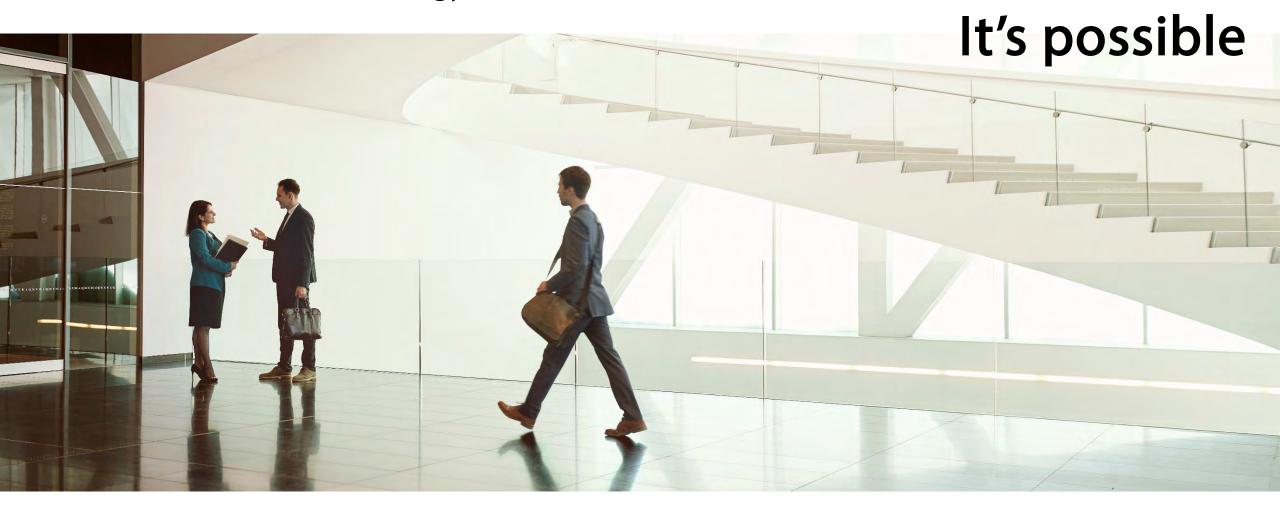
Quebec City's Eco-District:

Low-Energy, Affordable, Sustainable and Cost-Effective





















LEARNING OBJECTIVES

- 1. Explain best practices for a 13 story cross-laminated timber frame and superinsulated building enclosure;
- 2. Discuss successful development of an Eco-district: a collaborative approach amongst key players Origin, Habitus teams and Québec City's government;
- 3. Describe how successfully retrofit energy efficient heating/cooling systems in a 17th century building (Augustinian Monastery, Quebec);
- 4. Identify affordable and sustainable energy efficient building success and lessons learned; comprehensive sustainable practices, Cleantech, resources, water efficiency and waste management.



AGENDA

- 1. Introduction
- 2. Québec International Inc/BVI brief overview
- 3. Québec Eco-District:
 - Habitus
 - Origine
 - Monastère des Augustines Hôtel
- 4. Interactive Discussion



SPEAKERS

Martin Gougeon Director, Green & Smart Building Cluster, Québec International



Alejandro Montero President, TERGOS Architecture + Construction *Habitus project*



André Huot Quebec Business Development Director, Nordic Structures *Origin project*



Dany Blackburn Senior Partner / Architect, ABCP Architecture Augustinian Monastery project







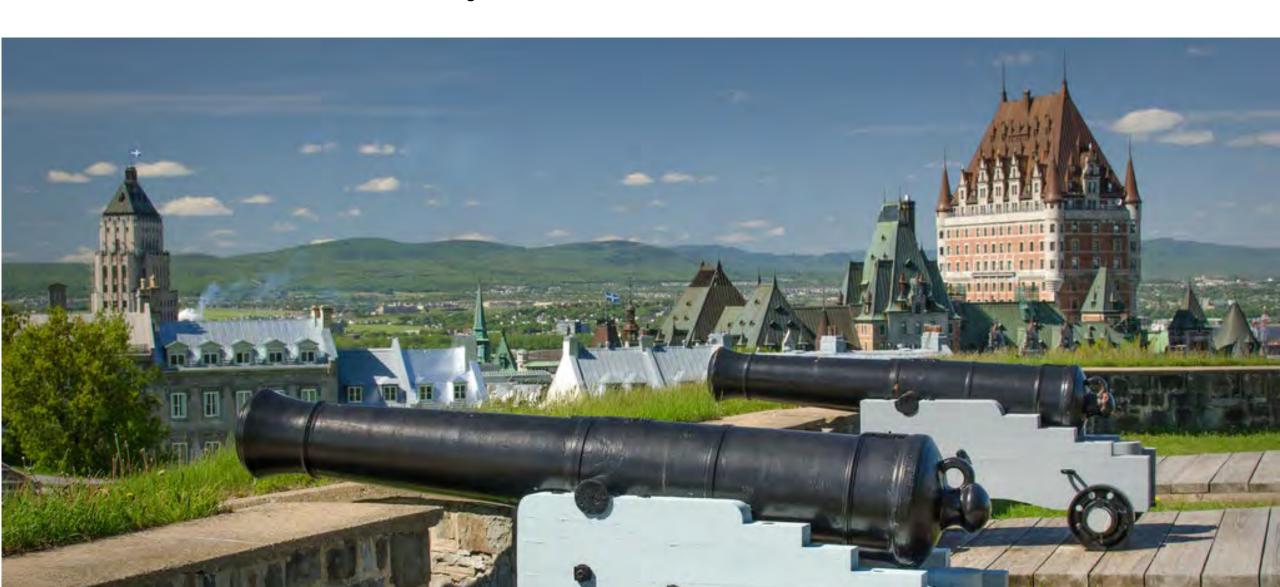
Martin Gougeon Director, Green & Smart Building Cluster, Québec International



AFFORDABLE ACCESSIBLE SUSTAINABLE

It's possible!

400 years of vision?



Creative!







Alejandro Montero Development Director, *Tergos architecture inc.*



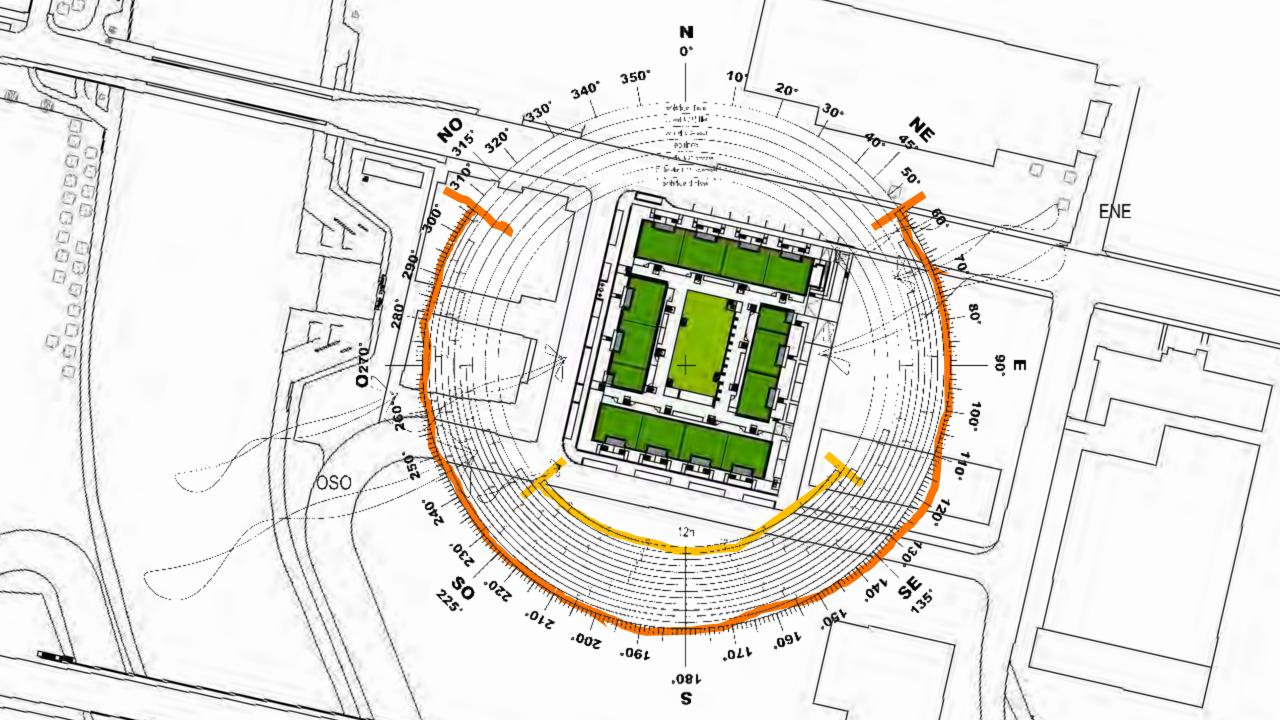


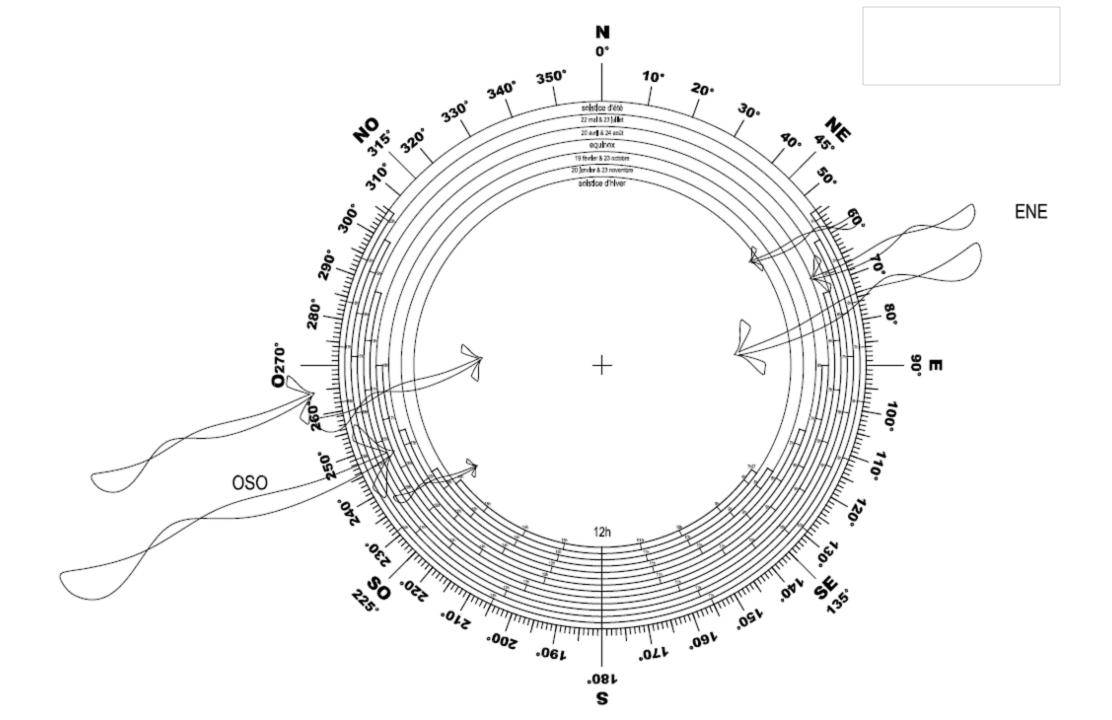
LOW COST AFFORDABLE RESILIENT SUSTAINABLE ENERGY EFFICIENT ARCHITECTURE

It's possible.









Latitude

46,82°

QUÉBEC CITY

42,36°

Heating Degree Days Cooling Degree Days 5320.4

350.4

BOSTON

653.9

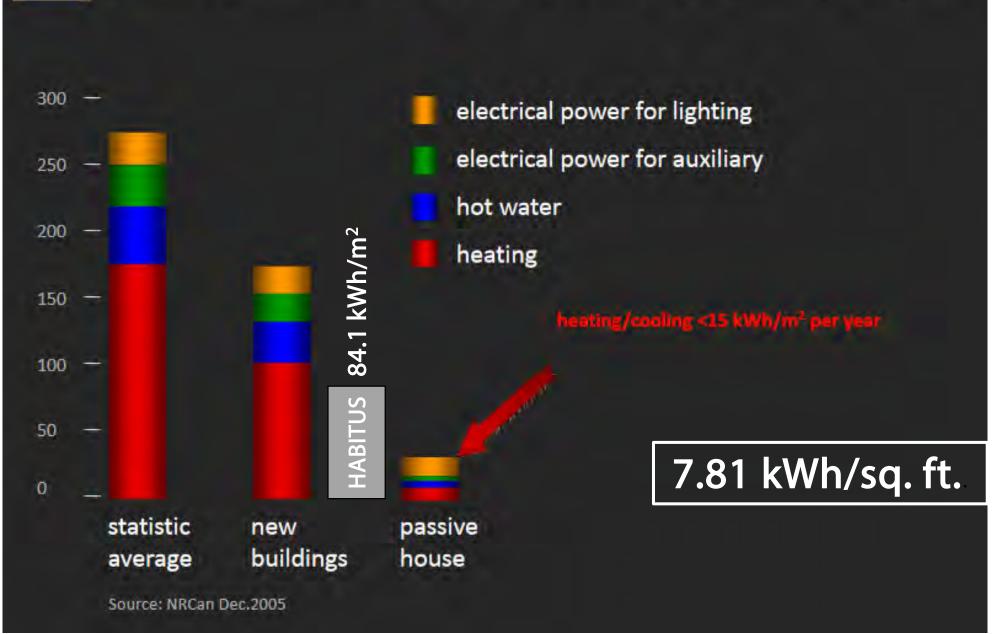
3103.9

2216.5 71% -303.5

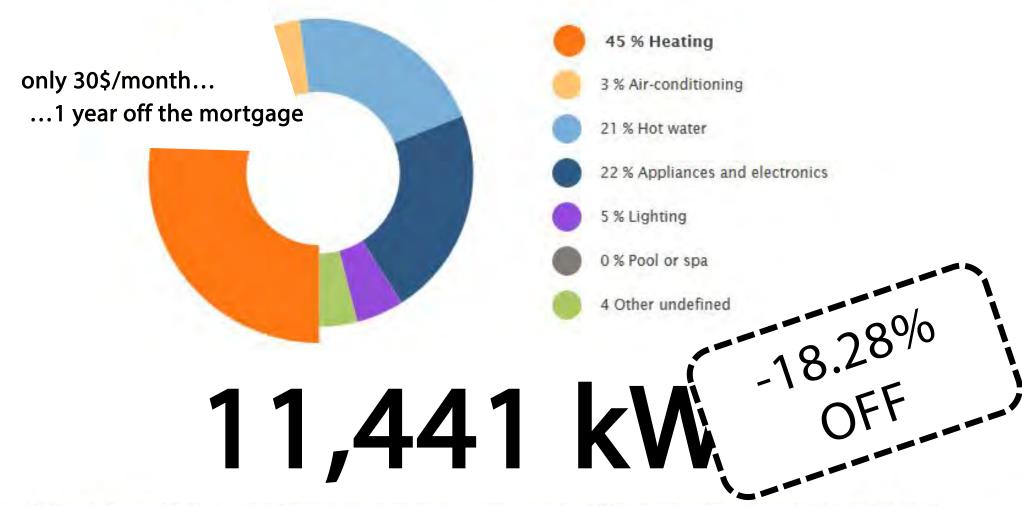
statistiques at 18°C (°F) last 12 months, www.degreedays.net



for residential buildings in kWh/m² per year



Breakdown of average electricity use for a home in a plex or multiunit building with air-conditioning 3

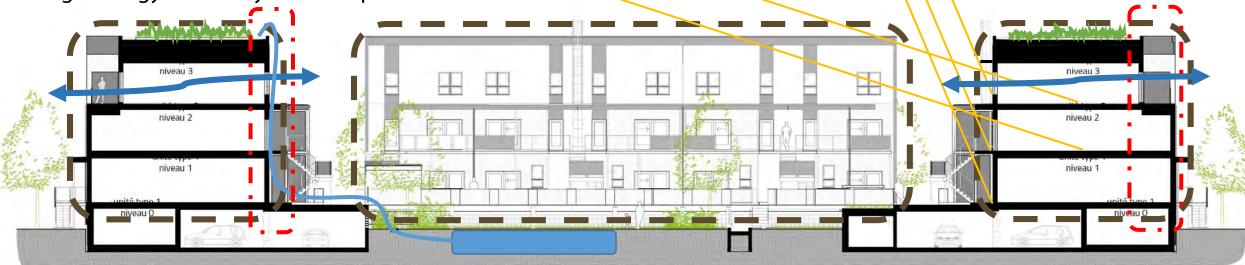


Did you know that air-conditionning can account for up to 20% of your summer electricity costs.

MORTGAGE

Death MORTGAGE Pledge

- 1. Summer passive occultation
- 2. Winter passive heating
- 3. Natural cross-ventilation
- 4. Extensive green roofs
- 5. Rain water recovery system
- 6. Three storey prefab low-carbon wood structure
- 7. High energy-efficiency wall composition



7SIMPLE STRATEGIES

SIMPLE & EFFICIENT A R C H I T E C T U R E



100% LOW-CARBON WOOD STRUCTURE

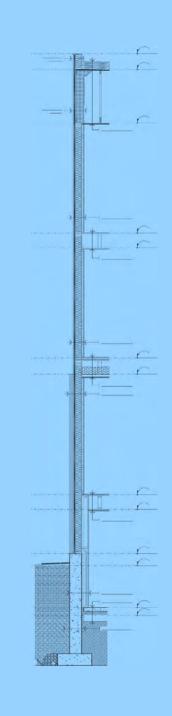
FACTORY PREFABRICATED

R45.3 ROOFS

R33.5 WALLS

R31.3 FOUNDATION WALLS

R11.2 SLABS



Gypsum board 5/8" (R0.55)

2x 1"x3" @ 16"o.c. horizontal (R1.02)

Vapour-barrier

Natural wood fiber panel ½" (R1.15)

Structure: 2" x 6" @ 16" o.c.

Rockwool 5 ½" (R22.00)

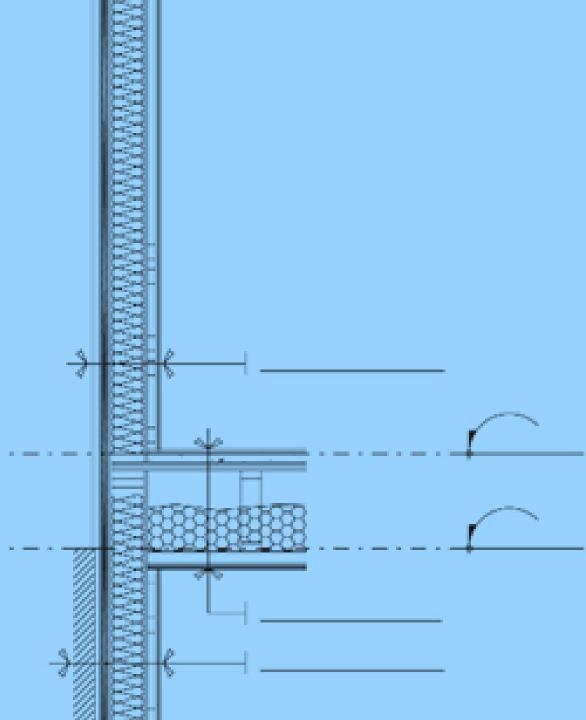
Wood chip bracing panel ½" (R0.71)

Air-barrier

Rigid rockwool panels 1 ½" (R6.00)

Vertical wood furrings 1"x3" (R1.02)

Exterior sheathing



	QUÉBEC CITY	BOSTON
AVERAGE GROSS FAMILY INCOME	56 674\$ USD	85 691\$ USD
30% Monthly Gross Income	1 417\$/month	1 977\$/month
Utilities and Condo Fees	58\$/utilities 68\$/condo fees (50%)	58\$/utilities 68\$/condo fees (50%)
Property and School Taxes	187\$	187\$
Maximum Monthly Mortgage	1 104\$	1 664\$
Maximum Purchase Price	210 000\$ MAX LOAN 262 500\$ MAX PRICE	316 000\$ MAX LOAN 395 000\$ MAX PRICE

*20% Cash-Down, 4% interest rate, 25 year amortisation













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MLS® # 27905789

Home > Quebec > La Cité-Limoilou (Québec)













CONDO FOR SALE IN LA CITÉ-LIMOILOU

322,525\$ USD = 215.16\$/sq.ft.

Bedrooms

136\$ USD

Maintenance Fees

Ask about this listing

First and Last Name

Email

Phone (Optional)

I would like to find out more about this property.

Optional: (Please add any questions or comments you have.)



Stéphane Ti Courtier immobilie et commercial

SHARE

Royal LePage Blan Real Estate Agend

MOBILE: 418,952,2697

EMAIL:

stremblay@royalle



Contact This Agent



Guylaine Jo Courtier immobili













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CONDO FOR SALE IN LA CITÉ-LIMOILOU

240,831\$ USD = 178.79\$/sq.ft.

1+2

Bedrooms

104\$ USD

Maintenance Fees

Ask about this listing

First and Last Name

Email

Phone (Optional)

I would like to find out more about this property.

Optional: (Please add any questions or comments you have.)



Stéphane T Courtier immobil et commercial

SHAR

Royal LePage Bla Real Estate Agen

MOBILE: 418.952.2697

EMAIL:

stremblay@royall



Contact This Agent



Guylaine Jo Courtier immobil



7.53M\$ USD 85\$/sq. ft.

AFFORDABLE & SUSTAINABLE





André Huot Quebec Business Development Director, Nordic Structures *Origin project*





NOVEMBER 2013

Régie du bâtiment du Québec (Quebec building commission, or RBQ)

- Initial meeting for project presentation (November 2013)
- Evaluation of the request and creation of a working group
- Tentative agreement (December 2014) and final agreement (May 2016)

OCTOBER 2016



- Regulatory precedent
- Public support
- Reproducibility
- 100% mass timber
- Fire

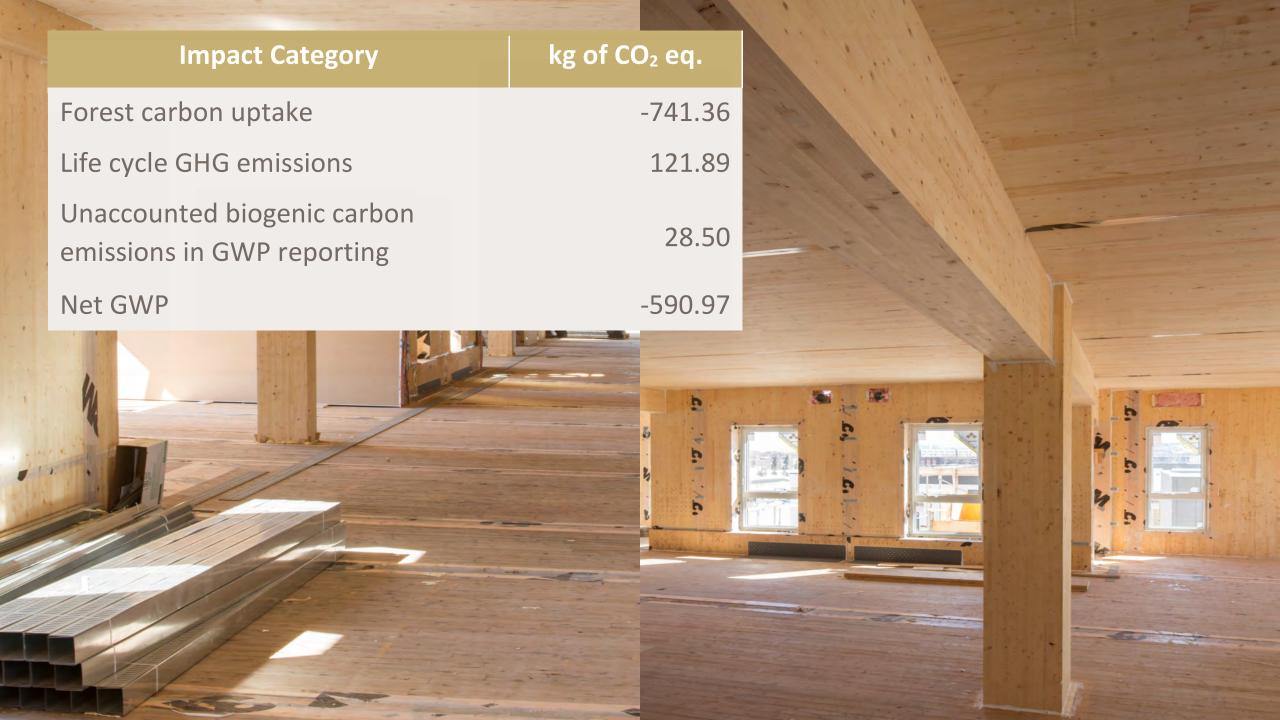
I feel like I'm in a cocoon!











Percentage of reduction between the reference building and the proposed one

	Reference building (CONCRETE)	Proposed building (WOOD)	Units	Percentage (%) of reduction
GWP Global warming potential	8119870.00	4095870.00	Kg CO2 eq.	-49.29
ODP Ozone depletion potential	2.39	2.29	Kg CFC-11 eq.	-3.82
AP Acidification potential	54473.90	49501.30	Kg SO2 eq.	-9.06
EP Eutrophication potential	23373.30	20581.60	Kg N eq.	-11.90
POCP Photochemical ozone creation potential (smog)	561995.00	501497.00	Kg O3 eq.	-10.59
Resource depletion – fossil	35904200.00	35071500.00	MJ	-2.31
Number of indicators with at least 10% of reduction				3





WELL BUILDING STANDARD









The mark of responsible forestry

FSC® C002803





Energy cost for heating and hot water

35\$ per month

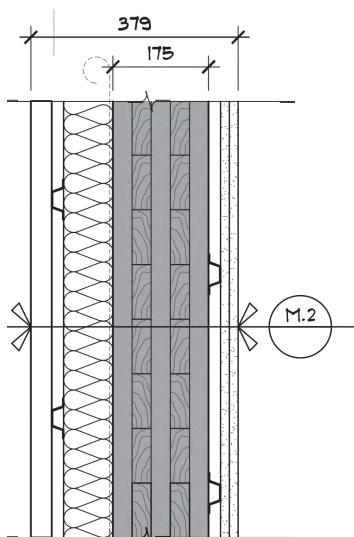
- Radiant heating floor
- Central boiler powered by natural gas
 - Heating
 - Hot water
- Solucycle organic matter collection system
- A safe, high-performance living space
- Improved isolation
- Superb acoustics for ultimate privacy











MUR EXTÉRIEUR DE TÔL (D.R.F. = 2 HEURES):

- REVÊTEMENT EXTÉRIEU VICWEST POSÉ VERTIC
- LATTAGE MÉTAL. HOR 22mm À 600mm C/C
- ISOLANT "CONFORTBO DE ROXUL 90mm
- MEMBRANE PARE-AIR AUTOCOLLANTE DE TYPI "SOPRASEAL STICK YP" SOPREMA (JOINTS SCELI
- CLT 175mm (VOIR STRU
- LATTAGE W-14 @ 400m
- GYPSE 16mm TYPE X
- GYPSE 16mm TYPE X

MUR EXTÉRIEUR DE TÔLE VERTICA 14B PANNEAUX CLT 175mm

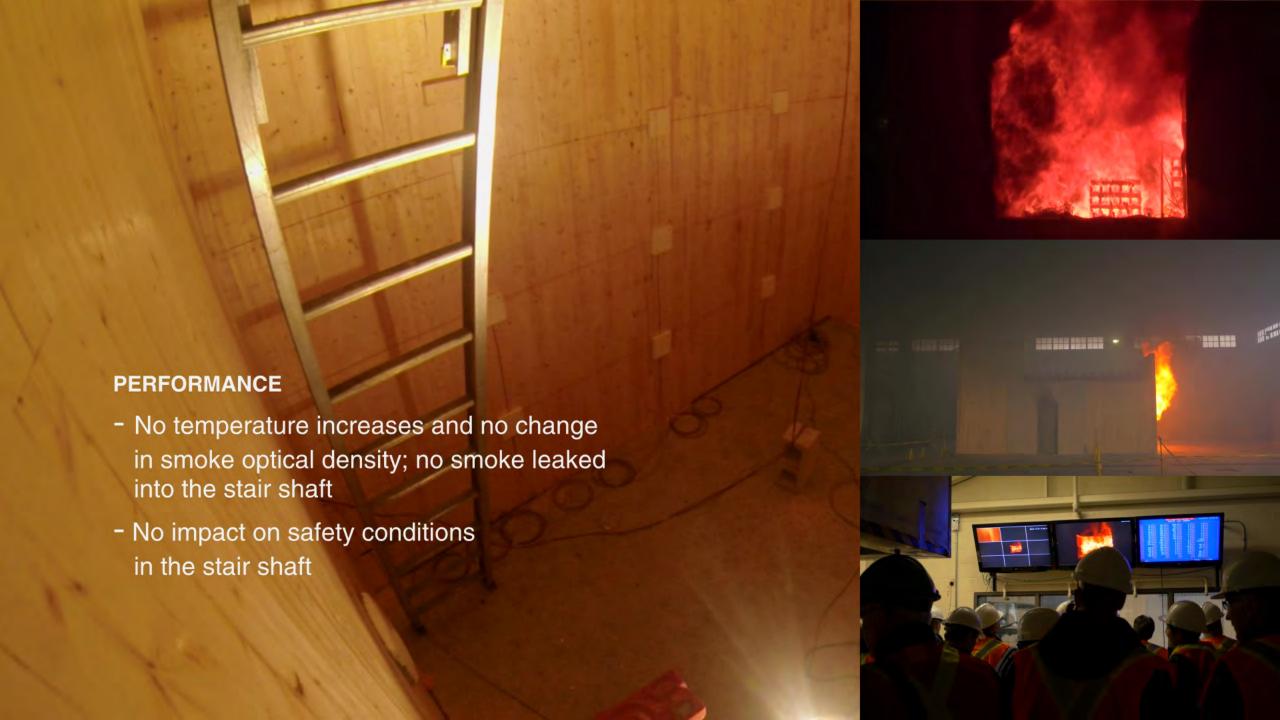
ÉCHELLE 1:10

CONSTRUCTION

- Full-scale three storey stair shaft and adjacent apartment
- 175 mm 5-ply CLT
- Structural floor load of 4.75 kPa
- Fire load density of 790 MJ/m², equivalent to the 95th percentile value for residential rooms





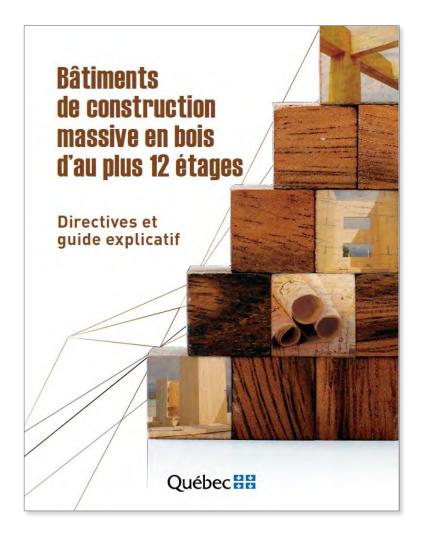




Results



- Origine project approved by the Régie du bâtiment du Québec
- Increased trust in mass timber: ARBORA
- Advancements that can be applied to other mass timber projects
- Expertise that can be applied to code changes
- New provincial regulation





54% of the weight of a 1.5 million \$\$ similar concrete building SOLUTION 900 mm rigid concrete raft Distribute evenly the load on the soil Place the building at a strategic place on the raft The weight of existing/remove backfill would compensate for most of the added weight

