Planning and Building Department
Development and Design Division
T: 905-615-3200 x5522
www.mississauga.ca

# City of Mississauga Green Development Standard

# Energy Modeling Report Terms of Reference

## DESCRIPTION

The Energy Modeling Report is a submission requirement for the City of Mississauga's Green Development Standard (GDS) EB1: Energy Performance metric. While the focus is on exterior design solutions, applicants may opt to meet the performance requirements with a combination of exterior design solutions, interior design solutions, or servicing strategies.

Buildings that do not have energy requirements under the Ontario Building Code (OBC) do not have to demonstrate energy performance under this standard. The Energy Modeling Report applies to buildings over 2,000 $m^2$. Buildings under 2,000 $m^2$ are not required to submit an Energy Modeling Report.

The Energy Modeling Report must identify the proposed energy conservation measures and the applicable assumptions made in the modeling of the energy performance of the building. It is expected that the energy models submitted will reflect the systems that are likely to be designed and built and that any performance liabilities are already understood and mitigated in the form of assumptions used in the energy model.

The results of the energy modeling are intended to show compliance with Mississauga's GDS performance requirements for Total Energy Use Intensity (TEUI), Thermal Energy Demand Intensity (TEDI), and Greenhouse Gas Intensity (GHGI). However, the thermal comfort and energy performance of the constructed buildings will depend on factors outside of the standardized assumptions, such as occupant behaviour, weather, and hours of use. The standardized assumptions align with those identified in the Toronto Green Standard Modeling Guidelines. It is expected that the project's performance, as modeled at the Site Plan Approval, will be maintained or improved throughout the remainder of the design and construction process.

The energy modeling process should be started as early in the design process as possible to maximize impact on design, but the Design Development Stage Energy Modeling Report is only required to be submitted as part of a completion application for Site Plan Approval once all required documents and/or drawings are available.

Planning and Building Department
Development and Design Division
T: 905-615-3200 x5522
www.mississauga.ca

## PERFORMANCE REQUIREMENTS

Projects must demonstrate: TEUI, TEDI, AND GHGI targets by building archetype per Table 1.
A building is considered mixed-use, if it consists of different use-types each contributing at least 10% of the total modeled floor area (MFA). Mixed-use buildings with different performance targets, calculate the TEUI, TEDI, and GHGI targets based on an area-weighting.

*Table 1. Summary of Energy Performance requirements by building type and Tier.*

| METRIC | TIER 1 REQUIREMENTS | TIER 2 REQUIREMENTS | TIER 3 REQUIREMENTS |
|---|---|---|---|
| **MID-RISE AND HIGH RISE MULTI UNIT RESIDENTIAL** | GHGI: 15 $kgCO_2e/m^2/yr$<br>TEUI: 135 $kWh/m^2$<br>TEDI: 50 $kWh/m^2$ | GHGI: 10 $kgCO_2e/m^2/yr$<br>TEUI: 100 $kWh/m^2$<br>TEDI: 30 $kWh/m^2$ | GHGI: 5 $kgCO_2e/m^2/yr$<br>TEUI: 75 $kWh/m^2$<br>TEDI: 15 $kWh/m^2$ |
| **COMMERCIAL OFFICE AND INSTITUTIONAL** | GHGI: 15 $kgCO_2e/m^2/yr$<br>TEUI: 130 $kWh/m^2$<br>TEDI: 30 $kWh/m^2$ | GHGI: 8 $kgCO_2e/m^2/yr$<br>TEUI: 100 $kWh/m^2$<br>TEDI: 22 $kWh/m^2$ | GHGI: 5 $kgCO_2e/m^2/yr$<br>TEUI: 65 $kWh/m^2$<br>TEDI: 15 $kWh/m^2$ |
| **COMMERCIAL RETAIL** | GHGI: 10 $kgCO_2e/m^2/yr$<br>TEUI: 120 $kWh/m^2$<br>TEDI: 40 $kWh/m^2$ | GHGI: 5 $kgCO_2e/m^2/yr$<br>TEUI: 90 $kWh/m^2$<br>TEDI: 25 $kWh/m^2$ | GHGI: 5 $kgCO_2e/m^2/yr$<br>TEUI: 70 $kWh/m^2$<br>TEDI: 15 $kWh/m^2$ |
| **INDUSTRIAL** | GHGI: 15 $kgCO_2e/m^2/yr$<br>TEUI: 130 $kWh/m^2$<br>TEDI: 60 $kWh/m^2$ | GHGI: 10 $kgCO_2e/m^2/yr$<br>TEUI: 100 $kWh/m^2$<br>TEDI: 50 $kWh/m^2$ | GHGI: 5 $kgCO_2e/m^2/yr$<br>TEUI: 70 $kWh/m^2$<br>TEDI: 37 $kWh/m^2$ |

Planning and Building Department
Development and Design Division
T: 905-615-3200 x5522
www.mississauga.ca

# Documentation Submission Requirements

## TIER 1: DESIGN DEVELOPMENT STAGE ENERGY MODELING REPORT

Tier 1 requires the submission of a Design Development Stage Energy Modeling Report prior to Site Plan Approval. This is considered a preliminary or design development stage energy model. The Design Development Stage Energy Modeling Report includes the following documents:

- Energy Modeling Report.
- Electronic energy model simulation files.
- Mechanical and Electrical Design Brief; and
- Related supporting drawings and calculations.

## TIER 2 AND TIER 3: AS-CONSTRUCTED ENERGY MODELING REPORT

Tier 2 and Tier 3 require the submission of an additional As-Constructed Energy Modeling Report based on as-built construction drawings. The As-Constructed Energy Modeling Report reflects the building's final design, including any changes made during the construction phase. This must be evaluated by a third-party project evaluator approved by the City of Mississauga. The As-Constructed Energy Modeling Report is submitted after occupancy begins and once all necessary shop drawings are available to create the energy model.

The third-party evaluator is responsible for conducting a site visit to ensure that equipment has been installed as part of the design documentation. The evaluator cannot conduct a review while the project is still under construction. The As-Constructed Energy Modeling Report submission documents include:

- Energy Modeling Report.
- Electronic simulation files.
- Modeling notes.
- Take-off calculations.
- Zoning diagrams.
- Outdoor air calculation spreadsheets.

Planning and Building Department
Development and Design Division
T: 905-615-3200 x5522
www.mississauga.ca

- Architectural, mechanical, and electrical drawings and specifications (issued for construction/as built).
- Product cut sheet(s)/spec sheet(s)/shop drawings for installed energy-efficient measures.
- Declaration template filled in by the energy modeler confirming that as-constructed energy model incorporates the equipment, schedules, and operations, as described in the design documentation, and also signed by the architect and mechanical and electrical engineers/consultants confirming that the equipment installed on site is as per the design documents and the Energy Modeling Report.

## ENERGY MODELING REPORT

The contents for the Energy Modeling Report should include the following sections: executive summary, project background, simulation overview, simulation details, and compliance results.

### Section 1: Executive Summary

Provide a project summary, a high-level summary of the modeling assumptions, the energy model inputs and results, and identify how the project complies with the energy performance targets for TEDI, TEUI, and GHGI.

### Section 2: Project Background

Provide a project background with the following information:

- Project description: project name, project address, building use and occupancy. If applicable, include different use-types present in the building.
- Project team: identify energy modeler, architect, coordinating registered professional (CRP), and mechanical and electrical engineers.
- Drawing set: referenced drawing set file names, and dates.
- Building size: MFA, Gross Floor Area (GFA), number of storeys and units.
- Climatic information: simulation weather file names.
- Energy Modeling Tool and Simulation: state the software and version used, and simulation file name.
- Performance targets: state the TEDI, TEUI, GHGI performance targets achieved in the modeling.
- Summary of energy efficiency measures: provide a summary of the efficiency measures that are provided in Section 4 of the Energy Modeling Report.

Planning and Building Department
Development and Design Division
T: 905-615-3200 x5522
www.mississauga.ca

**Section 3: Simulation Overview**

Provide details of the modeling simulation and building assumptions, including occupancy type areas, operation hours, and weather data.

**Section 4: Simulation Details**

Provide simulation details for the proposed and reference building details with the following information:

- Mechanical systems: provide details on the HVAC, ventilation, mechanical plant, domestic hot water systems.
- Lighting, plug, and other loads: provide details on the interior and exterior lighting, plug and process loads, and other loads.
- Architectural and building enclosure: provide details on the assembly description and R-values, and infiltration.

**Section 5: Energy Model Compliance Results**

Provide results from simulation, including energy use, emissions, and peak demands. State the performance targets achieved for TEUI, TEDI, and GHGI.

Planning and Building Department
Development and Design Division
T: 905-615-3200 x5522
www.mississauga.ca

## PREPARING THE ENERGY MODELING REPORT

The Energy Modeling Report must be completed and signed by the certified energy modeller and a licensed architect, C.E.T., B.E.M.O., or professional engineer. The reference building performance shall be calculated according to SB-10 2017 Division 3, using a computer simulation model for the entire building project. The acceptable software include:

- EQuest version 3.64 or higher.
- Energy Plus.
- IES Virtual Environment.

The proposed building design must meet the following requirements and criteria:

- City of Mississauga GDS EB1: Energy Performance requirements.
- Mandatory provisions with current Ontario Building Code (OBC) and any of its referenced energy codes.
- Inclusion of all building energy consumption within and associated with the building project.

The simulation model must comply with the following requirements and criteria:

- Designed to meet EB1: Energy Performance requirements.
- City of Mississauga's Energy Modeling Report Terms of References and ANSI/ASHRAE/IESNA Standard 90.1-2013 as modified by SB-10 2017 Division 3 Chapter 2 (as applicable). OR
- National Energy Code of Canada for Buildings 2015 as modified by SB-10 2017 Division 3 Chapter 3 (as applicable).

Mississauga's Energy Performance requirements have been designed to align with the Toronto Green Standard (TGS) requirements, as such applicants should follow the modeling parameters identified in the following sections of the Toronto Green Standard Modeling Guidelines:

- Section 3.0 Building Simulation Details.
- Section 4.0 TEDI.
- Section 5.0 Absolute Performance Targets Pathway Modeling Guidance.