CCInovation Conference 2017

Construction on the Precipice of Massive Change

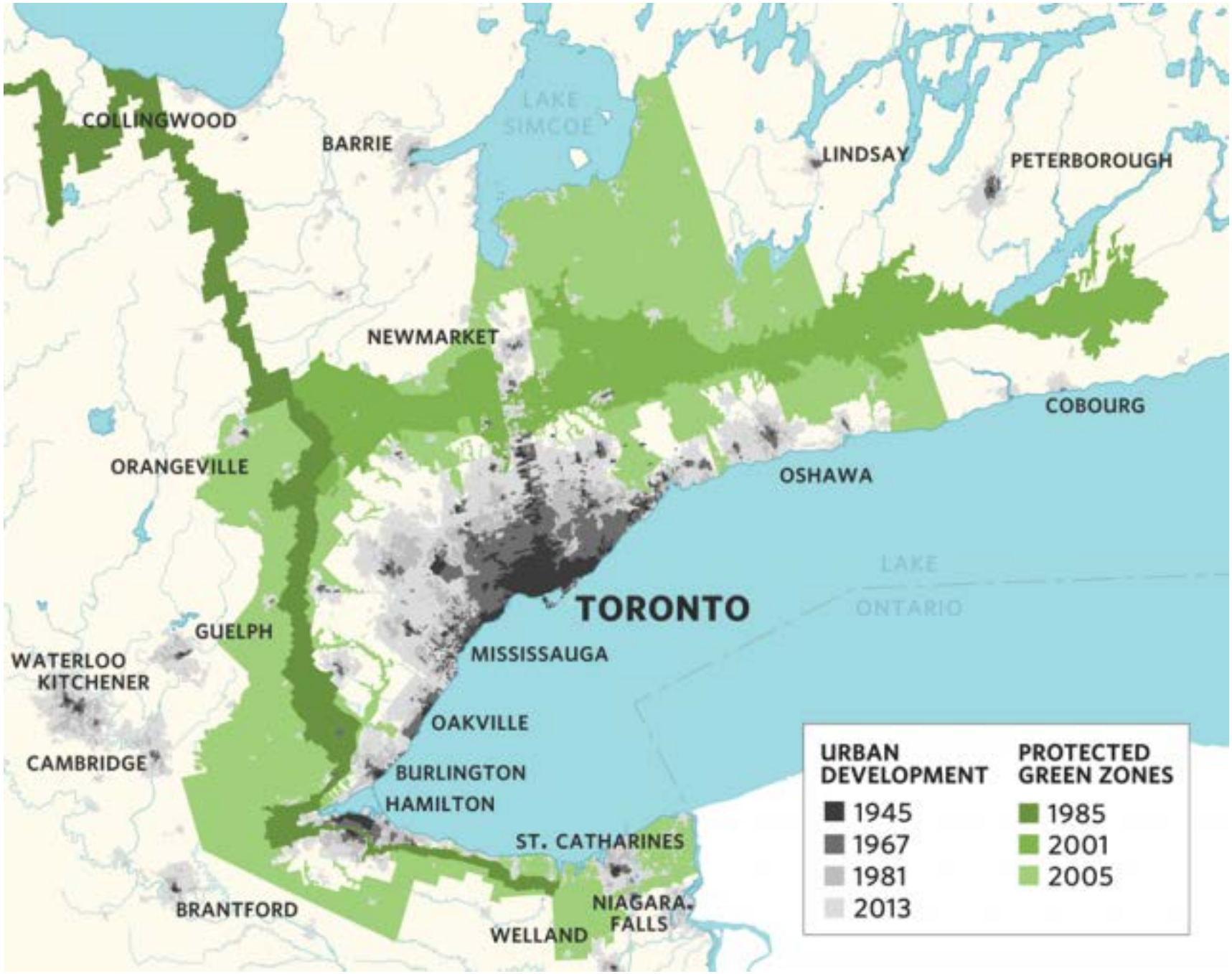
6 STRATEGIES

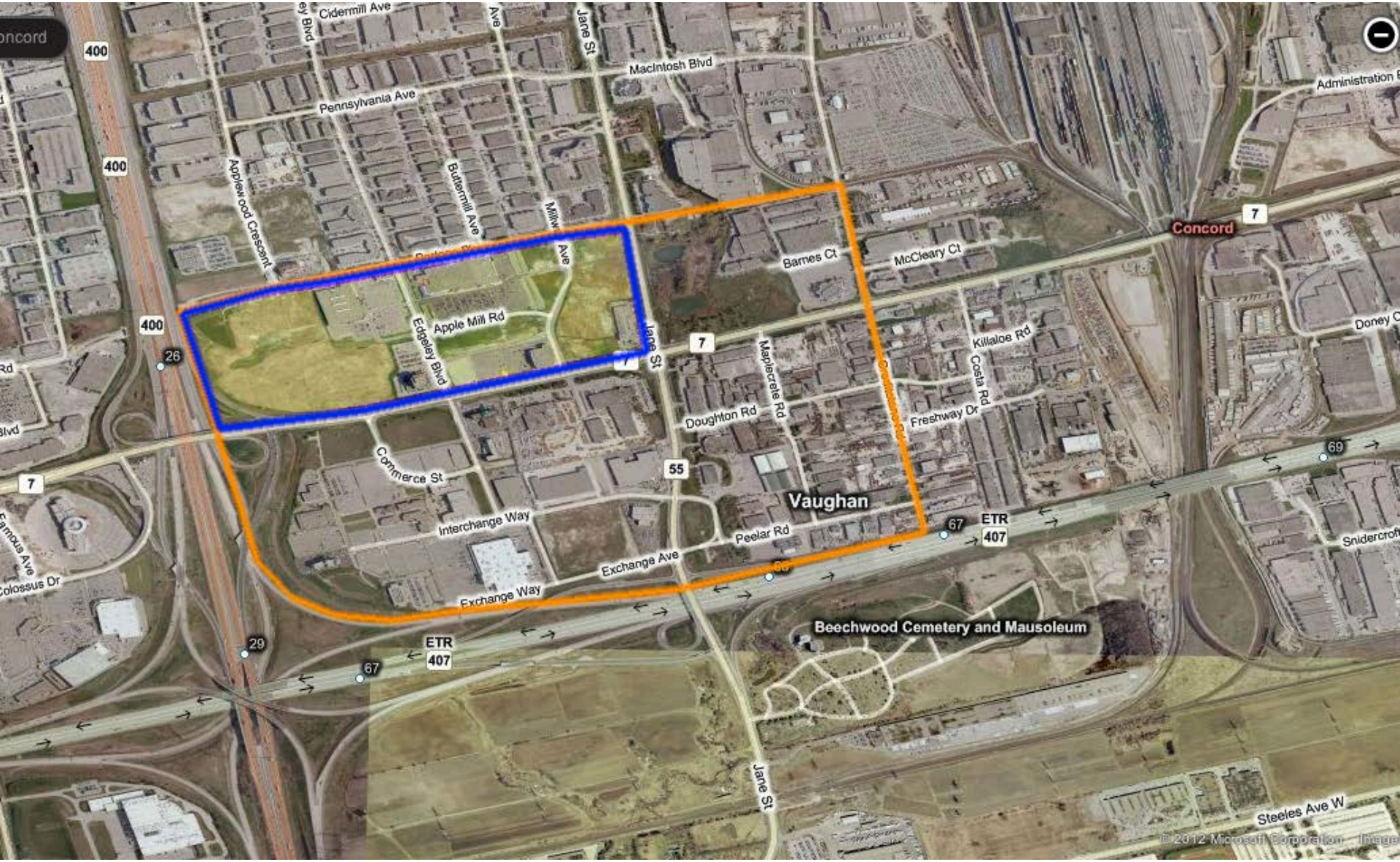
Panelist:
Michael Szabo, Principal

Diamond Schmitt Architects

Vaughan Metropolitan Centre
The Urbanization of Suburbia

1

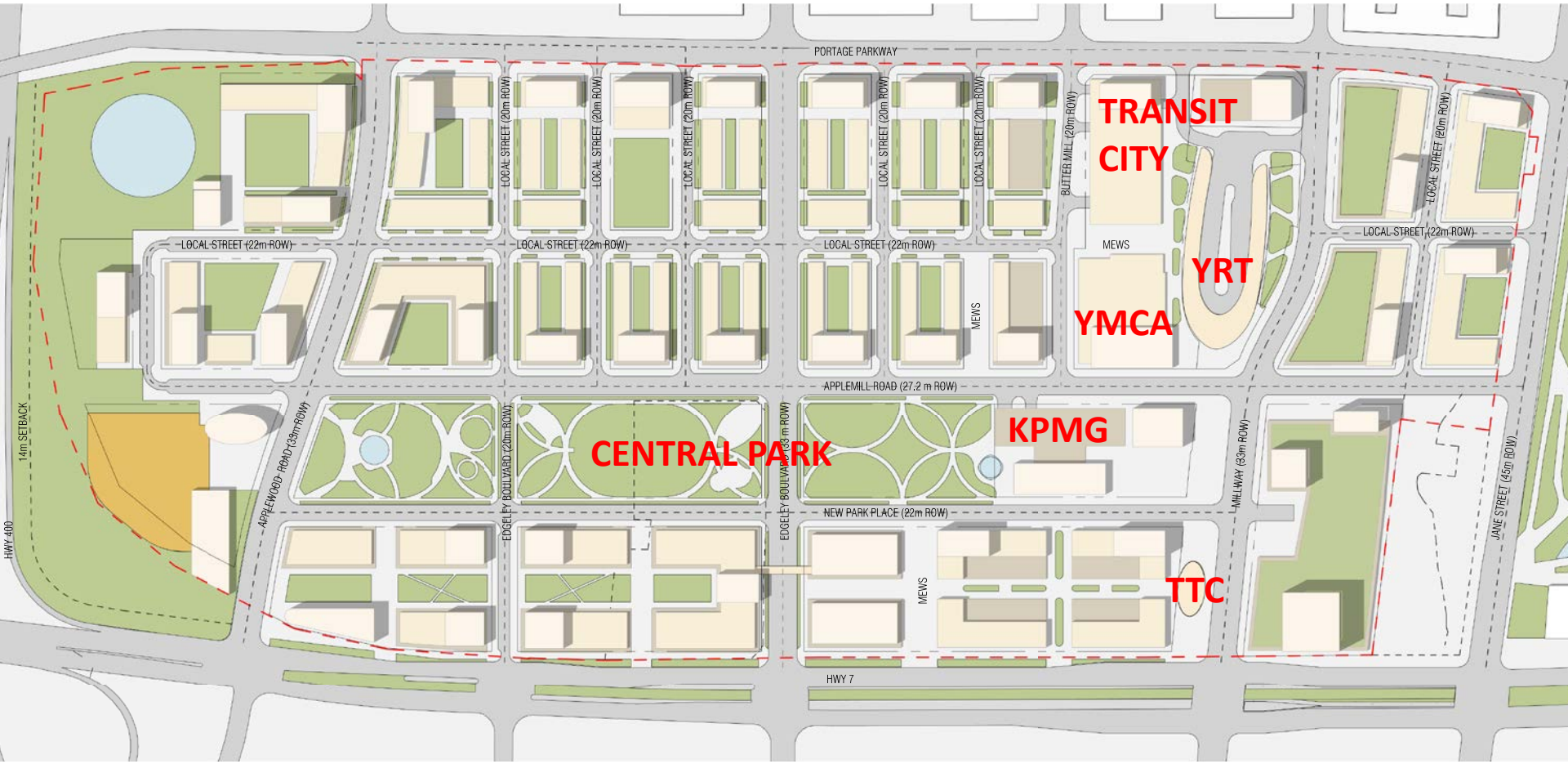

COLLINGWOOD
BARRIE
LAKE SIMCOE
LINDSAY
PETERBOROUGH
NEWMARKET
COBOURG
ORANGEVILLE
OSHAWA
LAKE ONTARIO
TORONTO
GUELPH
WATERLOO
KITCHENER
MISSISSAUGA
OAKVILLE
CAMBRIDGE
BURLINGTON
HAMILTON
ST. CATHARINES
BRANTFORD
NIAGARA FALLS
WELLAND
URBAN DEVELOPMENT
1945
1967
1981
2013
PROTECTED GREEN ZONES
1985
2001
2005



VMC North-West Quadrant

Vaughan Metropolitan Centre Master Plan

Framework for Development



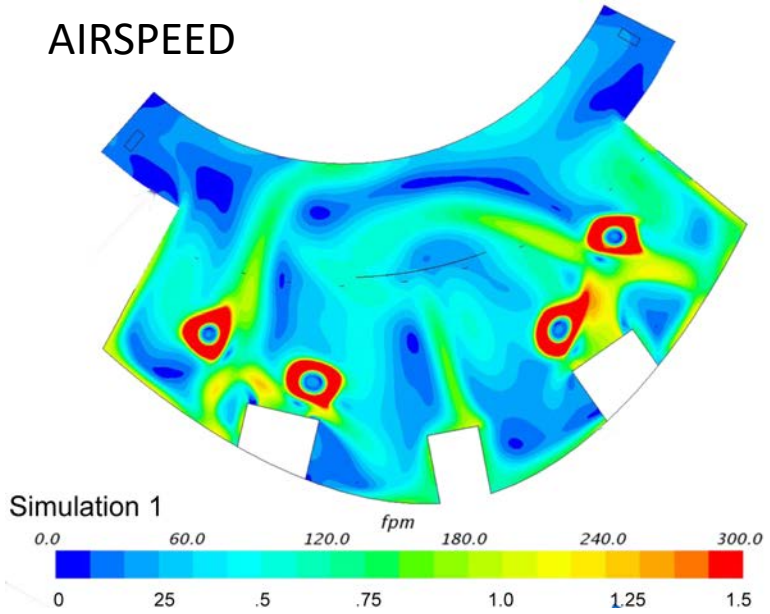
YRT Bus Terminal

CHANGING PARAMETERS

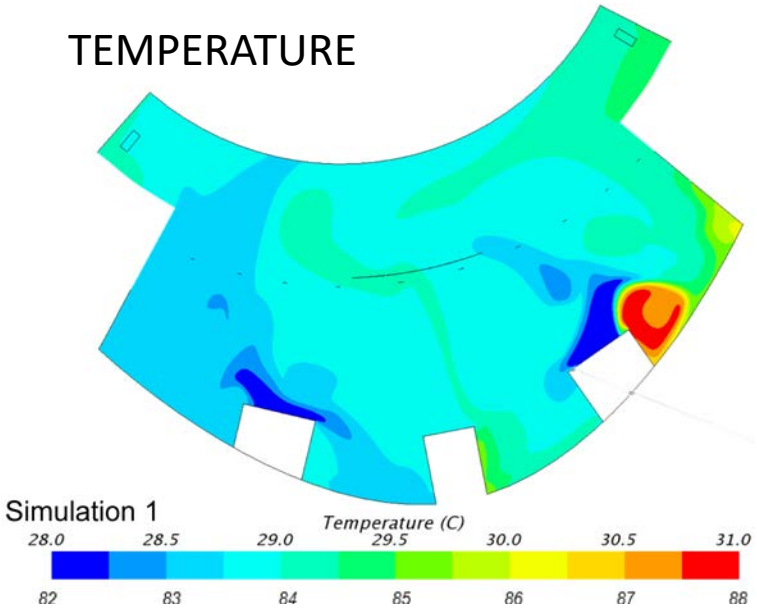
2


SMART CENTRES PLACE
CENTRE BUS TERMINAL

AIRSPEED

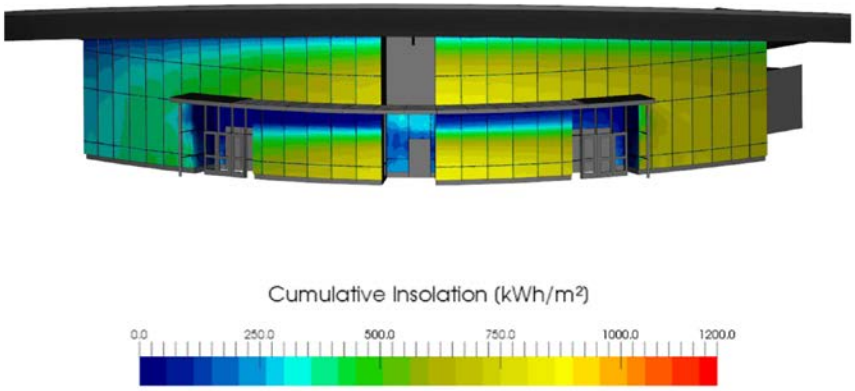


TEMPERATURE

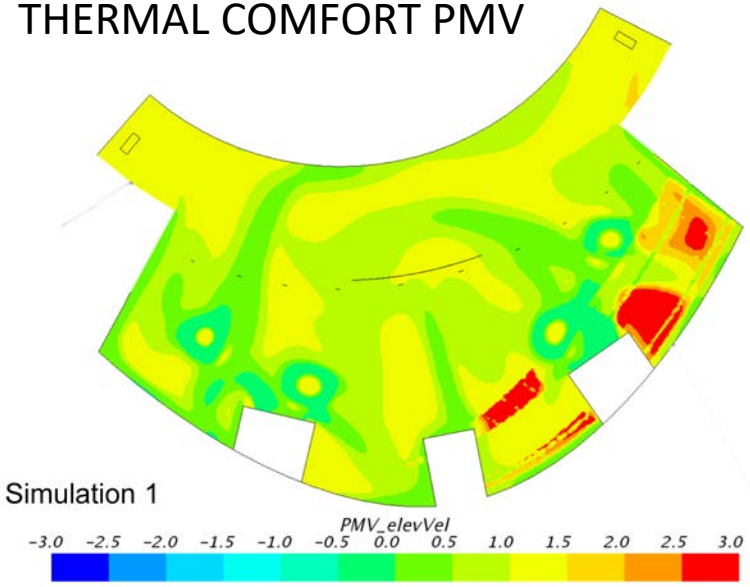


SOLAR

Oct-April



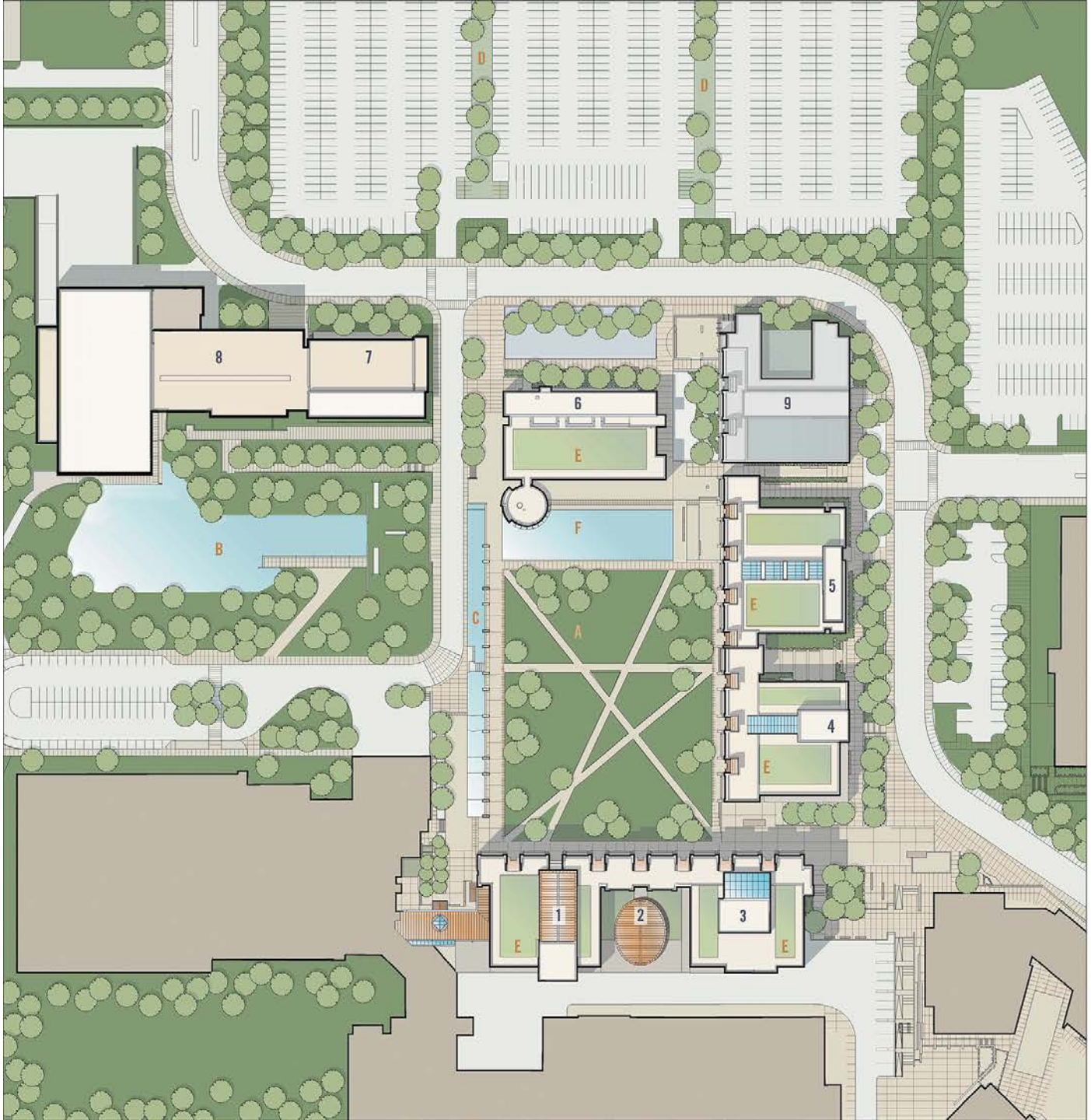
THERMAL COMFORT PMV



PEUI Reduction to 2006 Baseline

University of Ontario
Institute of Technology
New Campus Design

3

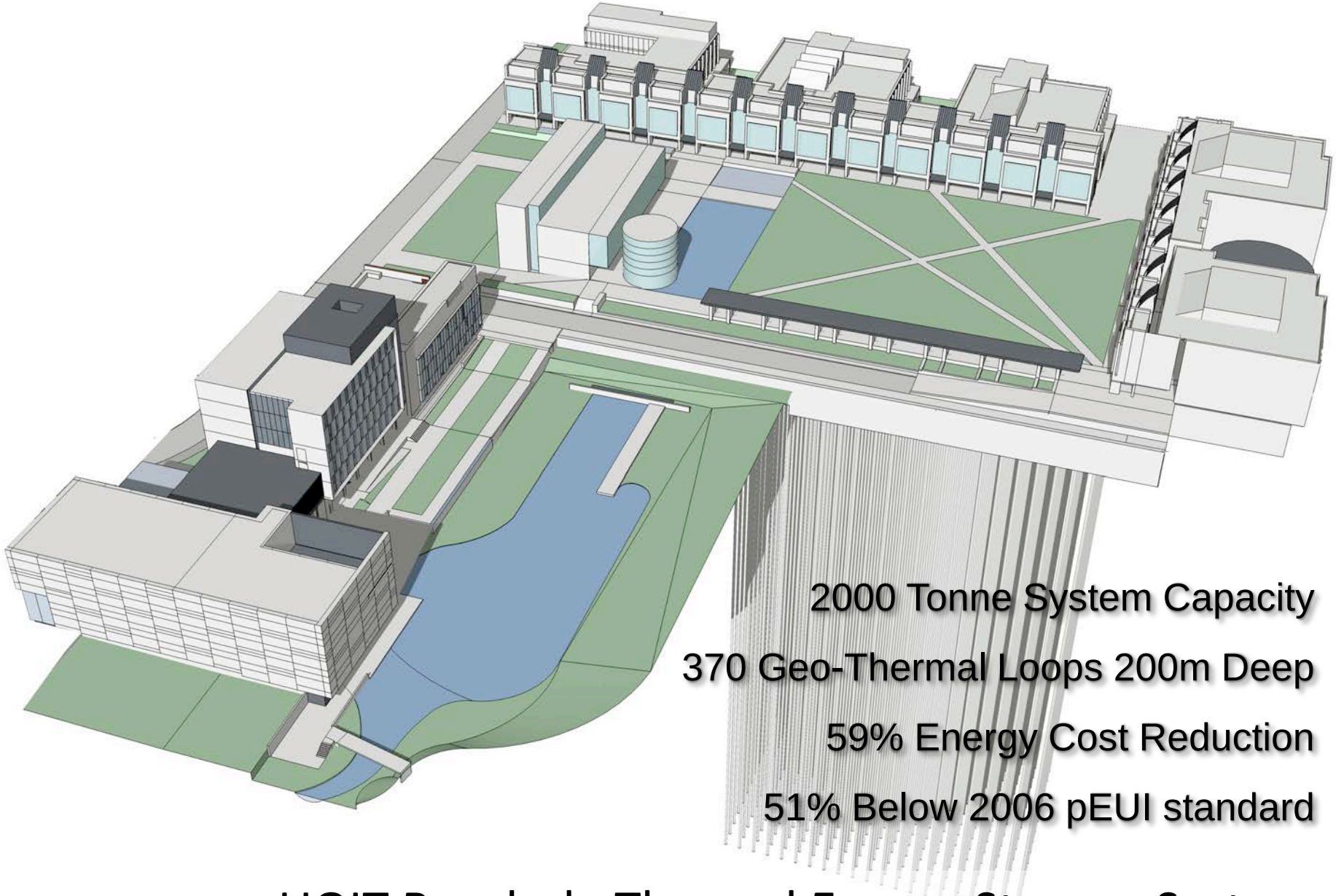


PHASED CAMPUS MASTER PLAN

1 Science Building 2003
2 250-seat Lecture Theatre 2003
3 Science Building 2004
4 School of Business & IT 2004
5 Energy Systems and Nuclear Research Centre 2011
6 Campus Library 2004
7 Ontario Power General (OPG) Engineering Building 2007
8 Automotive Centre of Excellence 2011
9 Law and Education future building

SUSTAINABLE STRATEGIES

A Quadrangle and Geothermal Well Field
B Storm Water Management Pond
C Linear Wetlands
D Bio-Swales
E Green Roofs
F Reflecting Pond and Skating Rink



UOIT Borehole Thermal Energy Storage System

UOIT Graduation on the Commons/BTESS

Peter Gilgan
Centre for Research & Learning
SickKids Hospital

4

NEW TYPOLOGY

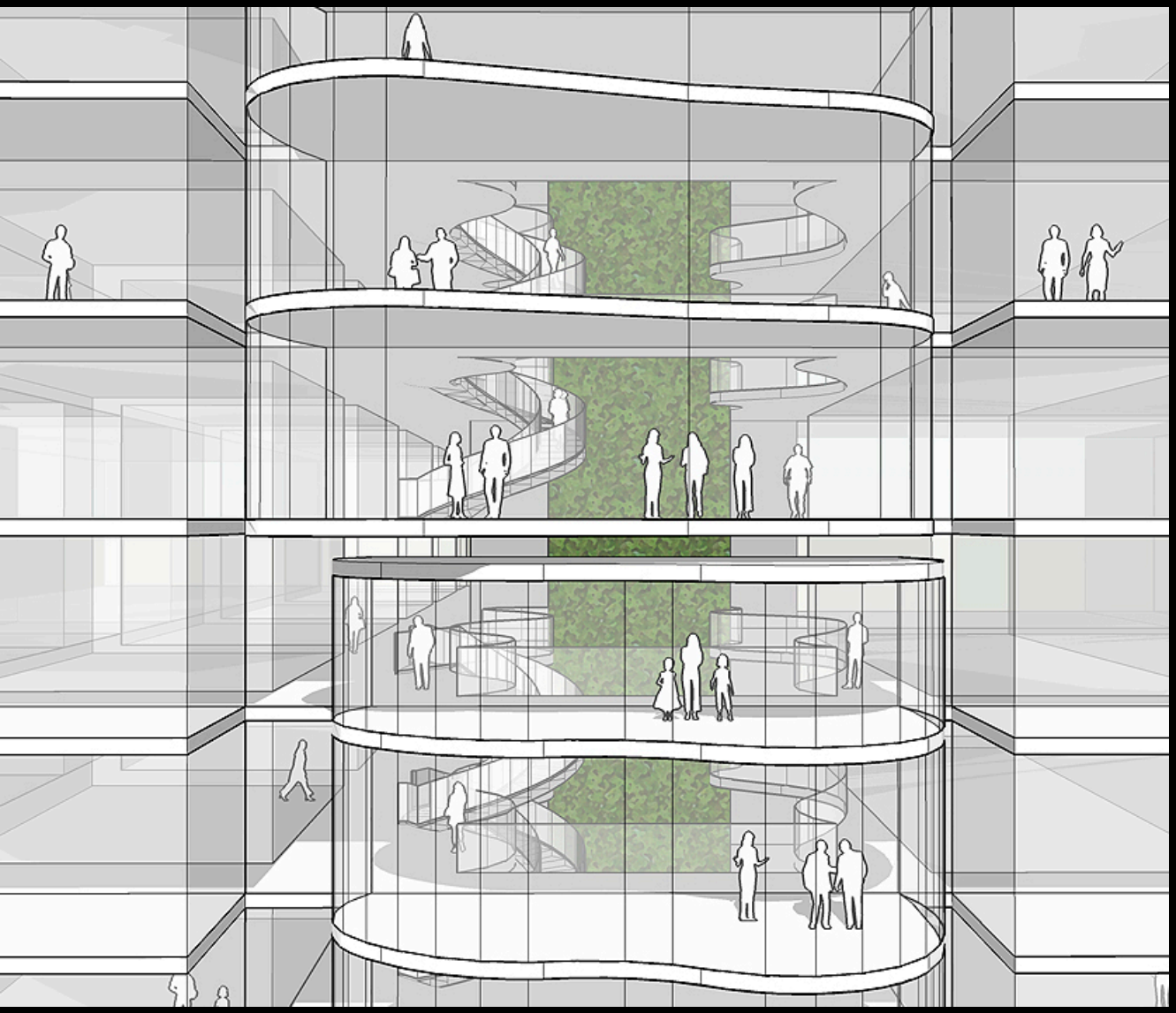
Research
Neighborhoods

Education

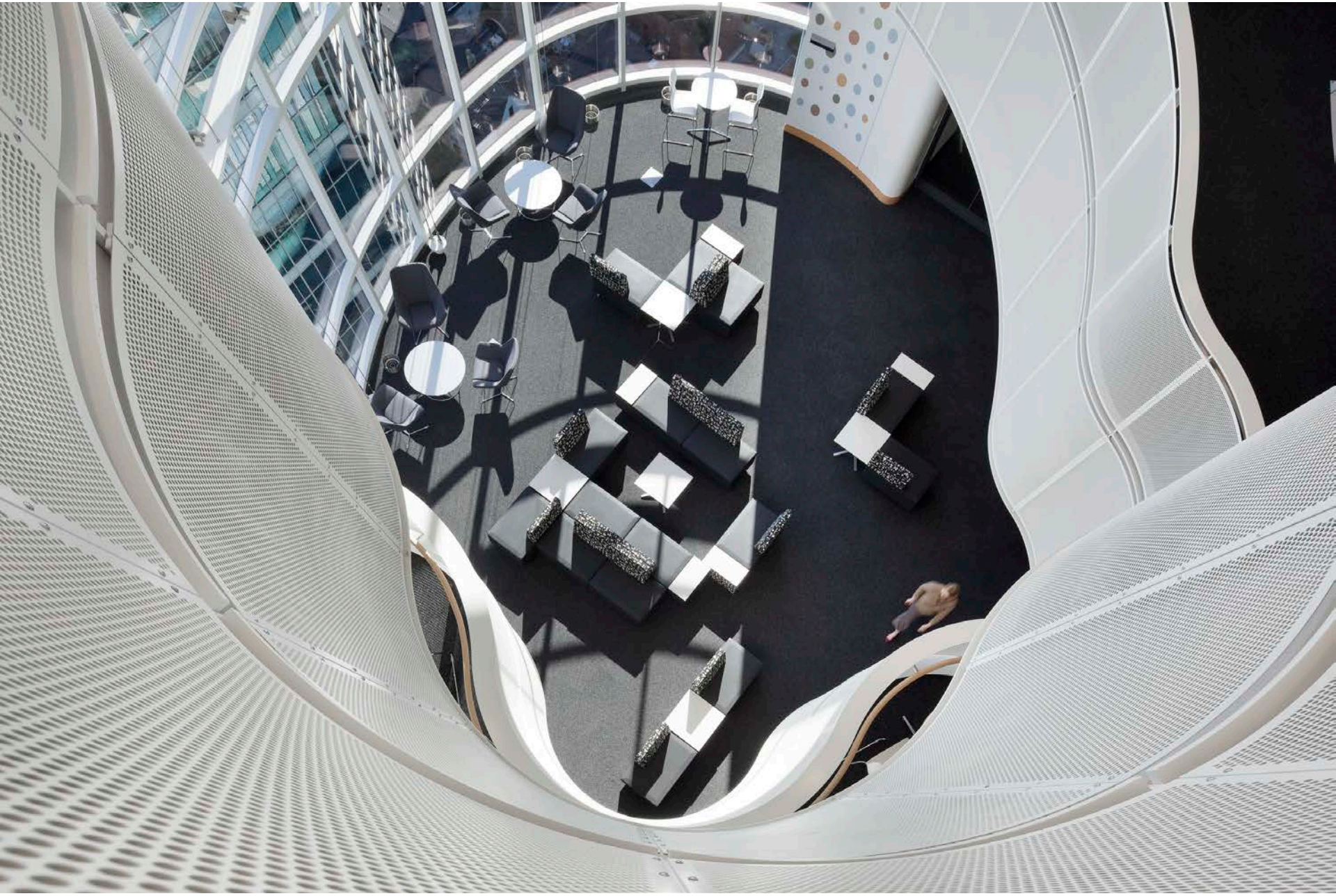
Retail, Lobby & Services

neighborhoods

RESEARCH NEIGHBORHOODS



- Showcase the research process
- Draw natural light deep into the building
- Priortize Stairs
- Shortcut Elevators

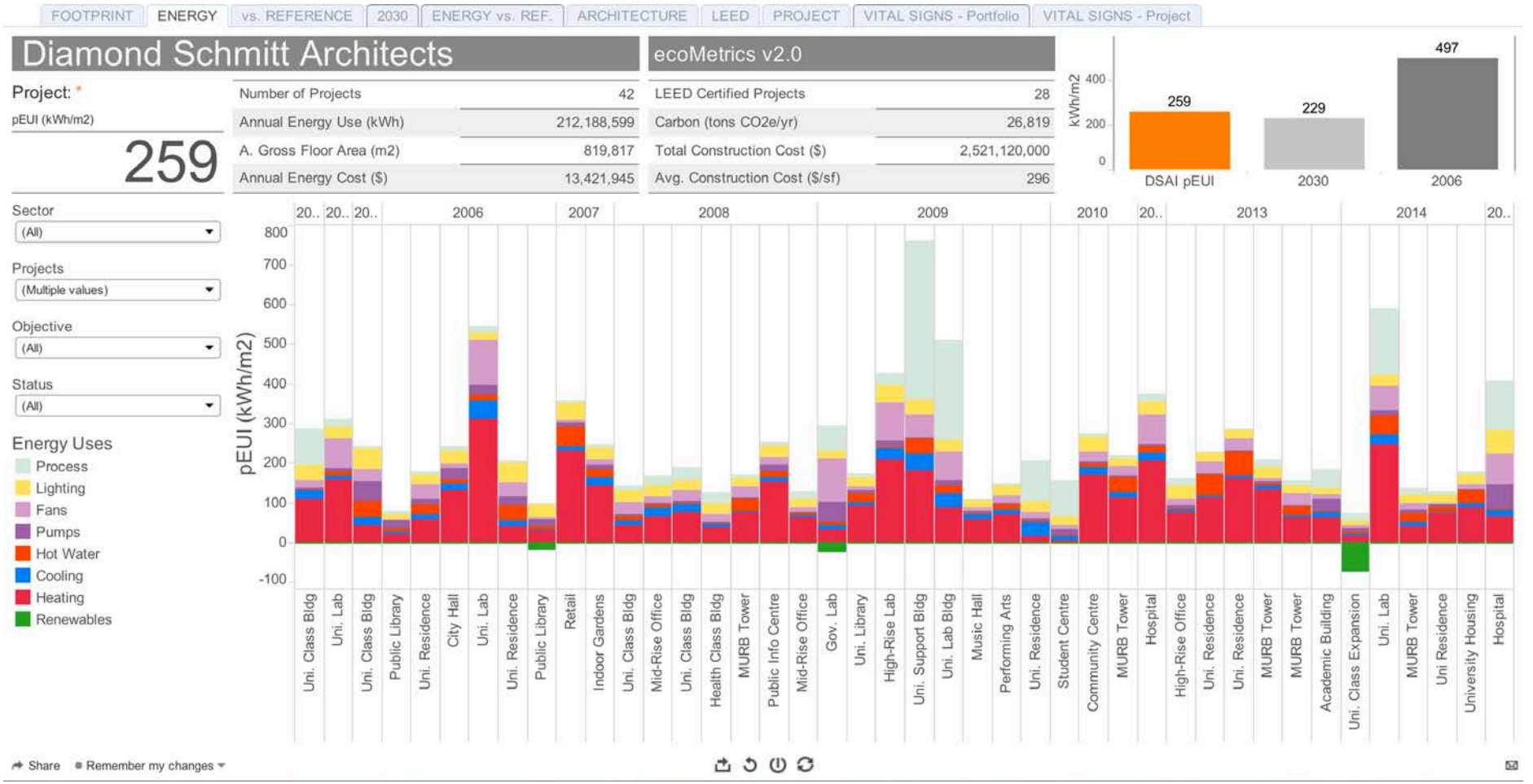


Data Analytics & Ecometrics
LEARING FROM OUR WORK

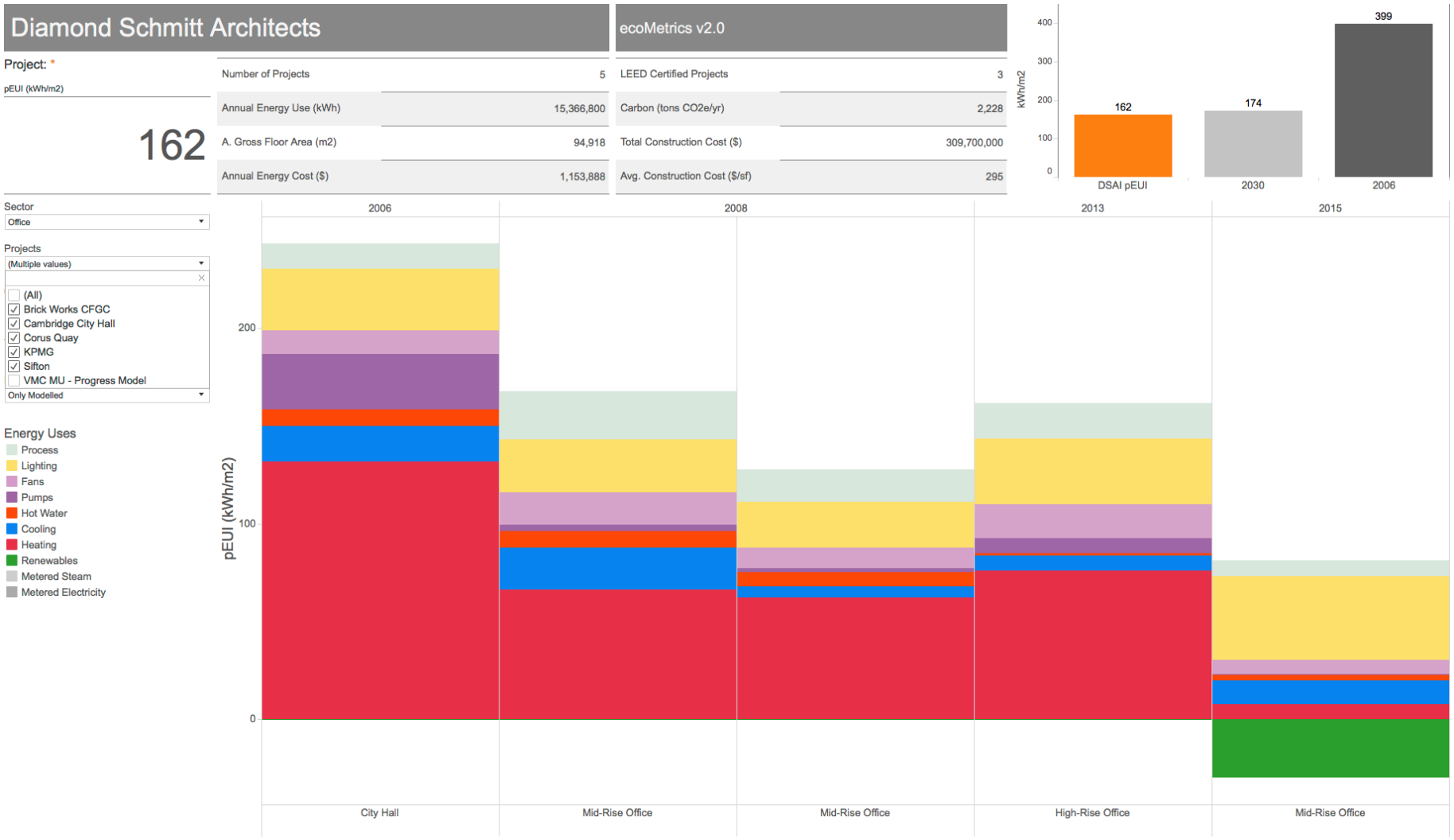
5

HOW DO YOU GET TO NET ZERO?

ECOMETRICS- LEARNING FROM OUR PORTFOLIO



Comparative analysis is a study that compares and contrasts two things: two life insurance policies, two sports figures, two presidents, etc. The study can be done to find the crucial differences between two very similar things or the similarities between two things that appear to be different on the surface.



Diamond Schmitt Architects

ecoMetrics v2.0

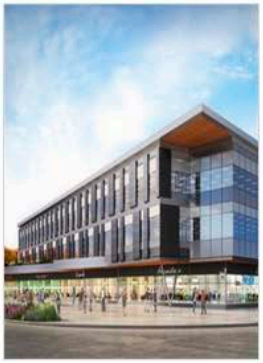
Project: Sifton

pEUI (kWh/m2)

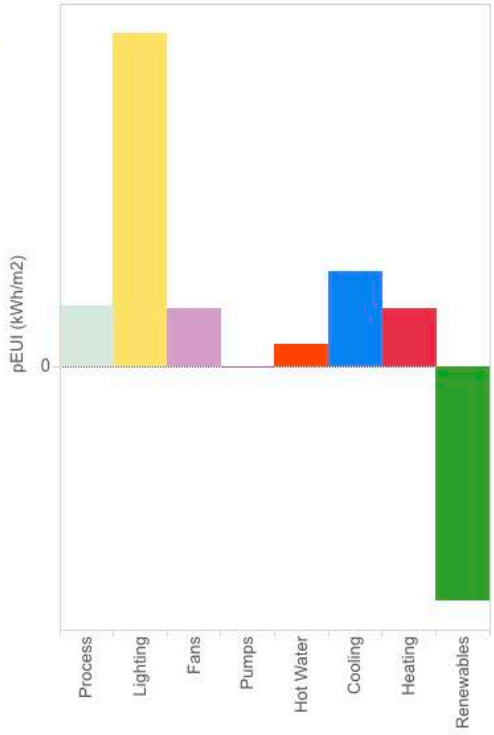
51

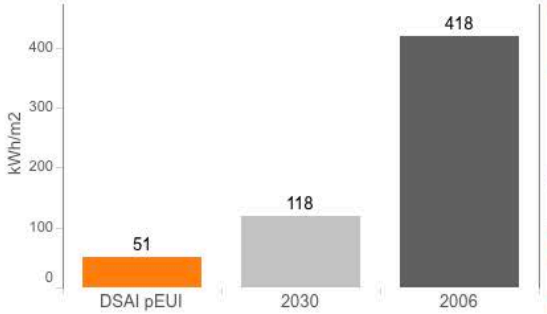
Annual Energy Use (kWh)	321,158
A. Gross Floor Area (m2)	6,284
Annual Energy Cost ($)	59,391
Energy Cost Intensity ($/m2)	9

Carbon (tons CO2e/yr)	25
Total Construction Cost ($)	18,500,000
Construction Cost ($/sf)	274
Annual Water Use (L/yr)	



Project: Sifton
Sector: Office
DSAI Project #: 1437
Project Phase:
Energy Model Status: Design Progress
Tender Year: 2015
Completion Year: 2017
Objective: Ontario Building Code



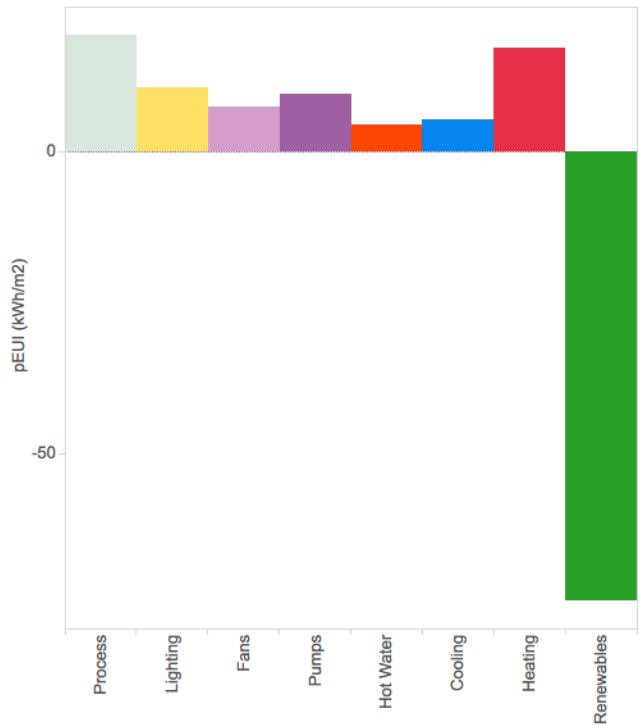


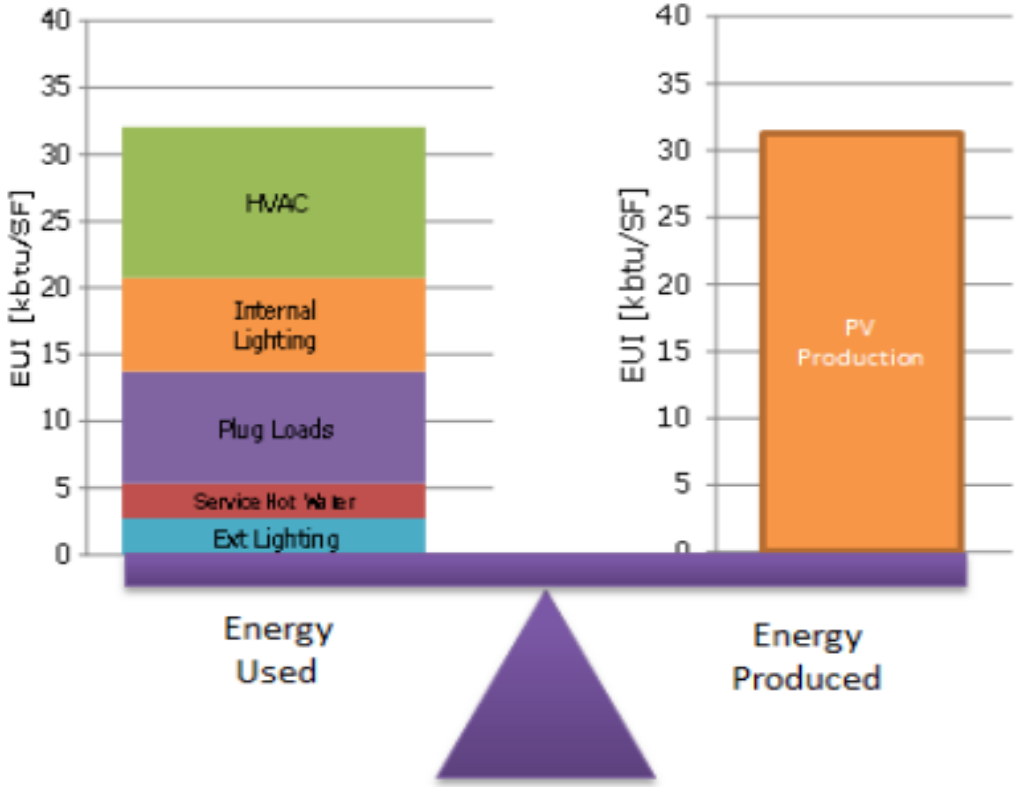
LEED

LEED Pts Achieved	
LEED Pts Available	
LEED Percent Pts Achieved	
LEED EAc1 Pts Achieved	
LEED EAc1 Pts Available	
LEED EAc1 Percent Pts Achieved	
Energy Cost Reduction	38%
Construction Waste (MRc2)	
Recycled Content (MRc4)	
Regional Content (MRc5)	
Irrigation Reduction (WEc1)	
In-Bldg Water Use Reduction (WEc3)	
Annual Water Use (L/yr)	
In-Bldg Grey Water Use (L/yr)	

Architecture

pEUI before Renewables (kWh/m2)	81
A. Gross Floor Area (m2)	6,284
B. Building Volume (m3)	28,134
C. Total Window (m2)	1,578
D. Wall Inc. Windows (m2)	3,253
E. Roof Inc. Skylights (m2)	2,271
C/D = Window to Wall Ratio	49%
A/B = GFA to Volume Ratio	0.22
A/(D+E) = GFA to Envelope Ratio	1.14
Avg Envelope (D+E) R (F-ft2-h/Btu)	13
Avg Walls R-Value (F-ft2-h/Btu)	27
Avg Roof R -Value (F-ft2-h/Btu)	40
Avg Window USI (W/C-m2-h)	1.4
Typical SHGC	0.2
Interior Lighting Power Density (W/m2)	12.4
Skylight (m2)	0


pEUI (kWh/m2)
0
-50
Process
Lighting
Fans
Pumps
Hot Water
Cooling
Heating
Renewables


EUI [kbtu/SF]
40
35
30
25
20
15
10
5
0
HVAC
Internal Lighting
Plug Loads
Service Hot Water
Ext Lighting
EUI [kbtu/SF]
PV Production
Energy Used
Energy Produced

Graph Controls

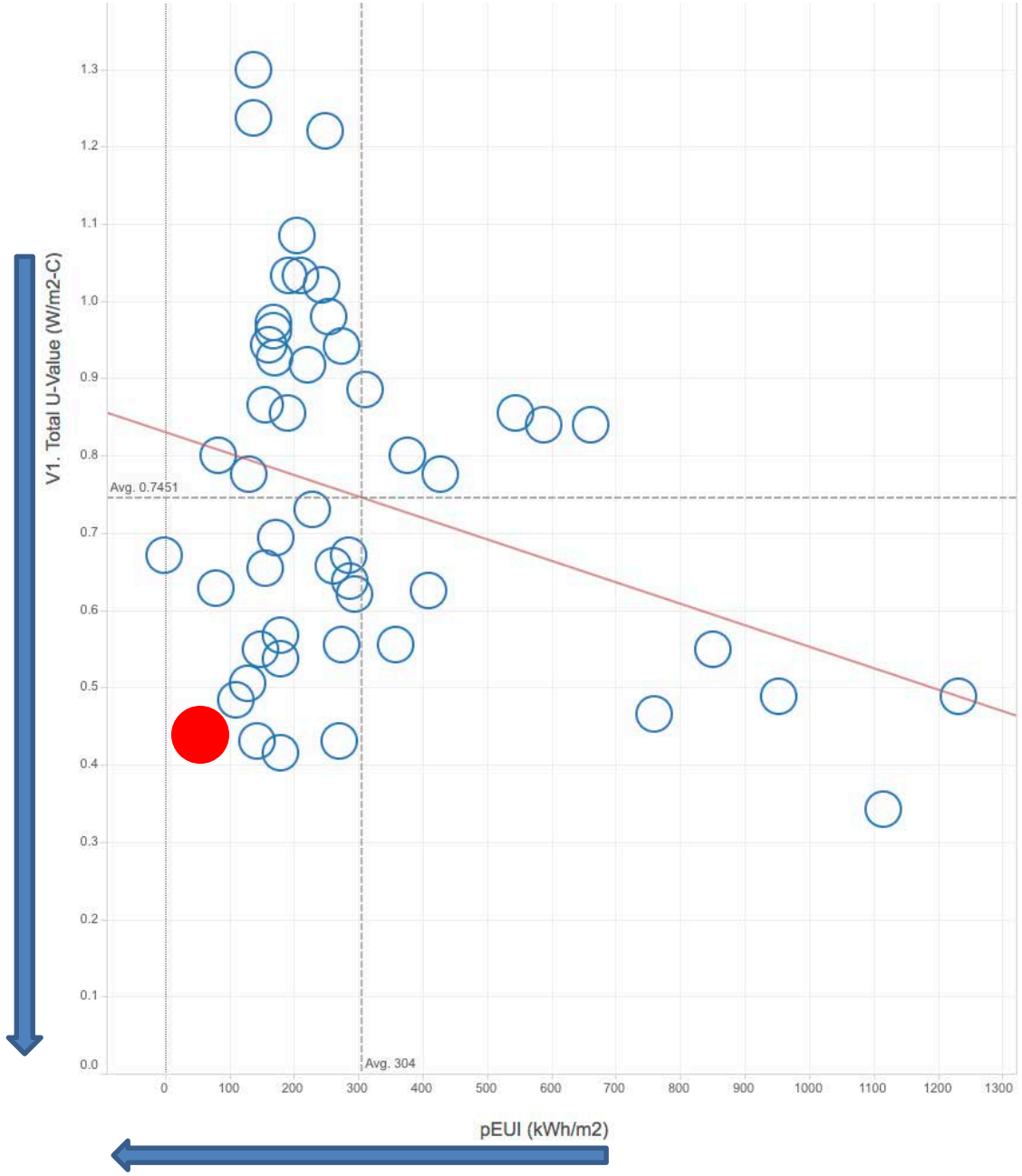
X-Axis

pEUI (kWh/m2)

Y-Axis

No Variable Selected

- No Variable Selected
- GFA (m2)
- V1. Total U-Value (W/m2-C)
- V2. GFA to Envelope Ratio
- V3. Conditioning for O/A (%)
- V4. Avg. Heating Eff. (%)
- V5. Avg. Cooling Eff. (%)
- V6. Total Internal Gains (W/m2)
- Window to Wall Ratio (%)
- LEED Pts Achieve (%)
- Energy Cost vs. Ref. (%)
- Energy Use vs. Ref. (%)
- HDD
- CDD



Ballasted
array on roof

Façade mount using Kingspan Karrier System

Hatch Centre
McMaster University
LIVING LABORATORY OF SUSTAINABILITY

6