priority. Descriptions of these three bundles are provided below and ECMs within each bundle are shown in Table 4-3.

- → **Bundle 1 – Good** – Reflects basic asset replacement with code-minimum equipment requirements and enclosure renewal. Some energy/GHG improvements result from these standard renewals (incidental airtightness and windows to code minimum).
- → **Bundle 2 – Better** – Reflects moderate changes that improve energy/GHG performance of systems above the status quo at the time of regular renewals.
- → **Bundle 3 – Best** – Reflects a change in the intent of the renewals to have a focus on energy improvements, choosing very high performance equipment and materials at the time of regular renewals.

TABLE 4-3 ECMS INCLUDED IN EACH ENERGY BUNDLE

DETAIL	BUNDLE 1 – GOOD	BUNDLE 2 – BETTER	BUNDLE 3 – BEST
Walls	Cladding renewal (no direct energy improvement)	Add 1.5" exterior insulation with low-conductivity cladding attachments: **Low-rise** – +R-5 **High-rise** – +R-2*	Add 4" exterior insulation with low-conductivity cladding attachments: **Low-rise** – +R-15 **High-rise** – +R-6*
Windows	Replace with code-minimum: **Low-rise** – U_{IP}-0.40,	Upgrade to double-glazed with better frame: **Low-rise** – U_{IP}-0.28,	Upgrade to triple-glazed with better frame: **Low-rise** – U_{IP}-0.17, SHGC

	Solar Heat Gain Coefficient (SHGC) 0.40 **High-rise** – U_{IP}-0.55, SHGC 0.40	SHGC 0.30 (double-glazed, vinyl frames, low-e coating) **High-rise** – U_{IP}-0.45, SHGC 0.40 (double-glazed, thermally-broken metal frames)	0.25 (triple-glazed, vinyl frames) **High-rise** – U_{IP}-0.32, SHGC 0.30 (triple-glazed, thermally-broken metal frames)
Airtightness	Incidental (10% improvement)	Deliberate air barrier detailing (50% improvement)	Deliberate air barrier detailing (50% improvement)
Roof	Membrane replacement (no direct energy improvement)	Add above-deck insulation: **Low-rise** – Add 2" insulation (+R-10) **High-rise** – None**	Add above-deck insulation: **Low-rise** – Add 4" insulation (+R-20) **High-rise** – Add 2" insulation (+R-10)
Heat Recovery Ventilators (HRVs)	n/a	n/a	Add suite level Heat Recovery Ventilators (HRVs) (70% sensible heat recovery) & Reduce Make Up Air (MUA) rate: **Low-rise** – to 15 cfm/suite **High-rise** – to 20 cfm/suite
Boilers for Space heating (*gas-heated archetypes*)	Code-minimum efficiency gas boiler (80%)	Medium efficiency gas boiler (87%)	High efficiency gas boiler (93%)
Domestic Hot Water (DHW) (*gas-DHW archetypes*)	Code-minimum efficiency gas boiler (80%)	Medium efficiency gas boiler (87%)	High efficiency gas boiler (93%)
Domestic Hot Water Fixtures	n/a	Upgrade 50% of DHW fixtures to low-flow	Upgrade all DHW fixtures to low-flow
Lighting	n/a	Upgrade to LEDs in common areas	Upgrade to LEDs in common areas and suites Install occupancy sensors in common areas

*Effective R-value improvement of adding exterior insulation is dependent on archetype characteristics, i.e. the increase in effective wall R-value of the wall upgrade ECM is lower for the high-rise archetype than for the other wood-frame archetypes due to heat loss though non-thermally broken balconies.
**Adding roof insulation will have a smaller impact on high-rise buildings compared to low-rise buildings and thus upgrades above code-minimum requirements would generally not be implemented in high-rises unless energy upgrades were a priority (Bundle 03).

4.2.3 Modelled Energy Savings

The five archetypes were modelled using their baseline conditions (as typical non-upgraded existing buildings), then by implementing the three ECM bundle scenarios. The energy consumption results are summarized in Figure 4-1, below.

The energy savings range from 5% to 22% for the Good bundle. The incidental energy efficiency improvements from this first bundle are due to replacing the windows with code-minimum products and improving whole-building airtightness through cladding

renewal. The Better bundle results in higher energy savings, 22% to 37%, due to intentional energy efficiency improvements. The Best bundle results in the highest range of energy savings, 36% to 50%, by increasing the amount of—and magnitude of—energy upgrades that occur during a regular renewal project.

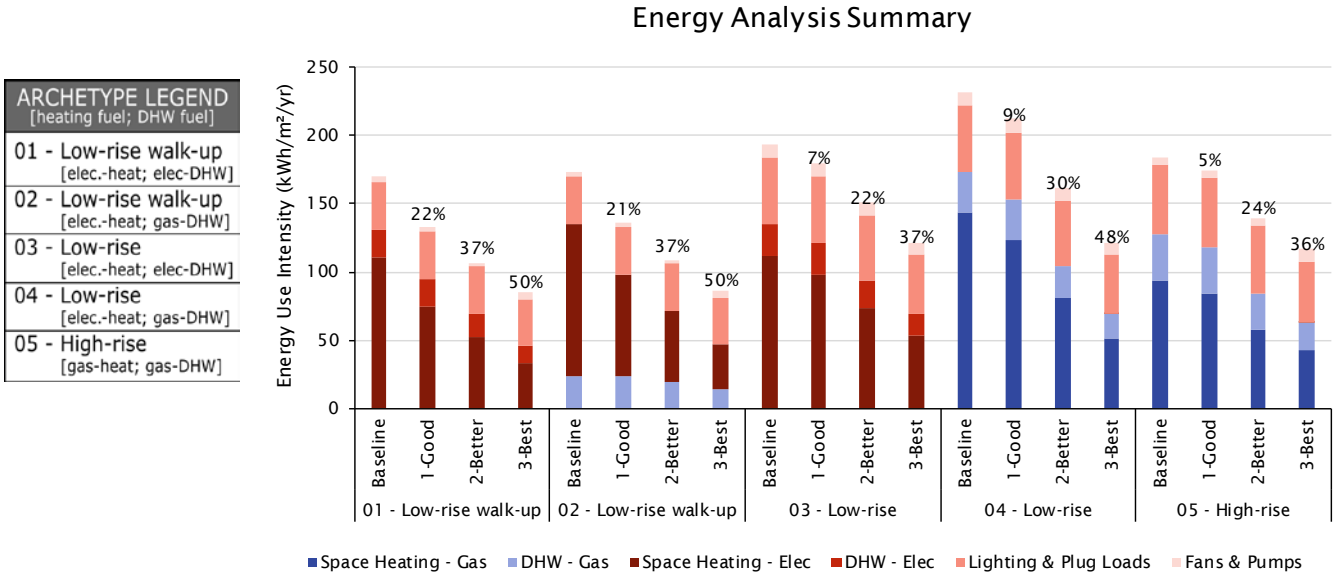


Figure 4-1 Summary of the energy analysis for all five market rental archetypes. The modelled energy consumption is shown broken down by end use as well as by fuel type, with the % savings over the baseline shown above each bundle result.

Note that to achieve the modelled energy savings from window upgrades, the entire window product, including frame, should be replaced and properly detailed into the critical barriers of the wall, not a "piggyback" retrofit. Individual window replacements (i.e. targeted repairs) will also not result in significant whole-building energy savings until all (or nearly all) windows of a building are replaced.

4.2.4 Emission Reduction Potential

The energy analysis results were used to calculate the emission reduction potential for the five archetypes by implementing the three bundle scenarios of ECMs. The greenhouse gas intensity (GHGI) reduction results are summarized in Figure 4-2, below.

The emission reductions range from 7% to 22% for the Good bundle. The incidental emission reductions from this first bundle are due to heating energy savings from replacing the windows with code-minimum products and improving whole-building airtightness through cladding renewal. The Better bundle results in higher emission reductions, 22% to 39%, due to intentional energy efficiency improvements. The Best bundle results in the highest range of emission reductions, 37% to 59%, due to the higher energy savings in this bundle.

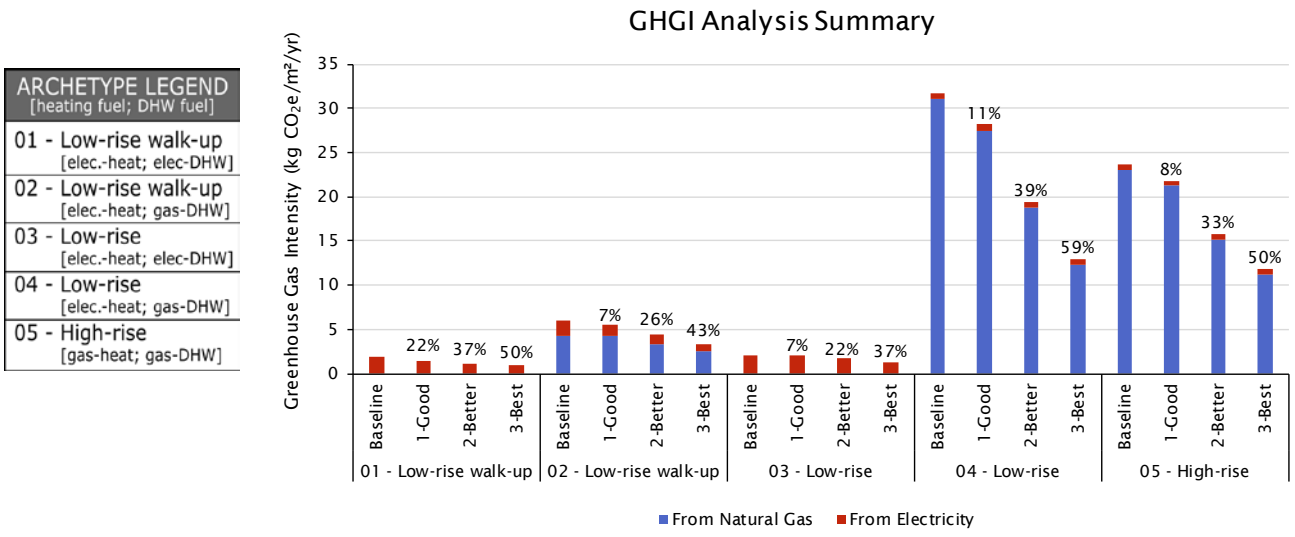


Figure 4-2 Summary of the emission reduction potential for all five archetypes. The calculated emission intensity (based on the modelled energy results) is shown by fuel source. The percent (%) emission reduction relative to the baseline is denoted above each bundle result.

In general, the all-electric archetypes have the lowest GHGI in all scenarios (0.9 – 2.1 kg $CO_2e/m^2/yr$) compared to the archetypes with gas hydronic heating and gas-fired DHW heating (12 – 32 kg $CO_2e/m^2/yr$), both before and after retrofits. However, based on our in-house database, landlord survey results and anecdotal information collected, all-electric buildings are relatively few compared to partially or fully gas-serviced buildings in the target building types. Accordingly, the buildings with natural gas-fired heating present the best opportunity for emissions reduction.

4.2.5 Additional ECMs

The ECMs chosen were intended to illustrate the potential for a revitalization program that prioritized energy and GHG savings, using currently widely available products and approaches. ECMs that go beyond those modeled in the three bundles may include achieving Passive House level airtightness, using Passive House window products, or thermally enclosing the balconies in the high-rise archetype to minimize thermal bridging. These additional ECMs could achieve even higher energy savings than those modeled above.

Fuel-switching measures such as a heat pump for DHW heating, central heat pump for hydronic space heating, or replacing the hydronic system with packaged terminal heat pumps could also be explored to achieve further GHGI reductions in the archetypes currently using natural gas. Many of these technologies are common in other building types but are not currently widely used in rental apartments. There are also emerging technologies like CO_2 heat pumps (for DHW heating) that are common in other markets (for example, Japan) but are not yet widely installed locally. These strategies are worth further consideration beyond the pilot stage of a City incentive program.

4.2.6 ASHRAE 100

ASHRAE Standard 100 – 2015, Energy Efficiency in Existing Buildings, provides guidance and targets for achieving energy efficiency improvements in existing buildings. It is a

performance based standard meaning that rather than prescribing practices that must be followed to meet the standard, building owners can apply a range of approaches that are best suited to their building and particular situation, so long as they meet a performance metric, expressed as a maximum energy use intensity per unit area per year.

ASHRAE 100's target Energy-Use Intensity (EUI) for apartment buildings with 5 or more units in Climate Zone 4C is 137 kWh/m^2 per year, which generally aligns with the performance of the energy retrofit bundles investigated in this analysis.

All of the modelled building types are shown to achieve this level of performance by implementing either the Better or Best suite of measures. While some measures may be costly, none require fuel-switching, nor major design changes, and as such, the ASHRAE target is a reasonable one for the City to pursue, should it choose to attach a performance based metric to the program.

4.3 Energy and GHG Key Findings

Based on the energy analysis presented above, key findings from the energy modeling results are summarized below.

4.3.1 Energy Savings Potential

Moderate energy efficiency (up to 22%) may be achieved through business-as-usual basic asset replacement. Energy savings up to 50% over the baseline may be achieved by implementing "energy as a priority" ECMs at the time of asset renewal.

4.3.2 GHG Savings Potential

Moderate emissions reductions (up to 22%) may be achieved through business-as-usual basic asset replacement. Emissions reductions up to 59% may be achieved by implementing a suite of "energy as a priority" ECMs at the time of asset renewal. The greatest absolute savings opportunities are presented by buildings currently heated using natural gas.

Further reductions could be achieved by considering fuel-switching strategies, which are not modeled here.

4.3.3 Building Types with Greatest Potential

The **all-gas low-rise with elevator** has the highest baseline energy consumption (232 kWh/m2/yr) and the highest baseline greenhouse gas emission intensity (32 kg CO2e/m²/yr). It consequently **has the greatest potential absolute energy and greenhouse gas emissions savings.** When further factoring in the fact that this building type makes up the largest component of older rental apartment buildings (190 buildings with 8400 total units), these data suggest that, were the City to further focus its program efforts on one building type, or initially target one building type, this one would present the greatest opportunities.

As an illustration, assume as a simplification that the modeled low-rise with elevator uniformly represents all 190 actual buildings of this type. If 20% of these buildings were successfully engaged in an incentive program, and they all achieved the "better" level of performance, the City would be supporting a total of over 2,000 tons CO_2e/yr in GHG savings and more than 11,500 MWh/yr in energy savings.

If 20% of these buildings achieved the "best" level of performance, the City would be supporting a total of over 3,000 tons CO_2e/yr in GHG savings and nearly 18,500 MWh/yr in energy savings.

4.4 Economics of Energy Upgrades

Regularly scheduled retrofits present opportunities to upgrade building energy performance. Planning energy efficiency upgrades at the time of regular renewals is the most economical strategy for reducing utility costs, improving occupant comfort, and reducing greenhouse gas emissions. As such, all capital costs of energy upgrades are considered incremental, above and beyond the cost of regular retrofits. This approach aligns with the City's intent to only incentivize incremental costs of improvement over basic asset replacement. *Figure 4-3* below illustrates this approach.

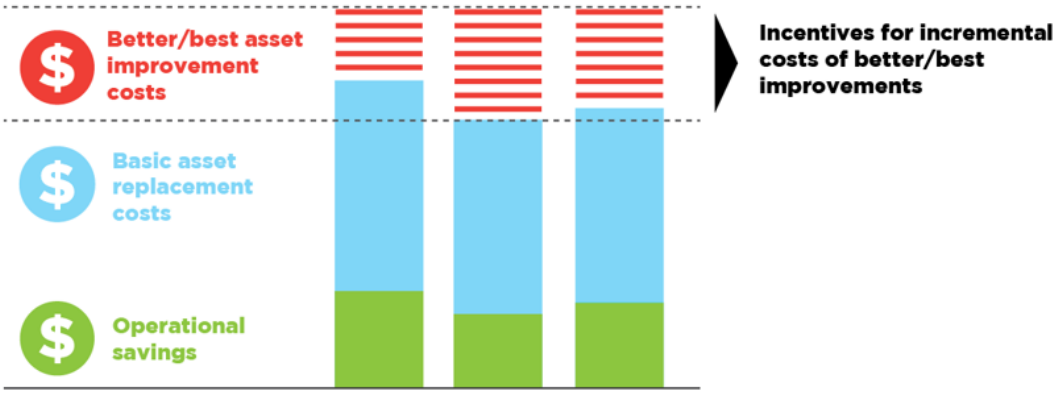


Figure 4-3: Focus for incentive strategies

4.4.1 Economic Analysis Methodology

The incremental capital cost (ICC) for each of the bundles of energy measures were estimated for each of the five archetypes. Cost estimates are based on the incremental capital cost of each element in the bundles over the typical business-as-usual scenario, assuming that the components have reached the end of their service life and must be replaced. A combination of project experience, manufacturer's cost data, and published costing references were used to develop the estimates. Descriptions of the costing elements are provided in Appendix F: Economic Analysis Results.

Examples include the addition of exterior insulation at the time of a cladding renewal or the replacement of a boiler at the time of failure with a higher performance model. In this way, only the incremental energy efficiency aspect is included in the cost, not the full cost of the retrofit. This reflects the City's interest in incentivizing work that has an added energy benefit beyond that which would be accomplished by simple asset replacement to code minimum standard. Synergies between measures – for example, downsizing a boiler following an enclosure renewal (which reduces heat loss) – are not considered in the analysis, but could lead to additional savings.

Financial Indicators

The economic analysis utilized a 30-yr timeframe, assuming that each bundle was implemented at year 0. Utility rates were determined from posted information as of April 2018. The 2018 electricity price ($0.1160/kWh) was assumed based on residential rates[14] with an average of 50/50 split of savings from Step 1 and Step 2. The 2018 natural gas price ($8.162/GJ) was assumed based on posted rates[15] and includes costs for delivery, storage, fuel, and carbon tax. Fuel prices were assumed to escalate at a rate of 2.1%/yr and 2.0%/yr for electricity and natural gas, respectively. A 7.0% nominal discount rate was assumed for the analysis.

Mechanical components within the bundles were assumed to have a 20-year lifetime after which an incremental cost for replacement was included in the analysis. Additional maintenance costs for replacing HRV filters were also included at 5-year intervals. No other annual operational costs or savings were included.

Financial indicators were calculated based on the modeled energy and GHG emission reduction outcomes and incremental capital cost estimates. A summary of the indicators is presented below while detailed results are tabulated in Appendix F: Economic Analysis Results. The indicators calculated include:

- → Net present value (NPV): the present value of future utility bills over the 30-yr measure life less the incremental capital cost of implementing the measure
- → Internal rate of return (IRR): the discount rate that would result in an NPV of zero
- → Return on investment (annual, discounted): the NPV divided by ICC divided by the 30-yr measure life
- → Incremental cost of carbon abatement: the incremental capital cost divided by the total GHG emissions reduced over the 30-yr measure life

Note that, because the financial analysis results are based only on the upfront capital costs compared to the utility cost savings over the analysis period, they do not account for less readily monetized benefits, such as improved tenant retention and comfort.

4.4.2 Economic Analysis Results

The results of the economic analysis are presented below for all five of the archetypes and discussed with regards to the three bundles of measures. The data presented are based on the midpoint of expected incremental capital costs. Tabulated data with the high, mid, and low values for incremental cost and other metrics are provided in Appendix F: Economic Analysis Results.

Incremental Costs

The total incremental cost for the renewal bundles are shown in Figure 4-4. As the Good scenario represents basic asset replacement, it is considered the baseline for this analysis and therefore zero incremental cost.

[14] Residential rates from BC Hydro accessed April 2, 2018: https://www.bchydro.com/accounts-billing/rates-energy-use/electricity-rates/residential-rates.html

[15] FortisBC rates accessed April 2, 2018: https://www.fortisbc.com/NaturalGas/Homes/Rates/Mainland/Pages/default.aspx

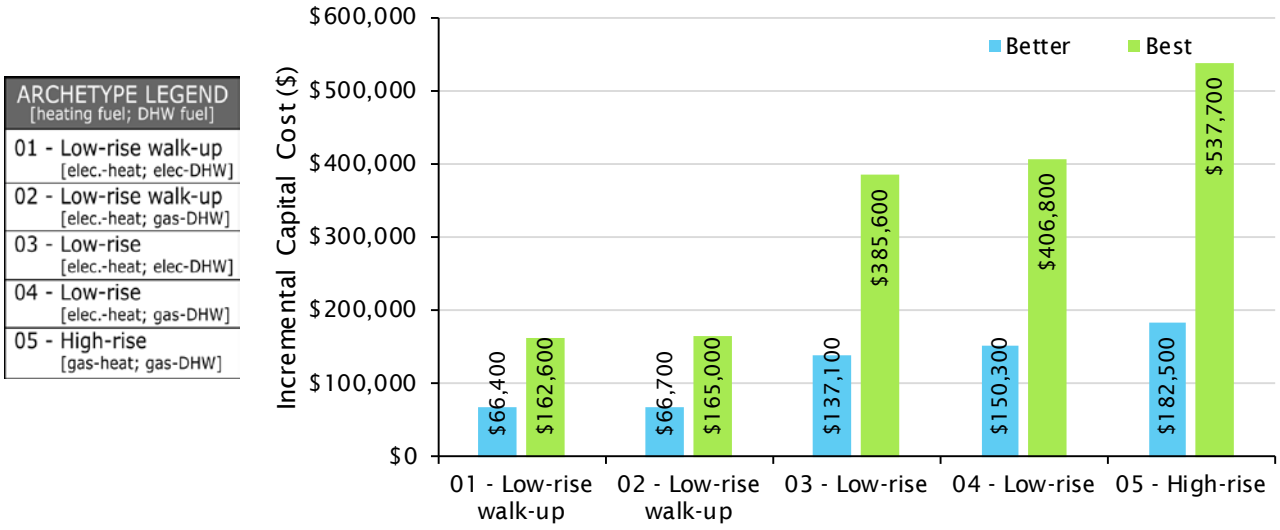


Figure 4-4 Total incremental capital cost of the Better and Best bundles. No incremental cost is incurred for the Good bundle as it represents business-as-usual basic asset replacement.

The incremental cost is normalized per suite in Figure 4-5, below.

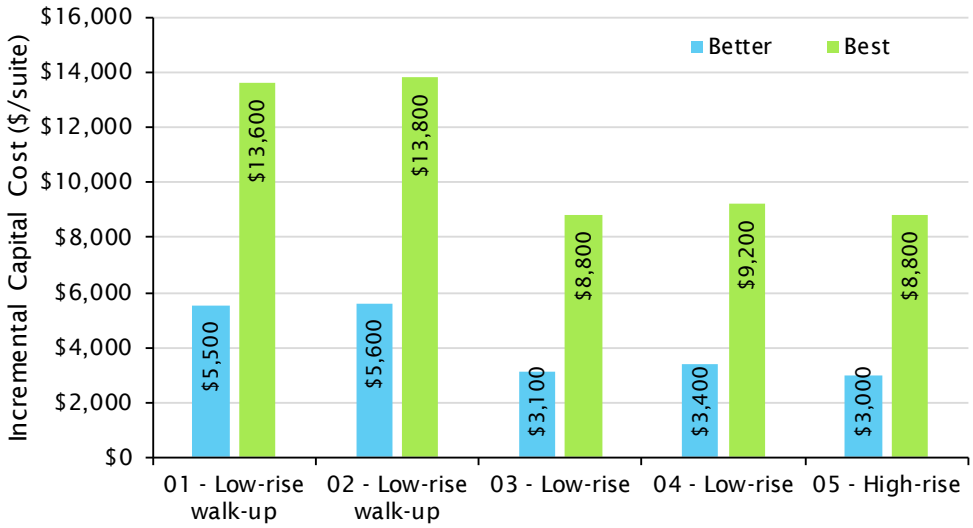


Figure 4-5 Incremental capital cost, normalized per suite ($/suite). No incremental cost is incurred for the Good bundle as it represents business-as-usual basic asset replacement.

The total incremental capital cost is highest for the larger archetypes due to the greater expense to implement measures throughout the building, as well as some differences in equipment and material assumptions between the low- and high-rise buildings (for example, a high-rise building typically uses non-combustible window frames, which are more expensive than vinyl). When compared on a cost per suite basis, however, the trend is reversed with larger per suite costs associated with the smaller archetypes, reflecting the impact of economies of scale.

The incremental cost of the Better bundles varies between ~$3,000/suite and ~$5,600/suite. The incremental cost of the Best bundles varies between ~$8,800/suite and ~$13,800/suite.

The items that add most significantly to the costs include:

→ Addition of wall insulation

→ Addition of roof insulation for the low-rise archetypes

→ Upgrading windows to high performance products

→ Addition of in-suite HRVs

In practice, the specific requirements of each individual building should be reviewed to determine the optimal measures to include in an energy retrofit. These will vary based on the building design and condition of existing equipment. In addition, other aspects of building operation including indoor air quality and comfort may be considered in the selection of measures which could improve performance but are not captured in the economic analysis based on energy performance only. An example of this is the potential indoor air quality improvements and reduction in condensation risk that may be realized with the installation HRVs in suites. Window upgrades are also commonly sited by building owners to improve tenant comfort, retention, and curb appeal.

Comparison of Bundles

The annual utility bill savings, based on year 1 fuel prices, is shown in Figure 4-6. All the bundles investigated in this study result in utility cost savings compared to the existing condition of the buildings. The utility cost savings are higher when space heating is provided by electricity, as is the case for MURB 01 through MURB 03, due to the higher price of electricity compared to natural gas.

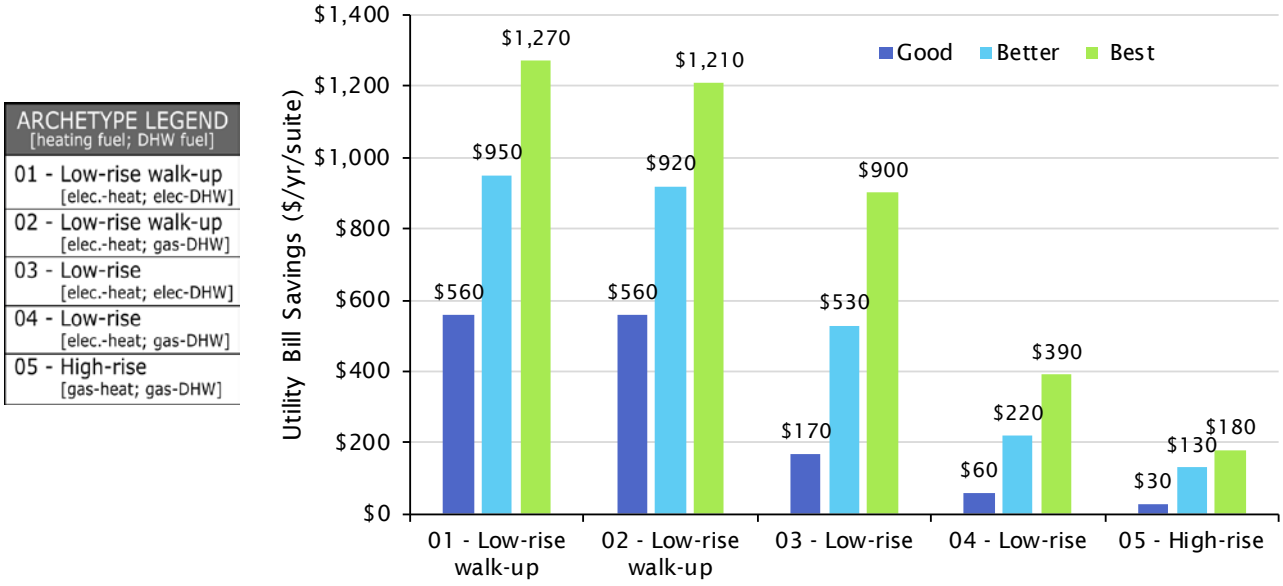


Figure 4-6 Annual utility bill savings per suite (based on year 1 fuel prices).

In addition to estimating incremental costs and savings from energy bundles, the lifecycle economics of the bundles were evaluated. The net present value (NPV) of future utility

bills less the incremental capital cost to add the energy measures associated with the bundles, results in the NPV of investing in energy conservation measures. A positive NPV value indicates an overall cost savings over the timespan of the analysis. A negative value suggests an overall loss (i.e. more money is spent on the capital upgrade cost than is recuperated in utility savings). The NPV per suite is presented in Figure 4-7.

Note that this analysis does not include any other non-energy benefits, such as potential rent increases, improved tenant retention, and tenant comfort that can also result from these types of projects. In addition, the financial returns from energy savings will only be realized by the building owner directly if they pay the utility bills. Data collected through landlord and property manager engagement suggest that building owners with central heat and domestic hot water pay for these utilities and are best positioned to realize the financial return from energy-improving investments. However, the fact that owners pay utility bills can also act as a disincentive for tenants to practice conservation behaviours.

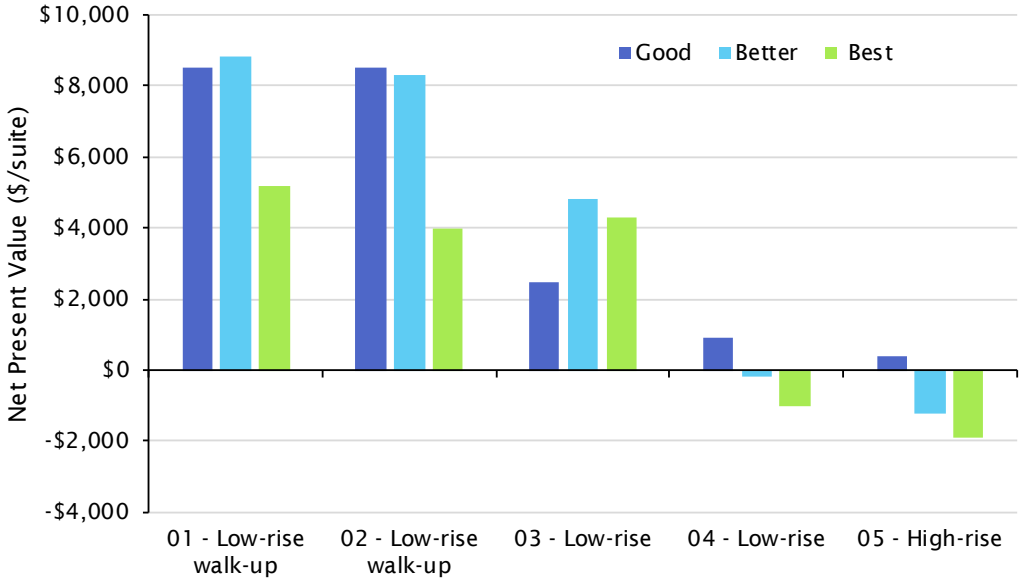


Figure 4-7 Net present value of energy efficiency improvements, normalized per suite ($/suite).

The NPV is positive for the Good bundle in all archetypes as this is assumed to be a zero incremental cost implementation that nevertheless results in incidental energy savings.

The NPV for the Better bundle is positive for MURB 01 through MURB 03 due to the large benefit from reducing heating requirements from the electric baseboard heaters. MURB 04 and MURB 05 both have slightly negative NPV for the Better bundle, primarily because they are heated using natural gas which is currently much cheaper per unit of energy than electricity.

The NPV in all archetypes is lowest for the Best bundle as it incorporates higher cost items with smaller incremental improvements to energy efficiency. The Best bundle still results in positive NPV for MURB 01 through MURB 03 but is negative for MURB 04 and MURB 05 due to the lower utility cost savings of natural gas.

The annual return on investment (ROI) has been calculated by dividing the NPV by the incremental capital cost and the 30-year time horizon of the economic analysis. The results are shown in Figure 4-8. The ROI is positive for both the Better and Best scenarios

for the three archetypes with electric space heating (MURB 01 through MURB 03). The ROI is negative for the archetypes that use natural gas as the space heating fuel.

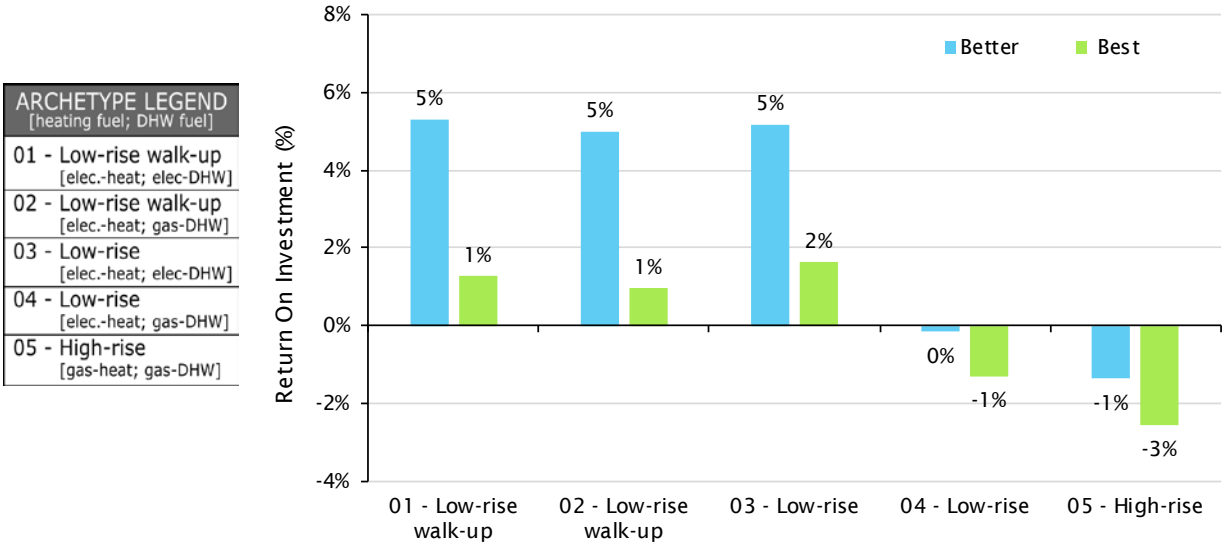


Figure 4-8 Discounted annualized return on investment (ROI). No incremental cost is incurred for the Good bundle as it represents business-as-usual basic asset replacement. As such, there is no investment and ROI is not applicable.

The incremental cost of carbon abatement is shown for each archetype in Figure 4-9 assuming the midpoint of the incremental cost range and the 30-years of GHG reductions associated with the lifecycle of the bundles.

Figure 4-9 Incremental cost of carbon abatement per suite ($/tCO₂e/suite), calculated using the incremental capital cost and the annualized GHGI savings.

The three electrically heated archetypes have high incremental costs of carbon because of the low GHG reductions associated with reductions in electricity uses. The incremental cost of carbon is lower for the two archetypes with gas heating (MURB 04 and MURB 05) as a result of the higher GHG reductions and varies between $90/tCO₂e and $290/tCO₂e

with lower values attributed to the low-rise archetype (MURB 04). For comparison purposes the cost of reducing carbon emissions can be compared to the price paid for carbon offset projects[16] ~$12.50/$tCO_2e$ or the incremental cost of renewable natural gas over standard natural gas[17] ~$110/$tCO_2e$.

4.5 Economic Analysis Key Findings

Based on the economic analysis presented above, key findings from the results are summarized below.

4.5.1 Cost Savings Potential

Buildings with electric space heating yield the greatest cost savings from energy upgrades due to the higher cost of electricity per unit of energy.

4.5.2 Cost per Ton of GHG Abated

However, **buildings utilizing natural gas as a heating fuel yield the greatest carbon emissions reductions, and the lowest cost per ton of GHG emissions abated**. It is also estimated based on survey and anecdotal input that there are considerably more buildings that are heated using natural gas than electricity.

4.5.3 Building Types with Greatest Potential

If the primary goal is to reduce carbon emissions, the two gas heated archetypes (including the low-rise with elevator discussed at length in the energy section) present the lowest cost per ton of GHG emissions abated, and should be the primary focus for a City incentive program.

Recall that **the all-gas low-rise with elevator has the greatest potential absolute energy and greenhouse gas emissions savings.** When layering on the economic analysis, we find that the incremental cost for energy upgrades to this building type are less per suite that the walk-up apartment, and comparable to the high-rise. However, utility cost savings are not as high as the all electric archetypes due to the relatively low cost of gas. As a result, the NPV and ROI are slightly negative, suggesting that some level of incentive would be required to offset these incremental costs in the current utility pricing scenario.

The NPV and ROI are positive for the three electrically heated archetypes, in this case due the high cost of electricity and the correspondingly high cost savings due to energy upgrades. This would suggest that less incentive would be required to motivate owners with these system types to undertake this work. Education around the options available may have considerable positive impact among these building owners. However, the challenge with electrically heated buildings is that they tend to be metered to individual tenants, who pay their own heating bills. Thus, an owner would be financing the upgrade, but the tenant would reap the cost savings, known as the 'split-incentive' challenge.

[16] Government of British Columbia: https://www2.gov.bc.ca/gov/content/environment/climate-change/public-sector/offset-portfolio

[17] Assuming the $7/GJ premium for renewable natural gas compared to standard natural gas (https://www.fortisbc.com/NaturalGas/RenewableNaturalGas/AffordableOptions/Pages/default.aspx), less the $1.5/GJ carbon tax and assuming an emissions factor of 50kg/GJ.

Another type of incentive structure may be needed for this type of scenario, should the City wish to pursue retrofits for buildings with these systems.

4.6 Key Program Elements – Energy & GHGs

This section summarizes key program considerations and elements for inclusion in a City-developed incentive program. These suggested program elements are informed by the project team's research and by the landlord engagement (focus group, one-on-ones and survey).

4.6.1 Access to Existing Incentive Programs

One of the city's more pro-active owner groups, which had already undertaken several energy efficiency projects, reported that simply providing education on what incentive programs were already available was of immense value.

Several of the energy efficiency measures identified in this report are already incentivized by programs offered by BC Hydro and/or FortisBC, for example, the Efficient Boiler and Water Heater Program[18], which provides rebates for boiler and hot water heater equipment, and the Rental Apartment Efficiency Program[19], which offers free showerheads and faucet aerators to buildings with gas-heated domestic hot water. There is also a provincial program currently under development to provide incentives for retrofits to existing multi-family buildings.

Feedback heard through the landlord engagement suggested that many owners, landlords and property managers are not aware of these programs. Programs also tend to come and go regularly, and it can be daunting for a property owner to stay current with the available options.

A city-developed program would not incentivize measures that are already covered by other programs, but could provide considerable value at low cost through the creation of an "ambassador" role, either internal or external to the City, who stays current as rebate and incentive programs evolve and can connect landlords with these opportunities.

The project team chose to include and evaluate measures already incentivized by other programs because it builds awareness of the options available, of their potential impact, and of the potential incentives that can be accessed today.

4.6.2 Energy and GHG Benchmarking

Any program that seeks to reduce GHGs and energy consumption needs to establish a starting point and monitor progress over time.

It is recommended that the revitalization program require energy and GHG benchmarking of each building that participates. Energy benchmarking is a process of tracking building energy use and comparing it to buildings of similar size and function. The goal of benchmarking is to determine how energy efficient a building is relative to similar stock while also tracking performance changes year over year.

[18] https://www.fortisbc.com/Rebates/RebatesOffers/EfficientBoilerProgram/Pages/default.aspx
[19] https://www.fortisbc.com/Rebates/RebatesOffers/RentalApartmentEfficiencyProgram/Pages/default.aspx

Benchmarking can be completed by the building owner using Energy Star's free Portfolio Manager online tool. Setting up an account takes 1-2 hours, and once set up, an owner's utility bills are automatically updated in the tool and can be shared with the City.

This component of the program aligns with the City's Climate Leadership Plan, which identified benchmarking as a strategy for improving energy literacy.

4.6.3 Identifying Opportunities

Each building is at a different point in its lifecycle. Similar to, and ideally in concert with, the seismic evaluation, it is recommended that an evaluation be completed for each building that participates in the revitalization program to identify the best energy/GHG saving opportunities. The evaluation would accomplish the following:

- → Establish existing conditions and recommendations for building renewal work
- → Establish and prioritize the most appropriate energy/GHG upgrade measures for the building
- → Provide high-level costs and savings for the items identified

The City could also consider providing education and/or support to encourage rental building owners to undertake capital planning for their buildings. Our survey and anecdotal information heard from landlords, property managers and owners indicates that many building owners respond reactively to building needs.

A lesson can be borrowed from strata buildings, where the completion of Depreciation Reports has been legislated since December 2013. A Depreciation Report is essentially a capital planning tool. In tracking the level of capital reserve planning before and after the legislation was passed, RDH staff have noted a significant increase in the amount of money being allocated to the capital reserve fund. Planning removes unpleasant surprises when a major system component fails, and allows building owners to plan for future renewals over a number of years.

One property management firm that provided feedback for this study indicated that they had begun a capital planning process with all of their clients. This initial act of motivating owners to think about what is coming can have a considerable impact on the ability to plan upgrade projects.

The upcoming Provincial retrofit program is likely to provide some funding to complete an energy study. If it does, the City-developed program should be designed to supplement the Provincial program by supporting the 'addition' of a seismic assessment to the energy assessment covered under the Provincial program. If it does not, the City-developed program should consider offsetting this cost via an incentive.

4.6.4 Phasing Over Time

The energy analysis categorized improvements in bundles representing incrementally better upgrade scenarios. The intent of this categorization was to enable quantification of program potential, as well as to illustrate for building owners what a "good", "better", and "best" performing existing rental building might look like, given commonly available equipment and techniques.

When turning the discussion toward implementation, though, one must consider how work is actually completed in rental apartment buildings in the city. Drawing from the landlord engagement and high-level building assessment activities, it is clear that it is rare that a rental apartment is upgraded all at once. More typically, one upgrade is undertaken at a time, or in some cases like window replacement or balcony upgrades, portions of the building are completed at one time.

In addition, each building is at a different point in its lifecycle. Most owners have made some upgrades to maintain the value of their asset over time, although there is considerable variation in what is done and when. For example, more pro-active owners have upgraded their heating plants to high-efficiency equipment, upgraded all plumbing fixtures, and replaced all windows. Others have only replaced a portion of their windows, and many upgrade in-suite fixtures (including lights and plumbing) on tenant turnover. As a result, many owners have already completed piecemeal upgrades in the "good", "better", or "best" scenarios.

Recognizing this reality, a city developed program should allow flexibility in both selection of measures implemented and timeframe of implementation.

4.6.5 Getting to Net Zero

The City's Climate Action Plan sets a target of 80% GHG emissions reduction city-wide by 2050. Achieving this target will require significant improvements to a large number of existing buildings in the City.

While keeping in mind the previous discussion about phasing over time, the City should consider strategies to provide the largest incentives to the measures that go the furthest. If a building, or portion of a building, is upgraded with like-for-like components, it is much less likely that that component will later be upgraded to address energy efficiency. This is a key reason why it is recommended that the incentive program piggyback on already planned renewal work for end-of-life components.

If the City can incentivize, say, moving straight from an existing single pane non-thermally broken aluminum framed window to a high performing triple pane window in one step, thereby skipping an intermediate upgrade to a present day 'code minimum' window, the City and building owner will gain the greatest energy and GHG savings with the least capital investment, since the window is only upgraded once.

With this in mind, the City could consider some "best-in-class" measures that could be incentivized on a prescriptive basis; for example, installing Passive House windows. This concept is further explored in the Incentive Program section.

4.6.6 Renewable Energy

The first step toward a carbon neutral future and the City's target of achieving 100% renewable energy by 2050 is to first reduce consumption, which has been a focus of this study. Implementation of energy efficiency upgrades is a critical first step and has been proven to be the most cost-effective means of achieving energy and carbon reductions. Efficient electrification (i.e. transitioning toward high efficiency electric solutions such as heat pumps) is also a key component of moving toward carbon neutrality, given that electricity is BC is mostly generated by renewable hydro.

After upgrades have been completed, or for buildings that have already taken multiple steps to reduce their energy consumption, the city could consider encouraging and/or incentivizing the installation of renewable energy. Rooftop solar photovoltaics to offset electricity demand and/or solar thermal to offset domestic hot water demand are recommended strategies that could be implemented relatively easily in these buildings. "Renewable" natural gas is also a potential option, whereby a higher rate is paid for natural gas supplied by FortisBC, which then subsidizes the addition of "renewable" natural gas into the grid. Renewable natural gas is biogas collected from landfills or other sources of methane, and would otherwise be emitted into the atmosphere.

Figure 4-10 Graphical representation of "efficiency-first" approach to Net Zero

Additionally, as the cost of renewable alternatives continues to drop globally, these options will become increasingly cost competitive with grid-tied electricity. Solar PV can also be grid-tied for net metering through BC Hydro, with a credit paid for excess electricity fed back into the grid.

4.6.7 Other Considerations

There are other considerations raised by landlords that extend beyond the scope of this study, but nevertheless may influence how the incentive program is implemented. The key ones are the following:

- ***Implications of Non-Energy Upgrades.*** By doing a comprehensive building enclosure renewal, a building can effectively reset its clock on exterior building components. Questions were raised during landlord consultations about upgrades to interior systems. In these aging buildings, electrical systems, piping systems, and elevators may also be nearing the end of their useful lives. While some of these upgrades can and have been done while maintaining tenants in place, it can prove challenging, particularly where the loss of an elevator will affect tenant mobility, or where invasive work has the potential to disturb hazardous materials.
- ***Hazardous materials.*** Many building owners expressed reluctance to undertake any work that would potentially disturb hazardous materials, such as asbestos in interior finishes.

  Exterior work can generally be done without disturbing tenants, even if hazardous materials are present. While it is possible to complete interior hazardous materials abatement with occupants in the building, they may need to be temporarily moved, or otherwise vacate their unit for a short period of time. From an owner's perspective, the unknown cost associated with hazardous materials abatement is the major risk in these older buildings, and a potential impediment to undertaking major upgrade work.

- → ***Building Permits.*** Some building owners expressed reluctance to undertake work that required a building permit. Concerns were related to associated costs, time delays, and potential additional work that might be triggered via the permitting process.
- → ***Current Market Conditions.*** Stakeholders noted the impact that the current low vacancy rate has on the market in terms of willingness, need and market advantage to upgrade buildings. Increasing the supply of new market rental stock in the City should be a central part of the strategy for alleviating some of the issues and goals this project seeks to address.

5 Seismic Opportunities

This section describes the opportunities and considerations associated with improving the seismic resiliency of typical 1960s and 1970s purpose built rental buildings within the City of Victoria. It provides some background on what seismic upgrades are typically needed for these buildings and describes a range of potential upgrade options. Finally, it defines key program elements related to seismic upgrades, as illuminated by the analysis and stakeholder input.

5.1 Background on Seismic Performance

It is recognized that structures that were designed and constructed when earlier Building Codes were in effect will not likely meet current BC Building Code design level forces. There will also be increased requirements that will be introduced in the next iteration of the BC Building Code (based on the National Building Code of Canada 2015) when the effects of the Cascadia Subduction Zone are included for seismic design.

The previously completed Victoria Seismic Vulnerability Study overlaid seismically vulnerable building typologies with existing soil conditions, finding that the southeast and southwest corners of the city are vulnerable areas where many older wood frame buildings and concrete buildings are located on soft soils. This is illustrated in *Figure 5-1* below.

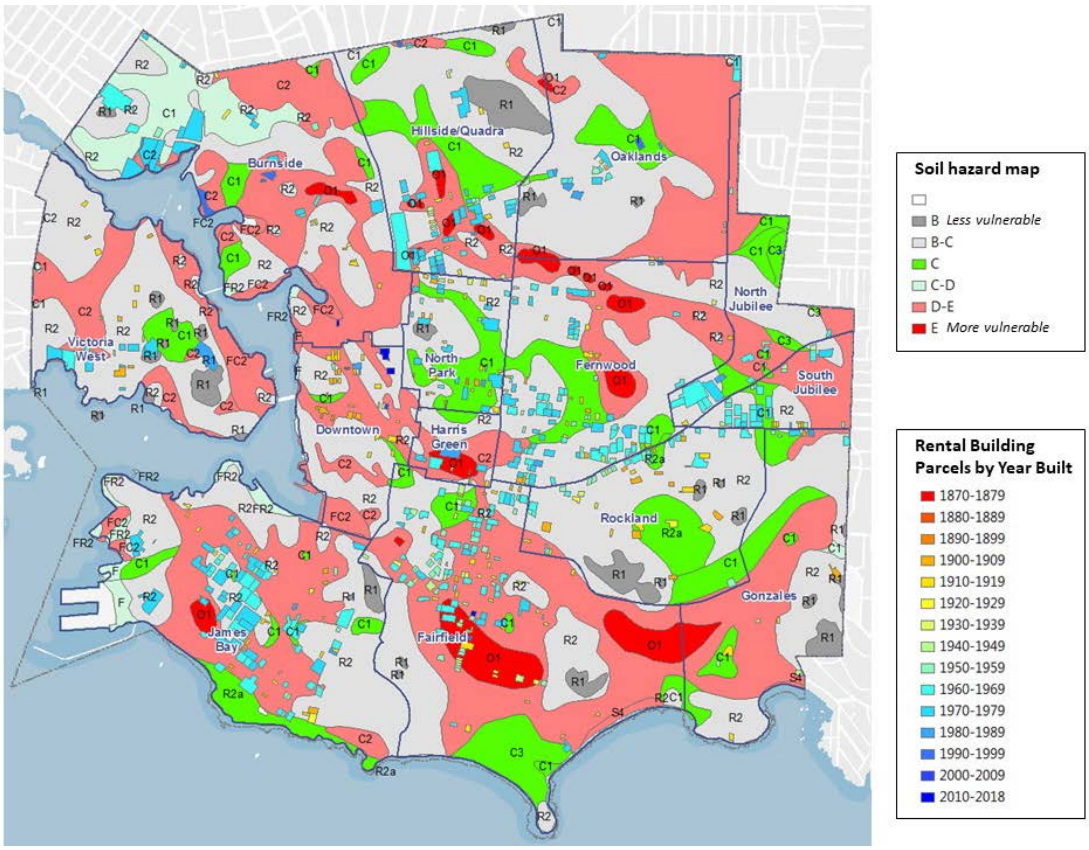


Figure 5-1: Soil hazard map overlaid with rental buildings by year of construction.

The City of Victoria's goal with respect to seismic performance of the current aging building stock is to improve their seismic resiliency, especially where measures to improve seismic performance can be incorporated into other capital improvement projects that may be undertaken by the building owner, while acknowledging that it may not be feasible to bring all older buildings up to current code. Even if not brought up to current code, partial upgrades can still improve life safety for the building occupants during a seismic event, meaning that occupants have a better chance of exiting the building safely. Increased resiliency can also improve the likelihood that the building may remain occupiable (or with fewer repairs required) to allow occupants to return more quickly after a seismic event.

The typical low-rise apartment buildings that are the focus of this study are two- to four-storey wood frame structures. Traditionally, buildings with light wood frame construction have performed relatively well under seismic loading due to their inherent ability to dissipate energy using conventional construction details. However, buildings that were designed to meet resistance requirements specified in building codes in the 1960s and 1970s will not have the capacity to meet current (and near future) code specified forces due to earthquakes. These existing buildings may be improved, however, by enhancing existing seismic resisting elements, or by reducing the demand on existing elements through the introduction of new structural components that contribute to the overall seismic resistance of the building.

5.1.1 Challenges and Opportunities to Improving Seismic Resistance

Challenges to improving seismic resistance of existing buildings include the capital cost of introducing upgraded or new structural elements, which may also include costs due to extending the construction schedule of a capital improvement project. Uncertainty related to the extent of upgrades that may be required, or with the discovery of other hidden deficiencies that increase construction costs are also noted to be a deterrent for considering seismic improvements to an existing building.

Irrespective of these challenges, there are several opportunities for improving seismic resistance of existing building. For example, some of these buildings contain a "weak storey" at the ground level. This often occurs where parking is provided at the main level, with a portion of the building footprint extending over the parking area (see *Figure 5-2*). Adding new seismic resisting measures at the ground floor to address this situation can significantly improve the building's ability to resist seismic forces and provide better life safety to the building occupants during a seismic event. In other cases, strengthening existing wood shear walls (or providing new supplemental shear walls) can also result in performances similar to what could be expected from newly designed structures.

Figure 5-2: Example of tuck-under parking that creates a seismically "weak storey"

5.2 Key Program Elements for Low-Rise Wood Frame Buildings

With the goal of encouraging Building Owners to improve the seismic resiliency of the existing building stock, several potential seismic program elements are proposed as part of the revitalization program. These program elements focus on feasible upgrades for the low-rise wood frame buildings.

5.2.1 Minimum Life Safety Requirements

It is recommended that the City first set a target for the level of seismic performance it would like to see achieved in these older low-rise wood frame apartments. A suggested starting point would be to upgrade the building to meet minimum life safety requirements. This is generally achieved when the upgrade design meets 60% of current

seismic design level forces. Structure damage would still be expected if the structure is subjected to a Code level seismic event, but life safety is improved.

5.2.2 100% of Current Seismic Design Level Forces

A better seismic upgrade design level, meeting 100% of current seismic design level forces, would not only improve life safety, it would likely increase the overall performance of the building during a seismic event. While structure damage may still occur due to an earthquake, the building would likely require less repair to return it to an occupiable state compared to a lower level of seismic improvement or compared to the original design capacity. This would be considered a best-case scenario, but is potentially infeasible or prohibitively costly to implement on these buildings. It may be that some elements of the structure can be economically improved to meet 100% of current seismic design level forces (above ground components such as wood frame shear walls for example) while other components, such as buried concrete foundations, could cost significantly more to improve. However, once improvement steps are taken, in many cases the incremental increase in cost to move from 60% to 100% of current design level forces would not be significant.

5.2.3 Recommended Program Elements

A weighting system and/or checklist approach could be employed to incentivize incrementally depending on whether partial or full upgrades are complete, and to allow implementation over a number of years. This would encourage building owners to take even a first step toward improving the seismic resiliency of their buildings.

Proposed program elements include the following:

1. ***Prerequisite:*** Engage a qualified structural consultant to perform a seismic evaluation of the building to identify opportunities for improving seismic resiliency to meet the target performance level (e.g. 60% of current design levels as a minimum), identify a priority for implementing the improvements, and to establish construction budgets. The estimated cost of this evaluation would be $5-10k. The evaluation would establish a plan of action, including annual budget amounts to implement the seismic upgrades in the order of priority established by the evaluation. This evaluation should also identify opportunities to improve seismic performance in cost effective ways – for example, it may be more economical to add new above grade elements to reduce the loads imposed on existing seismic resisting components to avoid more costly foundation improvements.

   Having an understanding of the various strategies that may be employed to increase seismic resiliency is necessary to determine when it may be advantageous (or where opportunities are available) to include seismic upgrades as part of an overall building improvement program.

2. ***Seismic Upgrade Options – Partial Upgrade:*** Seismic upgrades completed in this manner may address only part of the overall structural upgrade requirements but nonetheless incrementally improve life safety and the building's performance during a seismic event. For example:

   → Address a weak storey to immediately improve life safety. Possible measures include the introduction of new structural steel braced frames between existing

building support columns in the parking area (with possible upgrades to buried concrete foundations). This retrofit measure may reduce available parking. Increasing the size of existing concrete foundation elements may also be required, depending on existing details.

→ Address seismic upgrade measures in parallel with other retrofit work. Possible partial upgrade measures include the introduction of new shear wall elements at exterior walls, when upgrades to glazing and exterior finishes are being performed on the same wall. *Figure 5-3* shows sample detailing of how a new sheer wall might be added.

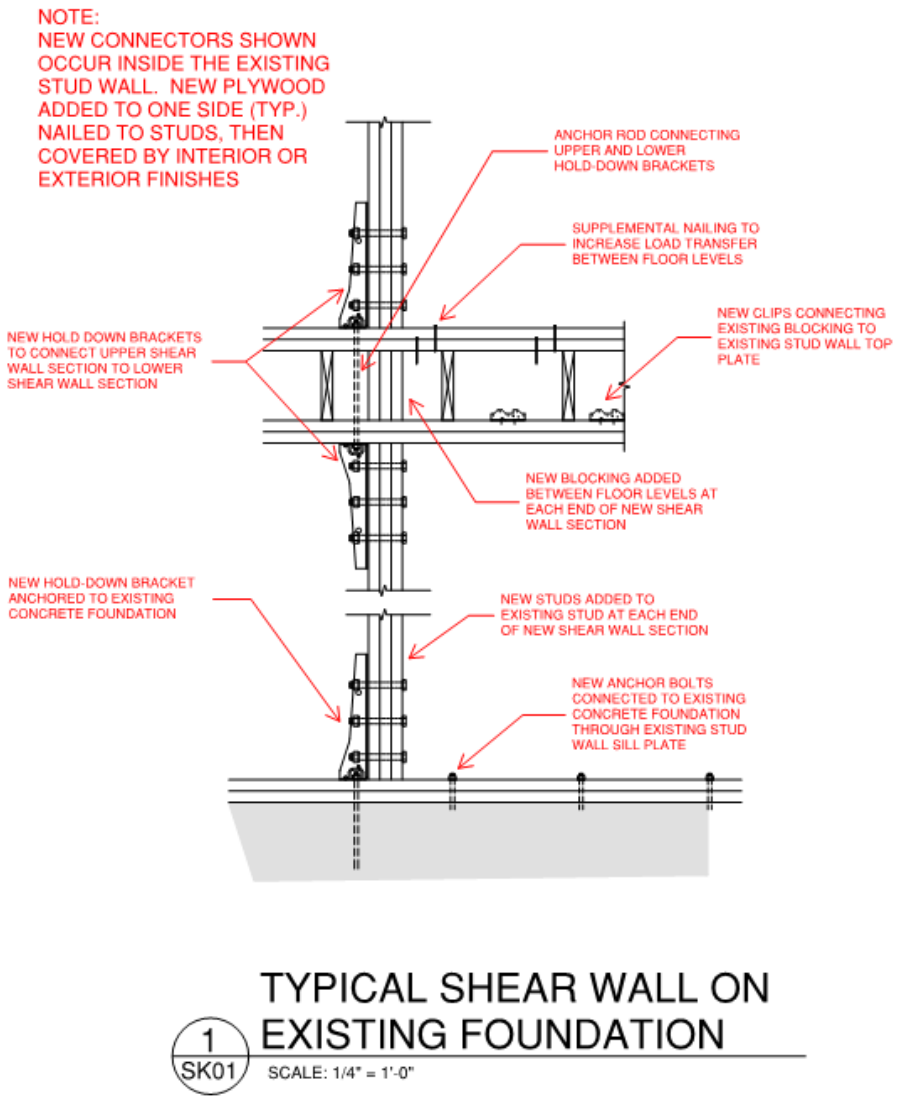


Figure 5-3: Example detail for addition of sheer wall to existing structure

3. ***Seismic Upgrade Options – Full Upgrade:*** Seismic upgrades completed in this manner would address all of the structural upgrade requirements identified in the evaluation to meet the City's targeted performance level. This would include the types of measures identified in the Partial Upgrade scenario, but would likely also include interior-focused elements. For example:

- → Introduce interior shear walls at selected party walls in empty units, when a tenant moves out or relocates to another unit in the building. This work could be completed in a phased manner, timed with tenant turnover.
- → Introduce new shear walls in common corridors and in some selected party walls between units. Example interior and exterior shear wall locations are shown in *Figure 5-4* below.
- → Upgrades to concrete foundation elements at interior areas of the building, where required.

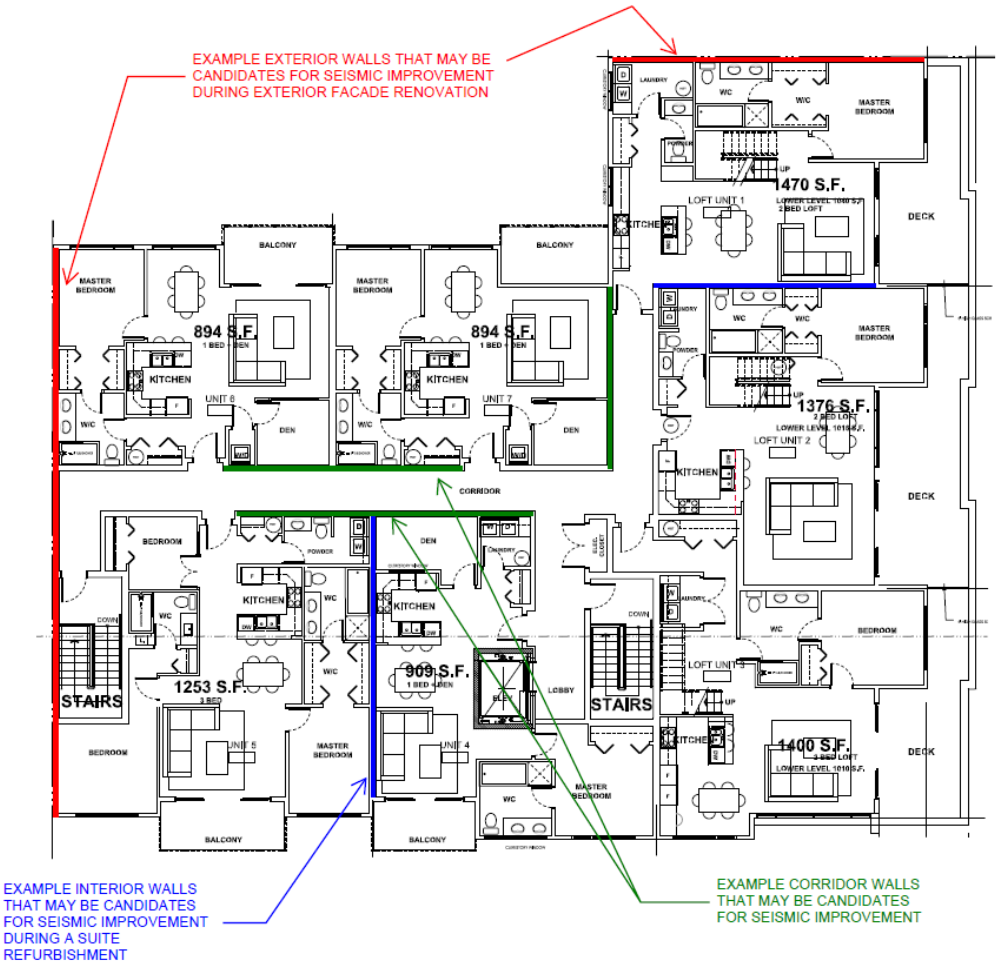


Figure 5-4: Potential Shear Wall Improvement Locations, Interior and Exterior

5.3 High-Rise Concrete Buildings

This building type is a multi-storey cast in place concrete structure, in the order of 100,000 square feet with thirteen or more floors. Concrete buildings designed to earlier building bodes are often lacking in construction detailing that is required under more recent codes, which are intended to make the building's lateral resisting system behave in a more ductile manner during seismic events. Older construction details have a limited ability to absorb forces during seismic events, and so must be designed to resist higher forces than buildings specially detailed to meet current ductility requirements.

It is recognized that seismic upgrades to concrete buildings require significantly more intervention, cause greater disruption to building occupants, and may be cost prohibitive when compared to upgrading low rise wood frame structures. For this reason, it is not recommended to be included in the first iteration of a City-developed incentive program, and further study and exploration of ways of improving seismic resilience in this archetype should be the focus of future work. If considering a seismic upgrade for this prototype, the following may be considered:

- → Engage a qualified structural consultant to perform a seismic evaluation of the building to identify opportunities for improving seismic resiliency, identify a priority for implementing the improvements, and to establish construction budgets.
- → Retrofit measures may include the introduction of new concrete shear walls or structural steel braced frames to supplement existing concrete shear walls that are under-designed for current code level requirements.
- → Interior work may be anticipated to have a more significant effect on unit layouts, and may require reconfiguration of selected units, including possible loss of area due to the introduction of new structural elements.
- → Retrofit work may include upgrades to existing concrete foundations, or require installation of new concrete foundations.

6 Incentive Program

The intent of a City-developed incentive program is to improve energy performance and seismic resilience of the city's aging rental apartment buildings, while retaining tenant stability. The program will be deemed successful if it supports building owners to improve their buildings beyond like-for-like replacement, and it is done in a way that is supportive of tenants and does not inadvertently lead to tenant displacement.

The SOM will be adopted independent of a rental revitalization program, as it is intended to harmonize and consolidate a basic standard of care for all rental properties in the city.

The TAP will also apply more broadly to projects than those captured by a rental revitalization program, but that address a long-standing gap in standards and best practices to guide building owners and tenants in cases of redevelopment or extensive renovation in which tenant safety is at risk. It is not the intent for the incentive program to facilitate displacement of tenants, but rather to encourage retention and demonstrate feasible methods of achieving upgrades without tenant displacement. The upgrades that are captured in this incentive program can be undertaken without tenant displacement.

The discussion that follows is therefore focused on incentive options that would be attached to the incremental energy and seismic improvements, with a pre-requisite to comply with the TAP in the rare cases that require tenant displacement.

6.1 Proposed Incentive Options

As touched on in previous sections, access to the incentive program would require meeting program prerequisites. These are summarized in below.

TABLE 6-1: RECOMMENDED PROGRAM PREREQUISITES	
Prerequisite:	**Rationale:**
No tenant displacement. In exceptional circumstances where displacement is required, adherence to Tenant Assistance Policy	One of the key drivers of the Rental Revitalization program is to provide tenant stability measures. While the program is seeking ways encourage "better than basic asset replacement" upgrades when an owner decides to do upgrades, the City intends to only incentivize projects that provide tenant stability measures.
Conduct energy, condition, and seismic assessment	Every building is in a different state of condition, and present different opportunities for upgrades. An assessment helps to prioritize and be strategic with investment. Cost: $15,000-$20,000 *Note this pre-requisite could be waived if a building implements "best in class" upgrades, for example Passive House certified windows.
Share energy consumption data over time with City of Victoria through Energy Star Portfolio Manager	Portfolio Manager[20] is a free online tool for tracking energy and water consumption over time, and sharing energy consumption data or "benchmarking" has been identified as a strategy for improving energy literacy in the Climate Leadership Plan. Establishing an Energy Star Portfolio Manager account is a small undertaking and should take a property owner no more than 1-2 hours to set up.

After meeting the pre-requisites, it is proposed that incentives be offered on a tiered basis according to the number of measures implemented and/or on their relative energy, greenhouse gas and/or seismic impact. These incentives may include the following:

- → Assistance in connecting to existing rebate programs (e.g., Fortis BC's Rental Apartment Efficiency Program, future Provincial retrofit program, others).
- → Expedited permitting. This would alleviate some of the challenges that landlords expressed with working a project through the approvals process. Additional guidelines specific to rental building retrofit projects could also be provided.
- → Building permit rebates. This would alleviate some of the upfront costs associated with proceeding through a formal permitting process.
- → Tiered property tax holiday in designated geographic areas in the city. This would be offered in a specified region of the city (for example, the proposed "rental retention area' in Fairfield may be a suitable candidate), structured in a similar way to the City's Tax Incentive Program for heritage buildings, and would be rolled out on a pilot basis to test efficacy. The city must balance multiple priorities: on the one hand, progressing toward its Housing Strategy and Climate

[20] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager

Action Plan commitments, and on the other, the impact of lost revenue from reduced property taxes that would have to be compensated for elsewhere.

Below is an example of how these tiered incentives could be offered, along with their relative impact and incremental costs. Costs and GHG savings are presented for the all-gas low-rise apartment with elevator (costs will vary for other building types, and tend to be higher per suite for the smallest buildings and lower per suite for the largest buildings). The City would aim to offset a portion of the incremental cost through one or more of the incentive strategies listed.

TABLE 6-2: TIERED INCENTIVE OPTIONS

Basic Asset Renewal ("Good")			
	GHG Savings Potential:	**Incremental Cost:**	**Potential incentive/support:**
Energy Improvements:			
Cladding Renewal with incidental air leakage improvement	11%	N/A	Facilitated access to existing rebates/retrofit programs
Code minimum window replacement			
Code minimum boiler and domestic hot water heater replacement			
Seismic Improvements:			
N/A			
Some Energy/GHG and Seismic Upgrades ("Better")			
	GHG Savings Potential:	**Incremental Cost:**	**Potential incentive/support:**
Energy Improvements:			
Cladding Renewal with exterior insulation and intentional air barrier detailing	39%	~$3,400/Suite ~$150,000 total for 44-unit sample archetype	Facilitated access to existing rebates/retrofit programs Funding for enclosure, energy, seismic needs/potential evaluation (~$20k) Expedited permitting Building permit rebates
Better than code minimum window replacement			
Better than code minimum boiler and domestic hot water heater replacement			
Added roof insulation with roof replacement			
Partial building DHW plumbing fixture upgrade (showerheads and faucets)			
LED lighting in common areas			
Seismic Improvements:			

TABLE 6-2: TIERED INCENTIVE OPTIONS			
Complete partial seismic upgrade (exterior walls)	N/A	~$3,300/suite	Same as above
Complete partial seismic upgrade (interior walls)	N/A	~$13,000/suite	
Energy/GHG and Seismic as a Priority ("Best")			
	GHG Savings Potential:	**Incremental Cost:**	**Potential incentive/support:**
Energy Improvements:			
Cladding Renewal with more exterior insulation and intentional air barrier detailing	59%	~$9,200/suite ~$400,000 total for 44-unit sample archetype	Facilitated access to existing rebates/retrofit programs Funding for enclosure, energy, seismic needs/potential evaluation (~$20k) Expedited permitting Building permit rebates Property tax holiday
Window replacement with highest performing windows (triple glazed)			
Highest efficiency boiler and domestic hot water heater replacement			
More roof insulation with roof replacement			
Full building DHW plumbing fixture upgrade (showerheads and faucets)			
LED lighting in common areas and suites			
Seismic Improvements:			
Complete full upgrade (including foundations)		$42,000-$53,000/suite	Same as above

One component of the program that the above examples do not illustrate is how incentives could be accessed as projects are implemented over time. One proposed strategy is to offer the energy and seismic upgrades in a checklist format, prioritized according to level of impact. The more, higher impact measures a building implements, the greater the incentive. Also, as mentioned previously, prescriptive incentives could be offered for "best in class" upgrades, such as Passive House certified windows, or CO_2 heat pumps. This list may evolve over time as new technologies and product options are developed and become more locally available.

As an illustration, the modeled energy conservation measures (ECMs) are ordered below for the **all-gas low-rise apartment with elevator**, in terms of estimated magnitude of GHG reduction potential. The more, higher impact measures are implemented, the greater the incentive that could be offered.

TABLE 6-3: ESTIMATED GHG IMPACT OF INDIVIDUAL ECMS		
Building Component	**ECM**	**GHG Reduction Potential**
Windows	U-0.17	V. High

TABLE 6-3: ESTIMATED GHG IMPACT OF INDIVIDUAL ECMS		
HRVs	In-suite, 70% efficient	V.High
Windows	U-0.28	High
Airtightness	50% improved	High
Wall R-value	+R-15	High
Space heating (gas)	93% efficient	High
DHW heating (gas)	93% efficient	High
DHW fixtures	100% replaced	High
Windows	U-0.40	Med
Airtightness	10% improved	Med
Roof R-value	+R-20	Med
Wall R-value	+R-5	Med
Space heating (gas)	87%	Med
DHW heating (gas)	87%	Med
DHW fixtures	50% replaced	Med
Roof R-value	+R-10	Med
Ventilation - MUA	reduce to 15 cfm/suite	Med
Lighting	LEDs in common areas	Low
Lighting	LEDs throughout	Low
Lighting Controls	Occupancy sensors	Low

This list is intended as an illustration. To further refine a list such as this, individual ECMs would need to be modeled separately.

6.2 Density Bonuses

In cases where property owners are exploring the potential for added density on sites with an existing rental building (e.g., the property has large surface parking lot or where an additional storey may be feasible), the program could provide policy guidance to encourage retention of existing rental units while simultaneously creating new rental stock.

This would be most feasible on sites that still have available density and/or that have a large surface parking area. Parking requirements would have to be considered as part of this scenario.

In reviewing the 54 building for which the high level visual assessments were completed, 48 out of 54 buildings had some surface level parking, and about one-third of these buildings had roughly half or more of their total property area in an open, “buildable” (i.e. more or less rectangular) configuration, where addition of density might be a possibility. Additional investigation would be required to establish how many and which properties within the larger inventory of targeted building have true added-density potential.

6.3 Ambassador Position

Emerging from both the policy development work and the energy and seismic incentive work was a common desire to have a resource available to guide building owners and tenants through the policy and incentive processes. This resource person or people could keep abreast of complementary incentive programs being offered through utilities, the province or other sources, assist building owners with benchmarking, as well as direct stakeholders through the TAP and/or SOM process. This need would likely best be met with one resource person dedicated to TAP and SOM questions and another person for energy and seismic incentive program related questions.

In some cases, tenant housing instability and displacement may result simply from the lack of awareness of the existing regulations, or the tenants' limited time or resources to pursue their rights as granted by the RTA. In these cases, rather than creating new municipal policies, regulations, or bylaws, which can be resource-intensive to develop and enforce, a more effective use of resources may be in supporting tenants in navigating the existing regulatory framework. The City of New Westminster, for example, places an emphasis on providing tenant resources and information to tenants. The City of Victoria may consider dedicating resources to tenant advocacy and support, whether it is grants or funding to existing tenant advocacy group or developing an advocacy role within the City itself.

6.4 Net Zero Pilot

The City may consider additional modeling and costing to quantify a "net-zero", "net-zero ready", and/or Passive House retrofit (EnerPHit) scenario for one or more of the targeted building types. It could then seek out the most pro-active building owners to pilot and showcase a 'best in class" deep energy retrofit for rental apartment buildings.

7 Closure

We trust this report fulfills the expectations as laid out in RFP 17-082 Market Rental Revitalization Study. We look forward to receiving and incorporating City and Council feedback prior to finalizing.

Yours truly,

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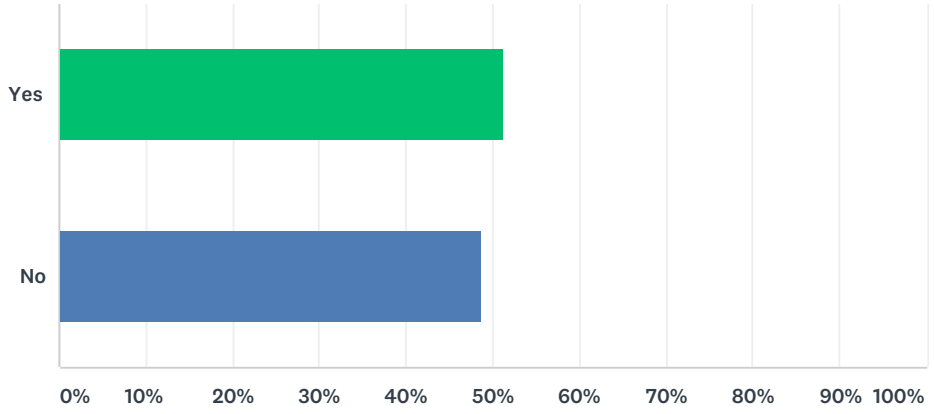
Appendix A: Landlord Survey Results

Q1 Do you or your company own or manage a purpose-built rental apartment building or buildings located in the City of Victoria?

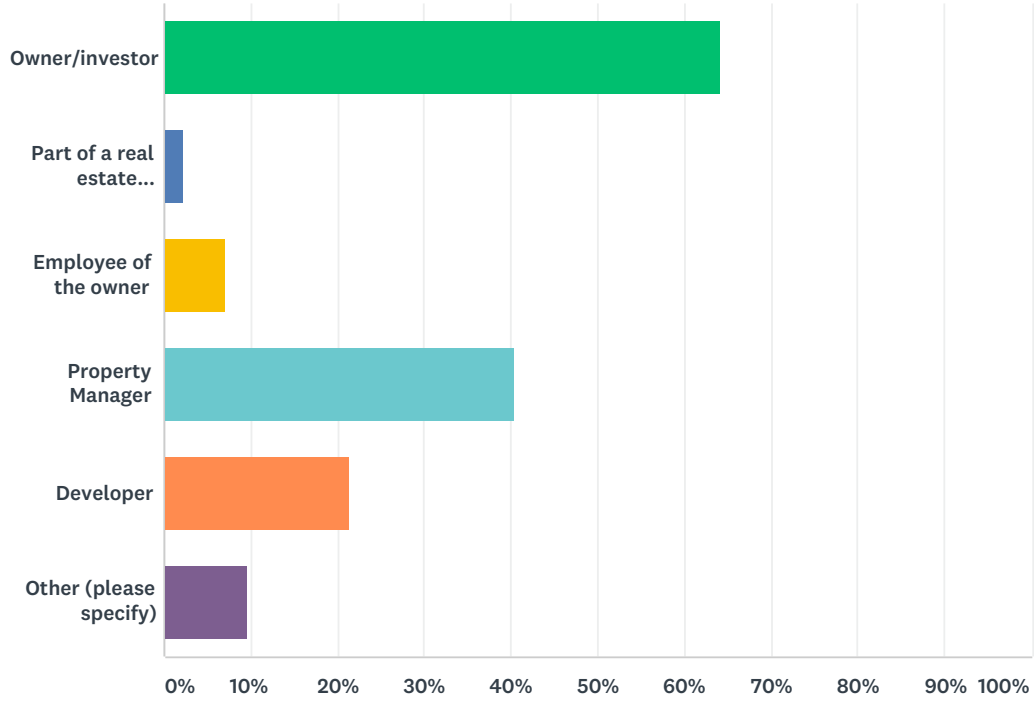
Answered: 84 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	51.19%	43
No	48.81%	41
TOTAL		84

Q2 Which best describes your role? (Check all that apply):

Answered: 42 Skipped: 42

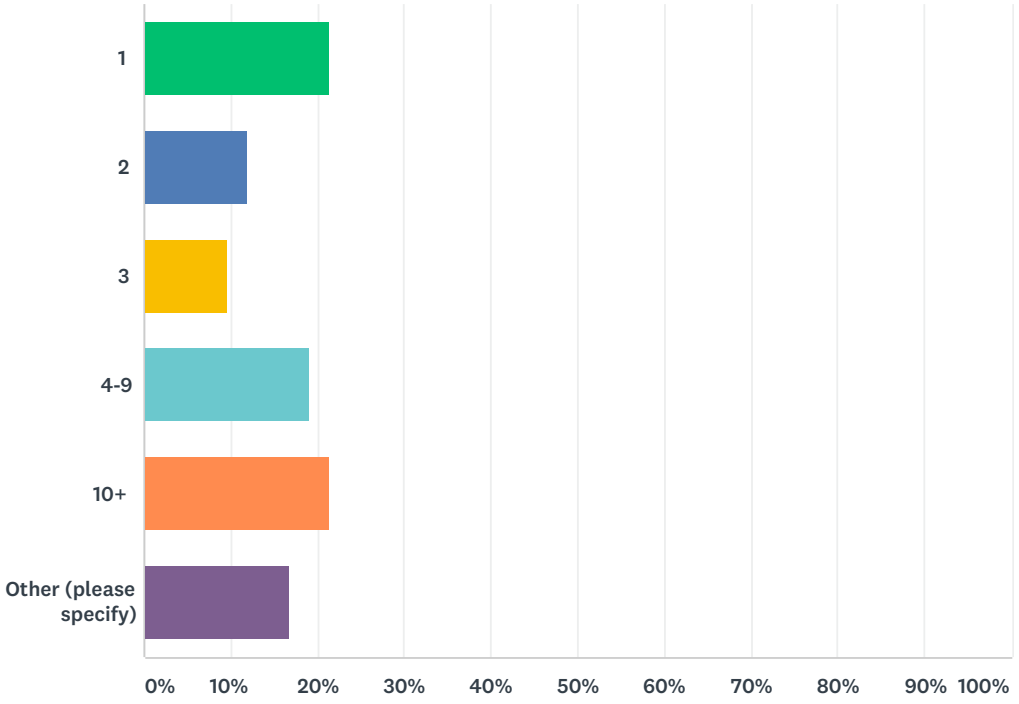


ANSWER CHOICES	RESPONSES	
Owner/investor	64.29%	27
Part of a real estate investment trust	2.38%	1
Employee of the owner	7.14%	3
Property Manager	40.48%	17
Developer	21.43%	9
Other (please specify)	9.52%	4
Total Respondents: 42		

#	OTHER (PLEASE SPECIFY)	DATE
1	non profit housing provider	2/14/2018 9:40 AM
2	Municipal Government	1/24/2018 4:00 PM
3	Planner, project manager	1/24/2018 10:24 AM
4	This is Christy - testing the survey - do not include in results!	1/22/2018 7:44 AM

Q3 How many rental apartment properties do you or your company own or manage?

Answered: 42 Skipped: 42

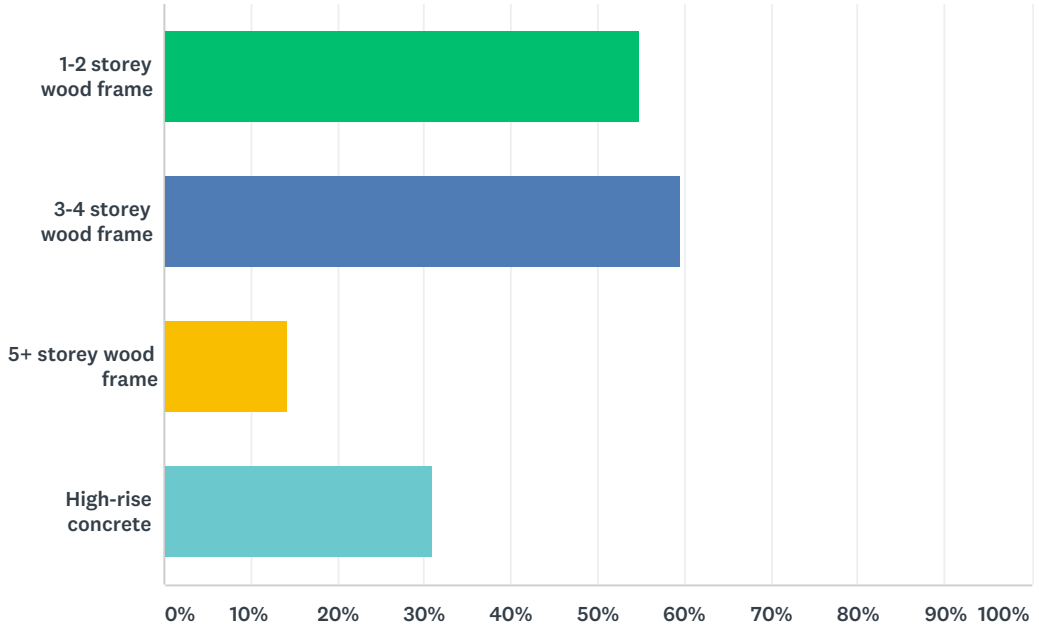


ANSWER CHOICES	RESPONSES	
1	21.43%	9
2	11.90%	5
3	9.52%	4
4-9	19.05%	8
10+	21.43%	9
Other (please specify)	16.67%	7
Total Respondents: 42		

#	OTHER (PLEASE SPECIFY)	DATE
1	700+	2/2/2018 1:02 PM
2	200	1/28/2018 2:01 PM
3	37	1/24/2018 5:41 PM
4	0	1/24/2018 4:00 PM
5	100+	1/24/2018 9:17 AM
6	5000+	1/24/2018 8:58 AM
7	N/A	1/22/2018 7:44 AM

Q4 Which building type best describes your rental building/buildings? (check all that apply)

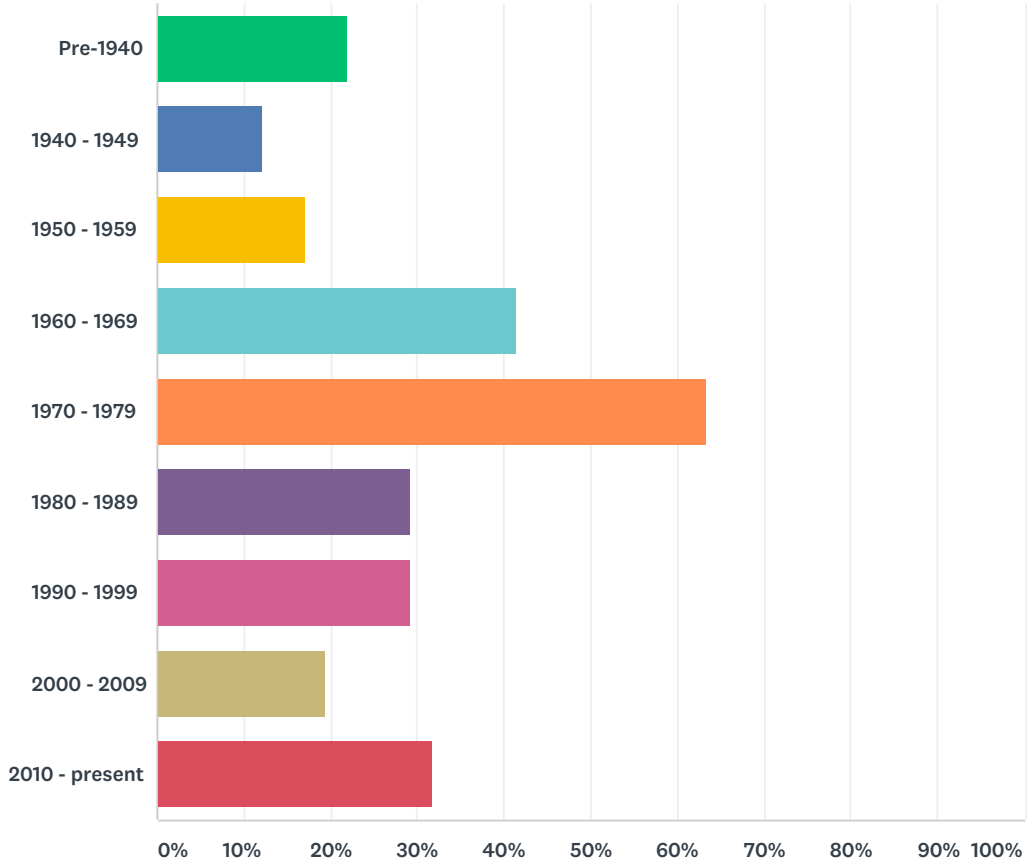
Answered: 42 Skipped: 42



ANSWER CHOICES	RESPONSES	
1-2 storey wood frame	54.76%	23
3-4 storey wood frame	59.52%	25
5+ storey wood frame	14.29%	6
High-rise concrete	30.95%	13
Total Respondents: 42		

Q5 When was your building(s) constructed? (check all that apply)

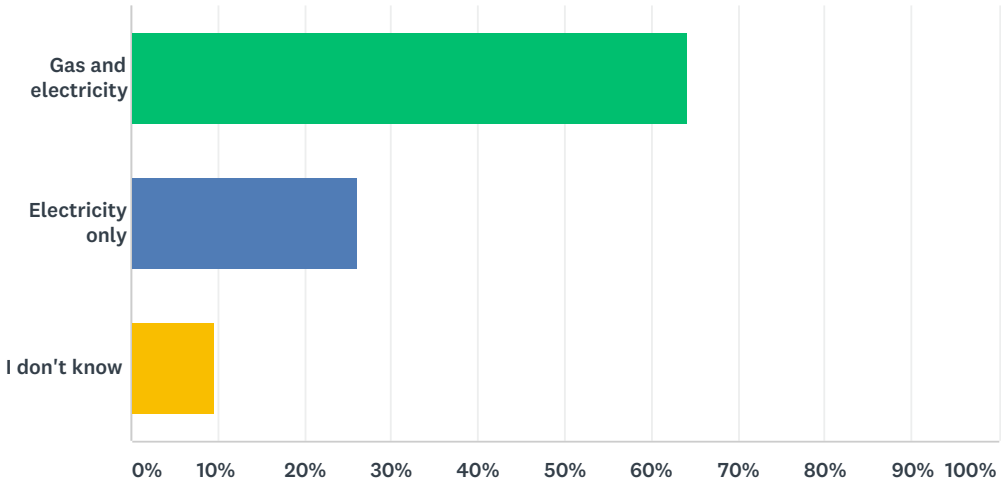
Answered: 41 Skipped: 43



ANSWER CHOICES	RESPONSES	
Pre-1940	21.95%	9
1940 - 1949	12.20%	5
1950 - 1959	17.07%	7
1960 - 1969	41.46%	17
1970 - 1979	63.41%	26
1980 - 1989	29.27%	12
1990 - 1999	29.27%	12
2000 - 2009	19.51%	8
2010 - present	31.71%	13
Total Respondents: 41		

Q6 Which utilities are used in common areas

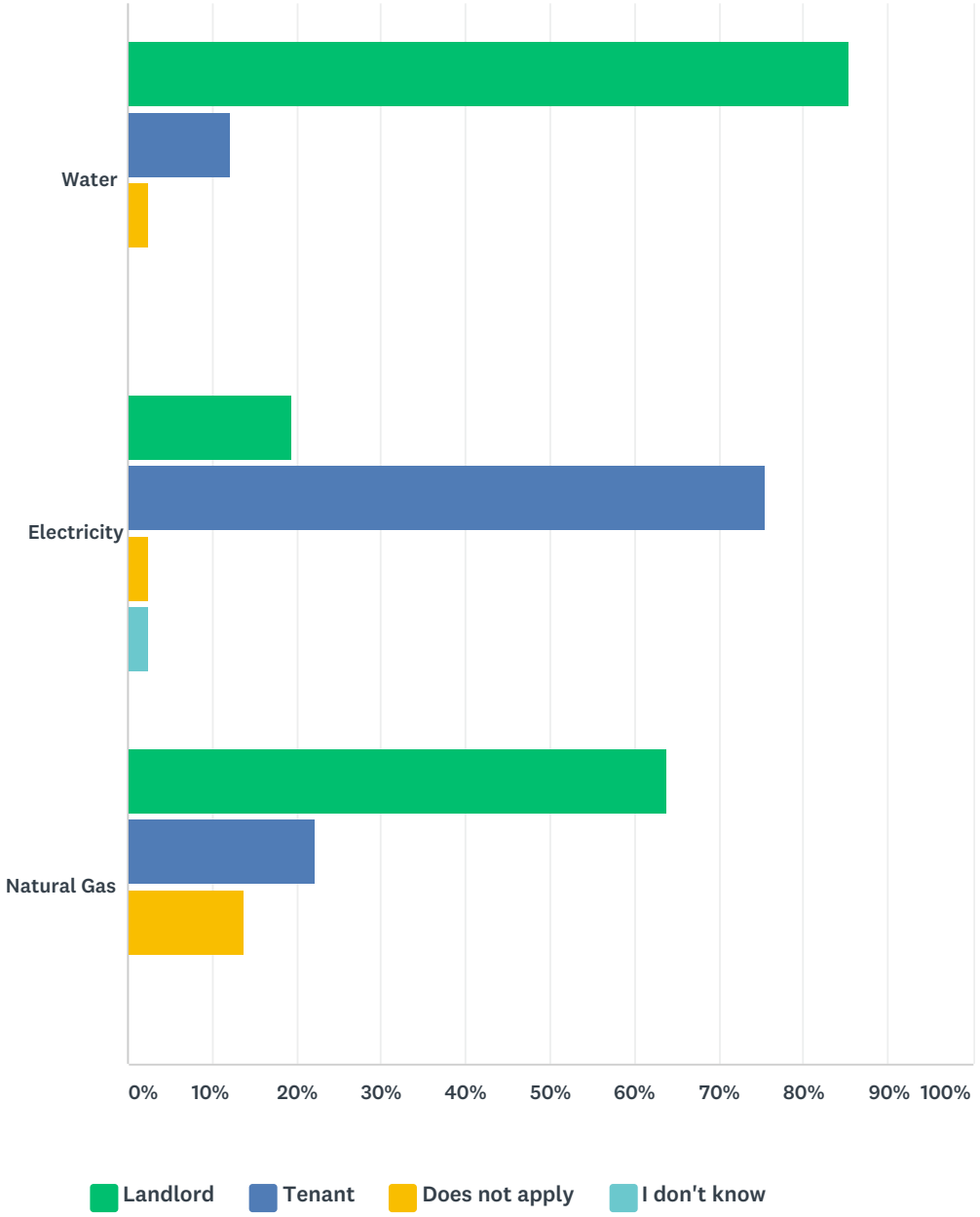
Answered: 42 Skipped: 42



ANSWER CHOICES	RESPONSES	
Gas and electricity	64.29%	27
Electricity only	26.19%	11
I don't know	9.52%	4
TOTAL		42

Q7 Who is billed for utilities in occupied suites?

Answered: 41 Skipped: 43



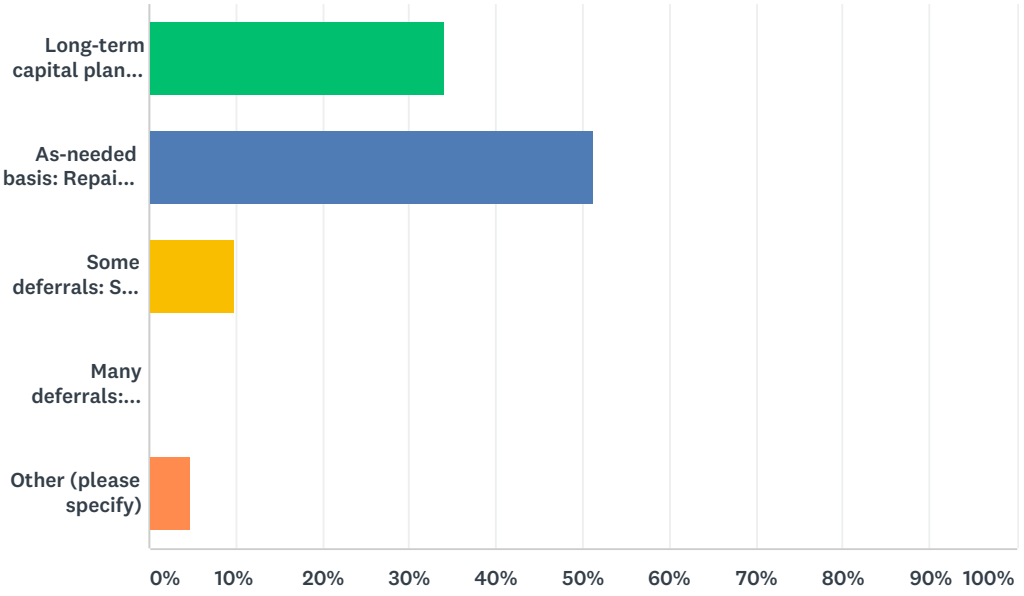
	LANDLORD	TENANT	DOES NOT APPLY	I DON'T KNOW	TOTAL
Water	85.37% 35	12.20% 5	2.44% 1	0.00% 0	41
Electricity	19.51% 8	75.61% 31	2.44% 1	2.44% 1	41
Natural Gas	63.89% 23	22.22% 8	13.89% 5	0.00% 0	36

#	OTHER (PLEASE SPECIFY)	DATE
1	depends on the building, some are both landlord and tenant depending on the meter	2/16/2018 11:36 AM

2	different arrangements for different buildings	2/14/2018 9:42 AM
3	oil	2/3/2018 7:02 PM
4	we have a mix on Electricity	2/2/2018 1:03 PM
5	In some buildings landlord pays electricity	1/24/2018 10:26 AM
6	I pay electricity in the high rise	1/24/2018 8:29 AM

Q8 Which of the following best describes your approach to planning capital upgrades and capital repairs?

Answered: 41 Skipped: 43

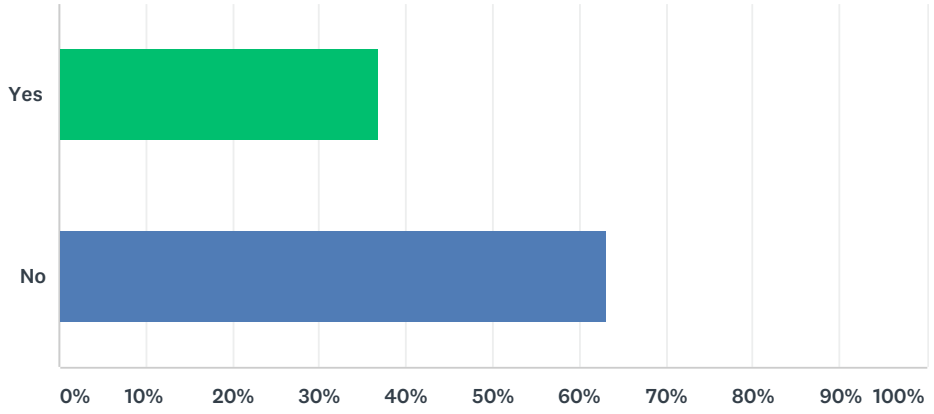


ANSWER CHOICES	RESPONSES	
Long-term capital plan: Repairs and upgrades are generally done according to a long-term plan	34.15%	14
As-needed basis: Repairs and upgrades are generally done promptly, as they are required.	51.22%	21
Some deferrals: Some needed repairs are being deferred.	9.76%	4
Many deferrals: Significant and important repairs and upgrades are being deferred.	0.00%	0
Other (please specify)	4.88%	2
TOTAL		41

#	OTHER (PLEASE SPECIFY)	DATE
1	All of the above. Capital plans (within a budget), deferrals, and as needed.	1/24/2018 10:29 AM
2	We have a mix of inventory to hold and to demolition for a rental development - therefore it depends on the goal of the acquisition	1/24/2018 8:46 AM

Q9 If you or your company own or manage multiple buildings, does this approach vary by building?

Answered: 38 Skipped: 46

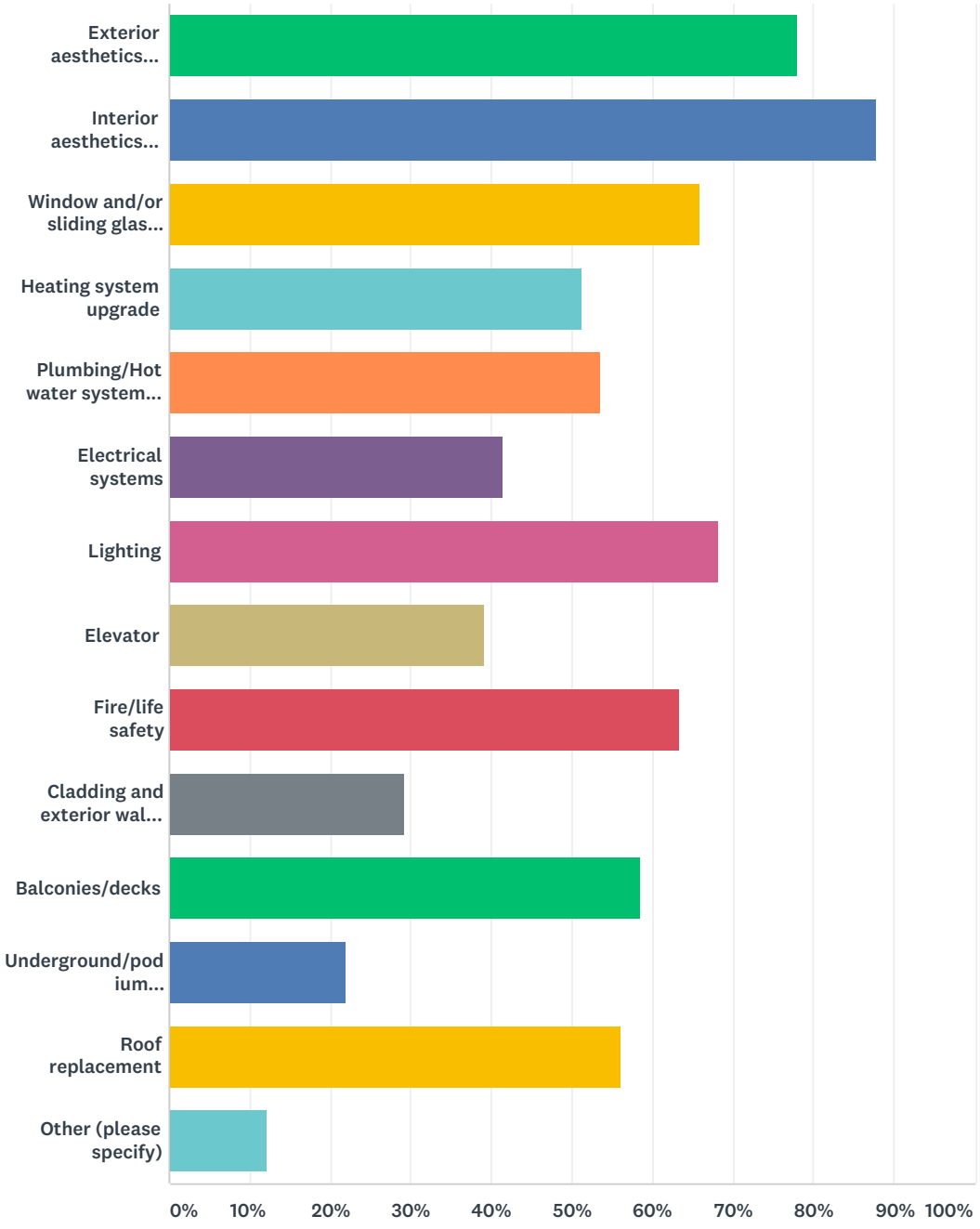


ANSWER CHOICES	RESPONSES	
Yes	36.84%	14
No	63.16%	24
TOTAL		38

#	IF YES, PLEASE SPECIFY	DATE
1	higher cost items are repaired until budget allows for replacement	2/16/2018 11:37 AM
2	Fixes as funding available, emergency repairs as needed	2/14/2018 9:42 AM
3	Some are slated for redevelopment so they are maintained until financing rezoning and permits are obtained. Sadly sometimes a multi year process.	2/2/2018 1:05 PM
4	Depending on the predicted lifespan of the building and costs to operate old building technology	1/28/2018 2:50 PM
5	It depends on the condition of the building and general attributes. Some have no balconies some do, some have sloped roof systems others do not, some have hotwater heat, others do not, some are stucco others are brick	1/24/2018 9:36 AM
6	Various ownership groups have various expense management and capital allocation strategies, which we operate under as directed.	1/24/2018 9:28 AM
7	We have a mix of inventory to hold and to demolition for a rental development - therefore it depends on the goal of the acquisition	1/24/2018 8:46 AM
8	Depends on the age of the building. They all have individual needs due to different ages and different wear and tear.	1/24/2018 8:44 AM

Q10 What types of capital projects have you completed at your rental property in the last 10 years? (check all that apply)

Answered: 41 Skipped: 43



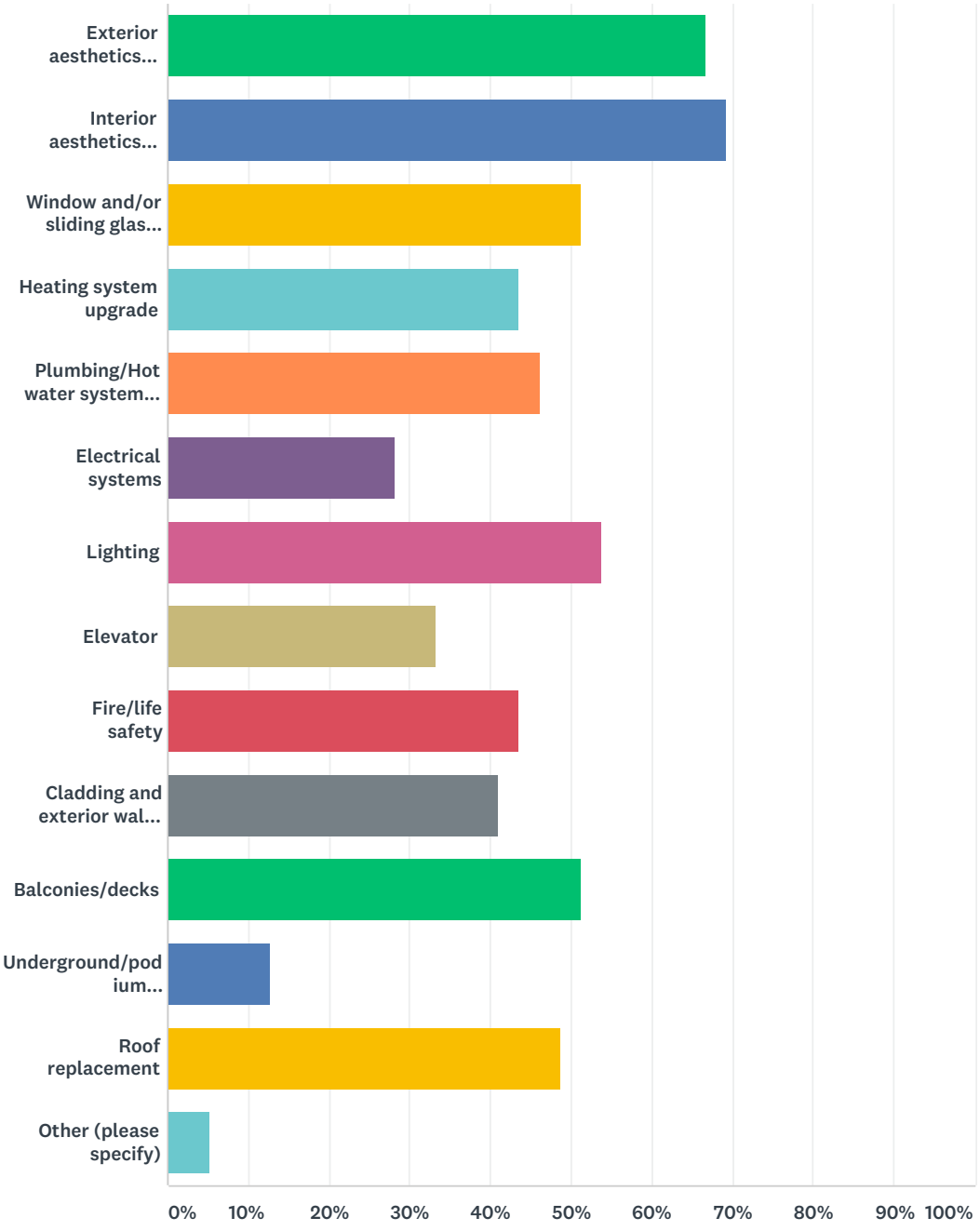
ANSWER CHOICES	RESPONSES	
Exterior aesthetics (e.g. paint)	78.05%	32
Interior aesthetics (e.g. corridors, kitchen/bathroom upgrades, flooring, interior paint)	87.80%	36
Window and/or sliding glass door replacement	65.85%	27
Heating system upgrade	51.22%	21

Plumbing/Hot water system upgrade	53.66%	22
Electrical systems	41.46%	17
Lighting	68.29%	28
Elevator	39.02%	16
Fire/life safety	63.41%	26
Cladding and exterior wall upgrade	29.27%	12
Balconies/decks	58.54%	24
Underground/podium waterproofing	21.95%	9
Roof replacement	56.10%	23
Other (please specify)	12.20%	5
Total Respondents: 41		

#	OTHER (PLEASE SPECIFY)	DATE
1	None as all buildings are less than 5 years old	2/16/2018 11:09 AM
2	New building....built 2015	2/4/2018 9:49 AM
3	None	2/2/2018 7:18 PM
4	parkade renovation, storm and sanitary sewer connection upgrades, foundation failure repair	1/28/2018 2:07 PM
5	Typo in question - ...have you completed "at" your...	1/22/2018 7:48 AM

Q11 What types of capital projects are you most likely to complete in the next 10 years? (check all that apply)

Answered: 39 Skipped: 45



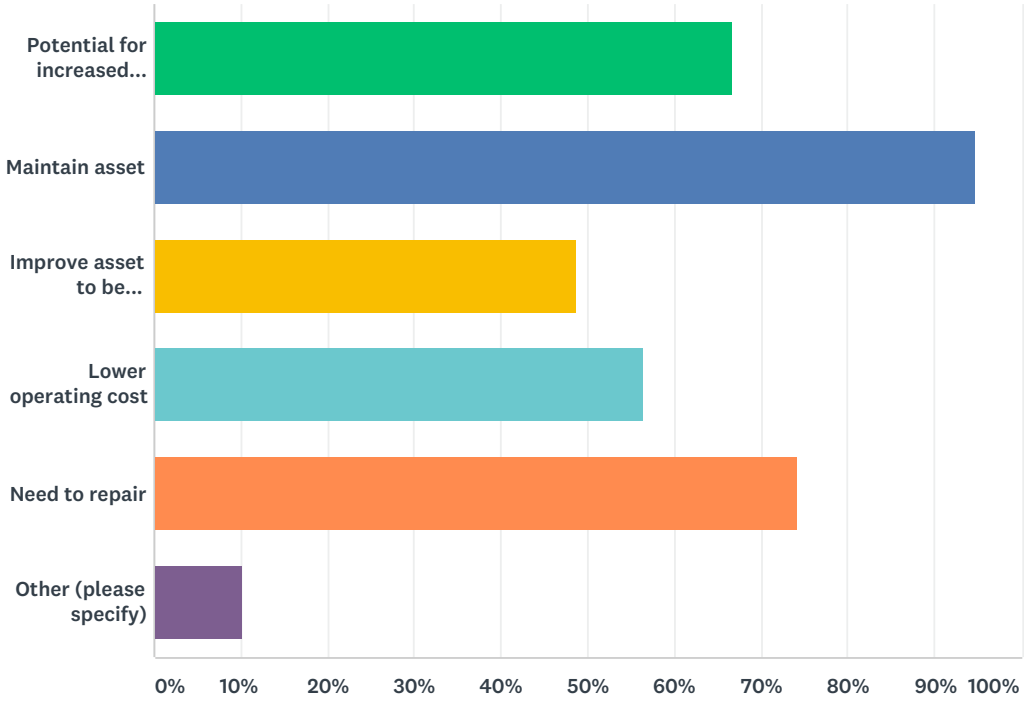
ANSWER CHOICES	RESPONSES	
Exterior aesthetics (e.g. paint)	66.67%	26
Interior aesthetics (e.g. corridors, kitchen/bathroom upgrades, flooring, interior paint)	69.23%	27
Window and/or sliding glass door replacement	51.28%	20
Heating system upgrade	43.59%	17

Plumbing/Hot water system upgrade	46.15%	18
Electrical systems	28.21%	11
Lighting	53.85%	21
Elevator	33.33%	13
Fire/life safety	43.59%	17
Cladding and exterior wall upgrade	41.03%	16
Balconies/decks	51.28%	20
Underground/podium waterproofing	12.82%	5
Roof replacement	48.72%	19
Other (please specify)	5.13%	2
Total Respondents: 39		

#	OTHER (PLEASE SPECIFY)	DATE
1	bicycle parking upgrades	2/14/2018 9:43 AM
2	Minor work as new building	2/4/2018 9:49 AM

Q12 What are some motivations to drive capital projects in your rental property/properties? (check all that apply)

Answered: 39 Skipped: 45

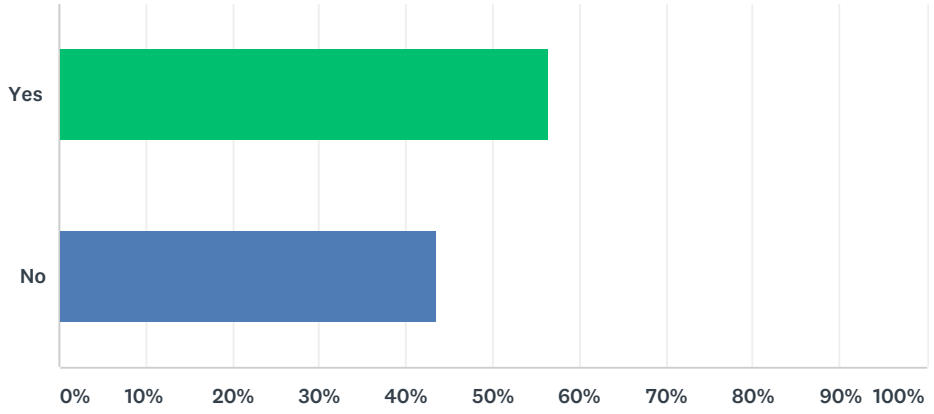


ANSWER CHOICES	RESPONSES	
Potential for increased revenue	66.67%	26
Maintain asset	94.87%	37
Improve asset to be competitive	48.72%	19
Lower operating cost	56.41%	22
Need to repair	74.36%	29
Other (please specify)	10.26%	4
Total Respondents: 39		

#	OTHER (PLEASE SPECIFY)	DATE
1	To get higher denseities and lower operating costs.	2/2/2018 1:09 PM
2	To access Subsidies	1/28/2018 2:52 PM
3	tenant safety, reduce risk	1/28/2018 2:11 PM
4	In question wording, add "property/properties"	1/22/2018 7:49 AM

Q13 Have you considered or are you considering upgrades beyond like-for-like replacement of your building assets?

Answered: 39 Skipped: 45



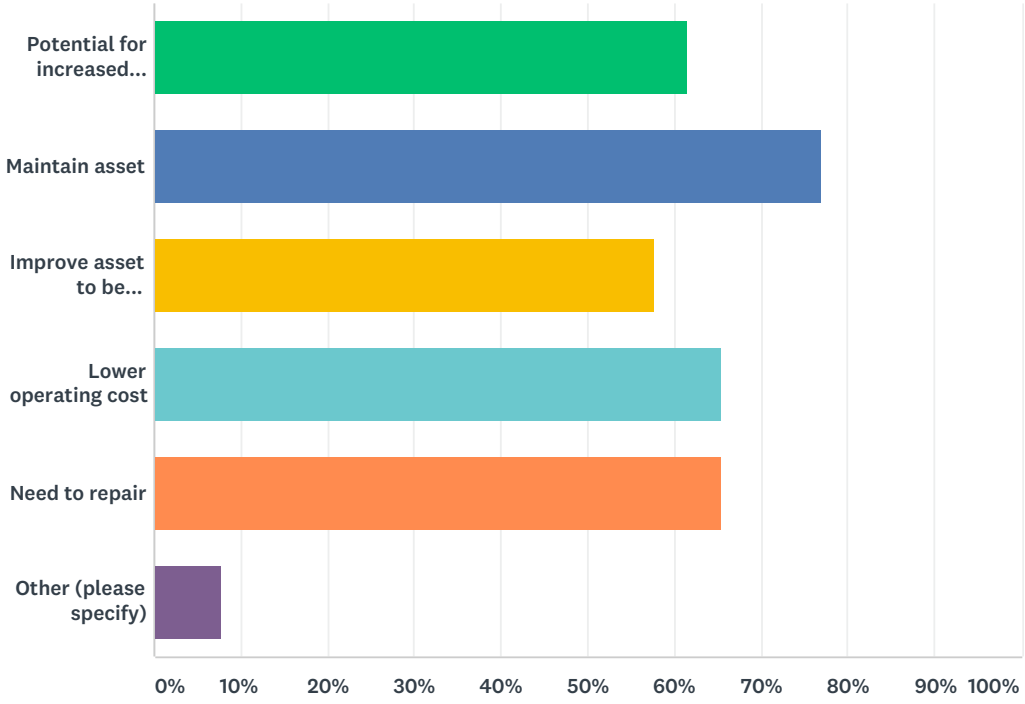
ANSWER CHOICES	RESPONSES	
Yes	56.41%	22
No	43.59%	17
TOTAL		39

#	IF YES, PLEASE SPECIFY	DATE
1	improvements for safety, upgrade appliances	2/14/2018 9:44 AM
2	One thing that is problematic is how the CRA treats some of these upgrades. If you are doing a like for like replacement on a roof, for example, for a building that has been owned for a long time you can actually expense the roof upgrade during the tax year. If you upgrade the roof at all it is considered a capital expense, meaning it needs to be paid for with after tax dollars. Sometimes this makes us reconsider upgrades rather than a like for like replacement.	2/13/2018 1:12 PM
3	New building	2/4/2018 9:49 AM
4	Bigger buildings better layouts, more accessible units. Greener buildings.	2/2/2018 1:09 PM
5	Plumbing overhaul	1/28/2018 2:52 PM
6	Apartment design and layouts, plumbing and electrical systems are out of date and no longer meet needs of tenants	1/28/2018 2:11 PM
7	Try to always improve each element - i.e. if an aluminum window is replaced, use a more thermally efficient vinyl. Or it drainage is repaired, improve the system during repair	1/24/2018 11:13 AM
8	increased energy efficiency for cost savings.	1/24/2018 10:32 AM
9	If I understand the question, we on occasion upgrade the exterior cladding to better quality products, replace copper and steel plumbing systems with galvanized and stainless steel and pex. etc. Improve elevator technologies.	1/24/2018 9:38 AM
10	Cost benefit analysis -- across small to medium size upgrades, all the way to redevelopment of the land.	1/24/2018 9:30 AM
11	Sure, if you are going to fix or repair anything we will always try and replace with something better.	1/24/2018 9:23 AM
12	investigated replacement of electric baseboard heat in units, however capital costs far exceeded potential benefits	1/24/2018 8:51 AM

13	Expectations and building standards change over time. New kitchens will have dishwashers when old ones did not. New windows are thermopane where old ones were single pane. New fire alarm systems are much more comprehensive and complex than the old ones. New lower maintenance materials are available for balconies renovations instead of using just painted wood like in the 1970s era balconies. Market competition and tenant demand pushes for nicer finises in cabinets, tiling and flooring selection than 30-40 years ago. New natural gas boilers are more efficient than old ones. and so on.	1/24/2018 8:49 AM
14	IN an number of our buildings we are increasing the number of bedrooms and improving existing inventory (the aging stock is beginning to have material defects)	1/24/2018 8:48 AM

Q14 If yes, what drives these considerations? (check all the apply)

Answered: 26 Skipped: 58

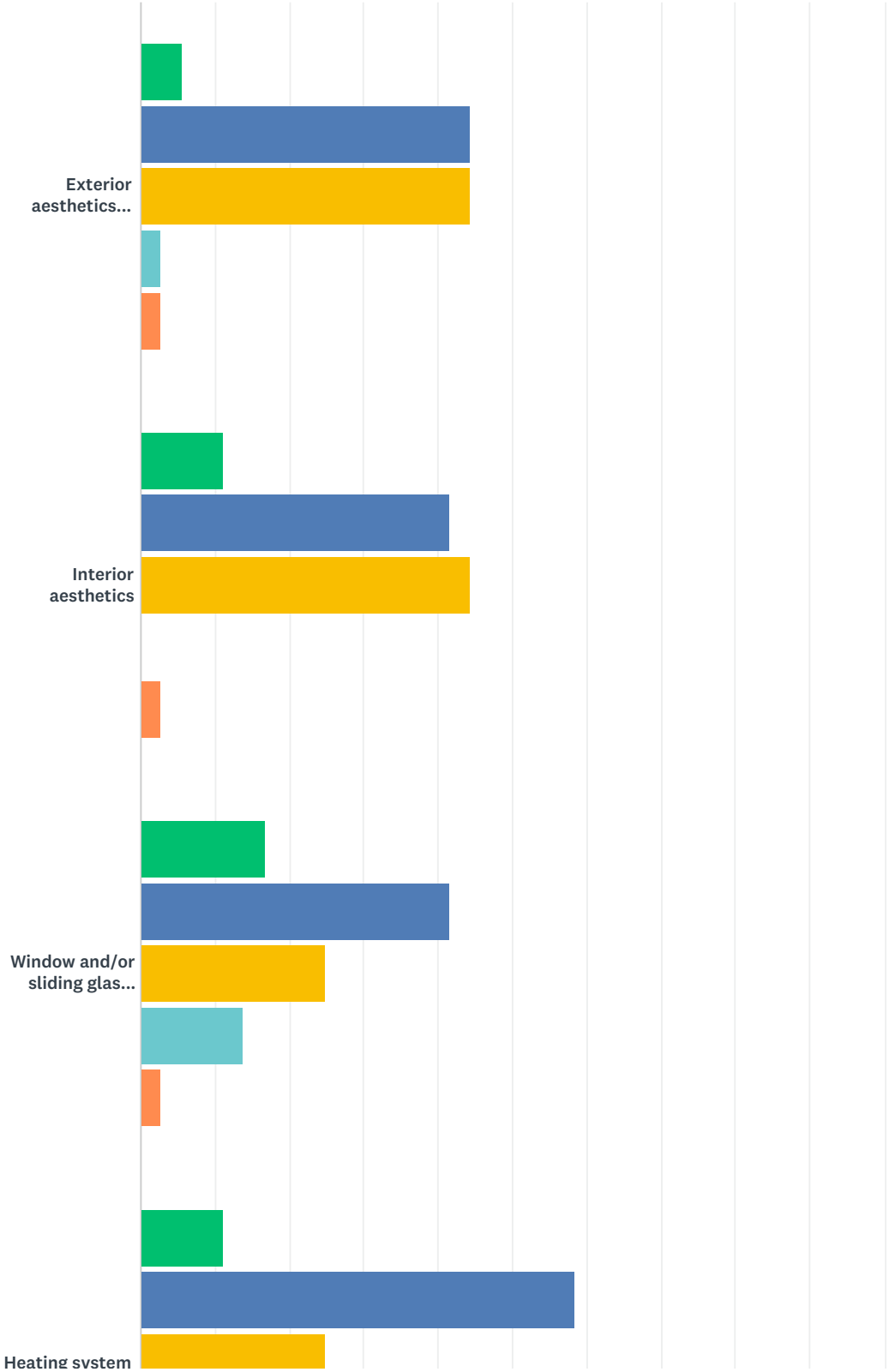


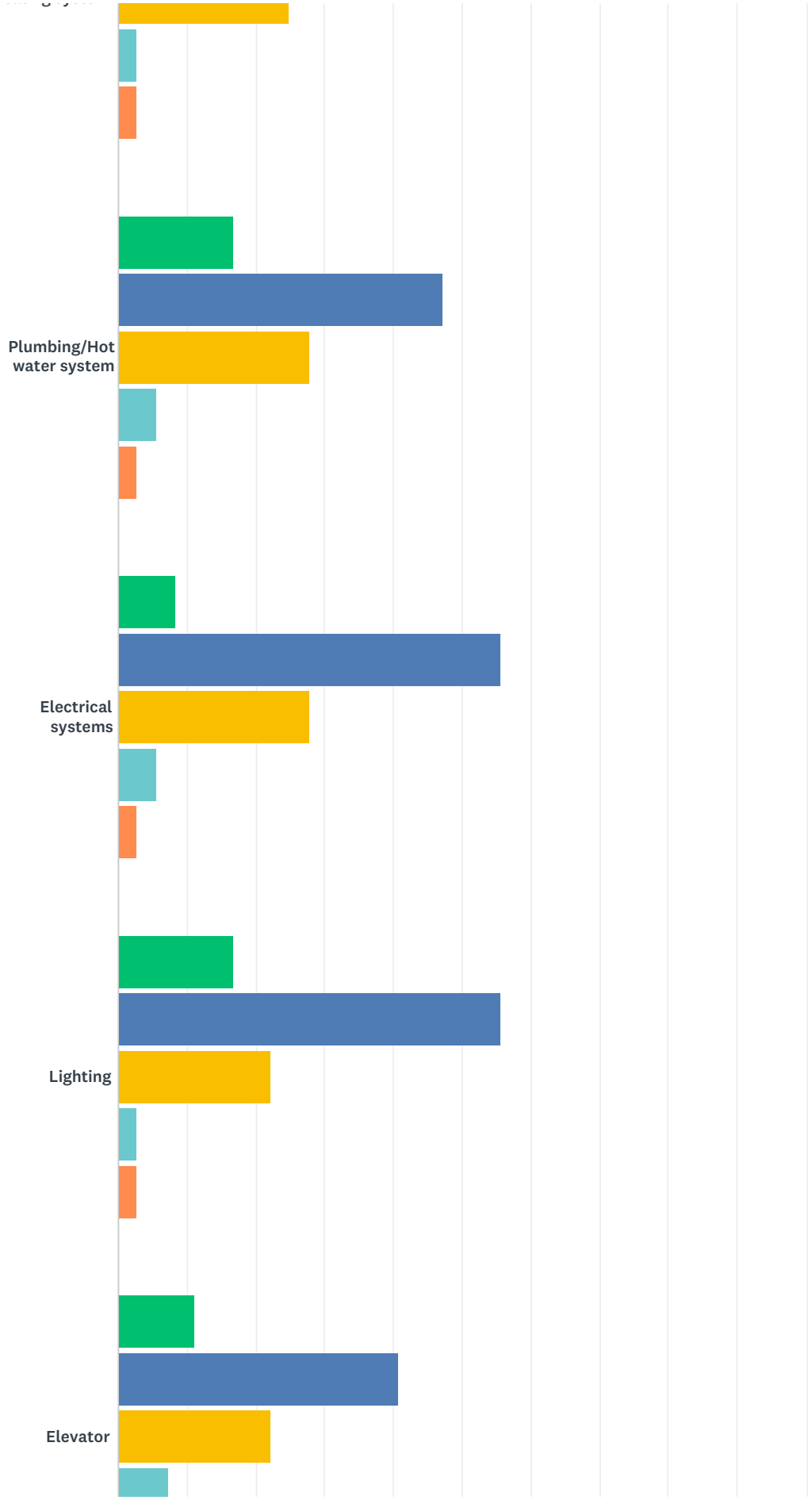
ANSWER CHOICES	RESPONSES	
Potential for increased revenue	61.54%	16
Maintain asset	76.92%	20
Improve asset to be competitive	57.69%	15
Lower operating cost	65.38%	17
Need to repair	65.38%	17
Other (please specify)	7.69%	2
Total Respondents: 26		

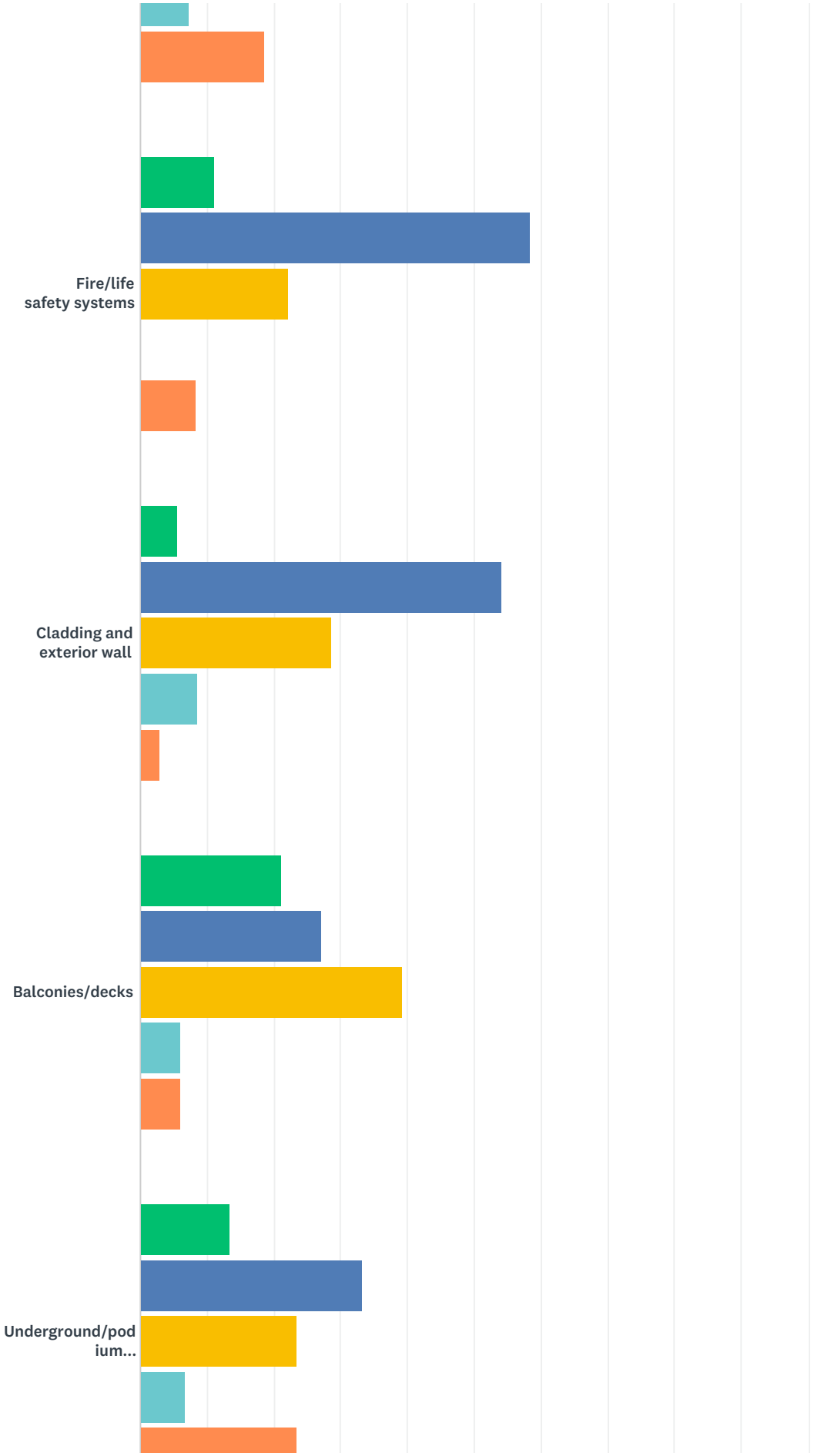
#	OTHER (PLEASE SPECIFY)	DATE
1	Taxes as above.	2/13/2018 1:12 PM
2	energy efficency	1/24/2018 10:32 AM

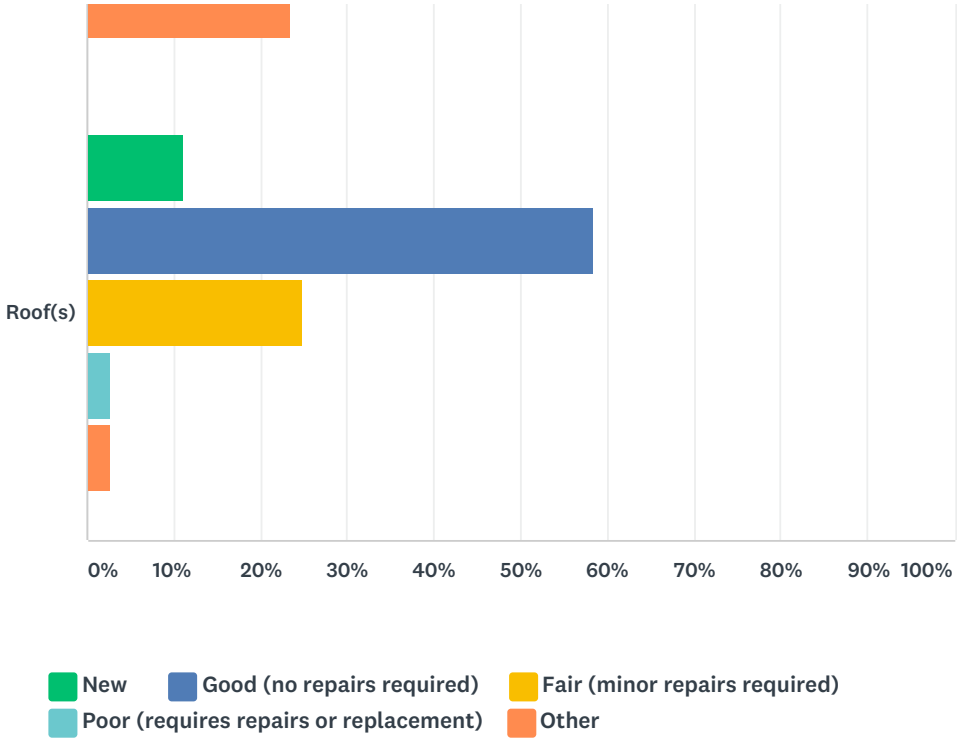
Q15 Rate the current overall condition of your building/building assets (for multiple buildings, consider the typical condition of your buildings/building assets).

Answered: 36 Skipped: 48




Plumbing/Hot water system
Electrical systems
Lighting
Elevator

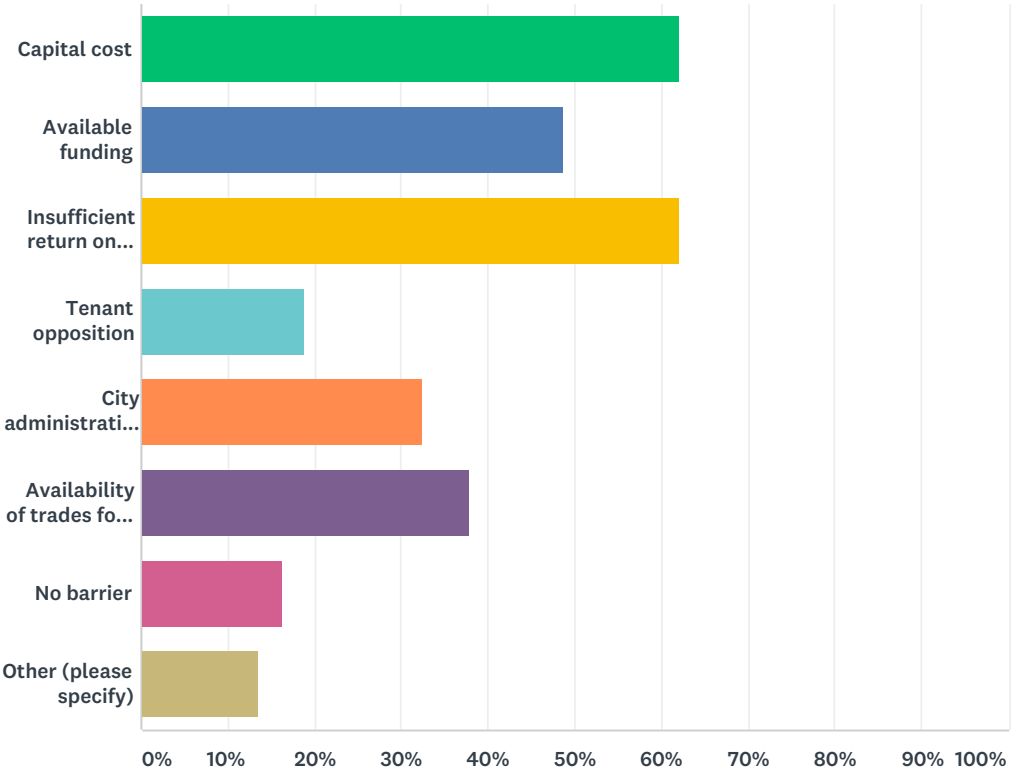

Fire/life safety systems
Cladding and exterior wall
Balconies/decks
Underground/podium...



	NEW	GOOD (NO REPAIRS REQUIRED)	FAIR (MINOR REPAIRS REQUIRED)	POOR (REQUIRES REPAIRS OR REPLACEMENT)	OTHER	TOTAL
Exterior aesthetics (e.g. paint)	5.56% 2	44.44% 16	44.44% 16	2.78% 1	2.78% 1	36
Interior aesthetics	11.11% 4	41.67% 15	44.44% 16	0.00% 0	2.78% 1	36
Window and/or sliding glass doors	16.67% 6	41.67% 15	25.00% 9	13.89% 5	2.78% 1	36
Heating system	11.11% 4	58.33% 21	25.00% 9	2.78% 1	2.78% 1	36
Plumbing/Hot water system	16.67% 6	47.22% 17	27.78% 10	5.56% 2	2.78% 1	36
Electrical systems	8.33% 3	55.56% 20	27.78% 10	5.56% 2	2.78% 1	36
Lighting	16.67% 6	55.56% 20	22.22% 8	2.78% 1	2.78% 1	36
Elevator	11.11% 3	40.74% 11	22.22% 6	7.41% 2	18.52% 5	27
Fire/life safety systems	11.11% 4	58.33% 21	22.22% 8	0.00% 0	8.33% 3	36
Cladding and exterior wall	5.71% 2	54.29% 19	28.57% 10	8.57% 3	2.86% 1	35
Balconies/decks	21.21% 7	27.27% 9	39.39% 13	6.06% 2	6.06% 2	33
Underground/podium waterproofing	13.33% 4	33.33% 10	23.33% 7	6.67% 2	23.33% 7	30
Roof(s)	11.11% 4	58.33% 21	25.00% 9	2.78% 1	2.78% 1	36

Q16 What are the biggest barriers for starting or completing your capital projects? (check all that apply)

Answered: 37 Skipped: 47



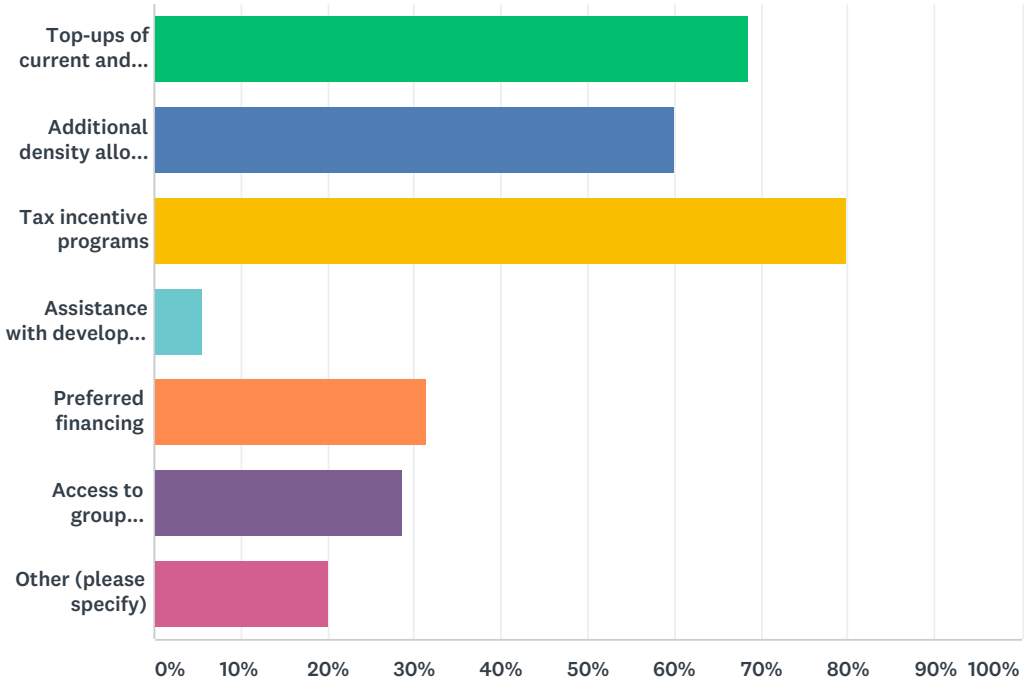
ANSWER CHOICES	RESPONSES	
Capital cost	62.16%	23
Available funding	48.65%	18
Insufficient return on investment	62.16%	23
Tenant opposition	18.92%	7
City administrative process	32.43%	12
Availability of trades for hire	37.84%	14
No barrier	16.22%	6
Other (please specify)	13.51%	5
Total Respondents: 37		

#	OTHER (PLEASE SPECIFY)	DATE
1	New building	2/4/2018 9:50 AM
2	remaining time in the re-financing cycle, i.e. when does the current financing term expire	1/28/2018 2:15 PM
3	Low suite turn over so difficult to access suites to do improvements without disturbing tenants.	1/24/2018 4:13 PM
4	Property taxes too high	1/24/2018 9:33 AM

5	add capital A to availability...	1/22/2018 7:58 AM

Q17 What type of incentive would encourage reinvestment in your rental property(ies)? (check all that apply)

Answered: 35 Skipped: 49



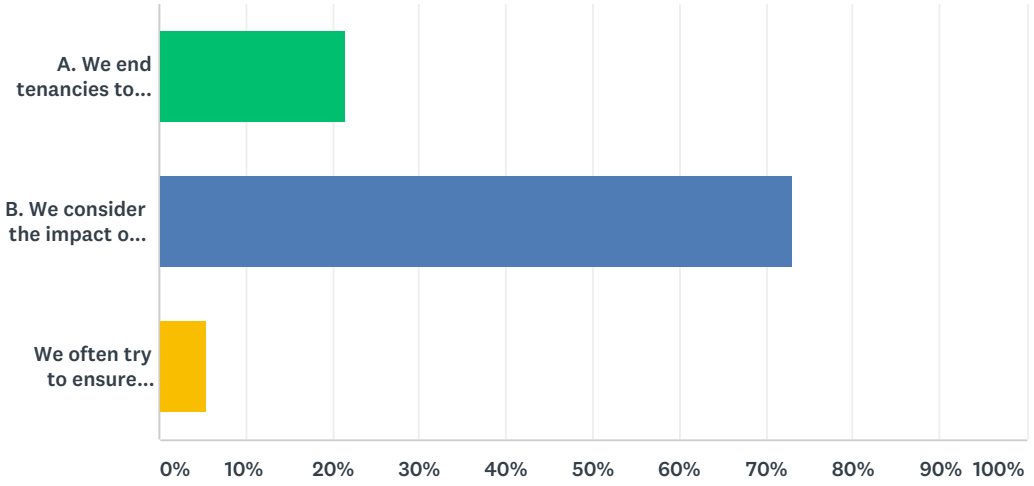
ANSWER CHOICES	RESPONSES	
Top-ups of current and ongoing rebate programs (e.g., Fortis BC's Rental Apartment Program)	68.57%	24
Additional density allowed on-site	60.00%	21
Tax incentive programs	80.00%	28
Assistance with developing a formal capital plan	5.71%	2
Preferred financing	31.43%	11
Access to group purchasing program for discounts on equipment/components	28.57%	10
Other (please specify)	20.00%	7
Total Respondents: 35		

#	OTHER (PLEASE SPECIFY)	DATE
1	allowable rent increases to offset capital expenditures	1/28/2018 2:17 PM
2	Incentive / rebate program for windows, make up air units, boilers, low flush toilets	1/24/2018 10:36 AM
3	Tax incentives are a little silly when a cost is written off as an expense and not taxed, however PST and GST rebates would help.	1/24/2018 9:41 AM
4	lower property taxes	1/24/2018 9:34 AM
5	Expediting of rental development and renovation opportunities. Right now the hardest part is getting approval given the almost 6 step process required to complete a development application.	1/24/2018 8:50 AM
6	I have one tenant, sitting since 1988 who smokes (before we bought the 4-plex). The only suite we have not renovated. Will do so when he moves or dies.	1/24/2018 8:36 AM

7	Change in RTB policies - currently my 3 rentals are off the market	1/23/2018 5:37 PM

Q18 In the case of renovation, what is your typical approach regarding current tenants?

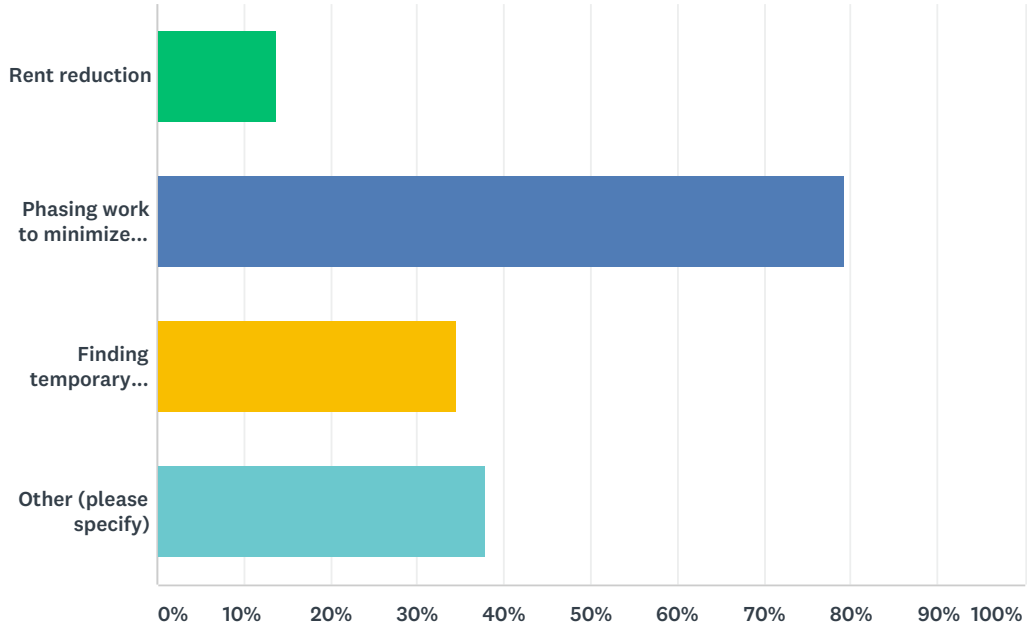
Answered: 37 Skipped: 47



ANSWER CHOICES	RESPONSES	
A. We end tenancies to complete renovation work when we need to (as permitted by the Rental Tenancy Act/RTA).	21.62%	8
B. We consider the impact of renovation work on tenants and attempt to mitigate the disruption.	72.97%	27
We often try to ensure renovation work is completed in a way that does not disrupt tenancies.	5.41%	2
TOTAL		37

Q19 If you choose B, what measures do you take to mitigate disruption? (check all that apply)

Answered: 29 Skipped: 55



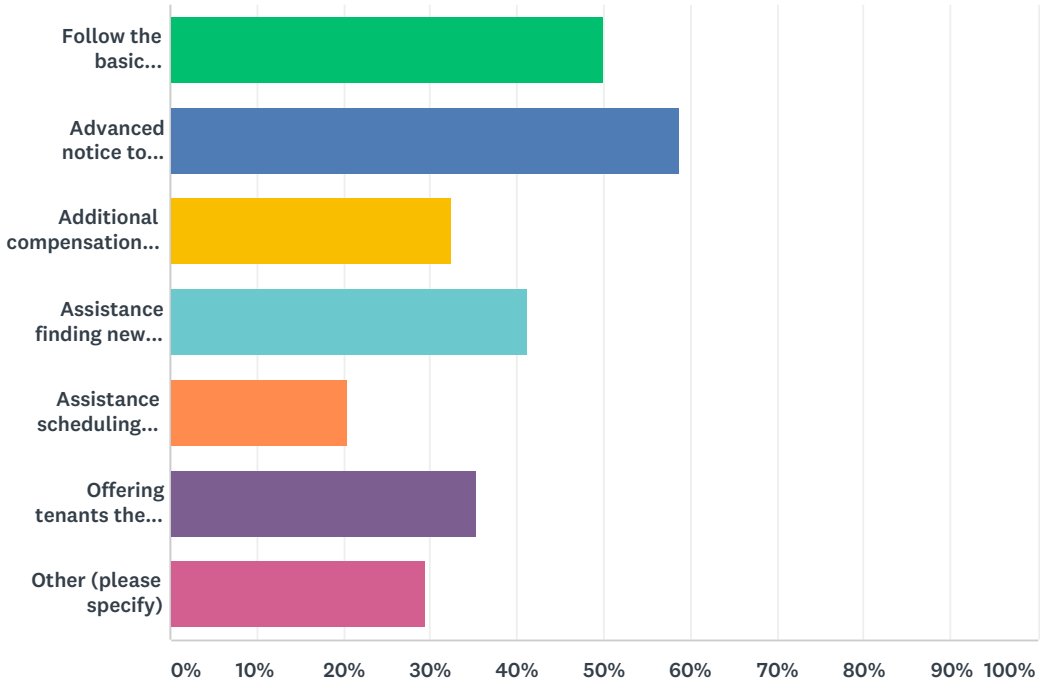
ANSWER CHOICES	RESPONSES	
Rent reduction	13.79%	4
Phasing work to minimize disruption	79.31%	23
Finding temporary accommodations for tenants	34.48%	10
Other (please specify)	37.93%	11
Total Respondents: 29		

#	OTHER (PLEASE SPECIFY)	DATE
1	Doing work between tenancies so no one suffers	2/16/2018 6:35 PM
2	keep tenants informed of renovations and what is required from them to assist in a quick renovation.	2/16/2018 11:42 AM
3	We perform renovations between tenants.	2/7/2018 5:49 PM
4	we notify tenants of repairs and improvements which don't seem to be a problem	2/3/2018 7:09 PM
5	Relocate in to other buildings we own	2/2/2018 1:13 PM
6	Strong communication plan	1/28/2018 2:54 PM
7	do in-suite renos on turn-over of tenancies, otherwise do the best we can	1/28/2018 2:19 PM
8	Ample communication early on to get message to residents.	1/24/2018 4:14 PM
9	Provide tenants information on what is being done, why, and any dates where inconvenience (noise, workers present, component shutdown) may be experienced.	1/24/2018 10:39 AM
10	It depends on the property. Most renovations in our portfolio are done without any disruption to tenancy. Only when a large scale renovation is required or a complete demolition is eviction considered.	1/24/2018 8:52 AM

11	renovate between tenants	1/24/2018 8:37 AM

Q20 When there is a need to end tenancies – whether it is for renovation work or for demolition/redevelopment – what measures do you currently have in place to assist tenants? (check all that apply)

Answered: 34 Skipped: 50



ANSWER CHOICES	RESPONSES	
Follow the basic requirements of the RTA	50.00%	17
Advanced notice to tenants – more than 2 months' notice required by the RTA	58.82%	20
Additional compensation to tenants – more than the equivalent of 1 months' rent required by the RTA	32.35%	11
Assistance finding new accommodations	41.18%	14
Assistance scheduling moving truck/company	20.59%	7
Offering tenants the opportunity to return to the building after renovations/redevelopment (Right of first refusal)	35.29%	12
Other (please specify)	29.41%	10
Total Respondents: 34		

#	OTHER (PLEASE SPECIFY)	DATE
1	does not apply	2/2/2018 6:48 PM
2	We don't kick people out in order to renovate	1/28/2018 2:55 PM
3	offer existing tenants first dibs on renting vacancies in other properties	1/28/2018 2:22 PM
4	Rent freeze effective the first date of notice of intent to redevelop.	1/25/2018 9:35 AM
5	we don't end tenancies to renovate	1/25/2018 7:05 AM
6	small asset so ending tenancy would only apply if site redeveloped - long term	1/24/2018 11:16 AM

7	We have renovated complete building envelops (with exterior rot), underground parking garages, roofs and balconies, plumbing, windows and we have done so without evicting one tenant. The only time it is necessary is temporarily if one is going to completely renovate the interior of a unit. For elevators we try to assist tenants with help moving things up the starts.	1/24/2018 9:43 AM
8	We experienced a major fire 6 years ago - offerred tenants right of first refual to return to thei suite	1/24/2018 8:56 AM
9	The offer of "Right of First Refusal" is at market rents.	1/24/2018 8:53 AM
10	Have not asked tenants to leave. The few that have left, have done so because they must for personal reasons. Otherwise, they stay (8-10 years).	1/24/2018 8:39 AM

Appendix B: Council Report

Committee of the Whole Report
For the Meeting of November 23, 2017

To:	Committee of the Whole	**Date:**	November 10, 2017
From:	Jonathan Tinney, Director, Sustainable Planning and Community Development		
Subject:	**Market Rental Revitalization Study Project Update – Building Maintenance and Tenant Stability Measures**		

RECOMMENDATIONS

That Council:

1. Receive this Market Rental Revitalization Study Project Update report for information.
2. Direct staff to
    a. prepare a new Standards of Maintenance Bylaw based on the content proposed in this report;
    b. develop a tenant relocation policy and template tenant relocation plan based on the recommendations contained in this report;
    c. provide recommendations on potential policy levers in the Community Charter that may create additional tenant stability beyond those offered in the Residential Tenancy Act.

EXECUTIVE SUMMARY

The Market Rental Revitalization Study is an examination of regulations, policy, and incentives to preserve and improve the existing stock of aging rental apartment buildings in the City of Victoria. One of the key objectives of the study is to fulfil an action in the Victoria Housing Strategy to protect existing rental stock by reviewing and updating the Property Maintenance Bylaw to improve tenant housing quality, and to examine the City's legislative authority for a municipal role in maintaining rental tenant stability. Following substantial review of provincial tools as well as work in this area in other jurisdictions, staff recommend developing a new standalone standards of maintenance bylaw for Victoria, as well as a new tenant relocation policy and template relocation plan for use in rezoning applications, guidance in the instance of development applications, and to provide assistance to property owners looking for City direction in this area. This report also recommends pursuing further legal analysis on solutions that may exist to supplement these actions under Victoria's regulatory powers in the Community Charter. If Council approves of the approaches recommended in this report, staff could return with bylaws and policy ready for implementation by Q1 2018.

PURPOSE

The purpose of this report is to present Council with the first project update to the Market Rental Revitalization Study, including information, analysis and recommendations for a municipal role in maintaining residential building standards and rental tenant stability.

BACKGROUND

The Market Rental Revitalization Study (MaRRS) was designed to achieve four supporting actions outlined in the Victoria Housing Strategy 2016-2025 under the overarching action of "Protect existing rental stock." The study's role is to look at policies, regulations, and incentives to preserve Victoria's large stock of market rental housing developed between 1960 and 2000 that typically provides lower rental rates than newer purpose-built rentals, but may also be requiring significant upgrades for safety and liveability. Due to a confluence of factors, such as a low rental vacancy rate, the cost of major capital repairs, lower rents and long-standing tenancies, and a rapid and marked increase in land values, tenants in these buildings are at risk of living in substandard housing conditions or losing their housing due to major repairs, redevelopment, or ownership changes.

Concurrently, this same stock of aging market rental housing has also been identified as being a major contributor to carbon emissions in the City, and with the assistance of a BC Hydro grant, MaRRS will also be examining how energy efficiency upgrades may be achieved in these buildings while still considering maintained affordability. As well, earlier research commissioned by the City also identifies this stock as being particularly vulnerable to seismic impacts, and so the Study is thirdly looking at the feasibility of incorporating seismic upgrades in the regulations, policies, or incentives under consideration. A Request for Proposals was issued in summer 2017 to procure consultant support to complete this project; a consultant group consisting of RDH Consulting, the Community Social Planning Council and Skyline Engineering were the successful proponents.

Two of the four supporting action items in the Housing Strategy that fall under the MaRRS project are the subject of this project update: "Examine legislative authority for a municipal role in maintaining rental tenant stability", and "Review and update the Property Maintenance Bylaw to improve tenant housing quality." Updates with regard to energy efficiency and seismic upgrades will be forthcoming in future reports.

Existing Regulations and Policy Gaps

In housing markets such as Victoria, where there is intense competition for rental units and therefore limited housing options available, tenants can become vulnerable to housing instability through substandard housing conditions or insecure tenancies. The Residential Tenancy Act (RTA) is provincial legislation that regulates residential tenancies in British Columbia. Under the Act, landlords are responsible for maintaining their rental units in a good state of repair. The Act also gives permission to landlords to issue a notice to end tenancy if work on the unit is required that necessitates the unit being vacant. However, there is some question as to whether the Act is sufficiently protecting tenancies in these instances. As a result, several municipalities in British Columbia have adopted supplementary policy and bylaws to improve tenant housing quality and housing stability beyond the measures identified in the RTA; the Victoria Housing Strategy identifies exploring whether the City of Victoria should follow suit as supporting action item.

Other legislation applicable to residential property includes the Fire Services Act, which contains provisions related to the maintenance and safety of property, and the Health Act, which regulates sanitary and health issues. Any new regulations created by the City would therefore serve to supplement existing provincial legislation and provide a locally enforceable set of rules.

ISSUES AND ANALYSIS

Property Maintenance

Although provisions exist within the RTA and other legislation to ensure the health, safety, and habitability of rental accommodation, several jurisdictions have created or expanded maintenance bylaws in order to create locally enforceable regulations. The government of British Columbia also provides guidance for municipalities around the creation of a municipal Standards of Maintenance (SOM) bylaw.

Victoria currently has a Property Maintenance Bylaw (Attachment B); however, its provisions are limited to external concerns and the protection of neighbours and neighbourhood character (the stated purpose of the bylaw is to regulate, prohibit, and impose requirements in relation to refuse, water accumulation, weeds, and graffiti or other 'unsightly conditions' on the property). There is no consideration in the current bylaw for the interior condition of a property or the health and safety of its occupants.

Through the Housing Strategy, Council has directed staff to prepare bylaw amendments to amend the Property Maintenance Bylaw to improve tenant housing quality. From the review of other jurisdictions' work in this area, the most common approach appears to be the establishment of a SOM bylaw that includes considerations such as:

- impacts of leaks from plumbing or water ingress
- functioning heat and hot water
- pest control
- fire safety concerns such as alarm systems and means of egress
- integrity/functionality of housing elements such as doors, windows, sanitation facilities, electrical facilities, appliances, etc.

An overview of select cities' bylaws is contained in Attachment A – MaRRS Policy Research.

Because the current Property Maintenance Bylaw contains no provisions for the interior condition of a property or health and safety of occupants, and the province gives authority to municipalities to create standalone SOM bylaws, staff recommend Council consider creating a new SOM bylaw for Victoria. In so doing, the City would have the ability to impose penalties on property owners who do not adhere to regulations and thus improve quality of housing for tenants. There would also likely be a positive impact on building upkeep and the retention of existing housing, as well as some mitigation around concerns of demolition by neglect. The Property Maintenance Bylaw could remain in effect so that the City could use both pieces of legislation to regulate the upkeep of residential property. It should be noted that a SOM bylaw would apply to all residential housing in the City, and not only rental properties. (The City could also choose to repeal the Property Maintenance Bylaw with the implementation of a SOM bylaw in order to have only one municipal bylaw relating to property maintenance; however as the bylaws do not contain significant overlap in terms of general standards, this is not required or recommended.)

Content Considerations

Based on the jurisdictional scan of typical components of a SOM bylaw and guidance provided by the Province, Victoria's SOM bylaw should contain the following:

1. Title and Definitions

This section would contain standard wording relating to residential property, and where the bylaw would apply. An important consideration for inclusion would be to identify the extension of

these provisions to unauthorized suites. The province notes that the provision of an SOM bylaw would not need to imply that a rental unit has satisfied the requirements of other bylaws, and that the landlord would be required to maintain the unit to the state of repair identified in the bylaw without necessarily having to 'shut the unit down'. The importance of this is that, like many other jurisdictions across BC, a significant number of rental units in the Victoria are unauthorized (illegal), and tenants could be concerned that reporting a complaint about maintenance concerns in an unauthorized unit would risk the unit being shut down. In reality, while there would be no implied immunity from other bylaws or regulations, municipalities can ascertain compliance with one bylaw without proceeding with enforcement on the compliance of all bylaws.

2. General Standards

The following items are recommended for inclusion in a new SOM bylaw:

Issue	Wording
Impacts of leaks from plumbing or water ingress	All plumbing, including plumbing fixtures, drains, vents, water pipes, toilets and toilet tanks and connecting lines to the water and sewer system, shall be maintained in good working order and repair, free from leaks or other defects and protected from freezing.
Functioning heat and hot water	Every hand basin and bathtub, shower and sink shall have an adequate supply of hot and cold running water and every toilet and toilet tank shall have an adequate supply of running water. Hot water shall be supplied at minimum temperature of 45 C (113 F) and a maximum of 60 C (140 F).
Pest Control	If pests have infested land, or any building or accessory building on it, the owner of the land must eliminate the infestation.
Fire safety concerns such as alarm systems and means of egress	Walls, floors and roof constructions, including fire protective closures, sprinkler systems, including fire alarm, and detection systems and other means of fire protection, shall be maintained so that they continue to provide the fire resistive properties and protection for which they were designed.
Integrity/functionality of housing elements such as doors, windows, sanitation facilities, electrical facilities, and appliances	Doors, windows, sanitation and electrical facilities and appliances identified in the Tenancy Agreement shall be maintained in good working order and repair

While some jurisdictions contain a more extensive list of items subject to enforcement (see Attachment A), it is recommended that the City of Victoria keep the list of standards to this level to ensure maximum enforceability and in recognition of the City's available resources, and importantly, the intention of the implementation of this bylaw. Including more building-related concerns such as foundation matters, room sizes, ceiling heights, etc., would not only require additional staff resources to enforce (for example building inspection staff for technical building elements) but would also significantly increase the risk of housing loss, especially in instances of unauthorized suites, effectively defeating the purpose of establishing this bylaw.

3. Inspections and Compliance

This section would outline authority for the building inspector to enter a property to determine whether the requirements set out in the above sections are being met, as well as the action the City can take should the property owner be determined to be noncompliant.

4. Penalties and Enforcement

This section would contain standard wording outlining penalties and enforcement of non-compliance. Victoria has several options when considering how to apply penalties for contravention of this bylaw, including:

a. the Ticketing Bylaw;
b. the Offence Act, where maximum penalties are allowed of $2000;
c. the Municipal Act, to suspend or revoke the landlord's business licence or place a notice of non-compliance on title

Further analysis on the best option for penalties and enforcement is recommended in order to minimize the impact to existing City resources.

Further Enforcement Considerations

It is recommended that if Council decides to approve the creation of a new SOM Bylaw, that the bylaw be used as a tool for complaints response only, rather than a basis for a proactive enforcement program. The reasons for this are twofold: first, as noted there are other tools in place that regulate these items, for example the Residential Tenancy, Fire Services, and Health Acts. Second, while the City currently does not have the resource capacity to proactively enforce these regulations, updating the bylaw and having it available for reference and use by bylaw enforcement officers would create a useful tool for the City should tenants complain of health and safety concerns within residential properties. Regardless of the approach taken, there will be resource considerations, as the creation of new regulations, even if only enforced on a complaints basis, will mean an increased level of enforcement compared to currently, where there are no regulations to enforce. Should Council approve the creation of a new SOM bylaw, staff could report back on enforcement considerations when the new bylaw is presented.

Tenant Protection and Relocation Policies

The renovation and redevelopment of buildings frequently has the effect of displacing existing tenancies, particularly in instances where tenants are paying below market rents. There are several reasons for this, including the ability to more efficiently complete major repairs without tenants present, as well as the ability to significantly increase rents with new tenancies in order to fund repairs. However the negative effects, especially in a restricted rental market such as Victoria's, are significant, and include the loss of affordable housing units as well as the risk of homelessness for vulnerable or very low income tenants. To address this, the Housing Strategy recommends examining the City's legislative authority for a municipal role in maintaining rental tenant stability.

The RTA sets out guidelines for the notice and compensation required for a landlord to give a tenant when relocation is required. The Province is exploring increasing the notice and compensation requirements; but as it stands, a landlord is currently required to give two months' notice to end a tenancy and provide the equivalent of one months' rent as compensation. This falls short of the standards set by other provinces; for example:

- In Ontario, a landlord is required to give 120 days' notice to end a tenancy and the equivalent of 3 months' rent, or offer another rental unit acceptable to the tenant. The tenant must also be offered the right of first refusal, to return to the building after the work is complete at a rental rate no more than what the landlord could have charged if there has been no interruption in the tenancy.

- In Quebec, a landlord must give a tenant 6 months' notice to end the tenancy (or 1 month if the tenant is within 6 months of expiry of a fixed term lease. The landlord must compensate the tenant with an equivalent of 3 months' rent, plus paying for moving expenses.

The RTA can also leave tenants vulnerable by failing to include enforceable guidelines for what type of renovation work is substantial enough to warrant ending a tenancy, and offers no provisions for the "right of first refusal" for a tenant to return to the building following renovation or redevelopment work, nor compensation for moving costs or relocation assistance.

Several municipalities in BC (and beyond) have instituted local policies around tenant protections and tenant relocation in order to augment the protections offered by the RTA, with specific attention towards renovation, demolition, and conversion. A selection of tenant protection policies from other jurisdictions is appended to this report in Attachment A.

Tenant protection measures tend to feature some common aspects such as:

- a prescribed amount of notice (time) given to tenants ahead of ending a tenancy
- a specific amount, and type, of compensation the landlord is to provide tenants (cash payout, free rent, covering moving expenses, etc.)
- the particulars of moving assistance the landlord is to provide to tenants (arranging for, or covering, moving expenses; locating alternative accommodations within specific guidelines; providing a coordinator or liaison to provide relocation assistance)
- the right of first refusal (the offer to return to the building once renovations or reconstruction is complete, sometimes with stipulations for the rent level to be paid)
- a template tenant relocation plan.

There may be other requirements, such as types of documentation to submit to the municipality, or additional support for vulnerable tenants. These measures may be requirements, or they may be guidelines. They may apply to certain types of rental stock (for example, more than a certain number of units within a building), and/or a certain type of development application (for example: rezoning applications or heritage alteration permits).

Despite the addition of policy in this area, the authority to enforce these measures is complex legislative terrain. The Local Government Act (LGA) and Community Charter contain legislative regulations that prohibit cities from creating special requirements to obtain building or development permits. That said, cities do have broader authority in the instance of rezoning applications; for example, while *requiring* a tenant relocation plan is not permitted under the LGA, Council may consider tenant protection *policies* in these instances in order to guide their decision on whether or not the approval of a rezoning application is in the best interest of the community.

Tenant protection policies outline basic minimum standards, and practice can often exceed what is outlined. In fact, according to planning staff at several BC municipalities (City of North Vancouver, City of Burnaby, City of New Westminster),[1] in practice, developer applicants have often gone above and beyond the basic stated minimum guidelines set out in the municipal polices and RTA. Municipalities reported often seeing developers offer advanced notice to tenants prior to a development application, increased compensation beyond the minimum standards, and have gone to lengths to assist tenants with suitable relocation. In the City of Victoria staff have received requests for policy guidance from applicants who are looking to

[1] Telephone interviews of planning staff conducted by study consultant

relocate tenants where there is no requirement to do so. What can be reasonably determined from this is that despite the fact that there may be minimal legislative authority to enforce the adherence to tenant relocation policies, applicants often wish to voluntarily adhere to City policies, and as such, there appears to be good value in developing a tenant relocation policy for applicant and Council guidance, and a template tenant relocation plan for voluntary use by landlords.

Because it is clear that the City does have legislative authority to create a tenant protection policy and that this policy could have value beyond rezoning applications as a guidance document for development applications or reference policy for developers, it is recommended that Council consider directing staff to develop a tenant relocation policy for Victoria, including a template tenant relocation plan for distribution to developers or property owners involved in tenant relocations.

In considering the development of a tenant protection policy, staff recommend Council consider including all of the elements typical in tenant relocation policies in other jurisdictions: notice, compensation, moving assistance, and right of first refusal. As a part of these measures, Council may then wish to consider the level of tenant protection the City should recommend. The following table identifies the basic legislative requirements contained in the RTA, and outlines options for moderate or strengthened protection measures.

Protection Measure	Current (basic RTA)	Moderate protection	Strengthened protection
Notice to tenants	Two months' notice to end tenancy, after issuance of appropriate permits	Encouraged to give advanced notice prior to issuance of appropriate permits; two months' notice when permit issued	Advanced notice when development proponent is in application stage, and consideration of a tenant relocation plan in rezoning tenant applications; three months' notice when permit issued
Compensation	Equivalent of one months' rent	Two months' rent	Compensation based on length of tenancy, with no options below three months' rent
Moving assistance (costs)	None	Assistance scheduling a moving truck / company	Covering appropriate moving costs, and arranging moving company, if tenant desires
Moving assistance (relocation assistance)	None	Tenants can request moving assistance (by Tenant Relocation Coordinator provided by developer/ property owner), to assistant with finding alternative housing options	Tenant Relocation Coordinator provided by developer/ property owner, to assistant tenants with finding a specified number of alternative housing options at a specified rent level (in relation to the tenants current rent, and/or in relation to market averages), and in same/desired neighbourhoods
Right of first refusal	None	First right of refusal offered, but no measures to limit the cost of purchase/rent of new unit	First right of refusal, with measures to limit the cost of purchase/rent of new unit

Because this policy will act as a guidance document, staff recommend Council consider approving the strengthened protection measures outlined in the above table. In so doing, the policy will emphasize the City's high expectations for tenant stability, and will encourage developers and property owners to do the most to protect tenants in instances of necessary tenant relocations. It will also serve as a 'high bar' from which to negotiate. However, because ultimately adherence to the policy is voluntary, it is not anticipated that choosing the strengthened options will unduly impede development.

Regardless of the approach taken, careful legal analysis of the final policy will be required to ensure the City acts within its authority in these measures; additionally, a tenant protection plan will be dependent on the options selected by Council, and therefore, staff require Council's decision on these recommendations before proceeding with this work. Should Council decide to approve the recommendations as outlined above, staff could return back expeditiously (by Q1 2018) with a draft policy and relocation plan ready for approval and implementation.

Other Potential Tenant Protection Mechanisms

Beyond an update to the Property Maintenance Bylaw and development of a tenant protection policy, there may be other mechanisms that could improve housing security for residential tenancies, specifically through the City's municipal authority in the Community Charter, which gives municipalities the authority to enact regulations around building, land, and businesses. It may be possible for the City of Victoria to develop regulations that landlords must adhere to when operating residential rental housing under these two categories. For example, landlords are required to obtain a business licence and adhere to the regulations in the Business Regulation Bylaw when operating residential tenancies. It may be possible to develop business regulations that specifically consider tenant protections in the event of renovations or the termination of tenancies. This is a unique approach that has not been observed in other jurisdictions (though it may be occurring); therefore, careful legal analysis would be required to determine whether this is a feasible option. Council could consider directing staff to report back in a closed council meeting in Q1 2018 with options and recommendations on this approach for consideration.

OPTIONS AND IMPACTS

Option 1 (recommended): Approve the recommendations put forth in this report by directing staff to return to Council by Q1 2018 with:

a. a draft new SOM bylaw containing the content provided in this report, including an analysis and recommendations on enforcement considerations;
b. a tenant protection policy that contains strengthened protection measures as identified in this report, as well as a template tenant relocation plan;
c. recommendations on additional measures to improve tenant stability that may be within the City's authority in the Community Charter.

Option 2: Council could chose to modify any of the recommendations in this report, for example adding additional standards to the SOM bylaw, also repealing the Property Maintenance Bylaw, or approving more moderate measures to be included in a tenant relocation policy. However any modifications to the recommendations could negatively impact the intention of these changes, and would also delay the expediency with which staff could implement new regulations.

Accessibility Impact Statement
There are no impacts on accessibility associated with the recommendations contained in this report.

2015 - 2018 Strategic Plan
The Victoria Housing Strategy and its associated work and resources is in direct alignment with Strategic Objective 6: "Make Victoria More Affordable". Staff's recommendation to explore unique options for tenant protection also fall under Strategic Objective 1: "Innovate and Lead"

Impacts to Financial Plan
The creation of a new SOM bylaw has enforcement considerations that may require additional resources; these will be dependent on the standards included and level of enforcement Council chooses to employ, and can be detailed when staff returns with a draft bylaw for adoption. The creation of a tenant relocation policy meanwhile is not anticipated to have any negative financial impacts.

Official Community Plan Consistency Statement
The MaRRS project supports OCP policies related to Section 13: Housing and Homelessness, including objectives 13(b): That housing affordability is enabled for housing types across the housing spectrum…and 13(c): That the existing supply of rental housing is expanded through regeneration.

CONCLUSIONS

The City has several options to choose from when considering tenant stability measures. After extensive analysis of policy work in this area by other jurisdictions, guidance from the Province, and consideration of the City's legislative authority to enact policy in this area, staff recommend developing a new SOM bylaw and tenant relocation policy as the best options for improving tenant stability in Victoria. Should Council approve the recommended approaches outlined in this report, staff could return to Council with documents ready for adoption by Q1 2018.

Respectfully submitted,

Lindsay Milburn, Senior Planner	Jonathan Tinney, Director
Housing Policy	Sustainable Planning and Community Development

Report accepted and recommended by the City Manager:

Date: _____

List of Attachments:

- Attachment A: MaRRS Policy Research
- Attachment B: Property Maintenance Bylaw No. 70-050

Appendix C: Draft Standards of Maintenance Bylaw

City of Victoria –Regulations to be included in proposed Rental Premises Standards of Maintenance Bylaw – April 30, 2018

<u>Regulations to be included in the proposed bylaw:</u>

Leaks from plumbing or water ingress

- All plumbing, including plumbing fixtures, drains, vents, water pipes, toilets and toilet tanks and connecting lines to the water and sewer system, shall be maintained in good working order and repair and free from leaks or other defects.

Functioning heat and hot water

- Every hand basin, bathtub, shower, and sink shall have an adequate supply of hot and cold running water and every toilet and toilet tank shall have an adequate supply of running water.
- Hot water shall be supplied at minimum temperature of 45C (113F) and a maximum of 60C (140F).
- Water provided must be potable.
- Heating: Every dwelling unit shall be equipped with adequate heating facilities properly installed and maintained in safe and good working condition.
- Portable room heaters shall not be used as a primary source of heat.
- Heating facilities shall be capable of maintaining a minimum indoor air temperature of 21 degrees in dwelling unit.

Pest Control

- If pests have infested any building or rental unit, the owner must eliminate the infestation.
- Tenants must cooperate with the landlord to ensure the effective elimination of the infestation.

Fire safety concerns such as alarm systems and means of egress

- Walls, floors and roof constructions, including fire protective closures, sprinkler systems, fire alarm and detection systems and other means of fire protection, shall be maintained so that they continue to provide the fire resistive properties and protection for which they were designed.
- Each dwelling unit shall have a working smoke detector in accordance with the current National Fire Code of Canada.
- Every means of egress shall be maintained in good repair and free of obstructions.
- Functioning hand rails (interior and exterior) in accordance with the Building Code shall be securely fastened to provide for a safe means of egress.
- Hallways, stairwells, and exterior areas shall be adequately illuminated to allow for safe passage.

Integrity/functionality of housing elements such as doors, windows, sanitation facilities, and electrical facilities

- Doors, windows, sanitation and electrical facilities and appliances identified in the Tenancy Agreement shall be maintained in good working order and repair

Ventilation

- Unless a satisfactory alternative means of ventilation is provided, every habitable room shall have at least one window which can be easily opened.

Other accessibility considerations

- Every elevator in any building used for residential purposes shall be maintained in an operational condition at all times.
- Elevator shall be out of service for no more than 1 month. The building owner must provide notice to tenants within the first week of an elevator being out of service and communicate the plan for repair along with specific provisions for accommodating tenants with mobility challenges.

Appendix D: Draft Tenant Assistance Policy

Policy Intent:

The Tenant Assistance Policy has been developed to help mitigate the potential impacts of displacement on tenants by providing guidelines for developers and property owners to provide additional supports for tenants who are displaced as a result of renovations or development.

Context

Renters account for a significant portion of the City of Victoria's population and are an important part of the City's social fabric.

Many of the renters live in older, lower-density, rental stock. With a proportionally high percentage of renters in the City (60% of the total population) and low vacancy rate (under 1%) for the past several years, this rental stock is a vital component of the City's overall supply of rental housing, with rental rates that are often lower than market average.

The demolition and replacement of rental buildings results in the displacement of tenants, an issue that is exacerbated by significantly higher rents in new buildings. This poses a particular challenge given the current low vacancy rate in the city, as new rental housing is not always readily available or affordable.

Lack of affordable housing, especially affordable rental stock, is a significant factor that contributes to relatively high levels of homelessness in the city, with significant social and economic costs and impacts. Any loss of rental stock and displacement of existing tenants, especially vulnerable tenants, is a serious challenge.

Responsible development must minimize displacement in the City's highly constrained rental market and must ensure that the impact of redevelopment or renovation activity on tenants is considered as part of any land use approval. In cases of redevelopment where tenant relocation is a necessity, this Tenant Assistance Policy is intended to provide guidance for property owners on appropriate measures to mitigate negative impact of redevelopment on existing tenants.

Policy

For any renovation or redevelopment that requires relocation of existing tenants, the property owner must develop a Tenant Assistance Plan that addresses the following issues:

- Early communication with the tenants
- Appropriate compensation
- Relocation assistance
- Moving costs and assistance
- Right of first refusal

Application

1. This Tenant Assistance Policy is applicable to rezoning applications to redevelop or demolish an existing purpose-built building with more than four residential rental units.
2. This policy offers best practice guidelines that can also be used by all applicants who are seeking to renovate or redevelop existing rental buildings.
3. This policy is intended to guide applicants and City staff as part of the application process but it is not intended to fetter Council's discretion when dealing with individual applications, each of which will be evaluated on its own merits.

This policy is particularly targeted towards vulnerable tenants, for whom the impact of displacement may be more acute. Vulnerable tenants may include:

- Long-term tenants who may be paying significantly below market-rent, and for whom entering the current market may present financial challenges
- Tenants with specific housing needs due to a disability
- Seniors, who may be long-term tenants and living on a fixed income
- Families with young children, who may have difficulty finding appropriate units

Guidelines for the Tenant Assistance Plan

Each application will require a unique Tenant Assistance Plan that best meets the needs of the tenants, given their unique circumstances, within the particular redevelopment proposal. The following guidelines for the various components of the Tenant Assistance Plan are offered as a minimum expectation but are not binding. Alternative arrangements that provide similar level of assistance to tenants may be appropriate depending on the circumstances of a proposed renovation or redevelopment.

Communications with Tenants:

Applicants should communicate their intention to apply for rezoning with tenants both prior to the application and following issuance of rezoning as well as application and issuance of development permit. The Tenant Assistance Plan should be developed with input from tenants and once finalized, the full plan should be communicated to tenants.

Advanced notice can be given to tenants when development proponent is in application stage.
Once necessary permits and approvals are in place, Council's expectation is that a minimum of three months' notice would be given to end tenancy.

Both advanced and three months' notice shall be posted within the building in a conspicuous place

Compensation:

Compensation should be given to displaced tenants. Compensation may take the form of free rent, lump sum payment, or a combination or both.

Compensation is recommended to be based on length of tenancy:

- Tenancies up to 5 years: 3 months' rent
- 5 to 9 years: 4 months' rent
- 10-19 years: 5 months' rent
- 20+ years: 6 months' rent

Moving expenses and assistance:

One of two options should be provided to displaced tenants, at the discretion of the landlord:

(1) An insured moving company may be hired by the applicant, with all arrangements and costs covered

OR

(2) Flat rate compensation (based on unit size) provided to the tenant at the rate of:

- $500 for bachelor and 1-bedroom households; and
- $750 for two or more bedroom households.

It is recommended that vulnerable tenants who may have difficulty moving or making arrangements of their own be provided with option (1).

Relocation assistance:

Tenants can request assistance finding new accommodations. An experienced **Tenant Relocation Coordinator** should be hired or appointed by property owner or landlord, to assist tenants with finding alternative rental housing options.

The Tenant Relocation Coordinator's contact information should be posted within the building in a conspicuous place and they should be contactable at regular and consistent hours.

At least three housing options should be presented to tenant. The new units should be comparable in terms of size, location, and rent amount (unless otherwise agreed to by tenant) with a minimum of one option within same neighbourhood.

Right of First Refusal:

Tenants should be offered the opportunity to return to the building, with rent rates discounted by 10% off starting rates.

Procedure

A Tenant Assistance Plan is to be submitted alongside the rezoning or development permit application and should include the following information:

- Number of units in building
- Current rent rate of units
- Length of tenancy

- Identification of vulnerable tenants
- Details of what has already happened:
    - Communications with tenants
    - Tenant Relocation Coordinator – name and contact information
- Plans for:
    - Amount of compensation
    - Moving expenses and assistance
    - Relocation assistance
    - Right of first refusal - discounted amount

Appendix E: Energy Analysis Results

1 Model Archetype Details

Two different modelling tools were used for the energy analysis. The two smaller low-rise walk-up archetypes (MURB 01 and MURB 02) were modelled using HOT2000 v11.4 with standard EnerGuide operating conditions, commonly used to model most Part 9 residential buildings in Canada. The remaining two low-rise archetypes (MURB 03 and MURB 04) and the high-rise archetype (MURB 05) were modelled using an hourly simulation program, DesignBuilder v4, which uses the EnergyPlus™ engine, commonly used for modelling Part 3 buildings. For the Part 3 MURBs, a combination of modelling inputs obtained through calibrated modelling (e.g. plug loads, lighting power density) and inputs from the City of Vancouver modelling guidelines (e.g. elevator power, domestic hot water flow rate) were used.

Emission factors from the BC Best Practice Guide[1] were used to calculate greenhouse gas intensity (GHGI, kg $CO_2e/m^2/yr$) of the bundles of energy conservation measures (ECMs), which translate to:

→ Electricity – 0.011 kg CO_2e/kWh

→ Natural Gas – 0.180 kg CO_2e/kWh

Three archetypal buildings of focus were defined based on the building inventory: low-rise wood-frame walk up; low-rise apartment with elevator, and high-rise concrete.
below shows the three building types with their typical characteristics.

TABLE 1.1 SUMMARY OF TYPICAL BUILDING CHARACTERISTICS

Building Type	**Typical Characteristics**
Wood-frame 3-storey low-rise walk-up without balconies	
	2-3 storeys Wood frame Constructed in the 60s or 70s No elevator ~14 suites ~13,000 SF Electric baseboard heat + electric in-suite hot water, or Electric baseboard heat with central gas fired domestic hot water (most common)

[1] 2016/2017 B.C. Best Practice Methodology for Quantifying Greenhouse Gas Emissions. British Columbia Ministry of Environment, Victoria BC, May 2016.

TABLE 1.1 SUMMARY OF TYPICAL BUILDING CHARACTERISTICS	
Wood-frame 4-storey low-rise with elevator and balconies	
	3-4 storeys Wood frame Constructed in the 60s or 70s Elevator ~45 suites 45,000 SF Electric baseboard heat + electric in-suite hot water, or Central gas-fired hydronic heat with central gas fired domestic hot water (most common)
Concrete and steel-stud high-rise with balconies	
	12-13 storeys Concrete Constructed in the 60s Balconies ~140 suites 60,000-225,000 SF Central gas-fired hydronic heat with central gas fired domestic hot water

Five whole building energy models were customized to represent the three major existing rental building types and two major system types in the City of Victoria. Variations of the 3-storey walk-up and 4-storey low-rise buildings were modelled with different mechanical systems. The archetypes were informed by the results of the market rental housing stock inventory work. The five energy models are as follows:

- → Wood-frame 3-storey low-rise walk-up without balconies, with electric baseboard heat and electric domestic hot water
- → Wood-frame 3-storey low-rise walk-up without balconies, with electric baseboard heat and central gas-fired domestic hot water
- → Wood-frame 4-storey low-rise with elevator and balconies, with electric baseboard heat and electric domestic hot water
- → Wood-frame 4-storey low-rise with elevator and balconies, with central gas-fired hydronic heating and central gas-fired domestic hot water
- → Concrete and steel-stud high-rise with balconies, with central gas-fired hydronic heating and central gas-fired domestic hot water

The five archetypes are described in further detail in Sections 1.1.1 through 1.1.5. Detailed model inputs are provided in Section 4.

1.1.1 MURB 01 – Low-rise walk-up [elec.-heat; elec.-DHW]

This archetype is a 3-storey wood frame walk-up residential building with construction typical of the 1960s to 1970s. This archetype has no balconies or elevator.

The building enclosure consists of 2x4 wood framing with batt insulation with overall effective R-value of R-11. The windows are single-glazed, aluminum frames (U-1.0) with 15% window to wall ratio.

The building is heated by electric baseboards. Domestic hot water is provided by electric storage tank. Ventilation is provided by an unheated make-up air (MUA) unit to pressurize corridors, with intermittent bathroom and kitchen exhaust fans in suites.

The total energy use for this archetype is 170 kWh/m²/yr. The baseline energy consumption by end use is shown below.

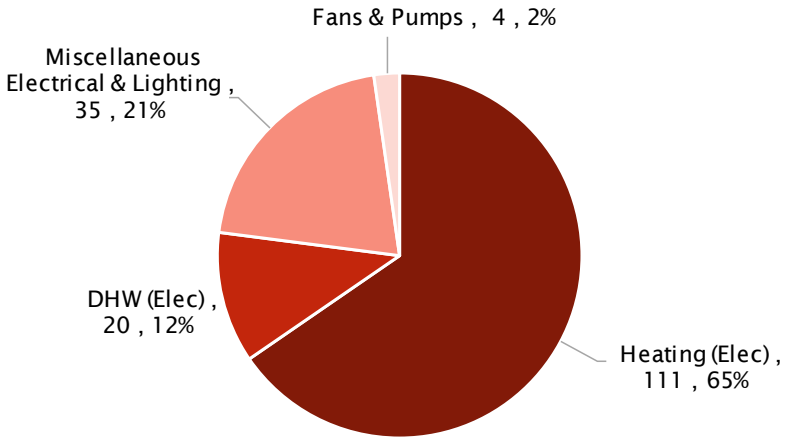


Figure 1.1 Baseline energy consumption break down by end use for MURB 01 – Low-rise walk-up [elec-heat; elec-DHW], shown in kWh/m²/yr and by % of total (170 kWh/m²/yr). This is an all-electric archetype.

1.1.2 MURB 02 – Low-rise walk-up [elec.-heat; gas-DHW]

This archetype is a 3-storey wood frame walk-up residential building with construction typical of the 1960s to 1970s, similar to MURB 01. This archetype has no balconies or elevator.

The building enclosure consists of 2x4 wood framing with batt insulation with overall effective R-value of R-11. The windows are single-glazed, aluminum frames (U-1.0) with 15% window to wall ratio.

The building is heated by electric baseboards. In contrast to MURB 01, MURB 02's domestic hot water provided by a centralized gas-fired boiler. Ventilation is provided by unheated make-up air unit to pressurize corridors, with intermittent bathroom and kitchen exhaust fans in suites.

The total energy use for this archetype is 174 kWh/m²/yr. The baseline energy consumption by end use is shown below.

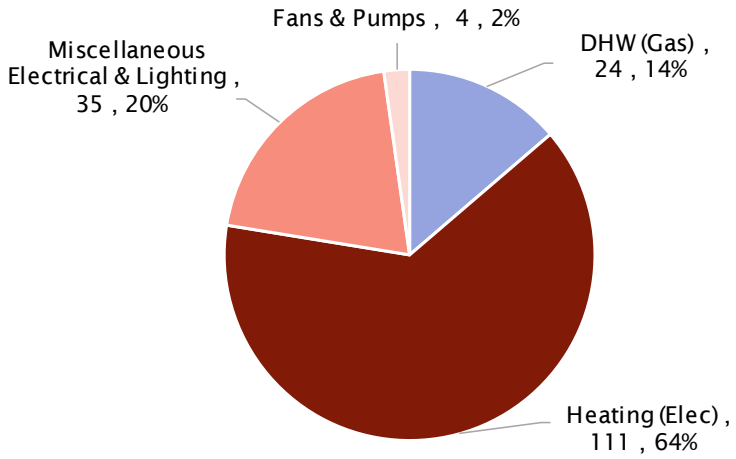


Figure 1.2 Baseline energy consumption break down by end use for MURB 02 – Low-rise walk-up [elec.-heat; gas-DHW], shown in kWh/m²/yr and by % of total (174 kWh/m²/yr). Electricity use is shown in shades of red, while natural gas consumption is shown in blue.

1.1.3 MURB 03 – Low-rise [elec.-heat; elec.-DHW]

This archetype is a 4-storey wood frame residential building with construction typical of the 1960s to 1970s, with balconies and elevator(s). It is typically larger in total area, with more units than the low-rise walk-up.

The building enclosure consists of 2x4 wood framing with batt insulation, with overall effective wall R-value of R-11. The windows are single-glazed, aluminum frames (U-1.0) with 20% window to wall ratio.

The building is heated by electric baseboards. Domestic hot water is provided by electric storage tank. Ventilation is provided by an unheated make-up air unit to pressurize the corridors, with intermittent bathroom and kitchen exhaust fans in suites.

The total energy use for this archetype is 194 kWh/m^2/yr. The baseline energy consumption by end use is shown below.

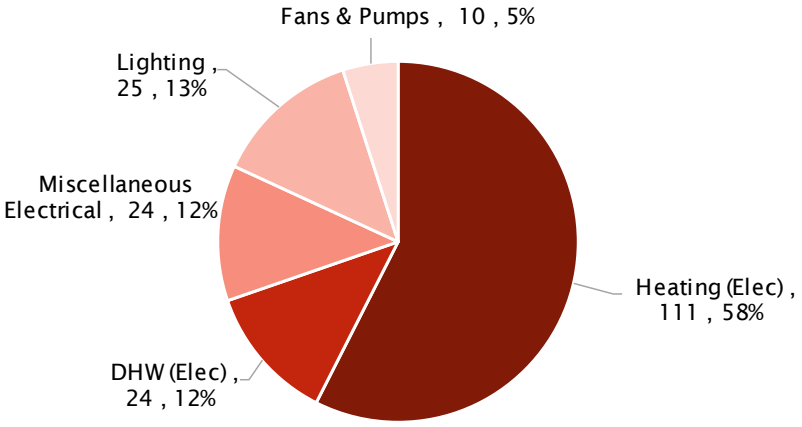


Figure 1.3 Baseline energy consumption break down by end use for MURB 03 – Low-rise [elec.-heat; elec.-DHW], shown in kWh/m²/yr and by % of total (194 kWh/m²/yr). This is an all-electric archetype.

1.1.4 MURB 04 – Low-rise [gas-heat; gas-DHW]

This archetype is a 4-storey wood frame residential building with construction typical of the 1960s to 1970s with balconies, similar to MURB 03.

The building enclosure consists of 2x4 wood framing with batt insulation, with overall effective wall R-value of R-11. The windows are single-glazed, aluminum frames (U-1.0) with 20% window to wall ratio.

In contrast to MURB 03, which is all-electric, MURB 04 has mainly gas-fired mechanical equipment. The building is heated by a central gas-fired boiler with hydronic radiators in suites. Central domestic hot water is provided by a gas-fired boiler. Ventilation is provided by an unheated make-up air unit to pressurize the corridors, with intermittent bathroom and kitchen exhaust fans in suites.

The total energy use for this archetype is 232 kWh/m^2/yr. The baseline energy consumption by end use is shown below.

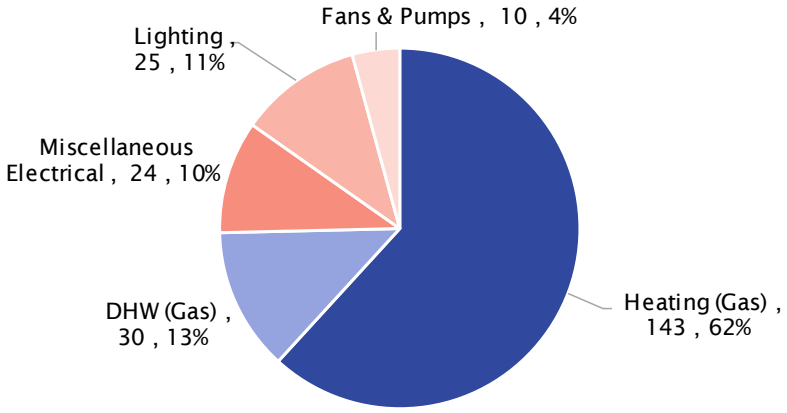


Figure 1.4 Baseline energy consumption break down by end use for MURB 04 – Low- rise [gas-heat; gas-DHW], shown in kWh/m²/yr and by % of total (232 kWh/m²/yr). Electricity use is shown in shades of red, while natural gas consumption is shown in shades of blue.

1.1.5 MURB 05 – High-rise [gas-heat; gas-DHW]

This archetype is a 13-storey multi-family high-rise residential building with construction typical of the 1960s to 1970s.

The building enclosure consists of concrete and steel studs with 1" interior insulation, uninsulated slab edges, and non-thermally broken balconies, with an overall effective wall R-value of R-5. The windows are single-glazed, aluminum frames (U-1.0) with 40% window to wall ratio.

The building is heated by a gas-fired boiler with hydronic radiators in suites. Central domestic hot water is provided by a gas-fired boiler. Ventilation is provided by an unheated make-up air unit to pressurize the corridors, with intermittent bathroom and kitchen exhaust fans in suites.

The total energy use for this archetype is 184 kWh/m^2/yr. The baseline energy consumption by end use is shown below.

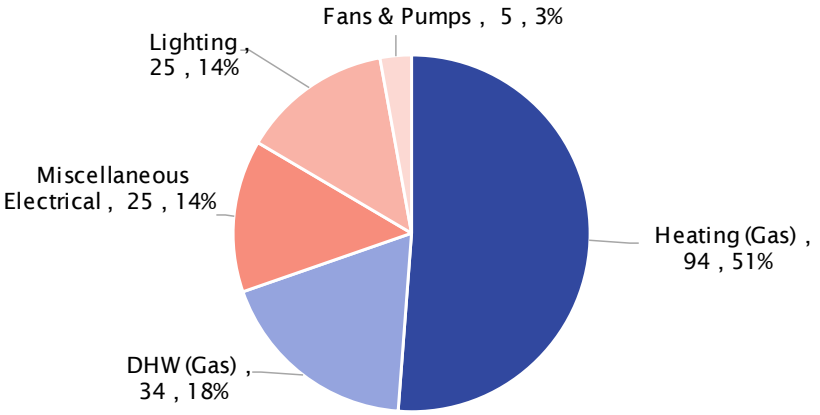


Figure 1.5 Baseline energy consumption break down by end use for MURB 05 – High-rise [gas-heat; gas-DHW], shown in kWh/m²/yr and by % of total (184 kWh/m²/yr). Electricity use is shown in shades of red, while natural gas consumption is shown in shades of blue.

1.1.6 Summary of Archetypes & Baseline Performance

The key characteristics of the five archetypes are summarized in Table 1.2 and detailed model inputs are provided in Section 4. The baseline energy consumption and greenhouse gas emissions of the five modelled archetypes is provided in Section 2.1. The individual ECMs GHGI reduction potential is provided in Section 3.

TABLE 1.2 KEY ARCHETYPE CHARACTERISTICS

	Size	Space Heat	DHW	Ventilation	Walls	Roof	Windows & W/W%
01 - Low-rise walk-up	3 floors 15,700 ft² 12 suites	Electric Base-boards	Electric, in-suite	Unheated corridor make-up air (MUA), Suite bathroom & kitchen exhaust	R-11, 2x4 wood w/batt	R-19, R-20 batt in low-slope roof	Single-glazed, metal frames, U_{IP}-1.0, SHGC 0.8, 15% window to wall ratio (WWR)
02 - Low-rise walk-up	3 floors 15,700 ft² 12 suites	Electric Base-boards	Gas, central	Unheated corridor MUA, Suite bathroom & kitchen exhaust	R-11, 2x4 wood w/batt	R-19, R-20 batt in low-slope roof	Single-glazed, metal frames, U_{IP}-1.0, SHGC 0.8, 15% WWR
03 - Low-rise	4 floors 47,000 ft² 44 suites	Electric Base-boards	Electric, in-suite	Unheated corridor MUA, Suite bathroom & kitchen exhaust	R-11, 2x4 wood w/batt	R-19, R-20 batt in low-slope roof	Single-glazed, metal frames, U_{IP}-1.0, SHGC 0.8, 20% WWR
04 - Low-rise	4 floors 47,000 ft² 44 suites	Gas Hydronic	Gas, central	Unheated corridor MUA, Suite bathroom & kitchen exhaust	R-11, 2x4 wood w/batt	R-19, R-20 batt in low-slope roof	Single-glazed, metal frames, U_{IP}-1.0, SHGC 0.8, 20% WWR

TABLE 1.2 KEY ARCHETYPE CHARACTERISTICS							
	Size	**Space Heat**	**DHW**	**Ventilation**	**Walls**	**Roof**	**Windows & W/W%**
05 – High-rise	13 floors 56,000 ft² 61 suites	Gas Hydronic	Gas, central	Unheated corridor MUA, Suite bathroom & kitchen exhaust	R-5, steel stud w/batt & exposed slab edges	R-9.5, 2" rigid foam in low-slope roof	Single-glazed, metal frames, U_{IP}-1.0, SHGC 0.8, 40% WWR

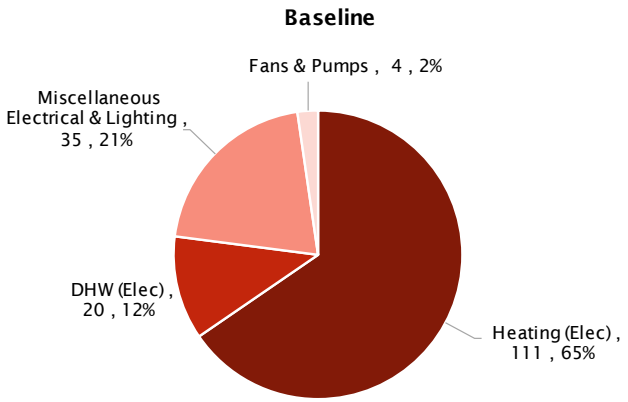
2 Energy Analysis Results

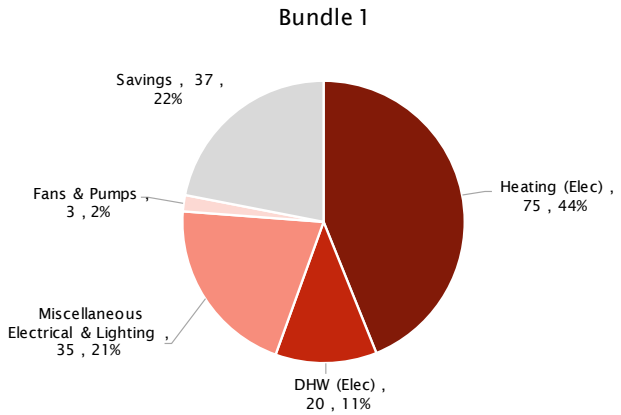
2.1 Summary Table

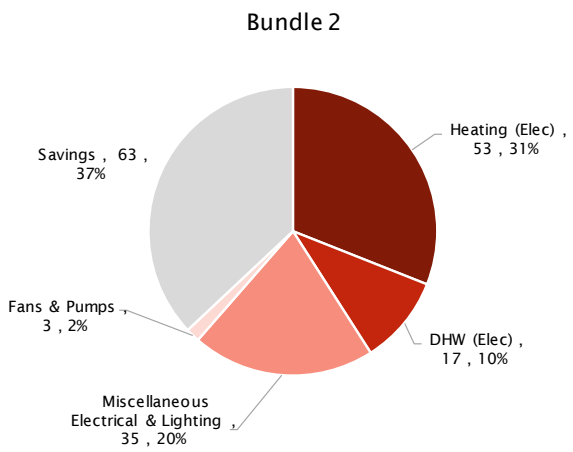
		Results (kWh/m²/yr)						Totals			Annual Fuel Breakdown				Emissions		
	Modelling Scenario	Space Heating - Gas	Space Heating - Elec	Fans & Pumps	DHW - Gas	DHW - Elec	Lighting & Plug Loads	Total kWh	TEUI, kWh/m²/yr	TEUI % savings	Electricity (kWh)	Electricity % savings	Natural Gas (GJ)	Gas % savings	Total GHGI (kg CO_2e/m^2)	GHGI savings (kg CO_2e/m^2)	GHGI % savings
01 - Low-rise walk-up	Baseline	0	111	4	0	20	35	247,100	170		247,100		-		1.9		
	1-Good	0	75	3	0	20	35	192,900	132	**22%**	192,900	22%	-	-	1.5	0.4	22%
	2-Better	0	53	3	0	17	35	155,700	107	**37%**	155,700	37%	-	-	1.2	0.7	37%
	3-Best	0	33	6	0	14	34	124,700	86	**50%**	124,700	50%	-	-	0.9	0.9	50%
02 - Low-rise walk-up	Baseline	0	111	4	24	0	35	253,100	174		218,300		125		5.9		
	1-Good	0	74	3	24	0	35	198,900	137	**21%**	164,200	25%	125	0%	5.5	0.4	7%
	2-Better	0	53	3	19	0	35	158,800	109	**37%**	131,400	40%	99	21%	4.4	1.6	26%
	3-Best	0	33	6	14	0	34	126,100	87	**50%**	105,200	52%	75	40%	3.4	2.6	43%
03 - Low-rise	Baseline	0	111	10	0	24	49	845,400	194		845,400		-		2.1		
	1-Good	0	98	10	0	24	49	787,000	180	**7%**	787,000	7%	-	-	2.0	0.1	7%
	2-Better	0	74	10	0	20	48	659,500	151	**22%**	659,500	22%	-	-	1.7	0.5	22%
	3-Best	0	53	8	0	17	43	528,600	121	**37%**	528,600	37%	-	-	1.3	0.8	37%
04 - Low-rise	Baseline	143	0	10	30	0	49	1,013,800	232		257,400		2,720		31.7		
	1-Good	124	0	10	30	0	49	927,300	212	**9%**	257,500	0%	2,410	11%	28.2	3.5	11%
	2-Better	81	0	10	23	0	48	707,800	162	**30%**	251,400	2%	1,640	40%	19.4	12.3	39%
	3-Best	51	0	9	18	0	43	528,400	121	**48%**	227,000	12%	1,080	60%	12.9	18.8	59%
05 - High-rise	Baseline	94	0	5	34	0	51	952,100	184		288,700		2,390		23.6		
	1-Good	84	0	5	34	0	51	900,800	174	**5%**	288,700	0%	2,200	8%	21.8	1.8	8%
	2-Better	58	0	5	27	0	49	719,000	139	**24%**	281,400	3%	1,580	34%	15.8	7.8	33%
	3-Best	43	0	9	20	0	45	604,700	117	**36%**	281,900	2%	1,160	51%	11.8	11.9	50%

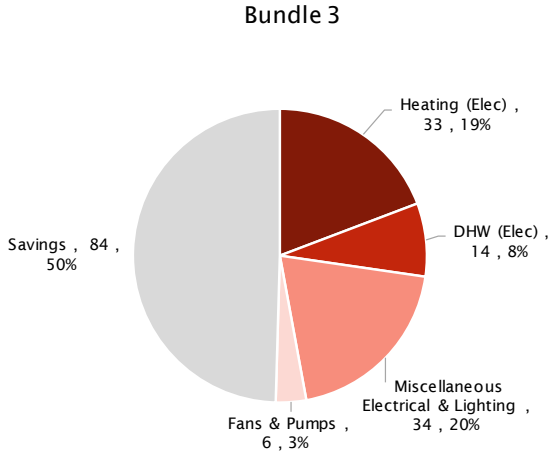
2.2 Energy Use Pie Charts

2.2.1 MURB 01 – Low-rise walk-up [elec.-heat; elec.-DHW]

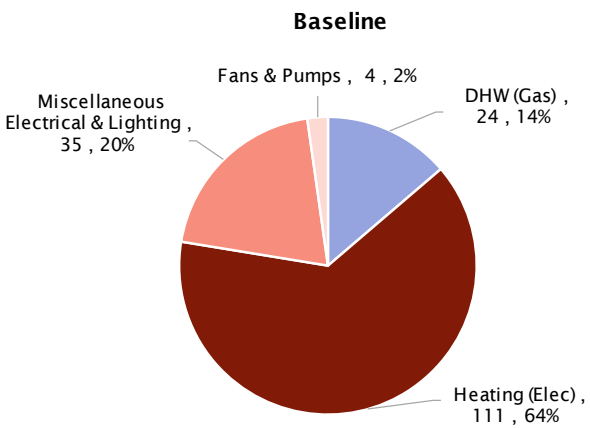


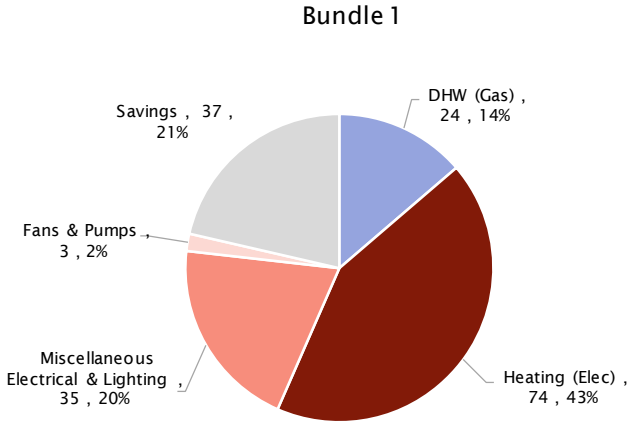


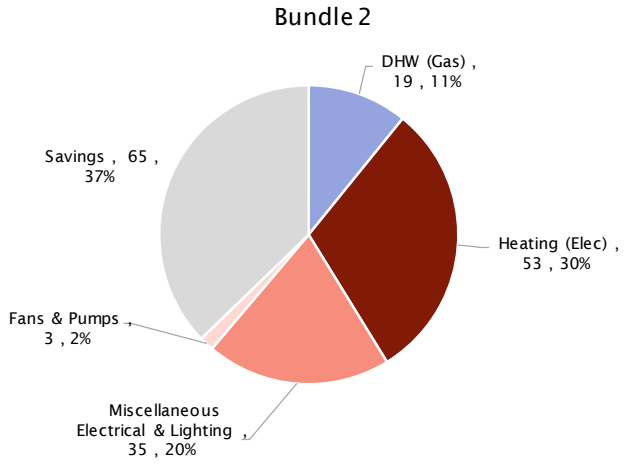


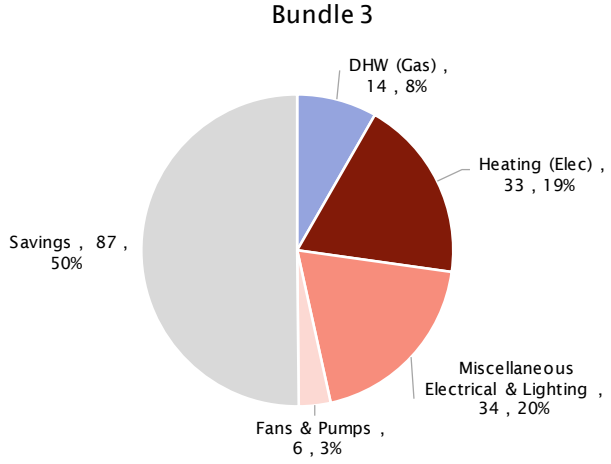


2.2.2 MURB 02 – Low-rise walk-up [elec.-heat; gas-DHW]

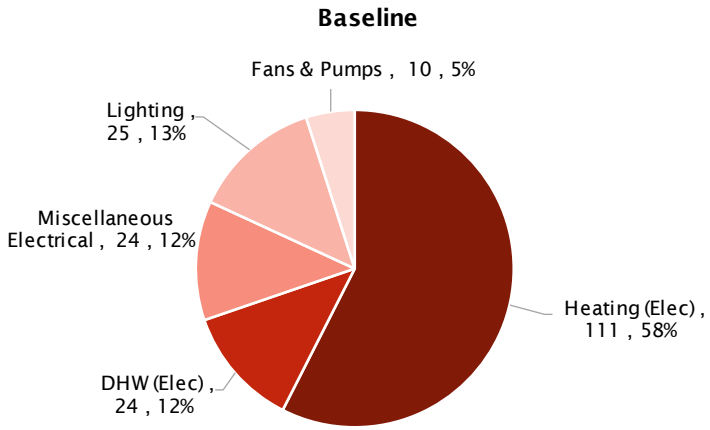


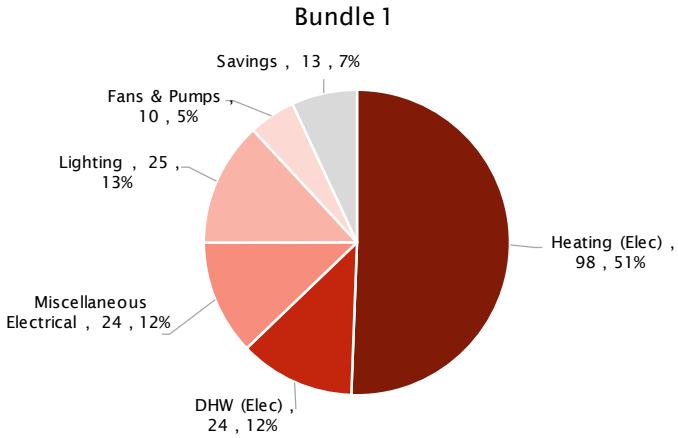


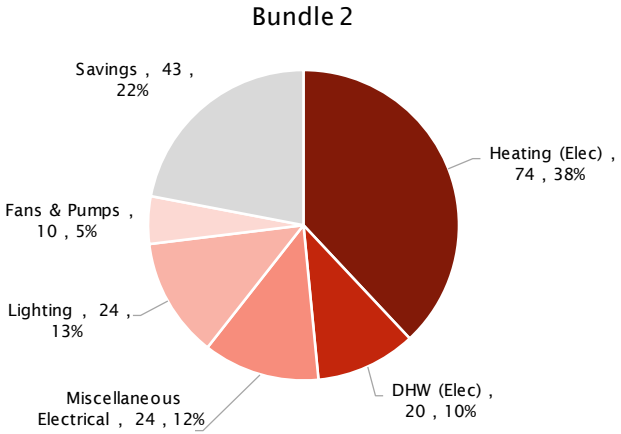


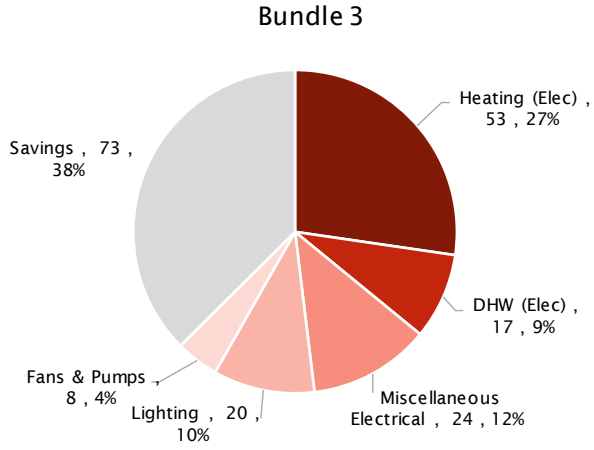


2.2.3 MURB 03 – Low-rise [elec.-heat; elec.-DHW]

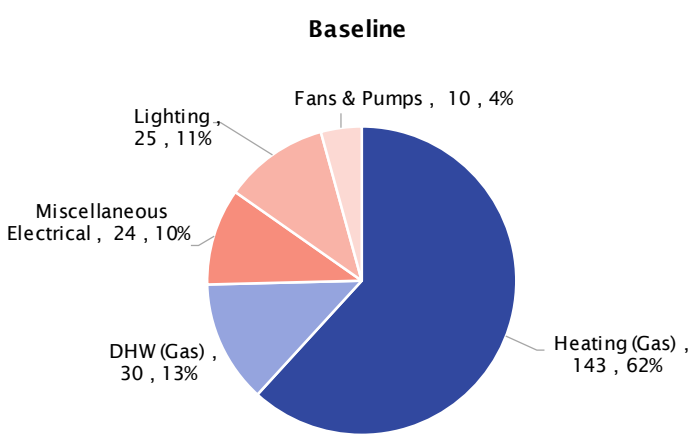


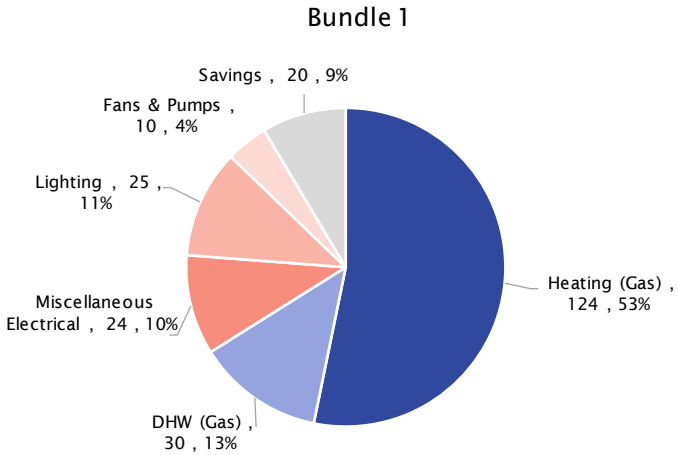


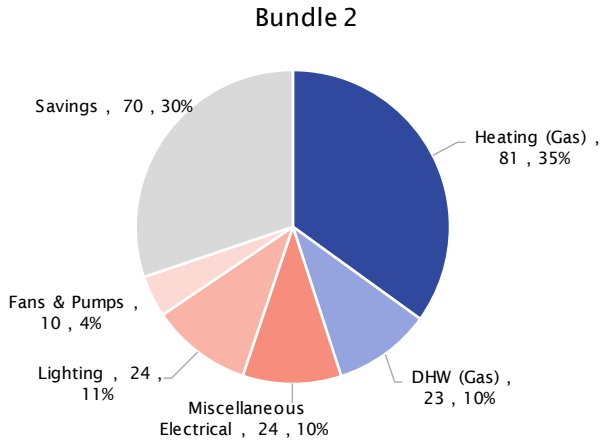


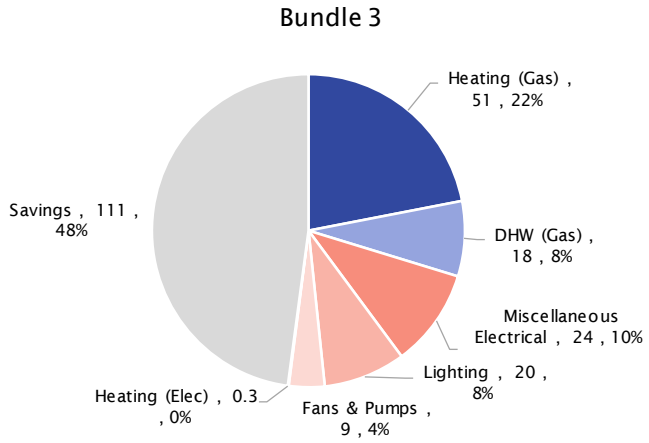


2.2.4 MURB 04 – Low-rise [gas-heat; gas-DHW]

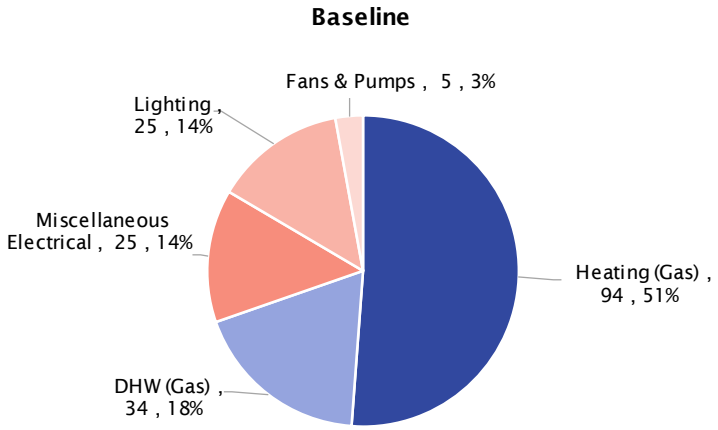


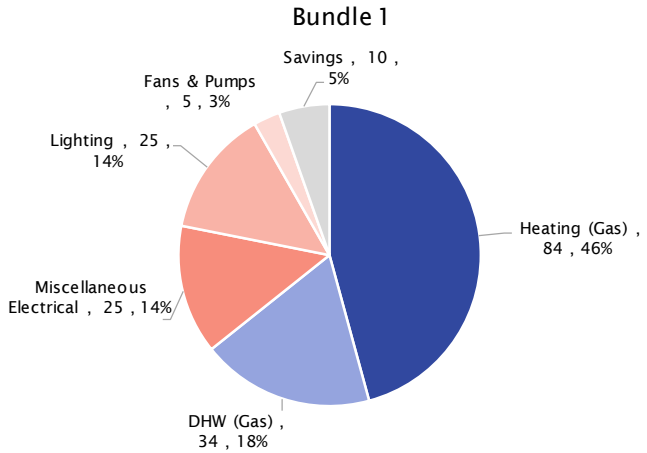


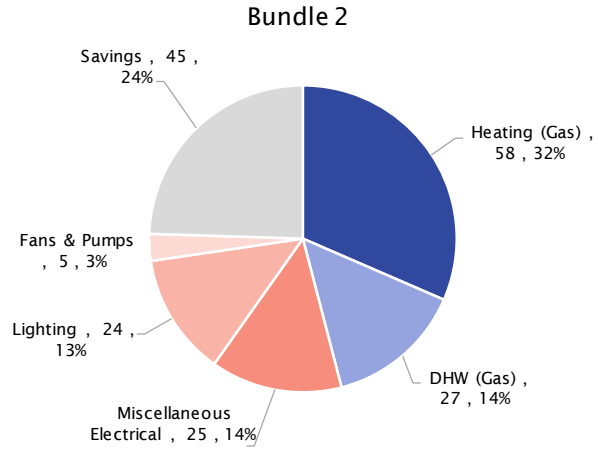


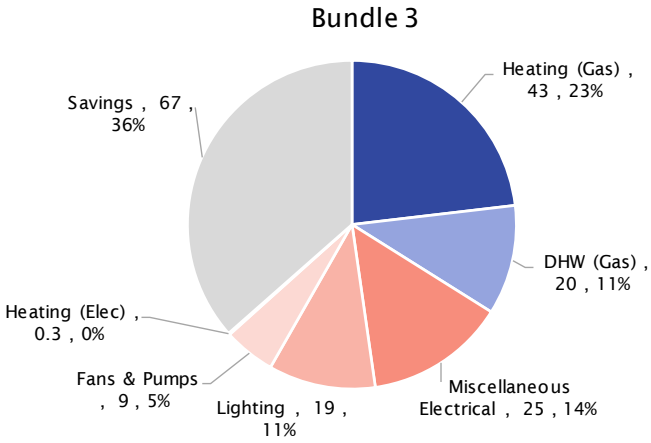


2.2.5 MURB 05 – High-rise [gas-heat; gas-DHW]









3 Individual ECM GHGI Reduction Potential

	Estimated GHGI Impact of Individual ECMs									
	01 - Low-rise walk-up Heating: Electric DHW: Electric	GHG reduction potential	02 - Low-rise walk-up Heating: Electric DHW: Gas	GHG reduction potential	03 - Low-rise Heating: Electric DHW: Electric	GHG reduction potential	04 - Low-rise Heating: Gas DHW: Gas	GHG reduction potential	05 - High-rise Heating: Gas DHW: Gas	GHG reduction potential
Windows	U-0.40	Low	U-0.40	Low	U-0.40	Low	U-0.40	Med	U-0.55	Med
Airtightness	10% improved	Low	10% improved	Low	10% improved	Low	10% improved	Med	10% improved	Med
Roof R-value	+R-10	Low	+R-10	Low	+R-10	Low	+R-10	Med		
Wall R-value	+R-5	Low	+R-5	Low	+R-5	Low	+R-5	Med	+R-2	Low
Windows	U-0.28	Low	U-0.28	Low	U-0.28	Low	U-0.28	High	U-0.45	High
Airtightness	50% improved	Low	50% improved	Low	50% improved	Low	50% improved	High	50% improved	High
Space heating							87%	Med	87%	Med
DHW heating			EF 0.70	Med			87%	Med	87%	Med
DHW fixtures	50% replaced	Low	50% replaced	Med	50% replaced	Low	50% replaced	Med	50% replaced	Med
Lighting	LEDs in common areas	Low	LEDs in common areas	Low	LEDs in common areas	Low	LEDs in common areas	Low	LEDs in common areas	Low
Roof R-value	+R-20	Low	+R-20	Low	+R-20	Low	+R-20	Med	+R-10	Low
Wall R-value	+R-15	Low	+R-15	Low	+R-15	Low	+R-15	High	+R-7	Med
Windows	U-0.17	Low	U-0.17	Low	U-0.17	Low	U-0.17	V. High	U-0.32	V. High
Airtightness	50% improved	Low	50% improved	Low	50% improved	Low	50% improved	High	50% improved	High
Ventilation - MUA	reduce to 15 cfm/suite	Low	reduce to 15 cfm/suite	Low	reduce to 15 cfm/suite	Low	reduce to 15 cfm/suite	Med	reduce to 20 cfm/suite	Med
Space heating							93%	High	93%	High
HRVs	In-suite, 70% efficient	Low	In-suite, 70% efficient	Low	In-suite, 70% efficient	Low	In-suite, 70% efficient	V.High	In-suite, 70% efficient	V.High
DHW heating			EF 0.82	High			93%	High	93%	High
DHW fixtures	100% replaced	Low	100% replaced	High	100% replaced	Low	100% replaced	High	100% replaced	High
Lighting	LEDs throughout	Low	LEDs throughout	Low	LEDs throughout	Low	LEDs throughout	Low	LEDs throughout	Low
Lighting Controls	Occupancy sensors	Low	Occupancy sensors	Low	Occupancy sensors	Low	Occupancy sensors	Low	Occupancy sensors	Low

4 Baseline Model Inputs

Model Inputs for the five baseline archetypes are in this section:

- MURB 01 – Low-rise walk-up [elec.-heat; elec.-DHW]
- MURB 02 – Low-rise walk-up [elec.-heat; gas-DHW]
- MURB 03 – Low-rise [elec.-heat; elec.-DHW]
- MURB 04 – Low-rise [gas-heat; gas-DHW]
- MURB 05 – High-rise [gas-heat; gas-DHW]

4.1 MURB 01 – Low-rise walk-up [elec.-heat; elec.-DHW]

Building Description

		MURB 01	Low-rise walk-up [elec.-heat; elec.-DHW]
General description		This archetype is a 3-storey wood frame walk-up residential building with construction typical of the 1960s to 1970s. The building enclosure consists of 2x4 wood framing with batt insulation with overall effective R-value of R-11. The windows are single-glazed, aluminum frames (U-1.0) with 15% window to wall ratio. The building is heated by electric baseboards. Domestic hot water is provided by electric heating coil. Ventilation is provided by unheated make-up air unit to pressurize corridors, with intermittent bathroom and kitchen exhaust fans in suites.	
Baseline Model EUI	kWh/m2/year	170	All Electric
Baseline Model GHGI	kg CO2/m2/year	2	All Electric

Architectural

	Units	MURB 01	Description
Storeys	-	3	
Gross Floor Area	m²	1457	
Building Enclosure	**Units**	**MURB 01**	**Description**
Exterior Walls - Above Grade - RSI-Value	m²-K/W	1.98	(R-11) based on 2x4 wood framing with batt insulation and balconies
Floors - Ground - RSI-Value	m²-K/W	H2K: SCN_1	uninsulated slab
Roofs - RSI-Value	m²-K/W	3.35	(R-19) based on R-20 batt in low-slope roof
Infiltration Rate	L/s/m² @ 5 Pa	0.4	House Volume: 4128.80 m³ Envelope surface area: 2525.62 m²
other infiltration units	m³/hr-m²	3.5 ACH50	
Fenestration - WWR	%	15%	
Fenestration - USI-Value	W/m²-K	5.7	Single glazing, aluminum frames (IP: U-1.0, R-1.0)
Fenestration - SHGC		0.80	Single glazing

Mechanical

Space Conditions	**Units**	**MURB 01**	**Description**
Occupant Density	m²/person	60.7	
Occupant Schedule	-	50% of time	
Heating Setpoint	˚C	21	
Cooling Setpoint	˚C	N/A	
Ventilation Systems	**Units**	**MURB 01**	**Description**
System Description		Unconditioned MUA ventilation	
Design Outdoor Air Volume	L/s	300	MUA rate, 55 cfm/suite (~26 L/s-suite * 12 suites)
Outdoor Air Volume Control	-	100% Outdoor Air	
Fan Power	W/cfm		228 Watts
System Description		Bathroom	
Maximum flow rate	l/s	33	396 Total (not per suite), run 2 hrs per day
Schedule	-	24/7	
Fan Power	W/cfm		301 Watts
System Description		Range Hood	
Maximum flow rate	l/s per suite	38	900 Total (not per suite), run 1 hr per day
Schedule	-	24/7	
Fan Power	W/cfm		684 Watts
Heating/Cooling Systems	**Units**	**MURB 01**	**Description**
System Description		Electic baseboards	
Fireplaces		none	
Zone Terminal Units			
Design Air Flow Rate	L/s	N/A	
Design Heating Capacity	W	35,000	H2K calculated
Fuel Type	-	Electric	
Efficiency	%	100	
Domestic Water Heating	**Units**	**MURB 01**	**Description**
System Description		Electric coil tanks	
Fuel Type	-	Electricity	
Tank Size	L	1800	151L *12 suites
Design Capacity	W		
Efficiency	%	EF 0.73	H2K default for electric tank
DHW Consumption	L/m²/day	1465.78 L/day	EnerGuide standards
Temperature	˚C	55	

Electrical

Lighting	**Units**	**MURB 01**	**Description**
Lighting Power Density	W/m²	20.40 kWh/day	EnergyGuide standards
Plug and Process Loads	**Units**	**MURB 01**	**Description**
Equipment Power Density	W/m2	62.16 kWh/day 52.80 kWh/day 4.8 kWh/day	EnergyGuide standards
Elevator	**Units**	**MURB 01**	**Description**
Elevator Power	kW	none	

4.2 MURB 02 – Low-rise walk-up [elec.-heat; gas-DHW]

Building Description

		MURB 02	Low-rise walk-up [elec.-heat; gas-DHW]
General description		This archetype is a 3-storey wood frame walk-up residential building with construction typical of the 1960s to 1970s. The building enclosure consists of 2x4 wood framing with batt insulation with overall effective R-value of R-11. The windows are single-glazed, aluminum frames (U-1.0) with 15% window to wall ratio. The building is heated by electric baseboards. Domestic hot water is provided by a central gas-fired boiler. Ventilation is provided by unheated make-up air unit to pressurize corridors, with intermittent bathroom and kitchen exhaust fans in suites.	
Baseline Model EUI	kWh/m2/year	174	
Baseline Model GHGI	kg CO2/m2/year	6	

Architectural

	Units	MURB 02	Description
Storeys	-	3	
Gross Floor Area	m²	1457	
Building Enclosure	**Units**	**MURB 02**	**Description**
Exterior Walls - Above Grade - RSI-Value	m²-K/W	1.98	(R-11) based on 2x4 wood framing with batt insulation and balconies
Floors - Ground - RSI-Value	m²-K/W	H2K: SCN_1	uninsulated slab
Roofs - RSI-Value	m²-K/W	3.35	(R-19) based on R-20 batt in low-slope roof
Infiltration Rate	L/s/m² @ 5 Pa	0.4	House Volume: 4128.80 m³ Envelope surface area: 2525.62 m²
other infiltration units	m³/hr-m²	3.5 ACH50	
Fenestration - WWR	%	15%	
Fenestration - USI-Value	W/m²-K	5.7	Single glazing, aluminum frames (IP: U-1.0, R-1.0)
Fenestration - SHGC		0.80	Single glazing

Mechanical

Space Conditions	**Units**	**MURB 02**	**Description**
Occupant Density	m²/person	60.7	
Occupant Schedule	-	50% of time	
Heating Setpoint	°C	21	
Cooling Setpoint	°C	N/A	
Ventilation Systems	**Units**	**MURB 02**	**Description**
System Description		Unconditioned MUA ventilation	
Design Outdoor Air Volume	L/s	300	MUA rate, 55 cfm/suite (~26 L/s-suite * 12 suites)
Outdoor Air Volume Control	-	100% Outdoor Air	
Fan Power	W/cfm		228 Watts
System Description		Bathroom	
Maximum flow rate	l/s	33	396 Total (not per suite), run 2 hrs per day
Schedule	-	24/7	
Fan Power	W/cfm		301 Watts
System Description		Range Hood	
Maximum flow rate	l/s per suite	38	900 Total (not per suite), run 1 hr per day
Schedule	-	24/7	
Fan Power	W/cfm		684 Watts
Heating/Cooling Systems	**Units**	**MURB 02**	**Description**
System Description		Electic baseboards	
Fireplaces		none	
Zone Terminal Units			
Design Air Flow Rate	L/s	N/A	
Design Heating Capacity	W	35,000	H2K calculated
Fuel Type	-	Electric	
Efficiency	%	100	
Domestic Water Heating	**Units**	**MURB 02**	**Description**
System Description		Central gas-fired boiler	
Fuel Type	-	Natural Gas	
Tank Size	L	1800	151L *12 suites
Design Capacity	W		
Efficiency	%	EF 0.60	EF = 0.67 - 0.0005*V, where V=151L
DHW Consumption	L/m²/day	1465.78 L/day	EnerGuide standards
Temperature	°C	55	

Electrical

Lighting	**Units**	**MURB 02**	**Description**
Lighting Power Density	W/m²	20.40 kWh/day	EnergyGuide standards
Plug and Process Loads	**Units**	**MURB 02**	**Description**
Equipment Power Density	W/m2	62.16 kWh/day 52.80 kWh/day 4.8 kWh/day	EnergyGuide standards
Elevator	**Units**	**MURB 02**	**Description**
Elevator Power	kW	none	

4.3 MURB 03 – Low-rise [elec.-heat; elec.-DHW]

Building Description

		MURB 03	4-storey, electric baseboards & elec. DHW
General description		This archetype is a 4-storey wood frame residential building with construction typical of the 1960s to 1970s. The building enclosure consists of 2x4 wood framing with batt insulation, with overall effective wall R-value of R-11. The windows are single-glazed, aluminum frames (U-1.0) with 20% window to wall ratio. The building is heated by electric baseboards. Central domestic hot water is provided by electric heating coil. Ventilation is provided by unheated make-up air unit to pressurize the corridors, with intermittent bathroom and kitchen exhaust fans in suites.	
Baseline Model EUI	kWh/m2/year	193	All Electric
Baseline Model GHGI	kg CO2/m2/year	2	All Electric

Architectural

	Units	MURB 03	Description
Storeys	-	4	
Gross Floor Area	m²	4369	
Building Enclosure	**Units**	**MURB 03**	**Description**
Exterior Walls - Above Grade - RSI-Value	m²-K/W	1.98	(R-11) based on 2x4 wood framing with batt insulation and balconies
Floors - Ground - RSI-Value	m²-K/W	0.53	(R-3) based on 6" concrete, uninsulated
Roofs - RSI-Value	m²-K/W	3.35	(R-19) based on R-20 batt in low-slope roof
Infiltration Rate	L/s/m² @ 5 Pa	0.76	RDH MURB study "High Average" (0.15 cfm/sf @ 5 Pa)
Fenestration - WWR	%	20%	Site visit pictures (model input 22% to get 20%)
Fenestration - USI-Value	W/m²-K	5.7	Single glazing, aluminum frames (IP: U-1.0, R-1.0)
Fenestration - SHGC		0.80	Single glazing

Mechanical

Space Conditions	**Units**	**MURB 03**	**Description**
Occupant Density	m²/person	45	~44 suites, 950 ft² each
Occupant Schedule	-	NECB	
Heating Setpoint	˚C	22/18	NECB App. G sched for set back
Cooling Setpoint	˚C	N/A	
Zoning Approach		1 Zone per Suite	
Ventilation Systems	**Units**	**MURB 03**	**Description**
System Description		Unconditioned MUA ventilation	Assumes 50% of MUA goes into suites
Design Outdoor Air Volume	L/s	1144	55cfm/suite [26L/s-suite]
Outdoor Air Volume Control	-	100% Outdoor Air	
Fan Type	-	Constant Air Volume	
Fan Efficiency	%	60	
Fan Power	W/cfm	0.76	
System Description		Natural Ventilation	
Design Air Flow	ACH/Zone	3	
Control		Outside T > 10˚C	Calibrated modelling
System Description		Intermittent suite exhaust	
Maximum flow rate	l/s per suite	35	ASHRAE 62.1 2001 - kitchen (100cfm), bathroom (50cfm) = 75 cfm av.
Schedule	-	7-8 am, 5-6pm	2 hours total
Fan total efficiency	%	60	
Fan Power	W/cfm	0.35	
Heating/Cooling Systems	**Units**	**MURB 03**	**Description**
System Description		Electric baseboards	
Fireplaces		None	
Zone Terminal Units		Electric Baseboards	
Design Heating Capacity	W	Autosize	
Fuel Type	-	Electricity	
Efficiency	%	100%	
Domestic Water Heating	**Units**	**MURB 03**	**Description**
System Description		Electric Coil DHW	
Fuel Type	-	Electricity	
Tank Size	L	Autosized	
Design Capacity	W	Autosized	
Efficiency	%	100%	
DHW Consumption	L/m²/day	1.9	
DHW Consumption	L/s/person	0.016	CoV modelling guidelines
Standby losses	W/K	3.00	
Pump Power	W/gpm	20.0	
Temperature	˚C	60	

Electrical

Lighting	**Units**	**MURB 03**	**Description**
Lighting Power Density	W/m²	6	RDH calibrated MURB study average
Schedule		NECB	
Exterior Lighting Power	W	600	NECB
Plug and Process Loads	**Units**	**MURB 03**	**Description**
Equipment Power Density	W/m2	6	RDH calibrated MURB study average
Schedule		NECB App. G	
Elevator	**Units**	**MURB 03**	**Description**
Elevator Power	kW	3	One motor, 3 kW, CoV modelling Guidelines
Schedule		NECB App. G	

4.4 MURB 04 – Low-rise [gas-heat; gas-DHW]

Building Description

		MURB 04	4-storey, gas hydronic & gas DHW
General description		This archetype is a 4-storey wood frame residential building with construction typical of the 1960s to 1970s. The building enclosure consists of 2x4 wood framing with batt insulation, with overall effective wall R-value of R-11. The windows are single-glazed, aluminum frames (U-1.0) with 20% window to wall ratio. The building is heated by a gas-fired boiler with hydronic radiators in suites. Central domestic hot water is provided by a gas-fired boiler. Ventilation is provided by unheated make-up air unit to pressurize the corridors, with intermittent bathroom and kitchen exhaust fans in suites.	
Baseline Model EUI	kWh/m2/year	232	
Baseline Model GHGI	kg CO2/m2/year	32	

Architectural

	Units	MURB 04	Description
Storeys	-	4	
Gross Floor Area	m²	4369	
Building Enclosure	**Units**	**MURB 04**	**Description**
Exterior Walls - Above Grade - RSI-Value	m²-K/W	1.98	(R-11) based on 2x4 wood framing with batt insulation and balconies
Floors - Ground - RSI-Value	m²-K/W	0.53	(R-3) based on 6" concrete, uninsulated
Roofs - RSI-Value	m²-K/W	3.35	(R-19) based on R-20 batt in low-slope roof
Infiltration Rate	L/s/m² @ 5 Pa	0.76	RDH MURB study "High Average" (0.15 cfm/sf @ 5 Pa)
Fenestration - WWR	%	20%	Site visit pictures (model input 22% to get 20%)
Fenestration - USI-Value	W/m²-K	5.7	Single glazing, aluminum frames (IP: U-1.0, R-1.0)
Fenestration - SHGC		0.80	Single glazing

Mechanical

Space Conditions	**Units**	**MURB 4**	**Description**
Occupant Density	m²/person	45	~44 suites, 950 ft² each
Occupant Schedule	-	NECB	
Heating Setpoint	˚C	22/18	NECB App. G sched for set back
Cooling Setpoint	˚C	N/A	
Zoning Approach		1 Zone per Suite	
Ventilation Systems	**Units**	**MURB 4**	**Description**
System Description		Unconditioned MUA ventilation	Assumes 50% of MUA goes into suites
Design Outdoor Air Volume	L/s	1144	55cfm/suite [26L/s-suite]
Outdoor Air Volume Control	-	100% Outdoor Air	
Fan Type	-	Constant Air Volume	
Fan Efficiency	%	60	
Fan Power	W/cfm	0.76	
System Description		Natural Ventilation	
Design Air Flow	ACH/Zone	3	
Control		Outside T > 10˚C	Calibrated modelling
System Description		Intermittent suite exhaust	
Maximum flow rate	l/s per suite	35	ASHRAE 62.1 2001 - kitchen (100cfm), bathroom (50cfm) = 75 cfm av.
Schedule	-	7-8 am, 5-6pm	2 hours total
Fan total efficiency	%	60	
Fan Power	W/cfm	0.35	
Heating/Cooling Systems	**Units**	**MURB 4**	**Description**
System Description		Gas hydronic	Central gas-fired boiler serving perimter hydronic baseboards in suites.
Central Plant Equipment		Heating Boiler	
Design Capacity	W	Autosize	
Fuel Type	-	Natural Gas	
Efficiency	%	80	
Hot Water Loop Design Flow Rate	L/s	Autosize	
Loop Supply Temperature	˚C	80	
Loop Temperature Difference	˚C	10	
Fireplaces		None	
Domestic Water Heating	**Units**	**MURB 4**	**Description**
System Description		Gas boiler	Central gas-fired boiler
Fuel Type	-	Natural Gas	
Tank Size	L	Autosized	
Design Capacity	W	Autosized	
Efficiency	%	80%	
DHW Consumption	L/m²/day	1.9	
DHW Consumption	L/s/person	0.016	CoV modelling guidelines
Standby losses	W/K	3.00	
Pump Power	W/gpm	20.0	
Temperature	˚C	60	

Electrical

Lighting	**Units**	**MURB 4**	**Description**
Lighting Power Density	W/m²	6	RDH calibrated MURB study average
Schedule		NECB	
Exterior Lighting Power	W	600	NECB
Plug and Process Loads	**Units**	**MURB 4**	**Description**
Equipment Power Density	W/m2	6	RDH calibrated MURB study average
Schedule		NECB App. G	
Elevator	**Units**	**MURB 4**	**Description**
Elevator Power	kW	3	One motor, 3 kW, CoV modelling Guidelines
Schedule		NECB App. G	

4.5 MURB 05 – High-rise [gas-heat; gas-DHW]

Building Description

		MURB 5	13-storey concrete, gas hydronic
General description		This archetype is an 13-storey multi-family high-rise residential building with construction typical of the 1960s to 1970s. The building enclosure consists of concrete with 1" interior insulation, uninsulated slab edges, and non-thermally broken balconies, with an overall effective wall R-value of R-5. The windows are single-glazed, aluminum frames (U-1.0) with 40% window to wall ratio. The building is heated by a gas-fired boiler with hydronic radiators in suites. Central domestic hot water is provided by a gas-fired boiler. Ventilation is provided by an unheated make-up air unit to pressurize the corridors, with intermittent bathroom and kitchen exhaust fans in suites.	
Baseline Model EUI	kWh/m2/year	184	
Baseline Model GHGI	kg CO2/m2/year	24	

Architectural

	Units	MURB 5	Description
Storeys	-	13	
Gross Floor Area	m²	5176	
Building Enclosure	**Units**	**MURB 5**	**Description**
Exterior Walls - Above Grade - RSI-Value	m²-K/W	1.06	(R-5) based on steel studs with batt, uninsulated slab edges and non-thermally broken balconies.
Roofs - RSI-Value	m²-K/W	1.67	(R-9.5) based on 1.5" rigid foam insulation
Infiltration Rate	L/s/m² @ 5 Pa	0.51	RDH MURB study "Mid Average" (0.10 cfm/sf @ 5 Pa)
Fenestration - WWR	%	40%	Estimate/average from images
Fenestration - USI-Value	W/m²-K	5.7	Single glazing, aluminum frames (IP: U-1.0, R-1.0)
Fenestration - SHGC		0.80	Belmont Existing 2009 IEC

Mechanical

Space Conditions	**Units**	**MURB 5**	**Description**
Occupant Density	m²/person	42	61 suites, 800 ft² each
Occupant Schedule	-	NECB	
Heating Setpoint	˚C	22/18	NECB App. G sched for set back
Cooling Setpoint	˚C	N/A	
Zoning Approach		1 Zone per Suite	
Ventilation Systems	**Units**	**MURB 5**	**Description**
System Description		Unconditioned MUA ventilation	Assumes 50% of MUA goes into suites
Design Outdoor Air Volume	L/s	1586	60 cfm/suite
Outdoor Air Volume Control	-	100% Outdoor Air	
Fan Type	-	Constant Air Volume	
Fan Efficiency	%	60	
Fan Power	W/cfm	0.76	
System Description		Natural Ventilation	
Design Air Flow	ACH/Zone	3	
Control		Outside T > 10˚C	Calibrated modelling
System Description		Intermittent suite exhaust	
Maximum flow rate	l/s per suite	35	ASHRAE 62.1 2001 - kitchen (100cfm), bathroom (50cfm) = 75 cfm av.
Schedule	-	7-8 am, 5-6pm	2 hours total
Fan total efficiency	%	60	
Fan Power	W/cfm	0.35	
Heating/Cooling Systems	**Units**	**MURB 5**	**Description**
System Description		Gas hydronic	Central gas-fired boiler serving perimter hydronic baseboards in suites.
Central Plant Equipment		Heating Boiler	
Design Capacity	W	Autosize	
Fuel Type	-	Natural Gas	
Efficiency	%	80	
Hot Water Loop Design Flow Rate	L/s	Autosize	
Loop Supply Temperature	˚C	80	
Loop Temperature Difference	˚C	10	
Fireplaces		None	
Domestic Water Heating	**Units**	**MURB 5**	**Description**
System Description		Gas boiler	Central gas-fired boiler
Fuel Type	-	Natural Gas	
Tank Size	L	Autosize	
Design Capacity	W	Autosize	
Efficiency	%	80%	
DHW Consumption	L/s/person	0.016	CoV modelling guidelines
Standby losses	W/K	3.00	
Pump Power	W/gpm	20.0	
Temperature	˚C	60	

Electrical

Lighting	**Units**	**MURB 5**	**Description**
Lighting Power Density	W/m²	6	RDH calibrated MURB study average
Schedule		NECB	
Exterior Lighting Power	W	600	NECB App. G sched for set back
Plug and Process Loads	**Units**	**MURB 5**	**Description**
Equipment Power Density	W/m2	6	RDH calibrated MURB study average
Schedule		NECB App. G	
Elevator	**Units**	**MURB 5**	**Description**
Elevator Power	kW	6	Two motors, 3 kW each, Cov Modelling Guideline
Schedule		NECB App. G	

Appendix F: Economic Analysis Results

1 Economic Analysis

TABLE 1.1 SUMMARY OF BUNDLE COSTING ELEMENTS

Detail	Baseline & Good Bundle	Better Bundle	Best Bundle
Walls	Cladding renewal	Materials and labour for the addition of 1.5" of exterior mineral wool insulation (L-R includes long screw attachment, H-R includes low-conductivity clips)	Materials and labour for the addition of 4" of exterior mineral wool insulation (L-R includes long screw attachment, H-R includes low-conductivity clips)
Windows	Window replacements with code minimum requirements L-R: Double glazed non-metal frames (U-0.40, SHGC 0.40) H-R: Double glazed thermally broken aluminum (U-0.55, SHGC 0.40)	Additional material cost for high performance L-R: Double glazed, vinyl frames, low-e coating (U-0.28, SHGC: 0.30) H-R: Double glazed thermally broken aluminum frames (U-0.45, SHGC: 0.40)	Additional material cost for high performance L-R: Triple glazed, vinyl frames (U-0.17, SHGC: 0.25) H-R: Triple glazed, thermally-broken metal frames (U-0.32, SHGC: 0.30)
Airtightness	Incidental improvements due to the cladding renewal and window replacement	Cost of one whole building air tightness test and additional materials and labour for intentional air barrier detailing	Same as Bundle 2
Roof	Planned membrane replacement	Materials and labour for additional insulation L-R: 2" XPS H-R: No additional	Materials and labour for additional insulation L-R: 4" XPS H-R: 2" XPS
Ventilation	No change	No change	Materials and labour to install in-suite HRVs (70%effective) and improve suite compartmentalization. Components include removal of old fans, running new ductwork, installing HRV, adding grilles, electrical connection, bulkheads, paint, and finishing to match existing, labour to reduce flow from existing MUA.
Heating Boilers (Natural gas heating archetypes only)	Replace boilers with code minimum efficiency (80%)	Additional material cost for installation of a medium efficiency boiler (87%)	Additional material and labour cost for installation of a condensing boiler (93% efficient) including changes to the venting

TABLE 1.1 SUMMARY OF BUNDLE COSTING ELEMENTS			
Domestic Hot Water Heaters (Natural gas DHW archetypes only)	Replace existing water heaters with code minimum efficiency heaters (80%)	Additional material cost for installation of a medium efficiency water heater (87%)	Additional material and labour cost for installation of a condensing water heater (93% efficient) including changes to the venting
Domestic Hot Water (DHW) Fixtures	No change	Material and labour costs to replace 50% of the fixtures with low flow models	Material and labour costs to replace all of the fixtures with low flow models
Lighting	Replace bulbs as they fail	Install new LED bulbs at the time of replacement within the common area. No change to the lighting fixtures.	Install new LED bulbs at the time of replacement within the common area and the suites. No change to the lighting fixtures. Labour and material to install occupancy sensors within the common spaces.

TABLE 1.2 INCREMENTAL CAPITAL COST ($)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	$0	$0	$0	$0	$0
	Mid	$0	$0	$0	$0	$0
	High	$0	$0	$0	$0	$0
Better	Low	$51,900	$52,200	$106,100	$116,600	$142,300
	Mid	$66,400	$66,700	$137,100	$150,300	$182,500
	High	$80,800	$81,200	$168,100	$184,000	$222,600
Best	Low	$130,000	$131,900	$311,600	$328,600	$438,200
	Mid	$162,600	$165,000	$385,600	$406,800	$537,700
	High	$195,200	$198,100	$459,600	$485,000	$637,200

TABLE 1.3 INCREMENTAL CAPITAL COST ($/SUITE)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	$0	$0	$0	$0	$0
	Mid	$0	$0	$0	$0	$0
	High	$0	$0	$0	$0	$0
Better	Low	$4,300	$4,300	$2,400	$2,700	$2,300
	Mid	$5,500	$5,600	$3,100	$3,400	$3,000
	High	$6,700	$6,800	$3,800	$4,200	$3,600
Best	Low	$10,800	$11,000	$7,100	$7,500	$7,200
	Mid	$13,600	$13,800	$8,800	$9,200	$8,800
	High	$16,300	$16,500	$10,400	$11,000	$10,400

TABLE 1.4 INCREMENTAL CAPITAL COST ($/M^2)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	$0	$0	$0	$0	$0
	Mid	$0	$0	$0	$0	$0
	High	$0	$0	$0	$0	$0
Better	Low	$36	$36	$24	$27	$27
	Mid	$46	$46	$32	$35	$35
	High	$55	$56	$39	$42	$43
Best	Low	$89	$91	$72	$76	$85
	Mid	$112	$113	$89	$94	$104
	High	$134	$136	$106	$112	$123

TABLE 1.5 UTILITY BILL SAVINGS ($/YR)			
Archetype	**Good Bundle**	**Better Bundle**	**Best Bundle**
MURB 01	$6,700	$11,400	$15,200
MURB 02	$6,700	$11,000	$14,500
MURB 03	$7,300	$23,100	$39,400
MURB 04	$2,600	$9,700	$17,400
MURB 05	$1,500	$7,600	$11,000

TABLE 1.6 UTILITY BILL SAVINGS ($/SUITE/YR)			
Archetype	**Good Bundle**	**Better Bundle**	**Best Bundle**
MURB 01	$560	$950	$1,270
MURB 02	$560	$920	$1,210
MURB 03	$170	$530	$900
MURB 04	$60	$220	$390
MURB 05	$30	$130	$180

TABLE 1.7 UTILITY BILL SAVINGS ($/M^2/YR)			
Archetype	**Good Bundle**	**Better Bundle**	**Best Bundle**
MURB 01	$4.60	$7.80	$10.50
MURB 02	$4.60	$7.60	$9.90
MURB 03	$1.70	$5.30	$9.10
MURB 04	$0.60	$2.20	$4.00
MURB 05	$0.30	$1.50	$2.10

TABLE 1.8 NET PRESENT VALUE ($)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	$103,800	$103,800	$112,000	$37,900	$22,500
	Mid	$102,000	$102,000	$110,000	$37,900	$22,500
	High	$102,000	$102,000	$110,000	$37,900	$22,500
Better	Low	$123,200	$117,500	$250,300	$24,100	-$33,000
	Mid	$105,600	$100,000	$213,000	-$7,100	-$74,500
	High	$91,200	$85,500	$182,000	-$44,800	-$115,600
Best	Low	$98,800	$84,700	$274,300	-$95,800	-$311,100
	Mid	$62,100	$47,700	$189,600	-$157,000	-$412,500
	High	$29,500	$14,400	$115,700	-$255,400	-$513,500

TABLE 1.9 NET PRESENT VALUE ($/SUITE)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	$8,650	$8,650	$2,550	$860	$370
	Mid	$8,500	$8,500	$2,500	$860	$370
	High	$8,500	$8,500	$2,500	$860	$370
Better	Low	$10,270	$9,790	$5,690	$550	-$540
	Mid	$8,800	$8,340	$4,840	-$160	-$1,220
	High	$7,600	$7,130	$4,140	-$1,020	-$1,900
Best	Low	$8,230	$7,060	$6,230	-$2,180	-$5,100
	Mid	$5,170	$3,970	$4,310	-$3,570	-$6,760
	High	$2,450	$1,200	$2,630	-$5,800	-$8,420

TABLE 1.10 NET PRESENT VALUE ($/M^2)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	$71	$71	$26	$9	$4
	Mid	$70	$70	$25	$9	$4
	High	$70	$70	$25	$9	$4
Better	Low	$85	$81	$58	$6	-$6
	Mid	$73	$69	$49	-$2	-$14
	High	$63	$59	$42	-$10	-$22
Best	Low	$68	$58	$63	-$22	-$60
	Mid	$43	$33	$44	-$36	-$80
	High	$20	$10	$27	-$59	-$99

TABLE 1.11 INTERNAL RATE OF RETURN (%)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	-	-	-	-	-
	Mid	-	-	-	-	-
	High	-	-	-	-	-
Better	Low	24%	23%	24%	9%	5%
	Mid	19%	18%	18%	7%	3%
	High	16%	15%	15%	5%	1%
Best	Low	13%	12%	14%	4%	-2%
	Mid	10%	9%	11%	3%	-4%
	High	8%	8%	9%	1%	-4%

TABLE 1.12 DISCOUNTED RETURN ON INVESTMENT (%)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	-	-	-	-	-
	Mid	-	-	-	-	-
	High	-	-	-	-	-
Better	Low	8%	8%	8%	1%	-1%
	Mid	5%	5%	5%	0%	-1%
	High	4%	4%	4%	-1%	-2%
Best	Low	3%	2%	3%	-1%	-2%
	Mid	1%	1%	2%	-1%	-3%
	High	1%	0%	1%	-2%	-3%

TABLE 1.13 NET COST OF CARBON ABATEMENT ($/tCO$_2$e)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	$0	$0	$0	$0	$0
	Mid	$0	$0	$0	$0	$0
	High	$0	$0	$0	$0	$0
Better	Low	$0	$0	$0	$0	$27
	Mid	$0	$0	$0	$4	$61
	High	$0	$0	$0	$28	$95
Best	Low	$0	$0	$0	$39	$169
	Mid	$0	$0	$0	$64	$225
	High	$0	$0	$0	$104	$280

TABLE 1.14 INCREMENTAL COST OF CARBON ABATEMENT ($/tCO$_2$e)						
Bundle	**Range**	**MURB 01**	**MURB 02**	**MURB 03**	**MURB 04**	**MURB 05**
Good	Low	$0	$0	$0	$0	$0
	Mid	$0	$0	$0	$0	$0
	High	$0	$0	$0	$0	$0
Better	Low	$1,720	$770	$1,730	$70	$120
	Mid	$2,200	$980	$2,230	$90	$150
	High	$2,680	$1,190	$2,740	$110	$180
Best	Low	$3,220	$1,180	$2,980	$130	$240
	Mid	$4,030	$1,480	$3,690	$170	$290
	High	$4,830	$1,780	$4,400	$200	$350