CITY OF VANCOUVER

Natural Resources Canada | Ressources naturelles Canada
Canada

BC Hydro

SES

Agenda

1. Introductions
2. Fortis Deep Energy Retrofit Pilot Program
3. Forte Deep Energy Retrofit Project
4. Field Guide to Retrofits in Occupied Buildings
5. Discussion + Q&A

Candace Le Roux

- Regional Property Manager for BentallGreenOak
- 30+ years of experience in the real estate management field

Ya’el Santopinto

- Architect, Principal, and practice lead at ERA Architects
- ERA’s lead Tower Renewal Architect, with specialized expertise in retrofit with residents in place

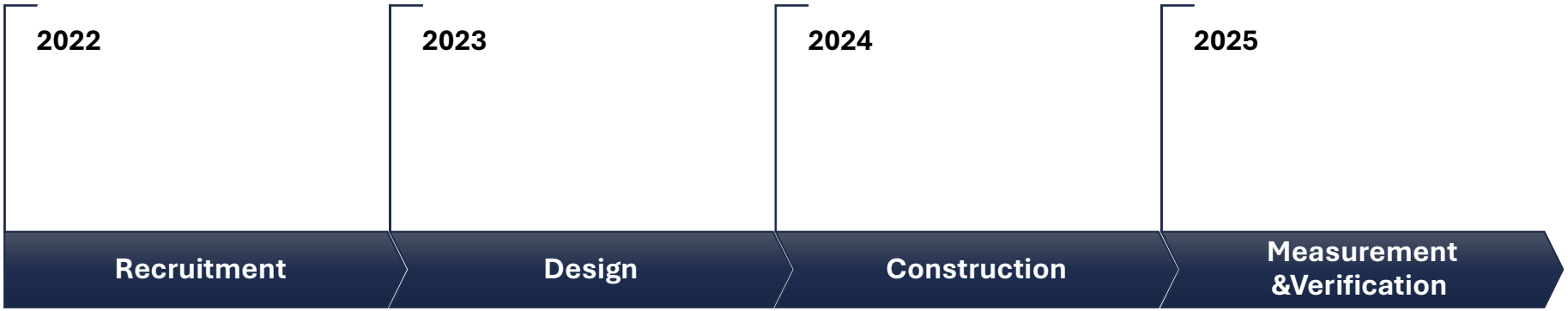
SES

Fortis BC Deep Energy Retrofit Pilot Program

- **Scope:** Implement deep energy retrofits that improve building energy performance through a holistic approach that targets the envelope and mechanical systems
- **Scale:** 20 single-family homes and 4 multi-unit residential buildings
- **Objective:** Reduce energy use and emissions by >50% while retaining natural gas the primary heating fuel
- **Goal:** Inform future education and incentive programs
- **Funding:** Costs of all ERMs were rebated by Fortis; participants agreed not to use the upgrades as a basis for rent increases or evictions

SES

Fortis BC Deep Energy Retrofit Pilot Program: Part 3



SES

Forte Deep Energy Retrofit

- **Location:** Vancouver
- **Building type:** 13-story concrete high-rise; rental apartments, 135 suites
- **Date of Construction:** 1971
- **Building owner**: Bentall Green Oak

Forte DER Project

May 30, 2025

Introduction

BentallGreenOak

Real estate investment firm headquartered in Miami, Florida that provides investment, lending, and property management services

- $86B in assets under management
- 750+ clients and partners
- Holdings in 13 countries

Introduction

Candace Le Roux

Regional Property Manager, British Columbia

- Over 26 years of experience in the multi-residential industry including leasing, resident relations, property operations, capital projects, and budget management
- Real Estate License with the BC Real Estate Association
- Certified Property Manager and Accredited Residential Manager designations with the Real Estate Institute of Canada
- Past president of the Real Estate Institute of Canada (2015-16)
- Instruction for the Real Estate Institute of Canada
- Human Resources Diploma, South Africa

Forte (Burrard and West 14th)

Before

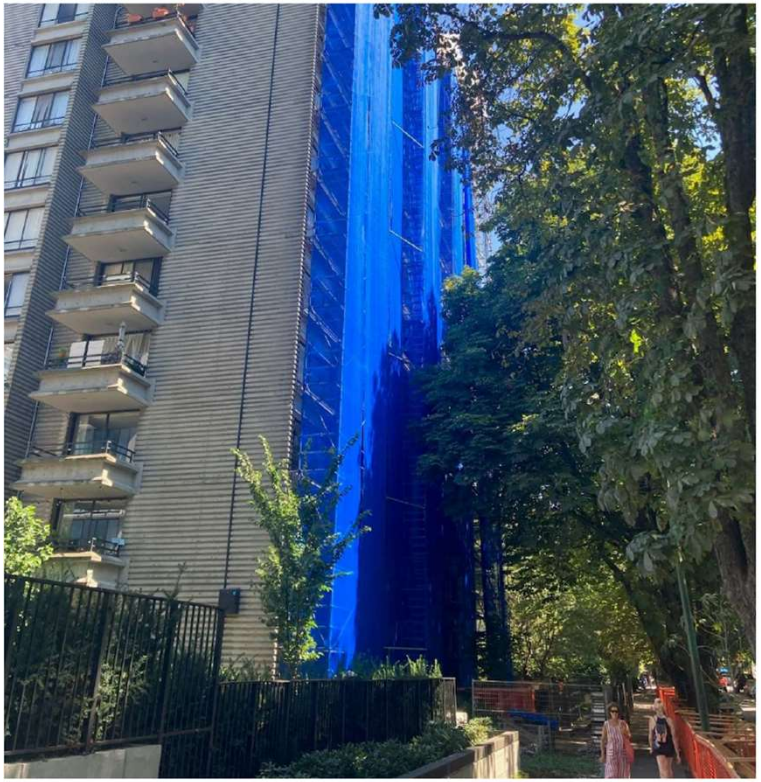
Forte (Burrard and West 14th)

After

Deep Energy Retrofit

Emission Reduction Measures

- Roof insulation
- Window replacement
- Airtightness improvement
- Gas heat pumps
- Heat recovery ventilation
- MUA with integrated cooling
- Cooling-ready upgrades
- Solar thermal pre heat



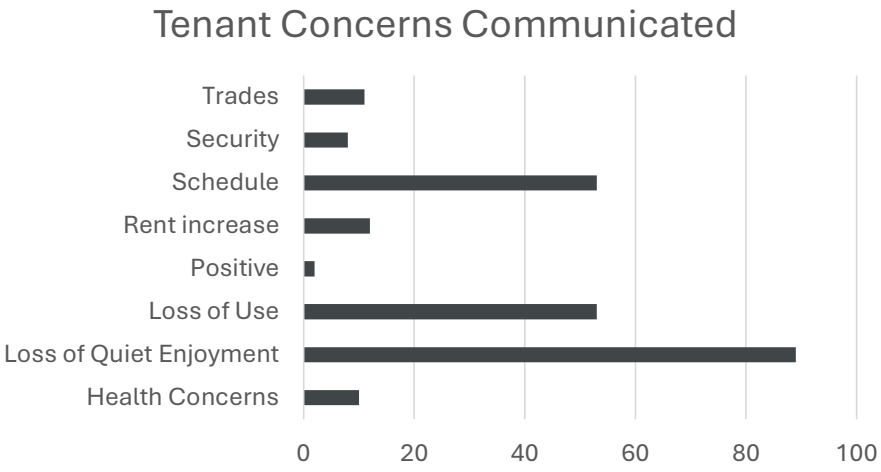
Challenges

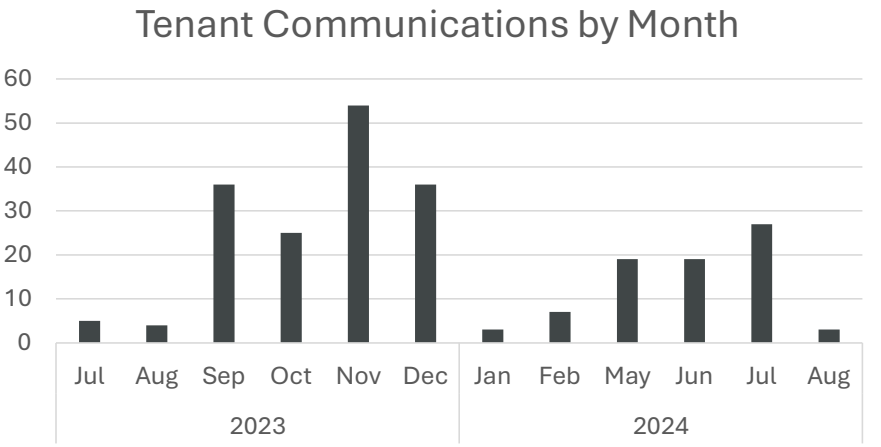
- Magnitude of the project
- Numerous moving parts
- Employees, trades, consultants etc.
- Demanding on the site staff
- Numerous entries into tenant homes, very intrusive
- Additional staffing needed for access to suites i.e., security
- Building enclosed in blue tarp over the fall and winter months
- Construction Schedules – No shows, sickness, sub trades, product availability

Tenant Engagement

- Pre-project open house
- Separate email address set up for tenant complaints and concerns
- Concern tracker
- Weekly communication to all tenants with upcoming schedule (example below)

Notice of Electrical Work **NO POWER**	**Please be reminded of the following dates for scheduled electrical work and power disruptions:** **Wednesday, May 1- 8:00am - 8:00pm** New House Panel Installation. Impact to residents: No suites will be affected during this shutdown; elevators will remain operational via the generator. Mechanical room will have loss of power temporarily. **SWIMMING POOL, LAUNDRY ROOM, GYM, AND RENTAL OFFICE WILL HAVE NO POWER AND WILL BE CLOSED.** **Thursday, May 2 - 11:00am - 3:00pm** Ground Floor Meter Work. Impact to residents: This work will be noisy. **NO POWER for the Main floor to 7th floor suites. No building systems will be affected.**

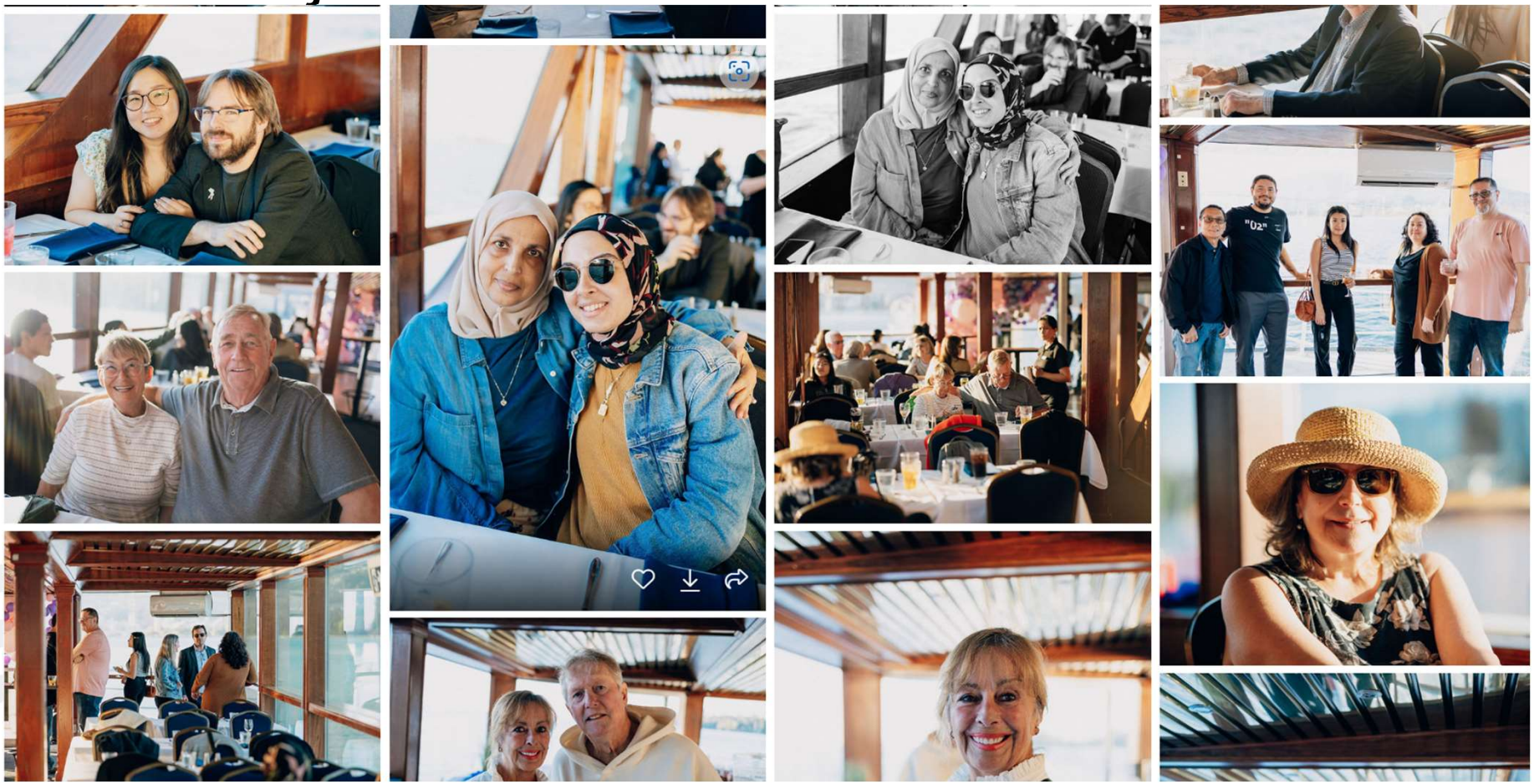


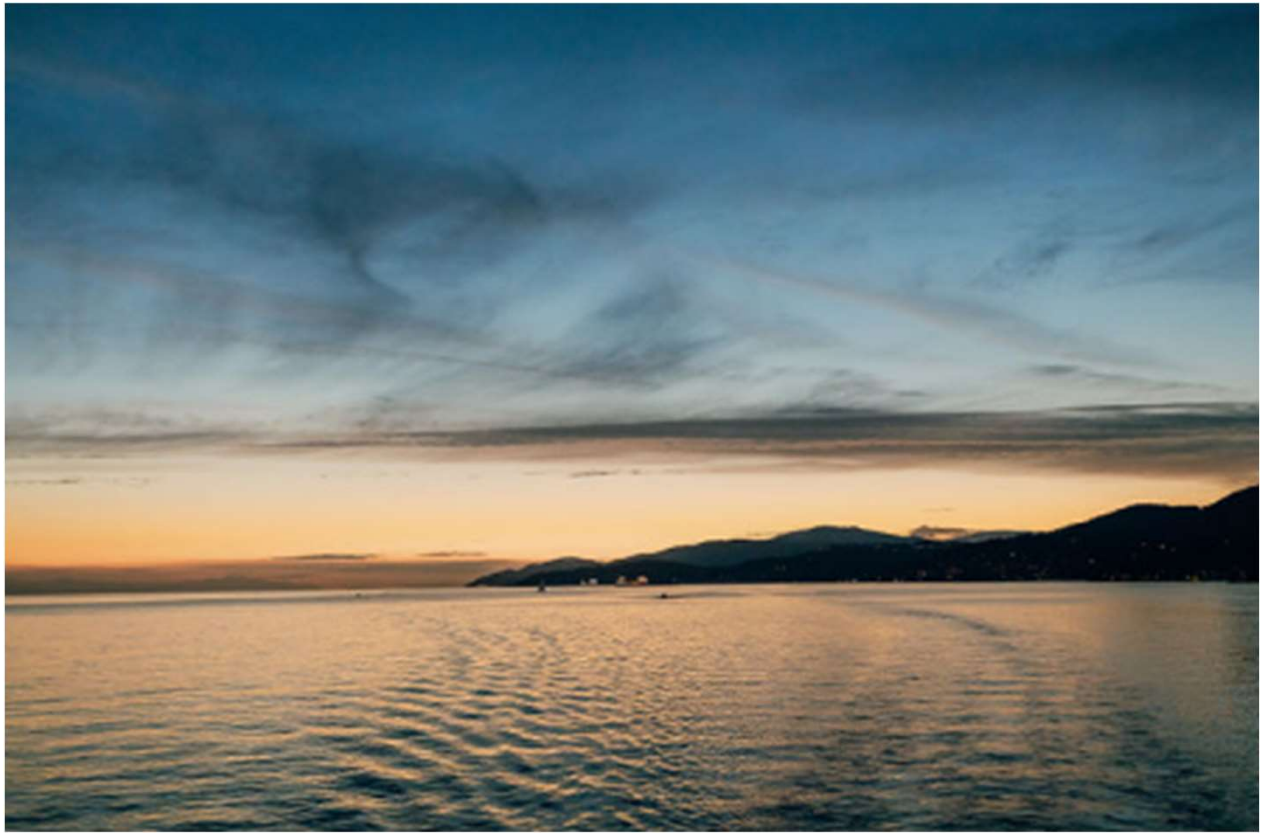


Lessons Learned

- **Project Roll Out** - Open house with detailed information of project including samples of products and subject matter experts to explain the products. Orient residents across a one-week period, allowing tenants to ask questions
- **Adequate Staffing** - Additional staffing for project, separate to running the existing building due to increased workload
- **GC Collaboration** - Weekly meetings with GC and operations invaluable
- **Resident Communication** - Weekly communication to keep tenants informed
- **Complaint Monitoring** - Tenant complaints monitored and dealt with timeously

Post Project and Celebration





TOWER RENEWAL

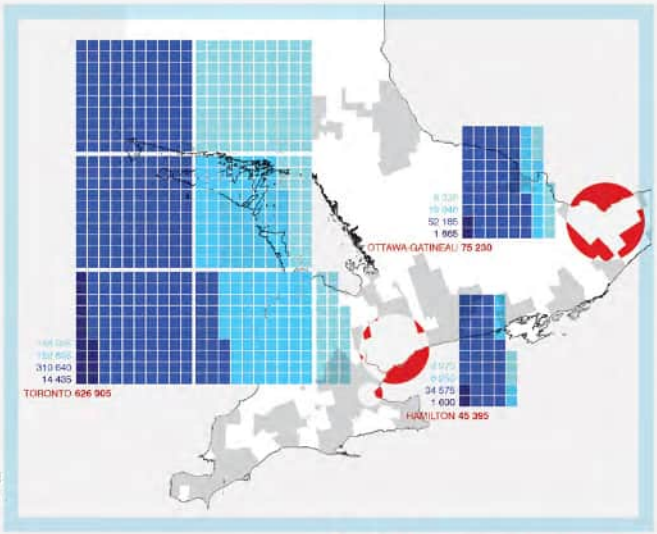
Transforming Affordable Housing - In Occupied Buildings

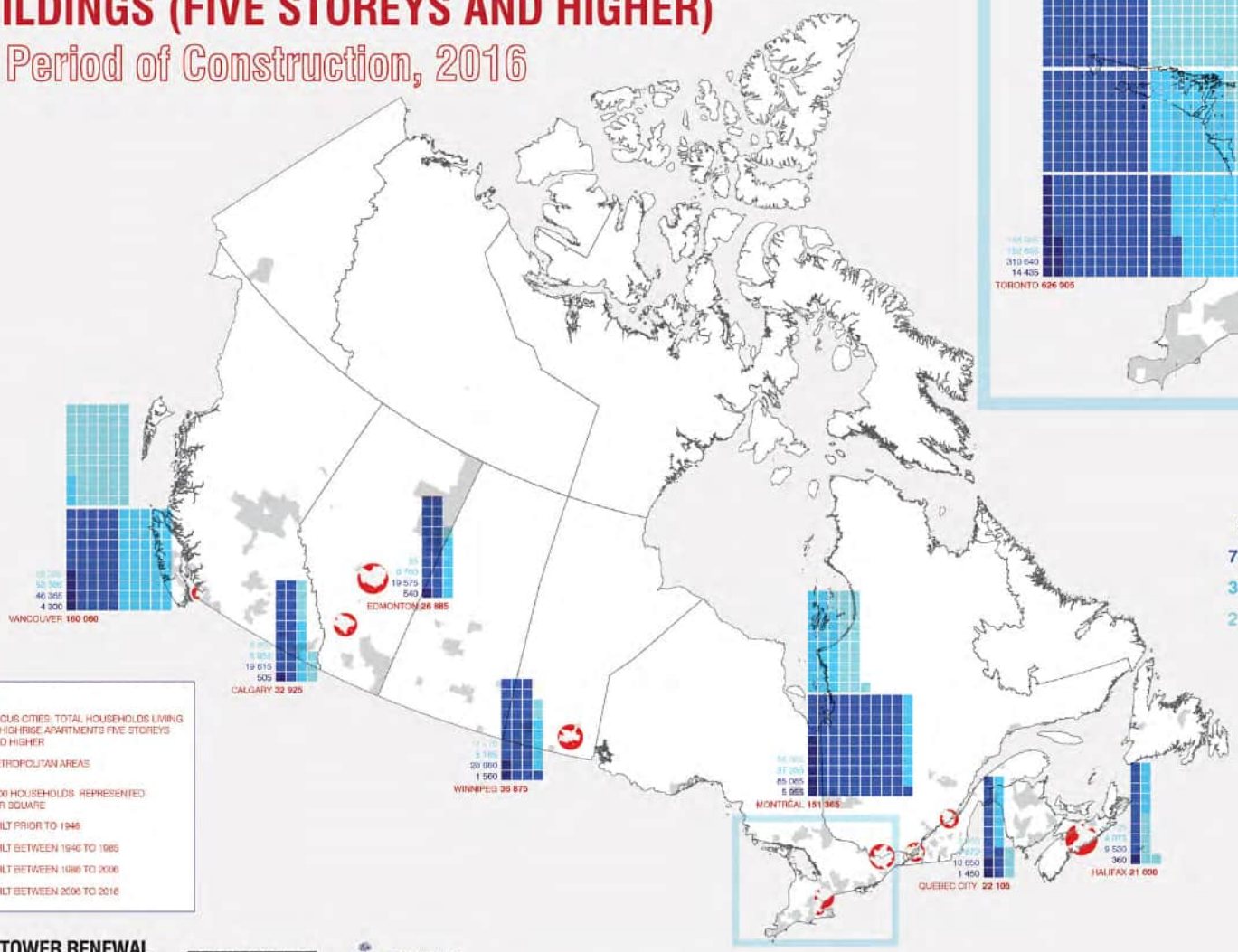
ERA TOWER RENEWAL PARTNERSHIP


TOWER RENEWAL
PARTNERSHIP

CANADIAN HOUSEHOLDS LIVING IN HIGHRISE BUILDINGS (FIVE STOREYS AND HIGHER)

By Period of Construction, 2016





LEGEND

- FOCUS CITIES: TOTAL HOUSEHOLDS LIVING IN HIGHRISE APARTMENTS FIVE STOREYS AND HIGHER
- METROPOLITAN AREAS
- 1000 HOUSEHOLDS REPRESENTED PER SQUARE
- BUILT PRIOR TO 1946
- BUILT BETWEEN 1946 TO 1985
- BUILT BETWEEN 1986 TO 2005
- BUILT BETWEEN 2006 TO 2016

1 391 040 TOTAL HOUSEHOLDS LIVING IN HIGHRISE BUILDINGS IN CANADA

■ 1000 HOUSEHOLDS PER SQUARE

TOTAL HOUSEHOLDS LIVING IN HIGHRISE BUILDINGS BY PERIOD OF CONSTRUCTION

37 610 | (03%) PRE - 1946
739 490 | (53%) 1946 - 1985
335 870 | (24%) 1986 - 2005
278 075 | (20%) 2006 - 2016

ONTARIO

886 705 NUMBER OF HOUSEHOLDS LIVING IN HIGHRISE APARTMENTS IN ONTARIO

55% OF CANADIAN HIGHRISE HOUSEHOLDS LIVE IN APARTMENTS CONSTRUCTED BETWEEN 1946-1985

QUÉBEC

187 800 NUMBER OF HOUSEHOLDS LIVING IN HIGHRISE APARTMENTS IN QUÉBEC

56% OF CANADIAN HIGHRISE HOUSEHOLDS LIVE IN APARTMENTS CONSTRUCTED BETWEEN 1946-1985

BRITISH COLUMBIA

177 830 NUMBER OF HOUSEHOLDS LIVING IN HIGHRISE APARTMENTS IN BRITISH COLUMBIA

31% OF CANADIAN HIGHRISE HOUSEHOLDS LIVE IN APARTMENTS CONSTRUCTED BETWEEN 1946-1985

ALBERTA

62 395 NUMBER OF HOUSEHOLDS LIVING IN HIGHRISE APARTMENTS IN ALBERTA

66% OF CANADIAN HIGHRISE HOUSEHOLDS LIVE IN APARTMENTS CONSTRUCTED BETWEEN 1946-1985

TOWER RENEWAL PARTNERSHIP

NEIGHBOURHOOD CHANGE

UNIVERSITY OF TORONTO

SOURCE: STATISTICS CANADA, CMA DATA, CENSUS 2006/2016

TOWER RENEWAL

Targeted green renewal and community reinvestment that will enable existing high-density tower neighbourhoods to emerge as self-sufficient, economically vibrant, socially diverse, culturally integrated and 'low carbon' communities throughout the city and region.

Eco-Retrofits (60%+ GHG Reductions)

Social & Economic Life

Neighbourhood Transformations

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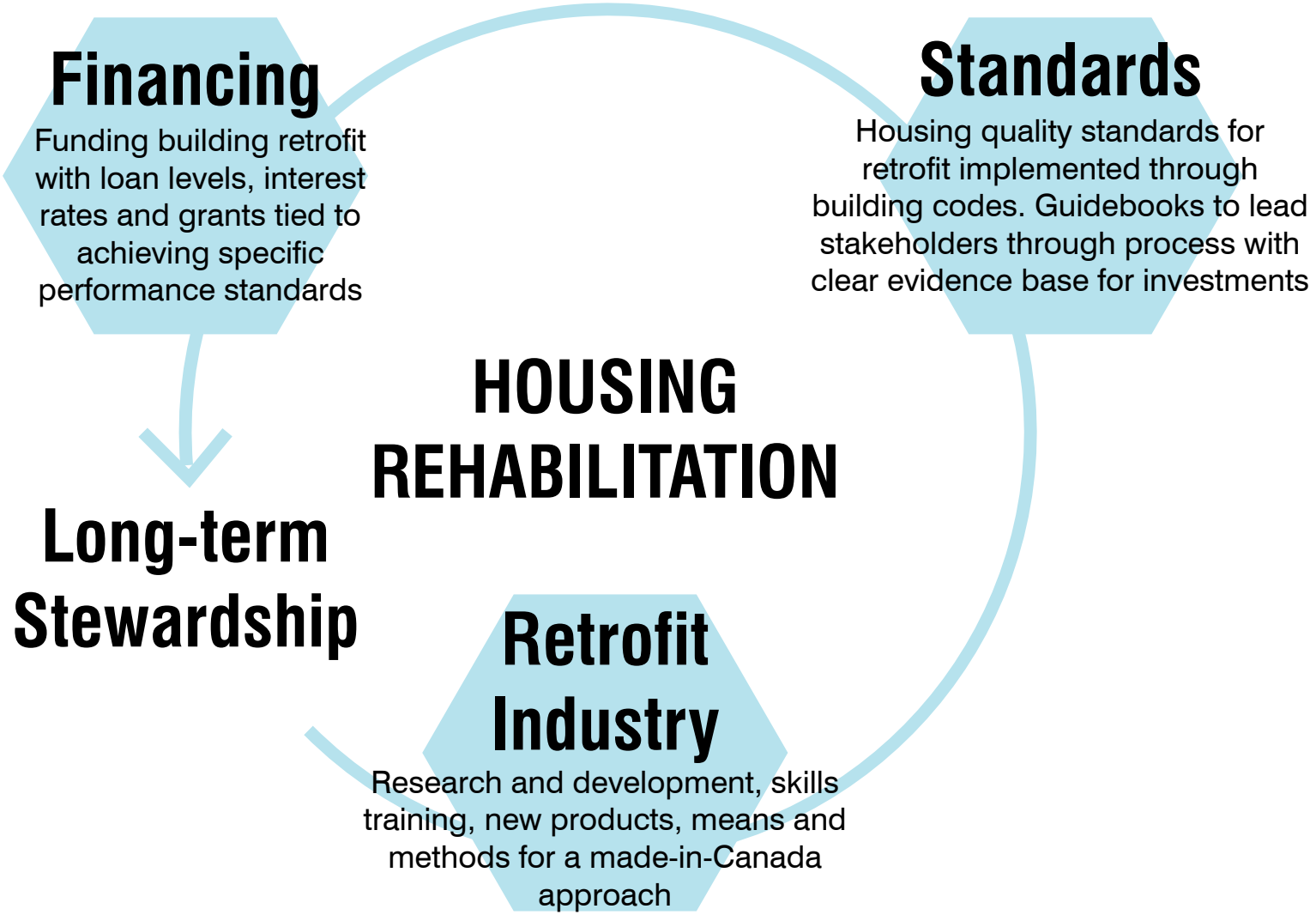

TOWER RENEWAL PARTNERSHIP

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dkgi

EVERGREEN CITYWORKS

United Way Toronto & York Region

nblc

Transsolar KlimaEngine

ENTUITIVE

Smith + Andersen

TORONTO

Ontario

CMHC SCHL

TOWER RENEWAL **ADVISORY NETWORK**

TOWER RENEWAL PARTNERSHIP

DKGi Inc.

United Way Toronto & York Region

TAF

JOSHUA MONK MANWYCK CONSULTING

Transsolar KlimaEngineering

EBA

TORONTO

Ottawa

MISSISSAUGA

Hamilton

ENTUITIVE

CITY HOUSING

Ontario Municipal Social Services Association

TORONTO Public Health

TORONTO REGION Board of Trade

PEMBINA Institute

Conservation

NAIMA CANADA

nblc

CAPREIT

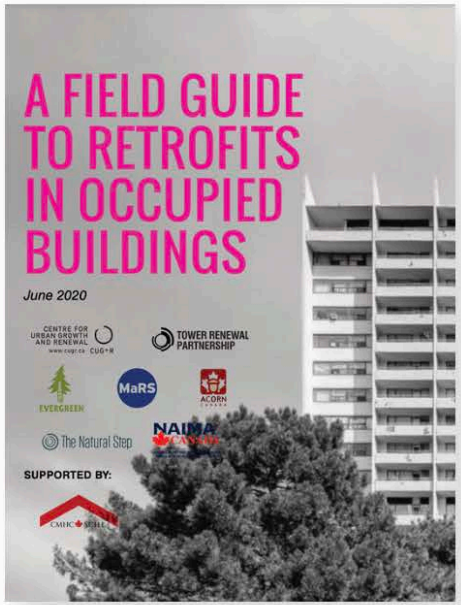
Wellesley Institute

NEIGHBOURHOOD CHANGE Research Partnership

ACORN CANADA

Ryerson University Ryerson City Building Institute

Toronto Community Housing


A FIELD GUIDE TO RETROFITS IN OCCUPIED BUILDINGS
June 2020
CENTRE FOR URBAN GROWTH AND RENEWAL
TOWER RENEWAL PARTNERSHIP
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ACORN
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NAIMA
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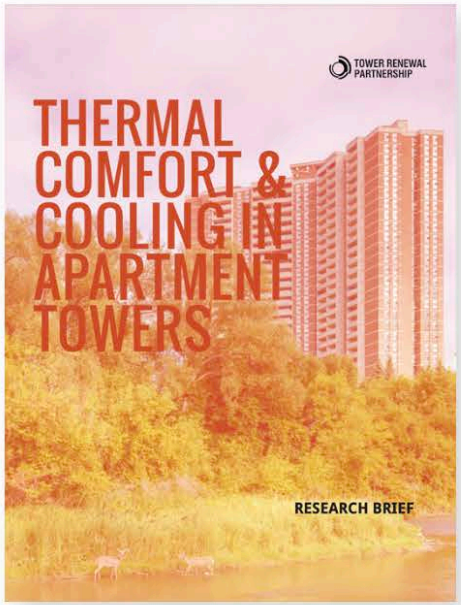
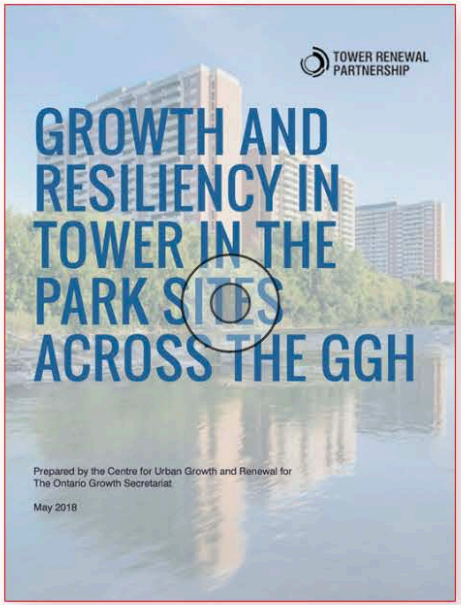
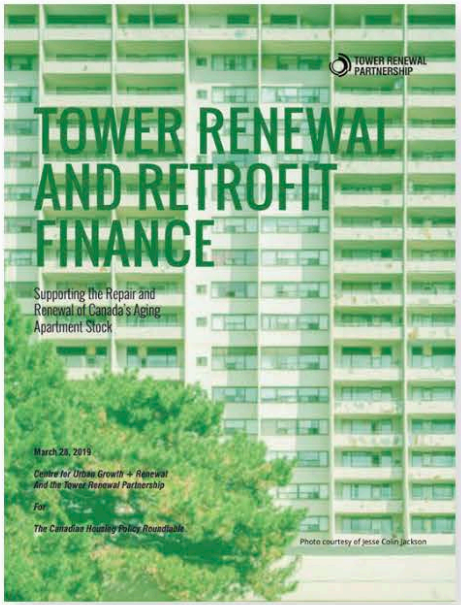
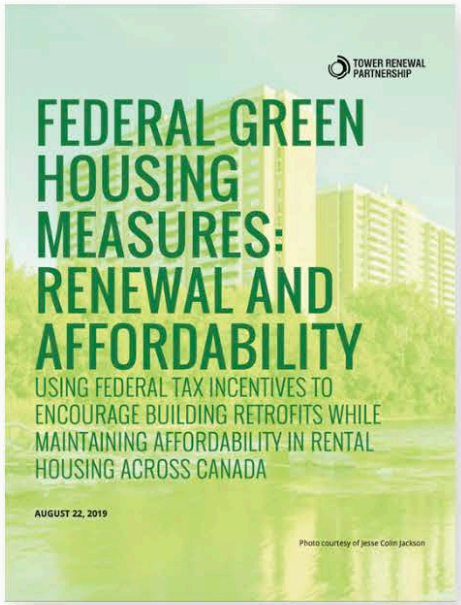
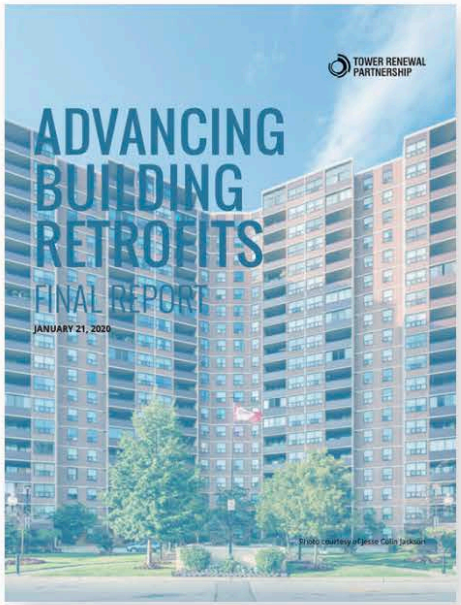
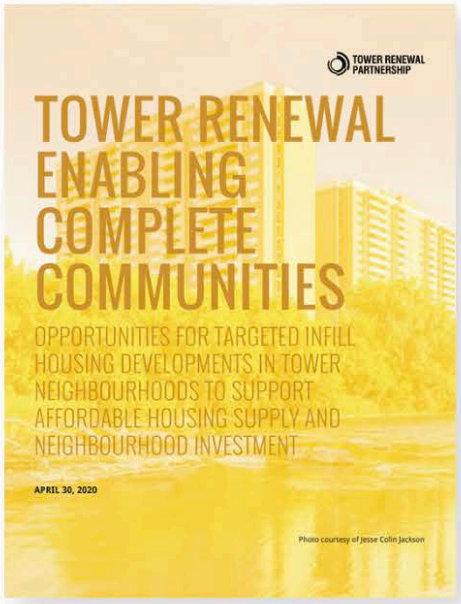

TOWER RENEWAL PARTNERSHIP
THERMAL COMFORT & COOLING IN APARTMENT TOWERS
RESEARCH BRIEF

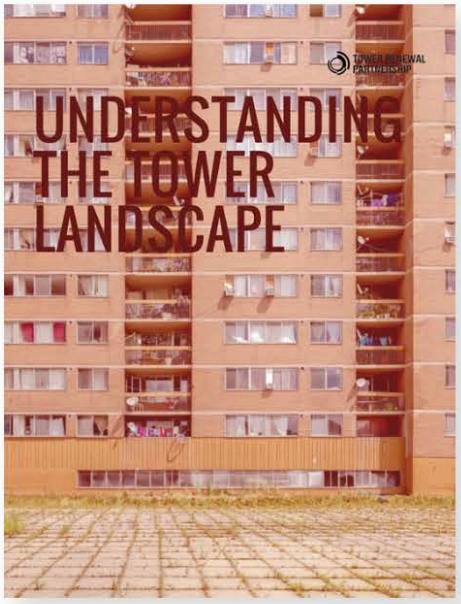

TOWER RENEWAL PARTNERSHIP
GROWTH AND RESILIENCY IN TOWER IN THE PARK SITES ACROSS THE GGH
Prepared by the Centre for Urban Growth and Renewal for
The Ontario Growth Secretariat
May 2018


TOWER RENEWAL PARTNERSHIP
TOWER RENEWAL AND RETROFIT FINANCE
Supporting the Repair and Renewal of Canada's Aging Apartment Stock
March 28, 2019
Centre for Urban Growth + Renewal
And the Tower Renewal Partnership
For
The Canadian Housing Policy Roundtable
Photo courtesy of Jesse Colin Jackson

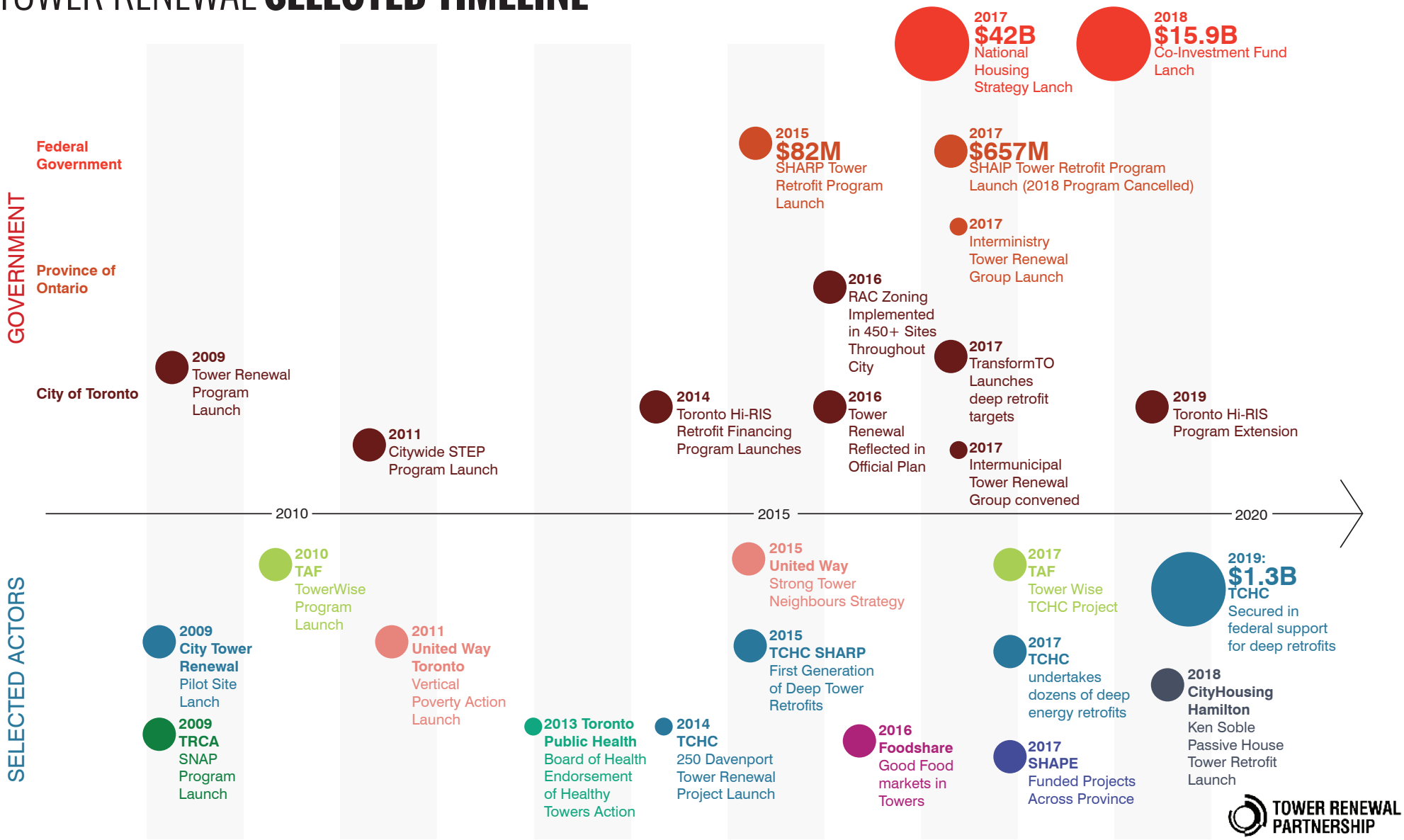

TOWER RENEWAL PARTNERSHIP
FEDERAL GREEN HOUSING MEASURES: RENEWAL AND AFFORDABILITY
USING FEDERAL TAX INCENTIVES TO ENCOURAGE BUILDING RETROFITS WHILE MAINTAINING AFFORDABILITY IN RENTAL HOUSING ACROSS CANADA
AUGUST 22, 2019
Photo courtesy of Jesse Colin Jackson


TOWER RENEWAL PARTNERSHIP
ADVANCING BUILDING RETROFITS
FINAL REPORT
JANUARY 21, 2020
Photo courtesy of Jesse Colin Jackson


TOWER RENEWAL PARTNERSHIP
TOWER RENEWAL ENABLING COMPLETE COMMUNITIES
OPPORTUNITIES FOR TARGETED INFILL HOUSING DEVELOPMENTS IN TOWER NEIGHBOURHOODS TO SUPPORT AFFORDABLE HOUSING SUPPLY AND NEIGHBOURHOOD INVESTMENT
APRIL 30, 2020
Photo courtesy of Jesse Colin Jackson


TOWER RENEWAL PARTNERSHIP
UNDERSTANDING THE TOWER LANDSCAPE

TOWER RENEWAL **SELECTED TIMELINE**



ReCover
ReImagine. ReBuild. ReCover.

PEER – Prefabricated Exterior Energy Retrofit

Developing, testing and validating innovative prefabricated building envelope technologies for retrofitting existing Canadian homes from the exterior.

be ex building energy exchange
Events

Low Carbon Multifamily Retrofit Playbooks

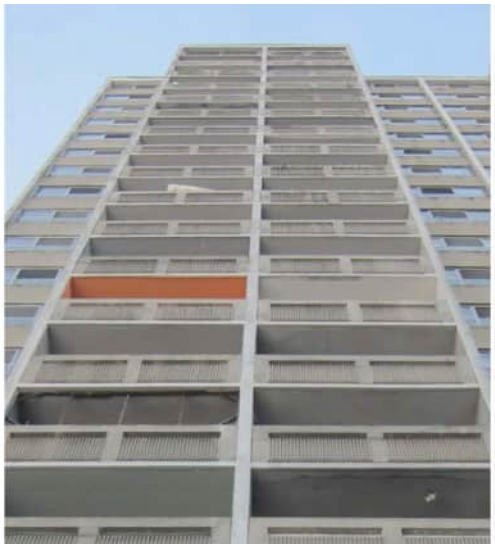
These playbooks summarize retrofit strategies that maximize occupant comfort and energy savings through a transition from fuel to electricity- based heating, cooling and hot water systems.

READ PROJECT SUMMARY >

Retrofit Accelerator - Homes
European Union
European Regional Development Fund

TAF

Retrofit Accelerator

Key Challenges

Deteriorating envelopes

Lack of insulation

Inadequate ventilation

Mould and hazardous materials

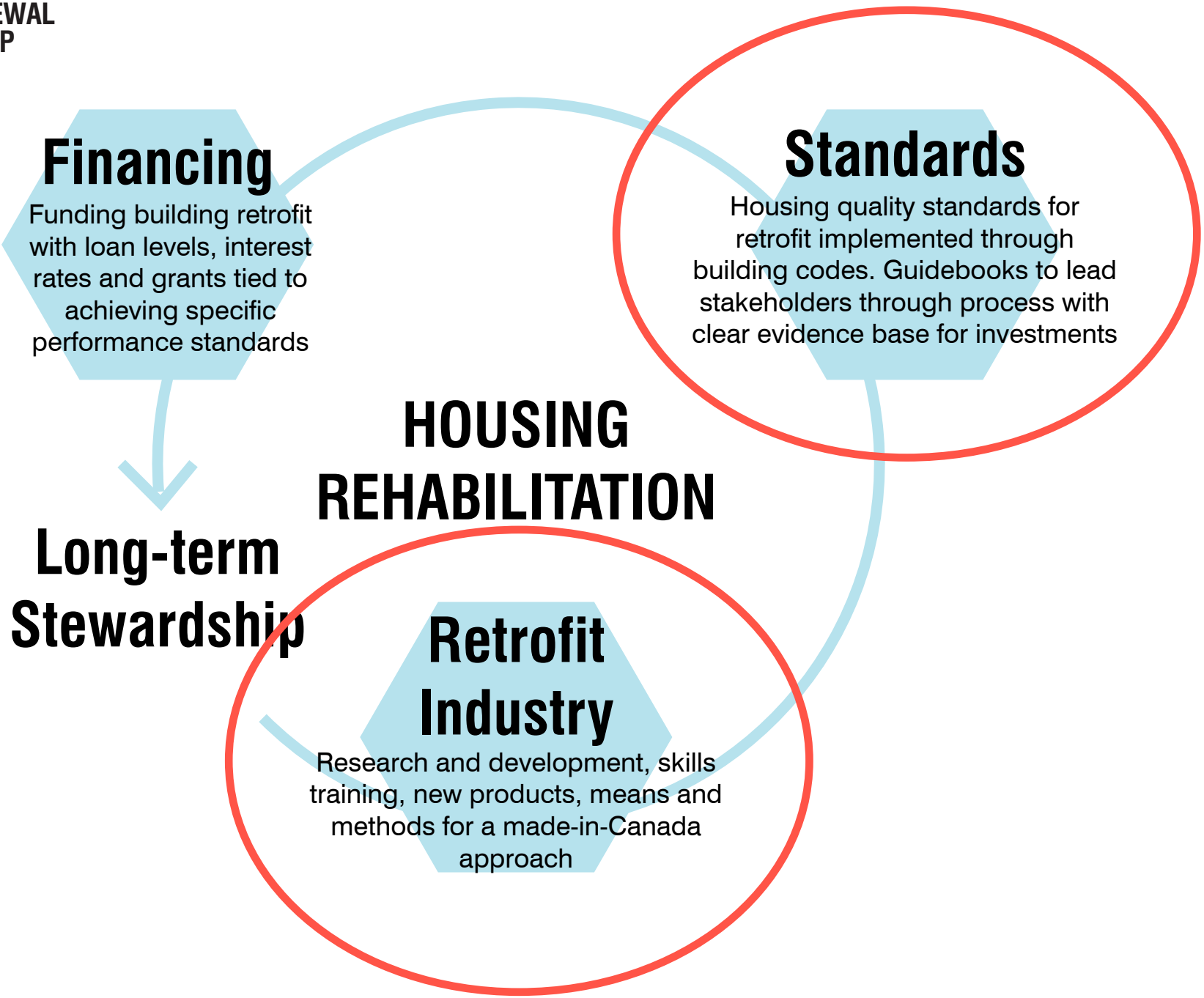
Lack of thermal control

End of life systems

Occupied buildings




TOWER RENEWAL PARTNERSHIP



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June 2020

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The Natural Step

NAIMA CANADA

SUPPORTED BY:

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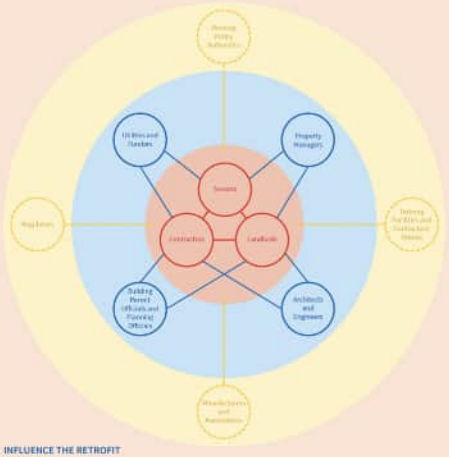
The Landlord Considers doing a Retrofit

A Team is Hired to Plan and Design the Retrofit

A Contractor is Selected to do the Work

Construction Takes Place in Your Apartment Unit

Residents Adjust to Post-Construction Apartment and Provide the Landlord with Feedback



INFLUENCE THE RETROFIT DIRECTLY

INFLUENCE THE RETROFIT INDIRECTLY

ACTIVE DAY-TO-DAY IN THE RETROFIT

The following sections introduce the general phases of a tower retrofit. In each section, we break down the things that need to be taken into consideration with respect to landlords, tenants and industry experts. We know there are additional people and roles to take into consideration, but our focus is on these three groups of people given how critically important they each are for a successful tower retrofit.

INTRODUCTION

The Landlord Considers doing a Retrofit

A Team is Hired to Plan and Design the Retrofit

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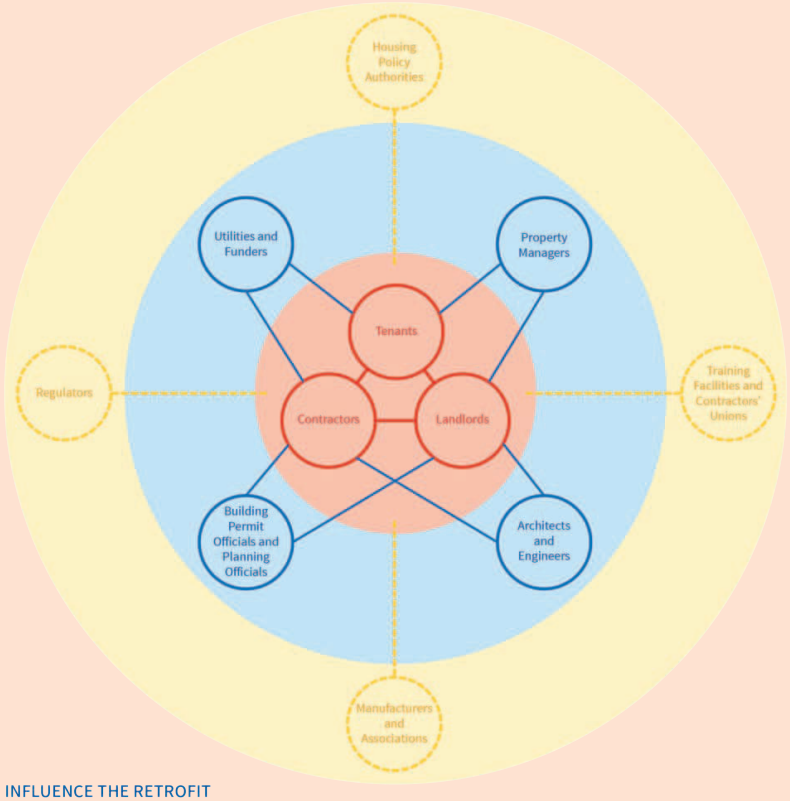


INFLUENCE THE RETROFIT DIRECTLY

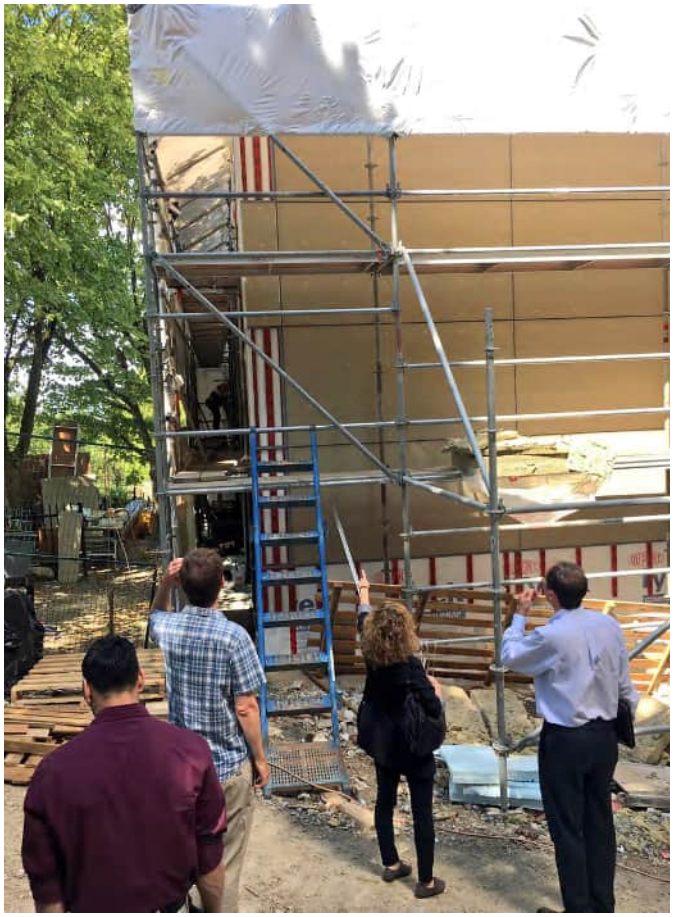
INFLUENCE THE RETROFIT INDIRECTLY

ACTIVE DAY-TO-DAY IN THE RETROFIT

CASE STUDY PROJECTS

Windrush Towers, Oxford UK

Gueterstrasse 30, Pforzheim, DE



Grandview Terrace, Vancouver BC

TOWER RENEWAL PARTNERSHIP


Mönch Gerüstbau
Mönch Gerüstbau

SOLUTIONS: INCORPORATE TENANT LIAISON ROLE INTO CONTRACTOR REQUIREMENTS

Incorporate Tenant Liaison Role into Contractor Requirements

Carrying out a construction project in an occupied building is complex: shared vertical access, maintaining exit routes, scheduling notifications for suite access, and maintaining safe and clear work areas inside people's homes can all pose challenges above and beyond a typical construction project. This unique set of challenges can be offset by incorporating a new role into the construction team: a "Tenant Liaison" can be responsible for foreseeing these scheduling and logistical challenges, and building solutions into the construction project.

The integration of a Tenant Liaison into retrofit projects can reduce construction delays, eliminate unforeseen remobilization and lost productivity costs, and provide tenants with a single, trusted point of contact who is on site at all times.

In many cases, the Tenant Liaison will know most tenants' names and unique needs, having completed surveys to identify things like respiratory or mental health conditions, overcrowding or hoarding, mobility assistance required, etc.

While some owners may prefer to fill this role themselves, there are significant benefits to integrating this role into the construction team: construction schedules, access and sequencing plans should be directly and dynamically informed by the Tenant Liaison.

SOLUTIONS: SPECIALIZED TRADES TRAINING PROGRAMS

Specialized Trades Training Programs

Training programs and certifications can play a role in familiarizing trades with the special skills required to work in occupied buildings. Communication procedures, sequence planning, scheduling for anticipated refused entry, safety and workplace protocols will all be part of this training.

Building this comfort and expertise into retrofits will expedite the process, while decreasing the “risk premium” making retrofits cheaper. Construction and design industries typically price work according to their comfort, experience and potential liability with the work which can result in higher costs for projects with new or different processes.

How is the training implemented?

A trades training program can be offered by construction associations, colleges and training facilities, or even in-house by specialized contractors.

Owners requiring or preferring contractors with this specialized retrofit certification will make it increasingly desirable, as more retrofit projects come online.

What are the Next Steps?

NAIMA Canada in partnership with TRP has developed a draft curriculum for a “Tenant Liaison Training Program”, alongside a sample “Healthy Housing Advocacy” training module. These can be used as the basis for development of programs across a number of institutions.


Tyvek
HomeWrap
DUPONT
Zero Energy Building Learning House
SIGA

SOLUTIONS: PREVENTING RENOVICTIONS

Preventing Renovictions

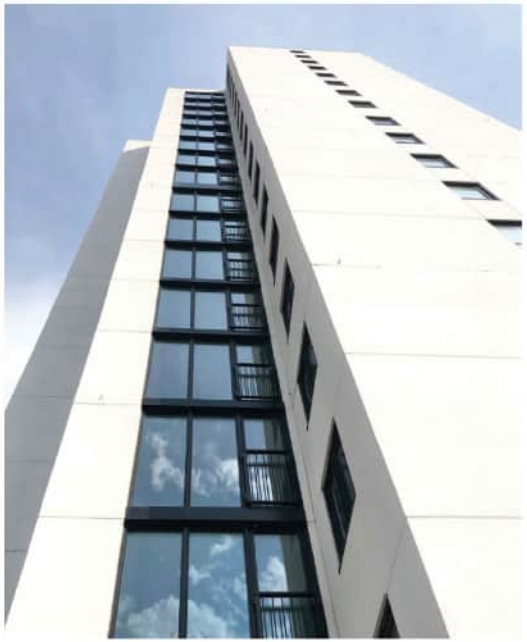
In some Canadian markets with low vacancies, renovictions are increasingly common. This is a practice where landlords force eviction, typically by raising rents above rent control guidelines, under the premise of a renovation. Often those renovations are cosmetic in nature, with little to no benefit to the tenant. Due to this trend, tenants are often concerned by news of retrofits in their buildings, which have come to signal pending housing insecurity rather than improved housing quality.

What can be done to prevent renovictions?

Municipal Actions & Solutions

- **Protect Rental Housing**
  - Introduce Rental Replacement policies which make 'condo-ization' illegal.
- **Data & Tracking**
  - Create inventory of buildings, work orders, code violations, etc.
  - Keep track of all apartment buildings sold, and immediately inform tenants of their rights;
  - Regulate and publicly register all tenant "buyouts."
- **Enforcement:**
  - Increase authority of Municipal Licensing and Standards divisions within cities to enforce housing standards.
- **Tenant Protection:**
  - Create an anti-displacement strategy and introduce tenant protection policies
    - Ensure owners/developers give all displaced tenants suitable housing options;
    - Consider enforcing new/existing regulations on tenant buyouts and tenant relocation through building permit approval processes and all tools/ mechanisms available to the Municipality;
  - Provide tenants and/or owners with resources for connecting someone in crisis with the right support system;


CANON
WARD
TOWER
2339 DUFFERIN




444 LOGAN
Zero Carbon
Building with
Residents in Place

444 LOGAN **RENEWAL**

ERA


KEN SOBLE

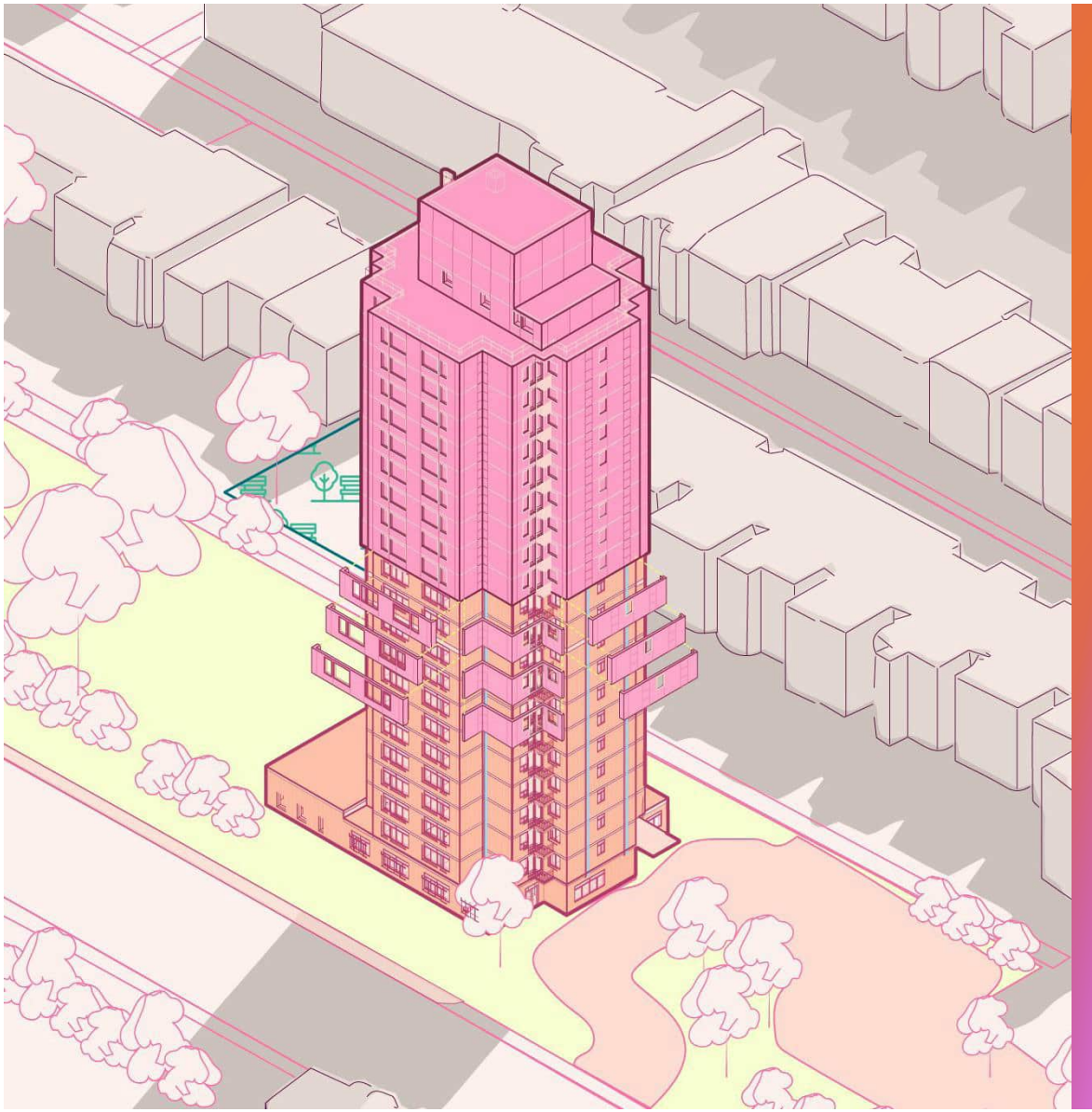

444 LOGAN AVE

PANELIZED RETROFIT

- Reduce durations
- Minimize work in-suites
- QA/QC in the shop

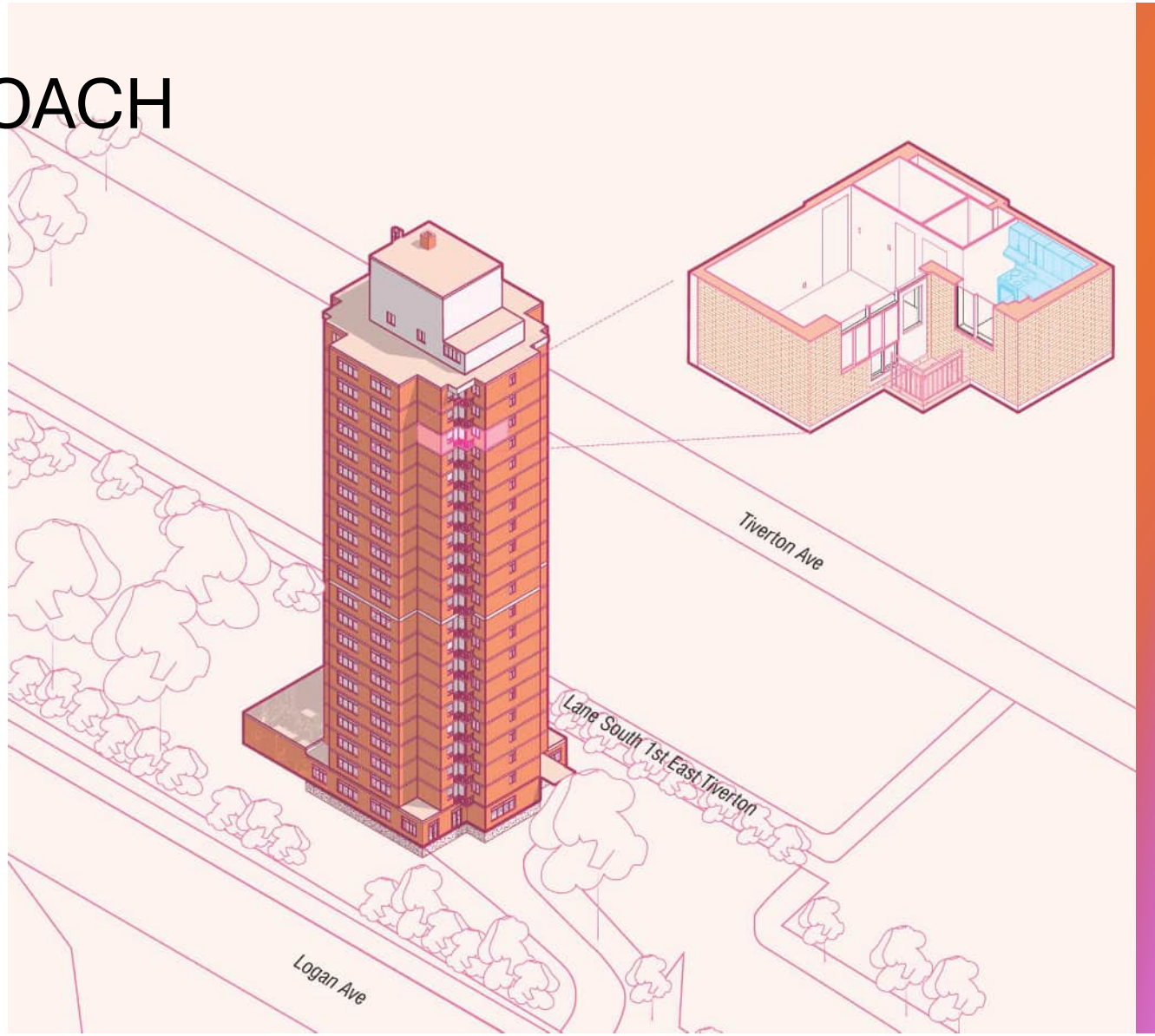
However:

- Few retrofit-ready systems on the market
- Almost none with installed track records



OUTSIDE-IN APPROACH

- New HVAC distribution integrated into overcladding
- Simple core into suites to install fan coils
- Distribution access panels integrated into façade



A TENANTS-FIRST APPROACH

- Dedicated role on construction team: Tenant Liaison
- Tenant steering committee
- Ongoing engagement program
- Sequencing plans designed to limit suite entries
- Regular evaluation and monitoring

INDUSTRY-INTEGRATED APPROACH

- **Trade and manufacturing engagement** through design from conception
- Early constructability workshops held with key trades – **IDP-style approach**
- **TAF Retrofit Accelerator** partnership allowed for this early integration

TOWER RENEWAL PARTNERSHIP

EBA

WOODGREEN
Opportunity made here

TAF

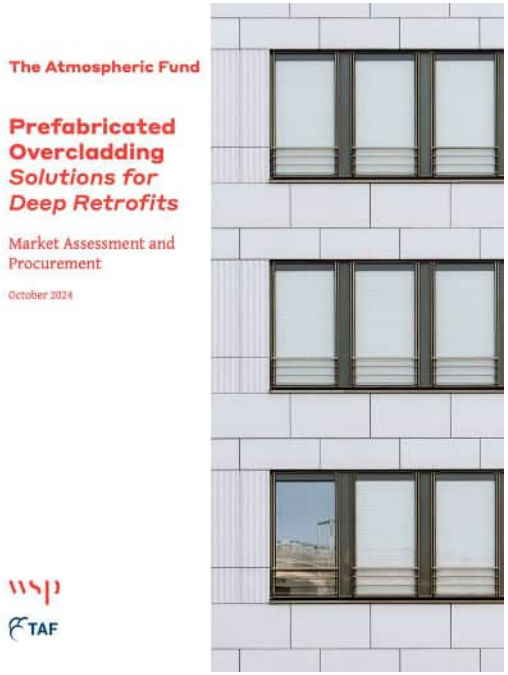
RETROFIT INNOVATION ROUNDTABLE

TOWER RENEWAL PARTNERSHIP

North America
13 December 2024

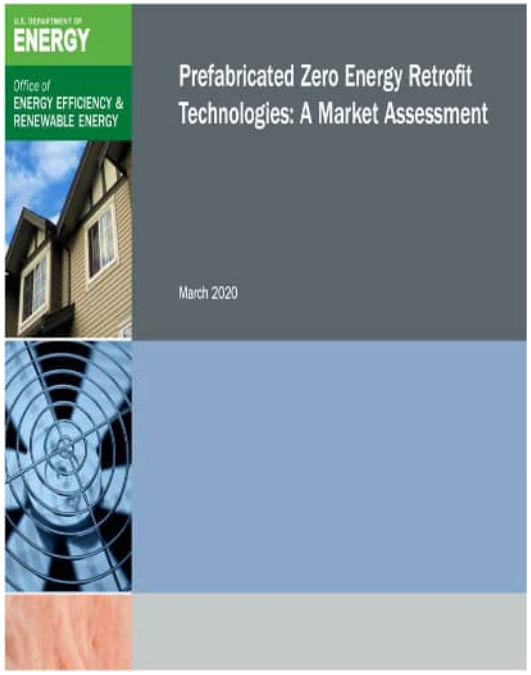
ADVANCES IN PANELIZATION

The Atmospheric Fund / WSP's Market Assessment

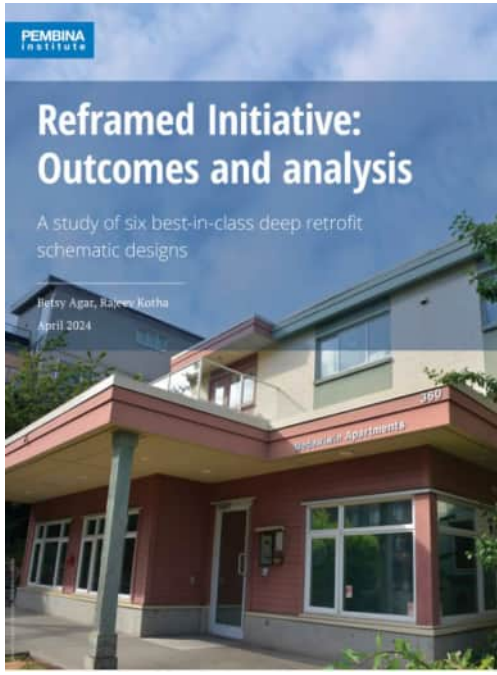


NRCan PEER // Ottawa Community Housing's Presland Road

Rocky Mountain Institute's Market Assessment



Pembina's Reframed Initiative

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AK


Prefabricated
Overcladding
Prequalification
TAF


RETROFIT
INNOVATION
ROUNDTABLE

EVA ROSENBLOOM

Manager of REALIZE-Massachusetts

Rocky Mountain Institute (RMI)

Test, Learn, Scale: Progress and Lessons from Building Retrofits

RMI is a nonprofit organization that advances clean energy transitions through a variety of economic sectors, with a large focus on buildings. Its Carbon Free Buildings practice facilitates deep energy retrofits for affordable housing in Massachusetts, California, and beyond, through research and analysis, programming and policy, and direct experience with emerging technologies and construction projects. Three recent projects showcase innovative envelope solutions and opportunities to scale market adoption of deep retrofits.

Two retrofit projects in Massachusetts are integrating high-performance, prefabricated overclad panels and new central mechanical systems—with distribution contained between the panels and the original building exterior. These upgrades will achieve significant energy and carbon savings, improved thermal comfort and indoor air quality, and bolstered passive resilience. With this approach, these projects will experience minimal disruption to tenants, as brief as one day of displacement. A third project in Corona Del Ray, CA, also achieved substantial performance upgrades with minimal disruption. This design utilized an insulated Dryvit (Tremco) Fedderlite and Revitalite panel system and was an effective approach to address both energy needs and seismic upgrades. While the panelized overclad was successful at this location, project data analysis from multiple whole-building retrofits in CA showed that in milder climates, lighter-touch methods, such as insulated roof panels and strategic air sealing, proved to be very effective and more financially justifiable.

Collaborative and pioneering projects like these enable research, development, deployment, and refinement that can build leading-edge market delivery capacity.

Further resources:

rmi.org/our-work/buildings
advancedbuildingconstruction.org

RMI

REALIZE-CA Design & Installation Guide
Click Here for Full Report

Relevant reports:

REALIZE-CA Design & Installation Guide
A Marketplace for Equitable Building Retrofits
Accelerating Residential Building Decarbonization
The Retrofit Playbook for Large Buildings
Prefabricated Zero Energy Retrofit Technologies

What is needed for the field of deep retrofits to flourish in future?

"The retrofit industry will flourish when:

- *building decarbonization is normalized, with costs, availability, and attainability no longer as barriers*
- *the value-add of retrofits, including avoided externalities and risk reduction, is fully integrated into decision-making*
- *a thriving market—supported by industry experience, consistent finance mechanisms, a robust ecosystem of stakeholders, policies, and innovation—eliminates the need for separate grants, rebates, and incentives."*

ReCover

LORRIE RAND

Co-founder and Design Director, Recover Initiative

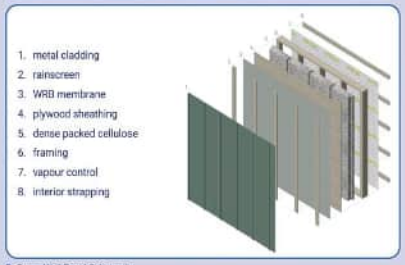
The ReCover Initiative

The ReCover Initiative is Atlantic Canada's Deep Retrofit Accelerator. Founded in Halifax, Nova Scotia ReCover completed eight feasibility studies researching the potential of panelized deep retrofits for buildings between 2020 and 2023. A study of a six-unit building owned by Toronto Community Housing led in 2022 to an NRCan funded project in collaboration with six municipalities in Canada (Halifax, New Glasgow, Colchester, Saskatoon, Oakville, Burlington) studying panelized deep retrofits for buildings including community centres, transit buildings, and office spaces. Design scenarios targeted at least 50% energy use intensity reduction, net zero energy ready, installation of air source heat pump or ground source heat pump, and ultimately net zero energy. All six schemes employ low embodied carbon wall panel assemblies comprising wood stud framed wall layered with a variable permeability vapour control followed by cellulose, plywood sheathing, water resistant barrier membrane, rainscreen, and finally metal cladding. The project found that the use of cellulose panels more than offsets the carbon cost of the retrofits due to the biogenic carbon stored in the panels. However, cellulose panel assemblies did not always have sufficient drying potential and more research is needed on hygrothermal analysis for this approach.

Further resources:

recoverinitiative.ca

Retrofit Innovation Roundtable



ReCover Wall Panel Schematic

What is needed for the field of deep retrofits to flourish in future?

"There are several barriers to address for Deep Retrofits to flourish in the future, including augmenting the capacity of the design and construction industries, derisking deep retrofits from both financial and technical perspectives and, perhaps most importantly, a mindset shift in evaluating building economics from a simple payback lens, to a holistic Total Cost of Ownership model."

DANIEL CHUNG

Associate Professor of Building Science,
University of Toronto

Reconstruct: Streamlining mass deep energy retrofits for Quebec & Canada

The Reconstruct research initiative aims to develop scalable turnkey solutions for deep energy retrofits (DER) in Quebec and elsewhere in Canada. Its approach focuses on improving the airtightness and insulation of the building envelope using prefabricated panels applied from the exterior of the building. The project is led by Professor Michael Jemtrud at McGill. Collaborators outside academia include organisations from research, industry, government, and the non-profit and community sectors. Reconstruct is funded by an NSERC Alliance Grant (2022-2027) in partnership with Hydro-Québec and the Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs.

Reconstruct's efforts are organised along five main axes: 1) Developing a deployment strategy and intermediary agency for DERs; 2) Engaging with the DER industry to expand capacity; 3) Creating evaluation and decision-making tools; 4) Assessing DER benefits beyond energy to

The pilot to pipeline approach

SAUL BROWN

Empire Building Challenge Program Project Manager,
New York State Energy Research & Development Authority

New York Envelope Treatments

New York State Energy Research & Development Authority's (NYSERDA) Empire Building Challenge Program manages deep retrofits in New York State and is engaged in developing retrofit technology with the aim of scaling it to mass market. Its demonstration projects have employed field-applied thermal overclad Exterior Insulation and Finish Systems (EIFS), EIFS thermal overclad with integrated mechanical, electrical, and plumbing delivery which minimizes resident disruption (demonstrated in the Retrofit NY-funded Casa Pasiva project in Bushwick, New York City), and prefabricated panels with thermal overclad with pre-fitted fenestration, and prefabricated panels overclad with integrated MEP delivery. NYSERDA also engages in research and development on integrated MEP systems, low embodied carbon prefabricated components (including wood, hemp, and mycelium), and automated construction scanning and installation systems.

ROUNDTABLE OUTCOMES

- Consensus that panelized solutions will unlock less disruptive and more cost-effective retrofits – but we are still in the **early adopter phase**
- Panelized assembly R&D has been **focused on the new construction** sector
- Retrofit solutions require extensive surveying and adaptation to variable conditions; **still deemed risky**
- **Demand has been limited** and therefore cost compression not yet realized
- Need for more pilots to **demonstrate market potential**
- **Case studies need to be aggregated** to help drive future demand


A FIELD GUIDE TO RETROFITS IN OCCUPIED BUILDINGS
June 2020
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MaRS
The Natural Step
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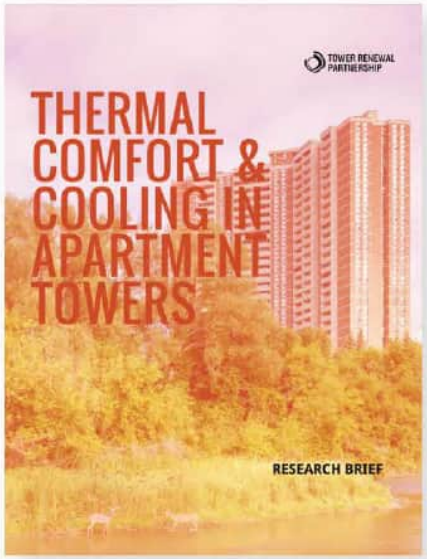
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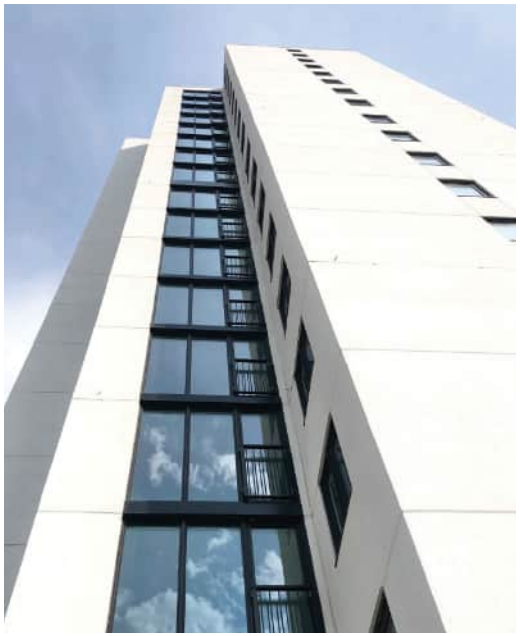
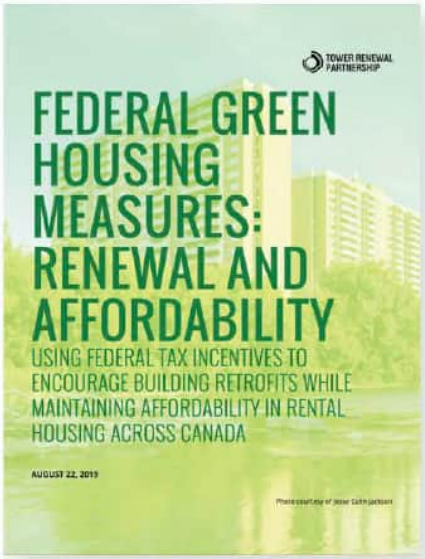
THERMAL COMFORT & COOLING IN APARTMENT TOWERS
RESEARCH BRIEF


CANON WARD TOWER
2339 DUFFERIN

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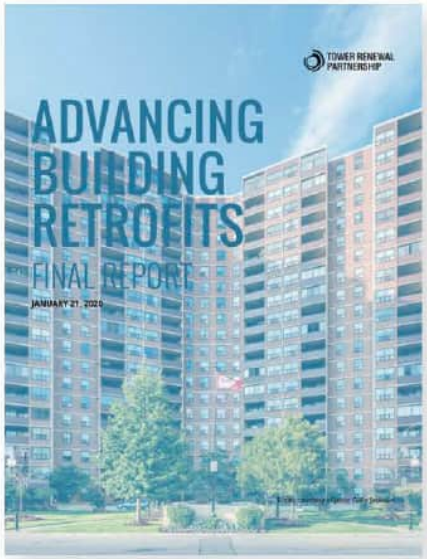
FEDERAL GREEN HOUSING MEASURES: RENEWAL AND AFFORDABILITY
USING FEDERAL TAX INCENTIVES TO ENCOURAGE BUILDING RETROFITS WHILE MAINTAINING AFFORDABILITY IN RENTAL HOUSING ACROSS CANADA
AUGUST 22, 2019


TOWER RENEWAL PARTNERSHIP
ADVANCING BUILDING RETROFITS
FINAL REPORT
JANUARY 21, 2020

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