Autocase

Justifying the Added Expenditure of a NZE Building for City of Toronto

Project Description

As part of the City of Toronto's response to the climate crisis, the feasibility of NZE buildings is being evaluated from technical and financial angles.

City planners as well as the design team led by MJMA needed to be able to justify the incremental cost necessary to push the building toward the higher sustainability requirements.

Strategies Assessed

- Upfront & O&M costs, as well as carbon taxes
- Landscaping
- Health and wellness
- Natural gas
- Electricity use

PARTNERS
City of Toronto + MJMA Architects

DESIGN PHASE
Conceptual Design

BUILDING TYPE
Community Center

SIZE
77,285 sq ft

LOCATION
Toronto, Ontario

Autocase

How Autocase was Used

The teams worked together to create the business case for decision making for:

- Thermal comfort and natural ventilation
- Energy sources that would meet net zero
- Green roof vs. solar PV roof, for renewables and stormwater management

Design Options or Improvements	Energy Savings**	TEUI (kWh/m^2)	TEDI (kWh/m^2)	GHGI*** (kg/m^2)
Base Design (Current)	24.87%	345.2	93.2	43.7
Airtightness Improvement	28.07%	330.9	80.5	43.2
Geothermal Heat Pump*	59.01%	190	93.2	7.6
Push and Pull System	31.36%	316.2	92.2	40.6
Natural Ventilation	28.68%	327.7	91.6	44.3
Heat Recovery on All AHUs	38.07%	286.1	37.8	32.6
Solar Thermal Collector (Full Roof)	40.17%	276.7	93.2	33.8

**All of building's ventilation cooling, heating and domestic hot water load has been shifted to the geothermal system.*
*** The energy savings are compared to the OBC-SB10 reference building*
**** Using Energy Star Portfolio Manager Greenhouse gas emission factors*

The Outcome

Using Autocase, the project team was able to justify pursuing NZE design and showed that the project fell within the required discounted payback period, allowing them to make the case for going net zero.

The project successfully moved into the schematic design phase.

Systems Package	Discounted Payback	Return on Investment	Benefit/Cost Ratio
Open Loop Geothermal	12-13 Years	39.91%	1.66
Closed Loop Geothermal	15-16 Years	22.88%	1.30
Air Source/Solar Thermal	12-13 Years	38.53%	1.63

Want to learn more?

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