OECI OPRESNIK ENGINEERING CONSULTANTS INC.

Energy Strategy Report

Site:

Lakeshore Blvd. GP
3353-3359 Lakeshore Road West
Multi-Use Residential Building
Toronto, Ontario

Report Prepared by:

Opresnik Engineering Consultants Inc.

3353-3359 Lakeshore Road West, Toronto ON
Mixed Use Development

The City of Toronto has developed the Toronto Green Standard (TGS) in an effort to address climate change. The TGS is and will be the basis in which the City will be shaped in terms of development. The standard continues to evolve and force developments to improve their sustainable design and ultimately reduce energy consumption and their carbon footprint. All developments greater than 20,000 sq.m. or within a City of Toronto Community Energy Plan area must provide an Energy Strategy Report.

The *Zero Emissions Building Framework* proposed the following three targets:

1. Energy Use Intensity – EUI – kwh/m2: Annual building energy use, divided by the conditioned floor area.
2. Thermal Energy Demand Intensity – TEDI – kWh/m2: Annual heating load, divided by the conditioned floor area. TEDI excludes the effects of mechanical efficiencies (ex. condensing boilers) but does include passive systems such as in-suite heat recovery, solar gains, and internal gains.
3. Greenhouse Gas Intensity – GHGI – kgCO2e/m2: Annual greenhouse gas emissions, divided by the conditioned floor area. The carbon emissions factors currently listed in OBC SB-10 are used for this calculation.

The contents of this energy strategy report will serve to address the energy use and Greenhouse Gas Intensity as the buildings are in the preliminary stage. Two representative models have been created to simulate the proposed and reference buildings. While the model is not an actual representation of the design, it has been created based on the proposed orientation, location weather file and potential systems and materials that may be used in the actual and final design. The purpose of this model is to illustrate compliance with the TGS and provide the basis of schematic design.

The proposed 3353-3359 Lakeshore Road West development is comprised of a 6 storey building with retail and residences. The building has residential units with lobby, mezzanine, indoor amenity and retail spaces on the ground floor. There is unconditioned underground parking directly below the development. Loading areas and open space are provided above grade.

The building will be conditioned primarily by heat pumps that will utilize variable refrigerant flow (VRF). Low flow suite fixtures will be implemented to conserve energy associated with domestic hot water. A central corridor spanning each floor is conditioned by a make-up air unit located on the rooftop, providing ventilation and pressurization to the central corridors.

Retail and amenity spaces shall be conditioned by high efficiency heat pumps and/or packaged units.

The design team will implement maximum resource conservation wherever it is commercially viable. In other words, the design will incorporate energy efficient measures in balance with the total associated costs to install and maintain the equipment and/or systems.

Each suite with have an energy recovery units (ERUs), the ERUs will have an efficiency rating of 60%, which exceeds the ASHRAE 90.1-2007 minimum requirement of 50% efficiency. The units will consider an ERV bypass – this will allow free cooling to occur through economizer modulation and provide additional savings by disengaging the ERU's fan during free cooling. Free cooling is considered a passive solution, as the mechanical cooling is also disengaged.

The ERUs will recover the heating or cooling within the exhaust air and preheat or precool the outdoor air being provided to the space. Dedicated exhaust areas are not connected to ERUs.

All of the pumps will consider variable speed options and all fan blower motors will be variable speed. This allows for energy savings when demands are decreased to partial levels. The ground floor perimeter heating may be supplemented by radiant panels and baseboards and a central boiler plant. The boiler plant will have high efficiency and all associated pumps variable speed. The water loop is the most effective means of provided perimeter heating.

All fenestration will be at least Solarban 60 double glazed low-e and argon filled. This provides substantial energy saving by reducing the solar heat gains during the summer months and provides significant savings in the winter months by reducing the heat loss through the windows. Thermally broken aluminum fames will be considered for all fenestration.

LED lighting provides quality lighting and colour rendition comparable to fluorescent lighting, however, at less than half the light power density. LED lighting will be considered with occupancy sensing wherever practical. The energy model has captured the savings from the lighting and occupancy measures in accordance with best practice energy modeling procedures from

ASHRAE Appendix G and NECB 2015 Division B Part 8, Advanced Energy Modeling.

The building insulation for the roof will be two layers of polyisocyranate, which provides an overall average insulation R-value of R-35. The energy modeling ran multiple iterations on the amount of insulation best suited for this application and the results supported this level of insulation. Increases the roof insulation beyond the R-35 resulted in diminishing returns as the associated installation costs increased to the point that it was no longer pragmatic to increase the insulation. The top layer of the roof is a white TPO membrane or green roof as required by the TGS.

Photovoltaics will be installed on the development as the energy harnessed from the sun will be utilized in the amenity and ground floor areas.

Proposed and reference baseline energy models will be created to ensure compliance with NECB 2015 as required by the Ontario Building code.

The energy model will considered all aspects of building design with consideration given to minimizing maintenance and the need for replacement in the future. Building maintenance can be directly proportional to the quality of sustainable design. In other words, the higher the quality of sustainable design, the lower the required amount of building maintenance. Inversely, the lower the quality of sustainable design, the higher the required maintenance.

By implementing sustainable design practices to the aforementioned measure, an expected outcome of less maintenance and decreased operational costs can be realized. This approach is the basis of the sustainable design process for the project and combines the knowledge of well tested materials with established industry standards as well as feedback from end users and commissioning agents. Such methods and measures will reduce the overall stress on building components and systems and as a result increase the life span of the buildings.

Short-term investment strategies and solutions are typically the downfall of sustainability as they cause underinvestment and economic inefficiencies. Fixed income return on investment focuses on risk or minimizing downsides; long-term investment focuses on upside opportunities and minimizing potential risks. Key components to long term investment that were implemented and considered in the design are:

1. Successful implementation of life cycle costing based on performance and risk. The Durable building requirements outline life expectancy, however, these are only achievable by continued maintenance with quality parts and materials that reflect the initial installation.
2. Benchmarks – Potential risks can be mitigated by utilization of the measurement and verification means that have been incorporated into the design to assist in maintaining the initial design and building performance as defined by the energy model baseline.
3. Tracking errors – Operational changes and seasonal anomalies can be updated on an ongoing basis by adjusting the energy model reference baseline. This provides the ability to track actual performance versus projected annual consumptions

Performance Monitoring – The energy model baseline is critical to establishing baseline performance and providing the means and methods for recommissioning of systems to restore original performance upon the completion of standard operational and maintenance procedures.

The energy modeling software that will be used to compile the energy models for both the proposed building and the reference building is eQuest version 3.64. eQuest 3.64 operates on the DOE protocols and platform. SB-10 requires that the energy modeling software be capable of hour by hour simulation and a minimum of 8760 hours per year. The maximum allowable number of unmet cooling or heating hours is 100 hours.

Therefore, it is the opinion of Opresnik Engineering Consultants Inc., that the Lakeshore Blvd. GP development located at 3353-3359 Lakeshore Road West will exceed the requirements as outlined in the OBC, NECB2015 and TGS v3 Tier 1 requirements.