

BELi - Building Enclosure Labs Inc.

Light Low-Rise Commercial Building Deep Energy Retrofit Study

Building Type: Light commercial building

Location: London, Ontario

Services: Deep Energy Retrofit Study

Year: 2024

Project Overview

BELi was requested to find the least-cost measure pathway to achieve 50% reduction in total (gas and electric) annual site energy usage as well as the associated lifecycle greenhouse gas (GHG) emission reductions on light low-rise commercial buildings (less than 10,000 ft² per unit). This type of building was chosen due to their commonality throughout Ontario.



Methodology

Energy conservation measures for this study included Hybrid RTUs, ERVs, LED lighting, increased roof insulation, weatherstripping, and AeroBarrier.

Energy models were performed using RETScreen Expert, a product of Natural Resources Canada. This software was used as it is able to model multiple fuel heating systems (dual fuel systems) and its heating-degree-day software is less time consuming than hourly simulations making it easier to

provide calibration of the historical building usage and estimate energy savings for various individual measures and packages of measures.

Operational carbon emissions were determined using emission factors and reference values produced by the Government of Canada, while embodied carbon emissions were determined using current environmental product declarations (EPDs).

Costing for measures were considered using actual quotes. Energy costs were based on 2024 energy costs for natural gas and electricity. Net present value and internal rate of return of all measures and packages were determined through RETScreen Expert.

Results

The hybrid RTUs delivered the largest reduction in energy consumption, achieving a 47% decrease and consequently providing the greatest reductions in both energy costs and GHG emissions among all measures evaluated. When combined with weatherstripping and AeroBarrier, the package achieved the target, with a 55% reduction in energy consumption while maintaining the lowest initial cost-effectiveness ratio, at \$2.95 per m³ of natural gas saved.

