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2050 Net Zero Building Standards

Demystifying Net Zero for Condos

Determining if it is Feasible for an Existing Building to Meet the Requirements to Retrofit Towards Net Zero



Do you know the construction year of your condominium? Typically, brick and concrete buildings have a lifespan of over 100 years when properly maintained. If your building was constructed after 1975, it is likely to be in operation for at least the next 25 years and will therefore become a part of the net zero landscape.

It is important to consider how to transition your property to meet evolving building and energy codes, as well as the expectations of potential condominium owners who prioritize sustainability, lower utility costs, and improved building resilience when purchasing a condo unit. Building owners are currently one major equipment replacement cycle away from the approaching net zero building standards which come into effect throughout Canada in 2050. In many jurisdictions, there are ambitious goals which accelerate the timelines associated with these net zero requirements.

Net zero feasibility entails determining

if it is even possible for an existing building to meet the requirements to retrofit towards net zero. This process includes benchmarking the current energy performance of a building, reviewing the existing electrical loads on-site, and studying potential on-site renewable energy production. Let us first discuss just how far from net zero we currently are.

Benchmarking is the first essential step in managing on-site energy use. Energy Use Intensity (EUI) refers to the total energy use, from all sources, per square meter of conditioned floor space for a building, measured in equivalent kWh per year. This widely used metric enables comparison of energy use between buildings of similar types. Partnered with Natural Resources Canada (NRCan), Energy Star maintains a technical reference which calculates, catalogues, and presents the median EUI by building type for Canadian buildings. Within each broad classification, buildings may have different geometries, envelope materials, and recreation facilities but this metric serves

as a baseline comparison between your building and its peers.

The EUI required for an existing multi-unit residential building (MURB) to transition to net zero is considered to be between 62 - 91 ekWh/m²/yr., depending on climate region. To put that into perspective, the average MURB in Canada currently performs at roughly 228 ekWh/m²/yr. This equates to 2.5 to 3.5 times the energy use of a net zero-ready building and illustrates just how far the average Canadian MURB must progress by 2050.

In order to help fund the energy-efficiency work that is required for existing buildings to transition to net zero, there are several federal incentive programs offered throughout Canada and several provincial incentive programs offered regionally through local utility providers across the country. There are also grant and low-interest loan programs that are offered by local municipalities as well as the Canadian Infrastructure

ILLUSTRATION BY CLAYTON HAMMER

Bank that have been created to help in Canada's transition to net zero.

The biggest question that must be answered by current building owners is: Will you take the carrot now or wait for the stick to make necessary changes to your building? In other words, will you take advantage of current incentives and funding opportunities being offered to upgrade your building and make smart, incremental changes in an affordable manner, or will you wait for government legislation to force you to comply?

If you wait for coming legislation, things can get expensive quickly, as the retrofits necessary to achieve net zero take time and planning to accomplish. New HVAC equipment is expensive and building envelope work is even more so, therefore, early planning and involvement in the net zero process are essential to achieve acceptable payback periods for retrofit projects.

Do not worry if you cannot make an immediate change to net zero, as all ex-

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isting buildings have time to evolve to reach this goal. Funding deep energy retrofits will be expensive and will involve changing key systems throughout your building. Achieving net zero requires a multi-faceted approach, and every building will take a slightly differ-

ent path to reaching the same goal.

Plan to engage with funding and incentive programs as well as low-interest/forgivable loan programs for energy-efficiency projects and begin proactive reserve-fund budgeting to ensure that these transitions are feasible. Connect with industry experts to understand what funding is available as well as the timelines and requirements for each program. Engage with your condominium community to decide on the path that is right for your property. Review funding and incentive submission requirements and ensure that all criteria are met so that funding will not be discontinued or denied based on a technicality.

Engage an energy consultant to help start the planning process and guide you through a staged transition to reach your goals. To make sound decisions, an integrated design process must be adhered to, and a total system approach must be incorporated into all decision-making.

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Each piece of equipment within your property has a lifecycle and with each subsequent equipment replacement, the systems within your building should evolve to become more resilient, more efficient, and, in turn, less costly to operate and maintain. Several of the primary energy and water distribution systems within a building remain in place for decades and will eventually require replacement. It is during these required major equipment and distribution system replacements that large efficiency projects and deep energy retrofits can be realized.

An excellent first step that we see building owners across all sectors currently engaging in is decarbonization. This essentially involves phasing out natural gas-consuming equipment and replacing it with new, energy-efficient electric equipment. Although not all electricity is generated through zero-emission processes, the switch to electric equipment will drastically reduce the greenhouse gas (GHG) emissions associated with your condominium and allow for an easier transition to renewable energy sources in the future.

Good examples of decarbonization are air source, ground source, water source, and variable refrigerant flow (VRF) heat pump systems which allow for the efficient transfer of heat and can integrate with existing heating/cooling systems within most condo buildings. Heat pumps have an advantage over traditional air-conditioning systems in that they are capable of providing heating and cooling while utilizing electricity to perform both functions. Other examples of decarbonization being adopted by a growing number of properties are replacing natural gas boilers with electric boilers and replacing natural gas-fired rooftop units (RTUs) with heat pump RTUs.

Mechanical upgrades are important but, in order to achieve net zero, you are going to have to perform envelope upgrades as well. Envelope upgrades will reduce the heating/cooling loads on-site and optimize the thermal performance of your passive building elements. Typically, this involves a re-cladding proj-

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ect for the existing building envelope, replacing windows with highly efficient windows, upgrading roof insulation, and eliminating thermal bridging wherever possible. Air sealing, weather stripping, and upgraded insulation for exterior doors are also part of an effective net-zero envelope upgrade.

When performing required roof replacement projects, it is good practice to have a structural assessment performed to determine the potential for installing larger HVAC units, solar photovoltaic (PV) systems, and solar thermal systems on your flat roof area. The best time to install solar arrays is during roof replacement projects, as all components for both systems can be designed and constructed in tandem. Planning structural upgrades will take time and should be done in conjunction with other required capital projects on-site to minimize construction costs and the need to perform subsequent renovations or building shutdowns.

Throughout the entire net-zero transition process, energy modelling should be employed to test and modify design iterations to optimize the passive and mechanical elements of your condominium building to function as desired. Performing this work will allow comparisons between design options and will enable issues to be addressed prior to becoming problems in the real world. This process begins with an energy

model of your existing building, properly calibrated using the actual utility consumption data and current on-site equipment performance and scheduling. Within the modelling software, multiple design iterations can be created and the annual energy use for each scenario can be simulated using local weather information. These iterations provide direct comparisons between the overall impact on annual energy use for each design decision. This process will save time and money by allowing all options to be fully considered prior to commencing construction.

Once a building has a decarbonization strategy and the envelope has been upgraded, it is time to start thinking about on-site renewable energy generation. Renewable energy is an essential component of any net-zero strategy and should be incorporated into a project in as many ways as possible. Solar PV systems generate clean energy that can be sold back to the grid or used directly on-site with battery storage systems to increase the resiliency of a property. Micro wind turbines help make generating energy with wind more reliable at lower wind speeds as well as reduce potential conflicts with height restrictions due to local zoning.

Solar thermal heating systems can be part of an effective heating strategy, and solar hot water, with proper storage design, can drastically reduce the utility costs associated with domestic hot water or pool water heating.

From a condominium owner perspective, a building that is more efficient represents lower utility costs and generally provides greater occupant comfort levels. Orienting your condominium community around net-zero values and marketing your condominium as a sustainable place to live will attract prospective owners and help foster a sense of community within your building. Don't go it alone! It is never too early to start the process of transitioning your condominium to net zero. Start planning by reaching out to industry experts and begin proactive reserve fund budgeting to ensure that your transition is a smooth one. 