

Project Summary

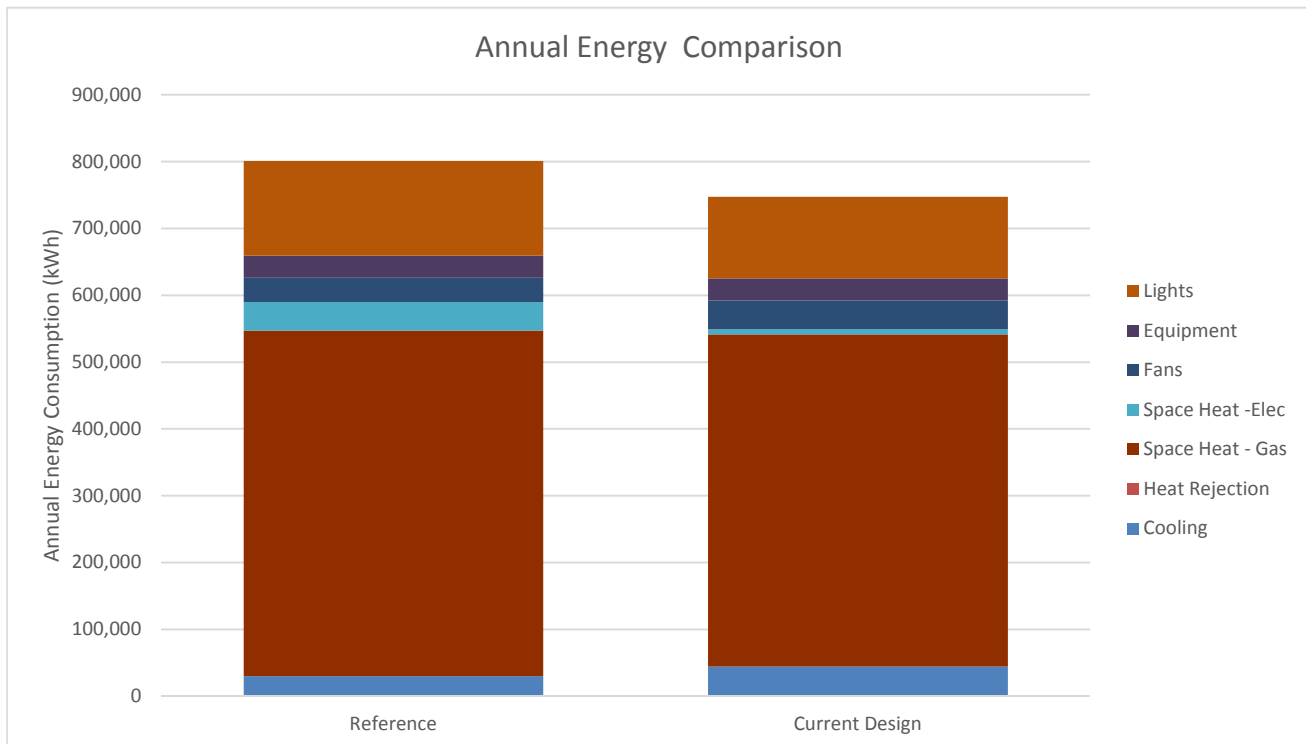
Project Name:	Toronto Estonian Cultural Centre	Compliance Path:	ASHRAE 90.1.2013+SB10
Project Number:	17488	Software:	Equest 3.65
Date:	1/17/2018	Modelled by:	Andleeb Zehra
Purpose of Model:	Design Assistance	Reviewed by:	Shaheen Asif

Executive Summary

An energy model was performed to evaluate the energy performance of the Toronto Estonian Cultural Centre Building located in Toronto, Ontario. This model was built to provide design assistance for the SPA TGS submission. The model is based on available drawings, validated assumptions and uses default values when detailed info is not available.

Energy Modelling Summary

Model	Energy Reduction (%)	EUI (kWh/m2)	Code Compliant?
Proposed Building	5%	272	Yes



Energy conservation measure included in the design

- High performance roof top units
- High performance lighting
- Air to air heat recovery

Architectural						
Opaque Constructions						
Construction	Type	Description	R-Values		ASHRAE 90.1.2013+SB10	Source of Information / Notes
			Nominal	Effective	Performance	
Exterior Wall Construction				R23	R-13+15 ci, U=0.044 (RSI 2.3+2.6 ci, USI-0.250)	Assumption
Roof Construction				R35	R35CI, U=0.029 (RSI 6.2 ci, USI-0.1640)	Assumption
Floors in Contact with Ground		Uninsulated Concrete		R-15 for 48 inch (RSI 2.6 for 1.2m)	R-15 for 48 inch (RSI 2.6 for 1.2m)	Assumption
Underground Wall Construction		Uninsulated Concrete		R-20 ci ,C=0.05 (RSI 3.5 ci, C=0.284)	R-20 ci ,C=0.05 (RSI 3.5 ci, C=0.284)	Assumption
Fenestration and Doors						
Window Type		Description	Performance		ASHRAE 90.1.2013+SB10	Source of Information / Notes
			CoG	Total	Performance	
Windows		Low-E Double Glazing, Aluminum Frame,Argon filled	0.24	0.35	U=0.38 (USI 2.15)	Assumed glass Solarban70XL-argon
Curtain Wall		Low-E Double Glazing, Aluminum Frame, Argon filled	0.24	0.35	U=0.38 (USI 2.15)	
Glazing Solar Heat Gain (SGHC)		Low-E Double Glazing, Aluminum Frame, Argon filled	SHGC=0.27		SHGC=0.4	
Operable Window		Low-E Double Glazing, Aluminum Frame	0.24	0.35	U=0.45 (USI 2.56), SHGC 0.4	
Entrance Door			0.24	0.69	U=0.69 (USI 3.94), SHGC 0.4	
Swinging Opaque Door					U=0.45 (USI 2.56)	
Opaque Door U-value					U=0.45 (USI 2.56)	
Overhead Door U-value					U=0.45 (USI 2.56)	

Electrical					
Lighting Systems					
Space Type	Occupancy Sensor (Y/N)	Daylight Sensor (Y/N)	Lighting Power (w/m ²)	ASHRAE 90.1.2013+SB10 Power (w/m ²)	Source of Information / Notes
Bank – banking activity area and offices	Y	Y	7.4	9.3	80% Ashrae 90.1.2013
Conference area/meeting/multi-purpose	Y	N	9.2	11.5	80% Ashrae 90.1.2013
Classroom/lecture/training	Y	N	8.3	10.3	80% Ashrae 90.1.2014
Dining area - for bar lounge/leisure dining	N	N	8.0	10.0	80% Ashrae 90.1.2013
Dining area - other	N	N	5.4	6.8	80% Ashrae 90.1.2013
Electrical/Mechanical area	N	N	3.7	4.6	80% Ashrae 90.1.2013
Lobby - other	N	N	8.6	10.8	80% Ashrae 90.1.2013
Lounge/recreation area	N	N	5.3	6.7	80% Ashrae 90.1.2013
Office - enclosed	Y	N	8.0	10.0	80% Ashrae 90.1.2013
Office - open plan	N	N	7.0	8.7	80% Ashrae 90.1.2013
Retail - sales area	N	N	10.5	13.1	80% Ashrae 90.1.2013
Washroom	Y	N	7.3	9.1	80% Ashrae 90.1.2015
Stairway	N	N	5.0	6.2	80% Ashrae 90.1.2013
Storage area	Y	N	5.4	6.8	80% Ashrae 90.1.2013
Exterior lighting					
Receptacles					

Space Type	Description	Power Density (W/m²)	ASHRAE Power Density	Source of Information / Notes
Conference area/meeting/multi-purpose		1.00	1.0	NECB 2011
Dining area - for bar lounge/leisure dining		1.00	1.0	NECB 2011
Dining area - other		1.00	1.0	NECB 2011
Electrical/Mechanical area		1.00	1.0	NECB 2011
Lobby - other		1.00	1.0	NECB 2011
Lounge/recreation area		1.00	1.0	NECB 2011
Office - enclosed		7.50	7.5	NECB 2011
Office - open plan		7.50	7.5	NECB 2011
Retail - sales area		2.50	2.5	NECB 2011
Sales area		2.50	2.5	NECB 2011
Stairway		0.00	0.0	NECB 2011
Storage area		1.00	1.0	NECB 2011

Mechanical

HVAC Systems

HVAC System Name	Description	Capacity (CFM)	EER/SEER	Heat Recovery Effectiveness	Source of Information / Notes
ERV-1	VAV unit providing tempered outdoor air to RTU1 and RTU2. Gas fired preheating	7300 CFM, Supply 0.5 W/CFM		73.3%Sensible,69.7% Latent	
RTU1 -Level2	Roof Top Unit DX cooling, evaporative cooled condenser, condensing furnace efficiency heating, Heat recovery wheel , Variable speed fan, high efficiency motors, GTS humidifier	17,000 CFM Supply , 0.8W/CFM , VSD Fan ,30%OA	EER 11 , 90% efficiency		
RTU2-All base building spaces in Basement, Level 1, Level 3, and Level 2 office in existing building	Roof Top Unit DX cooling, evaporative cooled condenser, condensing furnace efficiency heating, Heat recovery wheel , Variable speed fan, high efficiency motors, GTS humidifier	11,000 CFM Supply , 0.8W/CFM ,30%OA	EER 10.5, 90% efficiency		
HVAC Tenant Spaces-GF Café	VRF system with DX fancoil heating and cooling - Roof or wall mounted condenser units		VRF-1 :2400 CFM , 5 Tons, 42MBH heating, EER 12.5, ERV-2 550 CFM	76%Sensible, 70% Latent	
HVAC Tenant Spaces-GF Retail	VRF system with DX fancoil heating and cooling - Roof or wall mounted condenser units		VRF-2 :7800 CFM , 14 Tons, 219MBH heating, EER 12.5, ERV-3 1000 CFM	76%Sensible, 70% Latent	
HVAC Tenant Spaces-Basement Retail	VRF system with DX fancoil heating and cooling - Roof or wall mounted condenser units		VRF-2 :5400 CFM , 10 Tons, EER 12.5, ERV-4 1000 CFM	76%Sensible, 70% Latent	

Unit Heaters		Entrances /service areas			
Reference case HVAC Systems					
HVAC System Name	Description	EER	Fan Power (kW)	Heat Recovery Effectiveness	Source of Information / Notes
Sys 3- Public Assembly	Packaged single zone System. -DX cooling -Natural Gas furnace	EER 12.1, 80%	0.3W/CFM	No	
Sys5-Non residential	Packaged VAV System. -DX cooling -Hydronic heating	EER 12.1,80%	same as design	Yes, 55% effectiveness	
Plant Equipment					
Plant Name	Description	Capacity	Efficiency	ASHRAE 90.1.2013+SB10 Efficiency	Source of Information / Notes
Hot Water Plant	High efficiency condensing boilers for perimeter heating, reheat and entrance heating		93%	90%	
Domestic Hot Water Plant	Electric domestic hot water heaters	130 US gallon	100%		

Appendix-A

Better Buildings Partnership - New Construction Energy Modeling Report Summary

PROJECT INFORMATION

	Date (dd/mm/yyyy)	3/18/2018
Project Address:	9-11 Madison Ave, Toronto, ON	Building Type: Community Centre
SPA-Number:		Building Area: 3227
Energy Modeller Name:	Shaheen Asif	Architect Name: Vaughan Miller
Energy Modeller Telephone:	647 258 7111	Architect Telephone:
Energy Modeller E-Mail:	shaheen.asif@sa-footprint.com	Architect E-Mail:
Modelling Software Used	eQuest 3.65	Code Compliance Path: ASHRAE 2013+SB-10

Energy End Use	Reference Building					Proposed Building					Energy Savings			
	Electrical Annual Consumption (kWh)	Natural Gas Annual Consumption (kWh)	Energy Use Intensity (kWh/m2.yr)	Peak Demand Summer (kW)	Peak Demand Winter (kW)	Electrical Annual Consumption (kWh)	Natural Gas Annual Consumption (kWh)	Energy Use Intensity (kWh/m2.yr)	Peak Demand Summer (kW)	Peak Demand Winter (kW)	Peak Demand Summer (kW)%	Peak Demand Winter (kW)%	Annual Consumption (kWh)	Energy Efficiency Above Base Case%
Lights	141,520		44			122,120		38						
Misc. Equipment	33,130		10			33,130		10						
Space Heating	54,370	788,540	261			20,710	787,873	251						
Space Cooling	51,170		16	144.4	153.7	49,780		15	124.4	127.5	14%	17%	39,401	3.42%
Pumps	8,960		3			7,030		2						
Fans	50,690		16			69,480		22						
Service Hot Water		22,069	7				20,926	6						
Totals	339,840	810610	356.5			302,250	808799	344.3						

I hereby certify that the energy demand and consumption are properly representative of the energy modelling report submitted for the above project.

Energy Modeler Name:	Shaheen Asif	Architect Name:	
Title:	Associate	Title:	
Company:	S+A Footprint	Company:	Kongates Architects
Signature:		Signature:	

Appendix-B

Better Buildings Partnership - New Construction

Energy Modeling Report Template

Date:	3/18/2018 (mm/dd/yyyy)
Submission Overview:	The Toonto Estonian Cultural Centre Community Centre 9-11 Madison Ave, Toronto, ON is applying SPA submission for the site plan approval. Annual energy consumption for the proposed building is predicted with the help of an energy model and is compared with a Reference Building designed to ASHRAE 90.1 2013 SB-10. Toronto Green Standard requires the building to perform better than ASHRAE 90.1 2013 as modified by SB-10 to meet TGS Tier 1 requirement. The model is showing proposed design is performing better 3.42 % in energy efficiency than ASHRAE 90.1 2013+SB10 reference building and therefore passing the TGS Tier 1 requirements.
Project Description:	<p>An existing three (3) storey residential building located at 11 Madison Avenue will be renovated and connected to the new building. The building is 4 stories tall (3 levels, with rooftop terrace) and 1 story below-grade. The building will house the following spaces:</p> <ul style="list-style-type: none"> .1 Classrooms .2 A gallery/grand banquet hall, including a stage .3 Restaurant .4 A café .5 Leasable tenant space and retail units
Project's key energy conserving / efficiency measures proposed	
Passive Design Measures:	
Envelope Measures:	Well insulated building envelope
Lighting Measures	<p>High efficiency luminaires, primary interior lighting will be provided by LEDs</p> <p>Washrooms, storage rooms, admin areas, and any other transient occupancy will be provided with ceiling or wall mounted occupancy sensor.</p> <p>The garage will have ceiling mount motion sensors for all non-emergency parking garage, and corridor light fixtures.</p>
Mechanical and Electrical Measures	<p>The core of the building shall be serviced by two (2) roof top units providing the cooling, heating and make-up air to the base building spaces. The variable air volume terminal units shall be used to maintain space conditions. An enthalpy recovery ventilator will be used to recover energy from the exhaust air and supply tempered outdoor air to the roof top units.</p> <p>The retail / tenant spaces will be serviced by three (3) variable refrigerant flow (VRF) systems to provide heating and cooling. Enthalpy recovery ventilators will be used for each retail space to recovery energy from the exhaust air and supply tempered outdoor air to the VRF fan coil units. The HW system has two ultra high efficiency condensing boilers and have variable flow and variable speed staged pumping. High efficiency DHW heaters.</p>

Provide a complete summary of energy simulation inputs and assumptions, referencing the relevant plans, drawings or reports.

Design Parameters Description / Name		Proposed Building						Reference the relevant plans, drawings or reports
Schedules:		NECB C						National Energy Code for Buildings Canada
Space Use Classification:		Community Centre						
Conditioned Floor Area		3227 m2						
Total Floor Area:		3227 m2						
Window-Wall Ratio								
Gross Wall Area (ft ² or m ²):		3077						
North Fenestration Area (m ²):	108	East Fenestration Area (ft2):	664	South Fenestration Area (ft2):	339	West Fenestration Area (ft2):	466	
Window Wall Ratio:		51%						
Skylight-Roof Ratio								
Gross Roof Area (ft ² or m ²):		1761						
Skylight Area (ft ² or m ²):		0						
South Fenestration Area (ft ² or m ²):		South Fenestration Area (ft ² or m ²):		South Fenestration Area (ft ² or m ²):		South Fenestration Area (ft ² or m ²):		
Skylight-Roof Ratio:								

Passive Design Strategies/Elements:	

	Design Parameters Description / Name	Reference Building	Proposed Building	Reference the relevant plans, drawings or reports
Building Envelope	Typical Wall	R-13+15 ci, U=0.044 (RSI 2.3+2.6 ci, USI-0.250)	R23	Assumption
	Roof	R35CI, U=0.029 (RSI 6.2 ci, USI-0.1640)	R35	Assumption
	Floors in Contact with Ground	R-15 for 48 inch (RSI 2.6 for 1.2m)	R-15 for 48 inch (RSI 2.6 for 1.2m)	Assumption
	Underground Wall Construction	R-20 ci ,C=0.05 (RSI 3.5 ci, C=0.284)	R-20 ci ,C=0.05 (RSI 3.5 ci, C=0.284)	Assumption
	Curtainwall	U=0.38 (USI 2.15), SHGC=0.4	SHGC=0.27, CoG-0.24, Total-0.35	Assumed glass Solarban70XL-argon Low-E Double Glazing, Aluminum Frame, Argon filled
	Windows	U=0.38 (USI 2.15), SHGC=0.4	SHGC=0.27, CoG-0.24, Total-0.35	
	Entrance Door	U=0.69 (USI 3.94), SHGC 0.4	SHGC=0.27, CoG-0.24, Total-0.69	
Lighting	Lobby	1 W/ft2	0.8 W/ft2	80% Ashrae 90.1 2013
	Lounge/recreation	0.62 W/ft2	0.50 W/ft2	80% Ashrae 90.1 2013
	Dining area-other	0.63 W/ft2	0.5 W/ft2	80% Ashrae 90.1 2013
	Conference/ meeting/ multipurpose	1.07 W/ft2	0.86 W/ft2	OS, 80% Ashrae 90.1 2013
	Office-enclosed	0.93 W/ft2	0.74 W/ft2	OS, 80% Ashrae 90.1 2013
	Retail	1.22 W/ft2	0.98 W/ft2	80% Ashrae 90.1 2013
	Office-open	0.81 W/ft2	0.65 W/ft2	80% Ashrae 90.1 2013
	Classroom/lecture/training	0.96 W/ft2	0.77 W/ft2	OS, 80% Ashrae 90.1 2013
	Electrical/Mechanical	0.81 W/ft2	0.34 W/ft2	80% Ashrae 90.1 2013
	Washroom	0.85 W/ft2	0.68 W/ft2	OS, 80% Ashrae 90.1 2013
	Stairs	0.58 W/ft2	0.46 W/ft2	80% Ashrae 90.1 2013
	Storage	0.63 W/ft2	0.50 W/ft2	OS, 80% Ashrae 90.1 2013
	Bar lounge/leisure dining	0.93 W/ft2	0.74 W/ft2	80% Ashrae 90.1 2013
Plug Loads	Lobby	0.09 W/ft2	0.09 W/ft2	NECB 2011
	Lounge/recreation	0.09 W/ft2	0.09 W/ft2	NECB 2011
	Dining area	0.09 W/ft2	0.09 W/ft2	NECB 2011
	Conference/ meeting/ multipurpose	0.09 W/ft2	0.09 W/ft2	NECB 2011
	Office	0.70 W/ft2	0.70 W/ft2	NECB 2011
	Retail	0.23 W/ft2	0.23 W/ft2	NECB 2011

RTU1 -Level2	Sys5-Non residential Packaged VAV System. -DX cooling -Hydronic heating Supply Fan kW/cfm: same as design EER 12.1, 80% efficiency Heat Recovery: 55% effectiveness	Supply cfm:17,000 Supply Fan kW/cfm: 0.0008 VSD Fan ,30%OA EER 11 , 80% efficiency Heat Recovery: 73.3%Sensible,69.7% Latent	Mechanical Design Briefs
RTU2-All base building spaces in Basement, Level 1, Level 3, and Level 2 office in existing building	Sys5-Non residential Packaged VAV System. -DX cooling -Hydronic heating Supply Fan kW/cfm: same as design EER 12.1, 80% efficiency	Supply cfm:12,000 Supply Fan kW/cfm: 0.0008 VSD Fan ,30%OA EER 10.5 , 80% efficiency Heat Recovery: 73.3%Sensible,69.7% Latent	Mechanical Design Briefs
VRF-1 Tenant Spaces-GF Café	Sys 3- Public Assembly Packaged single zone System. -DX cooling -Natural Gas furnace Supply Fan kW/cfm: 0.0003 EER 12.1, 80% efficiency	VRF-1 EER 12.5 ERV-1 76%Sensible, 70% Latent	Mechanical Design Briefs
VRF-2 Tenant Spaces-GF Retail	Sys 3- Public Assembly Packaged single zone System. -DX cooling -Natural Gas furnace Supply Fan kW/cfm: 0.0003 EER 12.1, 80% efficiency	VRF-2 Supply cfm: 7800 Cooling capacity: 14 Tons Heating capacity: 219 MBH EER 12.5 ERV-2 Supply cfm: 1000 76%Sensible, 70% Latent	Mechanical Design Briefs
VRF-3 Tenant Spaces-Basement Retail	Sys 3- Public Assembly Packaged single zone System. -DX cooling -Natural Gas furnace Supply Fan kW/cfm: 0.0003 EER 12.1, 80% efficiency	VRF-3 Supply cfm: 5400 Cooling capacity: 10 Tons Heating capacity: 52 MBH EER 12.5 ERV-3 Supply cfm: 1000 76%Sensible, 70% Latent	Mechanical Design Briefs
HVAC Equipment System Level			
Hot Water	High efficiency condensing boilers for perimeter heating, reheat and entrance heating, 90% eff	Natural gas condensing boilers, 93% thermal efficiency Setpoints (supply/return): 160/130F	Mechanical Design Briefs



Domestic Hot Water (DHW)	Domestic Hot Water	Natural gas DW heater, 80% eff Lavs 1.9 LPM Showers 5.7 LPM Kitchen sink 5.7 LPM Condenser heat recovery	Natural gas condensing water heaters, 95% thermal efficiency Lavs 1.9 LPM Showers 5.7 LPM Kitchen sink 5.7 LPM Supply Temperature: 140F	Mechanical Design Briefs
Other				