



2017 ONPHA Conference and Trade Show

Shaping
OUR
Future

409

Going green to save you green

PRESENTED BY:

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Learning goals

1. Why undertake energy efficiency upgrades?
2. What is a “Building Envelope”?
3. What are “Unforeseen Conditions”?
4. How does energy efficiency upgrade impact health and safety?



THEME 1:
SPACE AND
WATER HEATING

Space and water heating typically accounts for 80% of all energy consumed.

CLICK ON THEMES TO EXPLORE

THEME 4:
MEASUREMENT,
CONTROL AND
ACCOUNTABILITY

Individual suites and occupant behaviour can affect energy and water consumption in MURBs so there is a large opportunity for savings.

THEME 2:
VENTILATION
AND AIR QUALITY

Type of ventilation system, air leakage patterns and the occupants' use of their windows and doors all impact the quality of air getting into the suites.

THEME 5:
LIGHTING AND
PLUG LOADS

Lighting, plug loads and appliances represent approximately 18% of the total energy end use for a typical MURB.

THEME 3:
BUILDING ENVELOPE

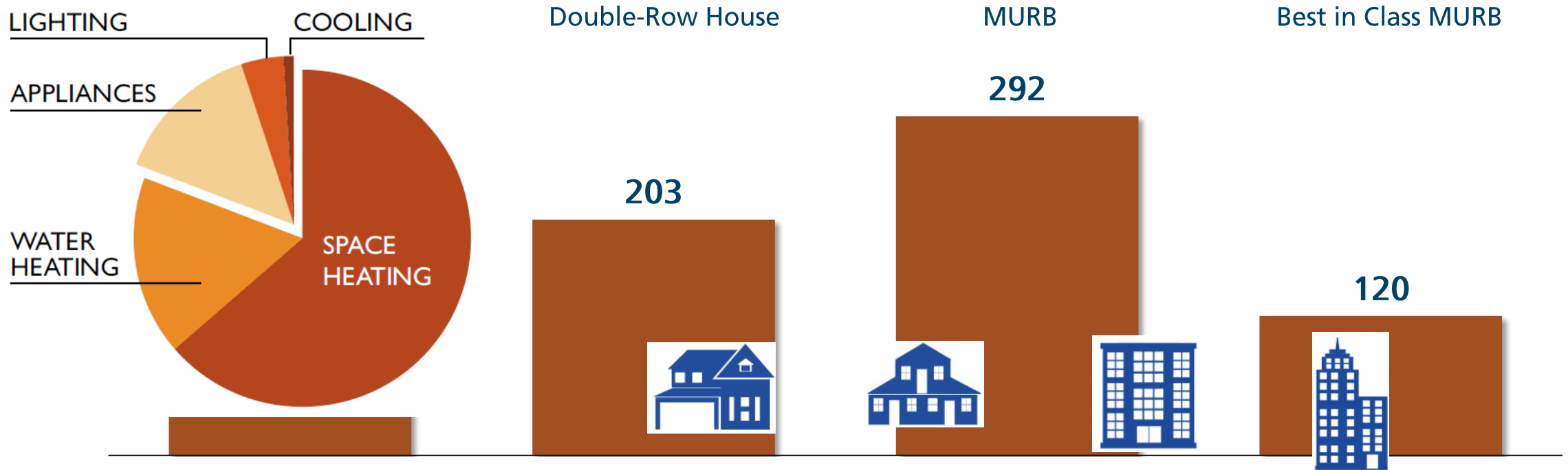
Despite advances in building envelope materials and systems, the benefits of these assemblies are often negated by thermal bridges and increased window-to-wall ratio.

THEME 6: WATER
CONSUMPTION

On average, Canadians use an average of 251L of freshwater per capita per day, which is the fourth highest average consumption globally.



Achieving High-Performance MURBs – the Opportunities

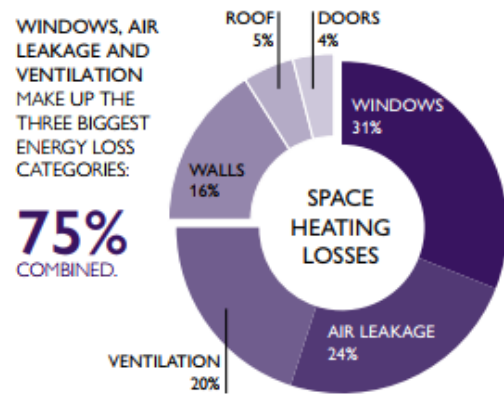


Energy Consumption by Dwelling Type ekWh/m²

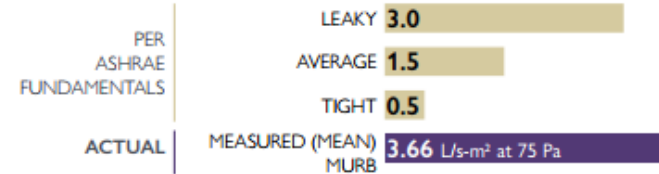


THEME 2: VENTILATION AND AIR QUALITY

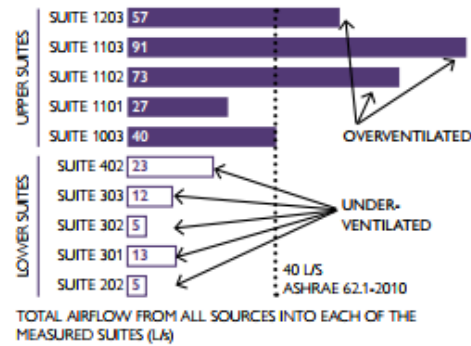
The type of ventilation system, air leakage and occupant actions all impact the quality of fresh air getting into the suites.



On average, MURBS HAVE BEEN FOUND TO BE MORE LEAKY than the values set by ASHRAE fundamentals.

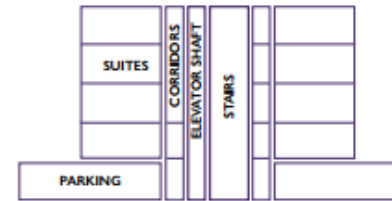


FRESH AIR IS NOT EQUAL ACROSS THE FLOORS.
Fresh air provided by corridor ventilation mechanical systems often does not make its way into the suites as a result of stack and wind effect and air leakage.



EXPLORE OTHER THEMES:

- 1 OVERVIEW
- 2 SPACE HEATING AND WATER HEATING
- 3 VENTILATION AND AIR QUALITY
- 4 BUILDING ENVELOPE
- 5 MEASUREMENT, CONTROL AND ACCOUNTABILITY
- 6 LIGHTING AND PLUG LOADS
- 7 WATER CONSUMPTION



COMPARTMENTALIZATION aims to provide controlled ventilation rates in all suites by a combination of airtight suites, corridors, etc., resistance to stack and wind effects, and independent ventilation provided directly to each suite via in-suite heat recovery ventilators. It also provides additional benefits to:

- MOISTURE CONTROL;
- ODOUR CONTROL;
- FRESH AIR CONTROL;
- PRESSURE CONTROL;
- SOUND/ACOUSTICAL CONTROL;
- FIRE/SMOKE CONTROL; and
- HEAT LOSS AND COMFORT.



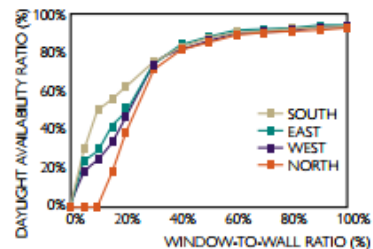
THEME 3: BUILDING ENVELOPE

ACHIEVING HIGH-PERFORMANCE MURBs: THE OPPORTUNITIES

Despite advances in building envelope materials and systems, the benefits of these assemblies are often negated by thermal bridges and increased window-to-wall ratio.

40% IS THE OPTIMAL WINDOW-TO-WALL RATIO as recommended by recent building codes. Placement of this available glazing is also important, as upward of

80% of the annual available interior daylighting can still be achieved with this fenestration ratio.



DEPENDING ON THE ASSEMBLY, THERMAL BRIDGES REDUCE THE THERMAL PERFORMANCE OF THE OVERALL ENVELOPE BY AS MUCH AS **70%.**



R-22 VS. **R-15.4** VS. **R-5.5**

THE NOMINAL (DESIGN) PERFORMANCE of a sample brick veneer wall.

30% REDUCTION
THE EFFECTIVE (TRUE) PERFORMANCE when the conductive loss of the veneer wall is taken into account.

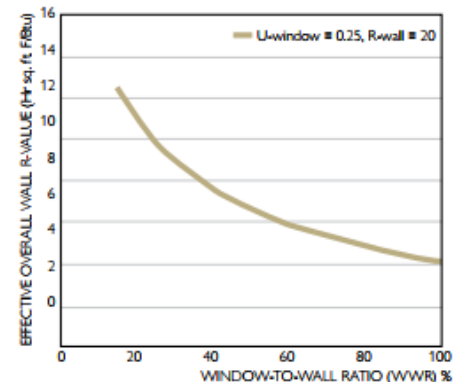
70% REDUCTION
THE EFFECTIVE (TRUE) PERFORMANCE when the conductive losses of the entire building are taken into account.

EXPLORE OTHER THEMES:

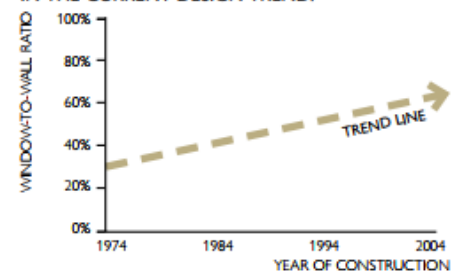
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THE WINDOW-TO-WALL RATIO DRAMATICALLY INFLUENCES THE THERMAL PERFORMANCE OF THE OVERALL ENCLOSURE.

The higher the window-to-wall ratio is, the lower the effective overall wall R-value becomes.



THE WINDOW-TO-WALL RATIO IS INCREASING IN THE CURRENT DESIGN TREND.



THEME 4: MEASUREMENT, CONTROL AND ACCOUNTABILITY

Individual suites and occupant behaviour can affect energy and water consumption in MURBs so there is a large opportunity for savings.

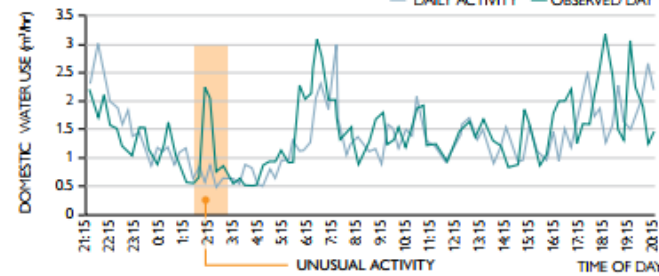
ACHIEVING HIGH-PERFORMANCE MURBs: THE OPPORTUNITIES



+12% MORE ELECTRICITY
+15% MORE WATER

CONSUMPTION INCREASES WHEN UNITS ARE NOT SUB-METERED AND BILLED INDIVIDUALLY.

Sub-metering provides feedback on energy and water consumption to occupants, which can alter their habits and ultimately reduce energy and water end use.



YOU CAN'T IMPROVE WHAT YOU DON'T MEASURE.

REAL-TIME METERING of building equipment and consumption allows building operators and residents to identify when equipment isn't operating properly.

30%

ELECTRICAL HEATING ENERGY SAVINGS can be achieved with



HEATING MANAGEMENT SYSTEMS, which adjust the available heat output from boiler systems based on:

- exterior temperature;
- floor level; and
- suite orientation.

This can reduce electricity consumption for space heating while still maintaining a comfortable indoor space temperature.

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+2°C WARMER

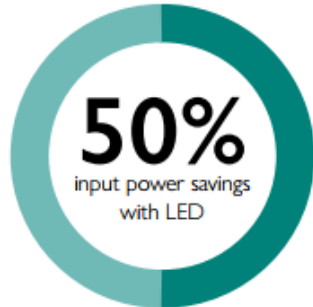
On average, occupants living in the bulk metered apartments keep their units about 2°C warmer than occupants living in units where they pay for the heat they use.



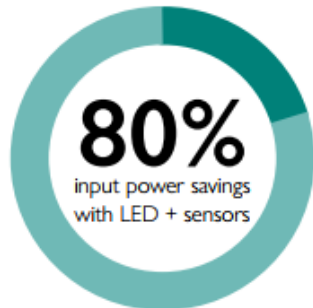
THEME 5: LIGHTING AND PLUG LOADS

Lighting, plug loads and appliances represent approximately 18% of the total energy end use for a typical MURB.

ACHIEVING HIGH-PERFORMANCE MURBs: THE OPPORTUNITIES



LED (light emitting diode) technology can reduce the input power without compromising lighting levels in the space.



Occupancy sensor placement can further save electricity in common areas by APPROXIMATELY 30% by shutting off non-essential lighting when not in use.

9-25% ELECTRICITY SAVINGS



can be achieved with
**ENERGY-EFFICIENT
IN-SUITE APPLIANCES**
rather than standard appliances.



UP TO
2% OF OVERALL ENERGY CONSUMPTION

The size of a household's 'phantom load' will depend on the number of electronic devices and their design but can account for up to 2% of overall energy consumption for MURBs.



In North America,
the average home has
**25 OR MORE
PRODUCTS
THAT CONSUME
ELECTRICITY
24 HOURS A DAY.**

**CONSIDER UNPLUGGING PRODUCTS
WHEN NOT IN USE OR PLUGGING THESE
ITEMS INTO A TIMED POWER SWITCH.**

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THEME 6: WATER CONSUMPTION

On average, Canadians use an average of 251L of freshwater per capita per day, which is the fourth highest average consumption globally.

CANADIAN
AVERAGE
USE OF
FRESHWATER
PER CAPITA
PER DAY

251L

FOURTH HIGHEST
AVERAGE
CONSUMPTION
GLOBALLY

These high water demands put a strain on both upstream and downstream facilities, including municipal water supply, wastewater and stormwater infrastructure.

17%

of a MURB's annual
utility costs

WATER
CONSUMPTION
can represent up to
17% of a MURB's
annual utility costs.



Building and site design can also
**REDUCE IMPACT ON DOWNSTREAM
STORMWATER FACILITIES**

by reducing the extent of impermeable
surfaces on site through:

- GREEN ROOFS;
- AT-GRADE VEGETATION; and
- PERMEABLE PAVEMENT.

Low-impact development maximizes the
amount of water infiltrated on site to
reduce stormwater runoff.

Native and adaptive planting species also reduce the amount of
water required for irrigation while providing vegetation that is
suitable to the microclimate.

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ACHIEVING HIGH-PERFORMANCE MURBs: THE OPPORTUNITIES

37% WATER SAVINGS
were achieved with

A **PLUMBING RETROFIT** of low-flow toilets and shower heads, which was recently conducted by Ottawa Community Housing across its portfolio. Indoor water consumption can be reduced in multi-unit residential buildings through the use of low-flow plumbing fixtures for faucets, water closets and shower heads.

RECOMMENDED FLOW
AND FLUSH RATES FOR

SHOWER HEAD



5.7
L/min

TOILET



3.8
L/flush

LAVATORY FAUCET



3.8
L/min

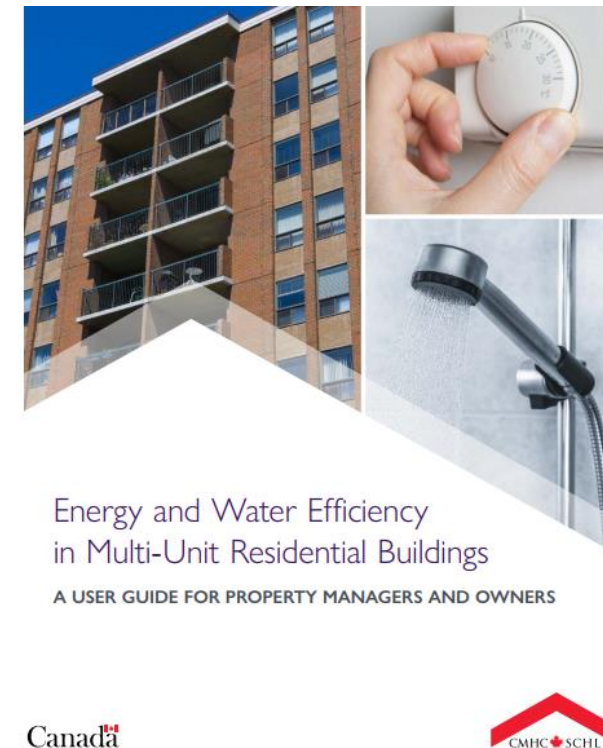
KITCHEN FAUCET



5.7
L/min



CMHC Resources – cmhc.ca



Contact Information

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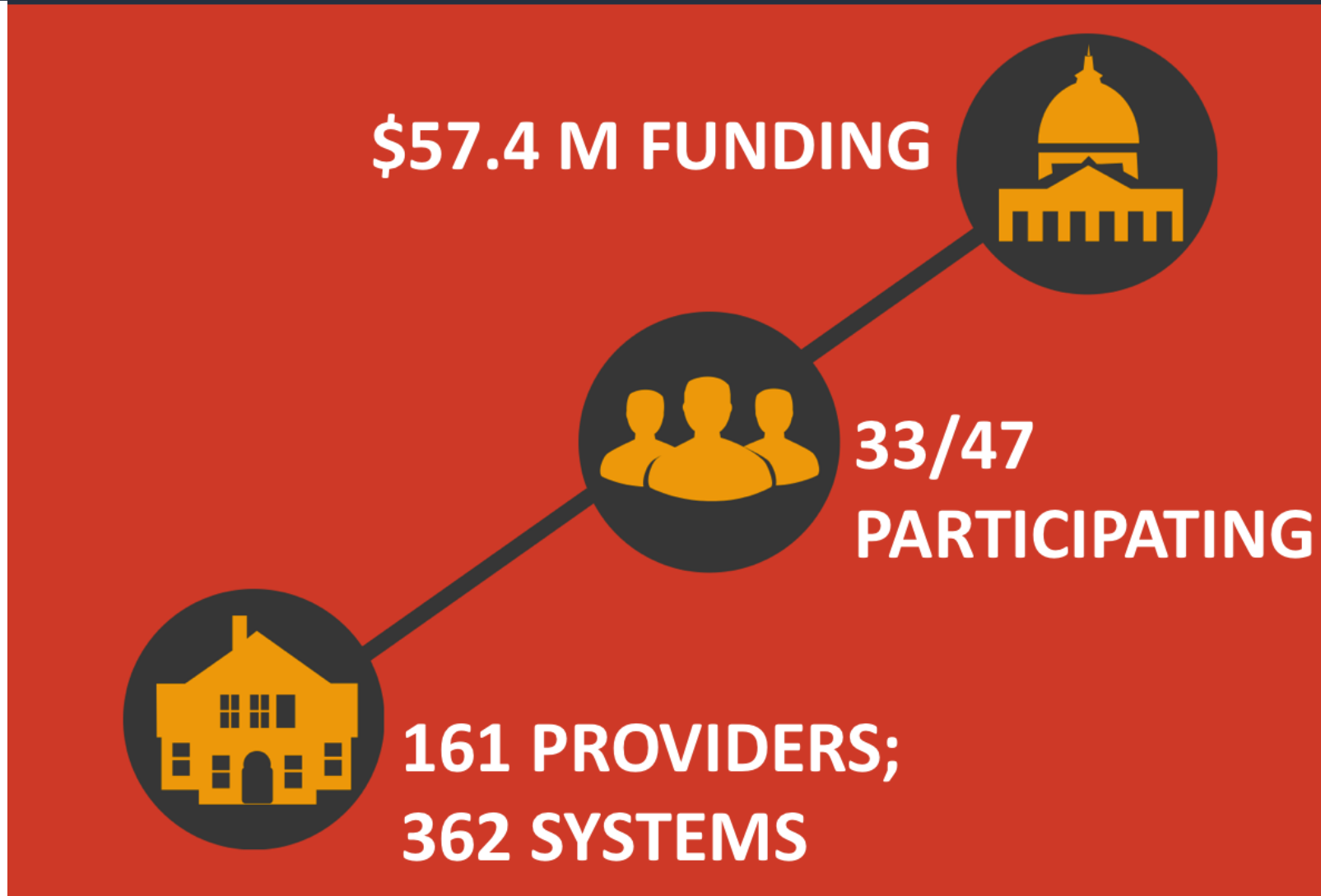
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REI PROGRAM (2009)



REI PROGRAM OBJECTIVES

- HELP HOUSING PROVIDERS SAVE ENERGY
- REDUCE GHG
- CREATE JOBS & STIMULATE ECONOMY
- NET LIFETIME SAVINGS FOR HOUSING PROVIDERS

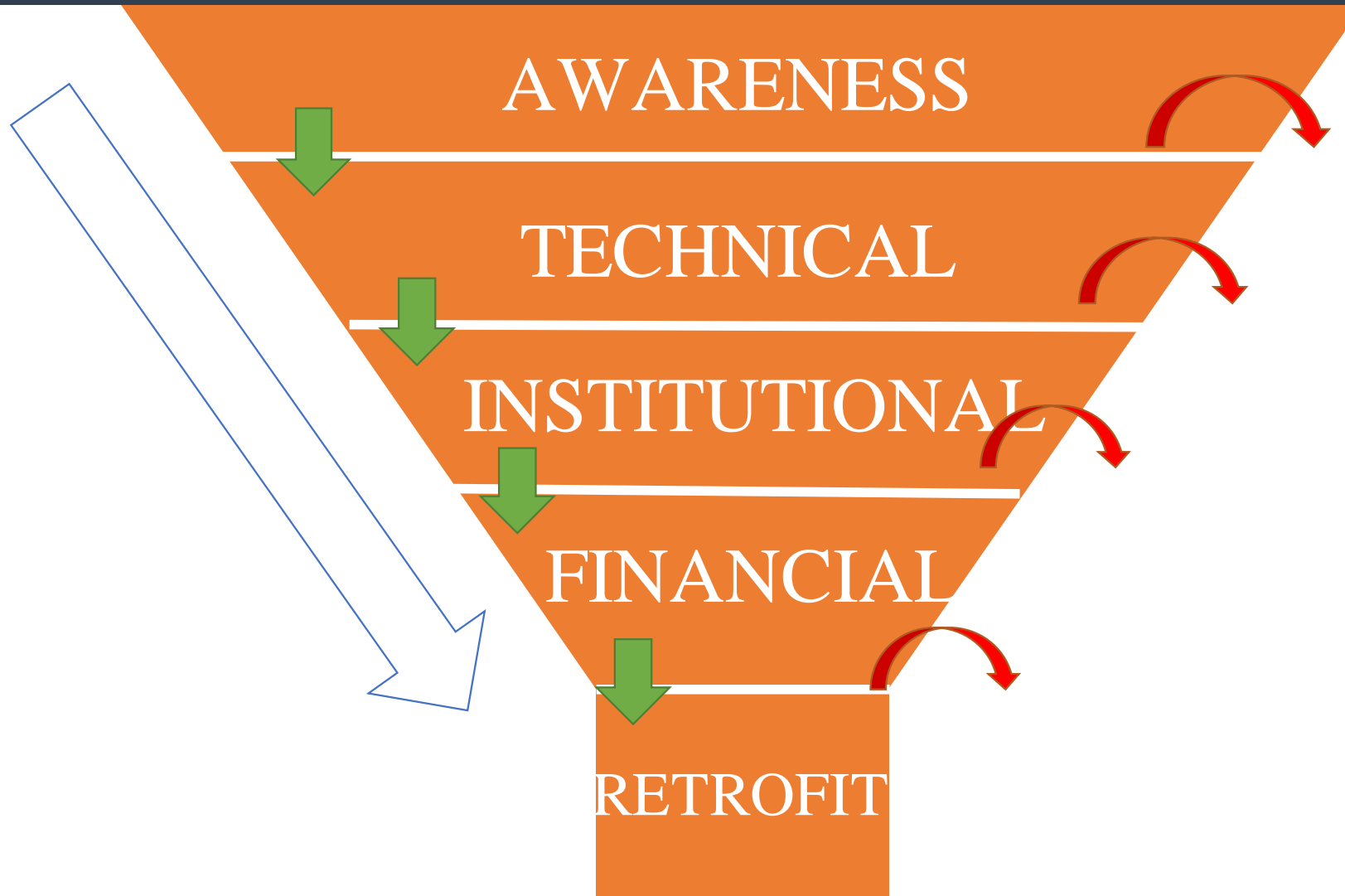


KEY FINDINGS

- Overall provider experience positive
- Most providers excited about energy sustainability
- \$1 spent = \$1.25-\$1.27 in net benefits to providers
- \$62m in GDP and 604 FTE jobs
- Experiences with technology – mixed
- Urban areas benefit most
- Municipal providers benefit most
- Timelines, qualified vendors - barriers
- Energy efficiency is 'low hanging fruit' and should be prioritized



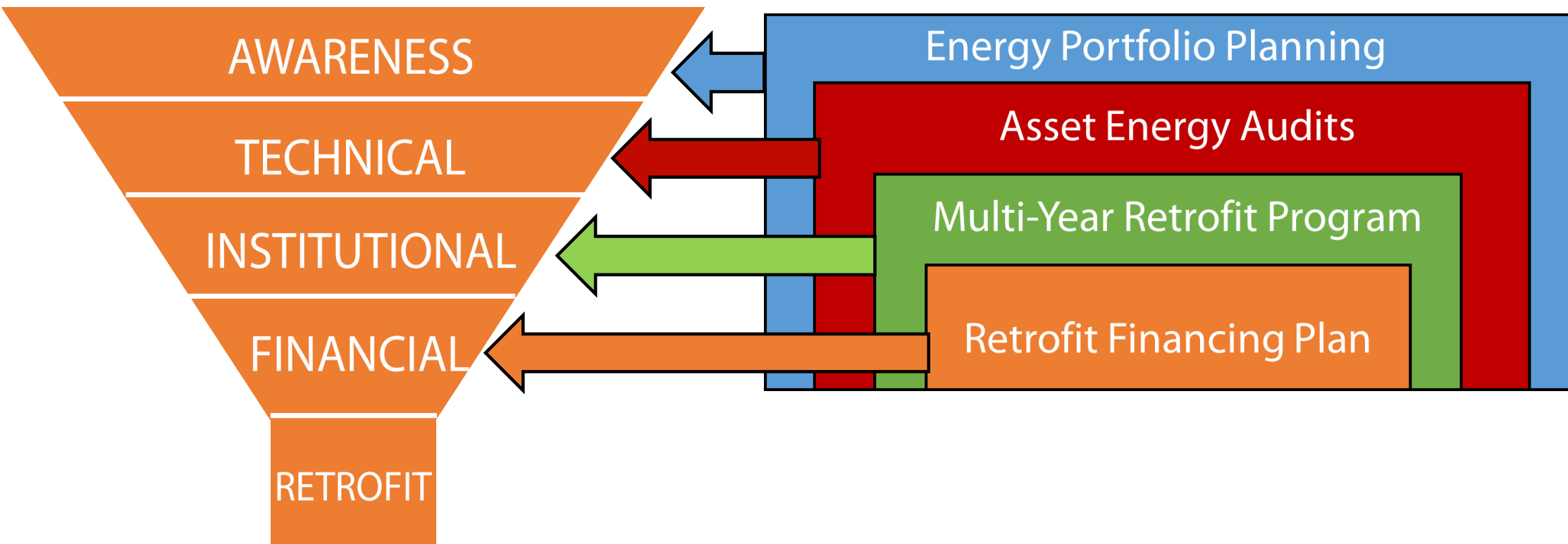
BARRIERS TO ENERGY EFFICIENCY



CHALLENGES OF REI PROGRAM



INTEGRATED ENERGY MANAGEMENT



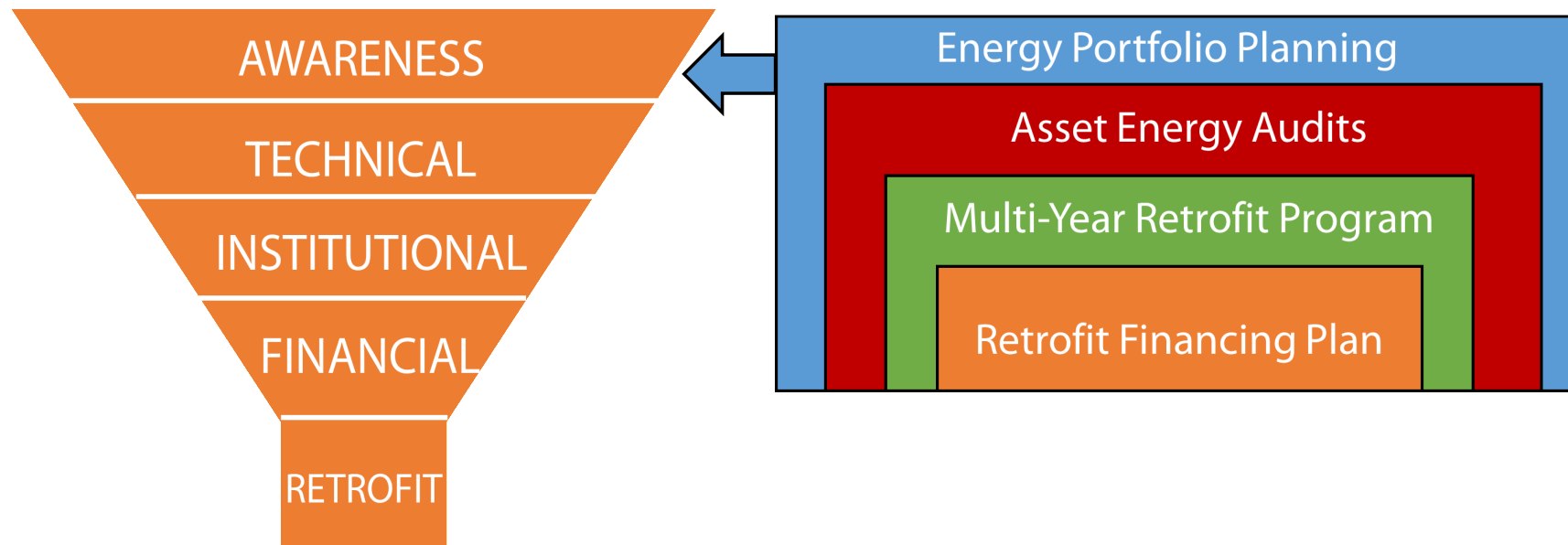
Step 0 – Secure Commitment

- A formal energy policy or vision statement that aligns with broader corporate goals. (Eg - *Use energy more wisely, use less energy, produce more energy locally*)
- Endorsement from senior management and board.
- Identify a champion, assemble team, assign responsibilities.
- Identify local resources (Community Energy Plans) and build partnerships (utilities, local sustainability non-profits)



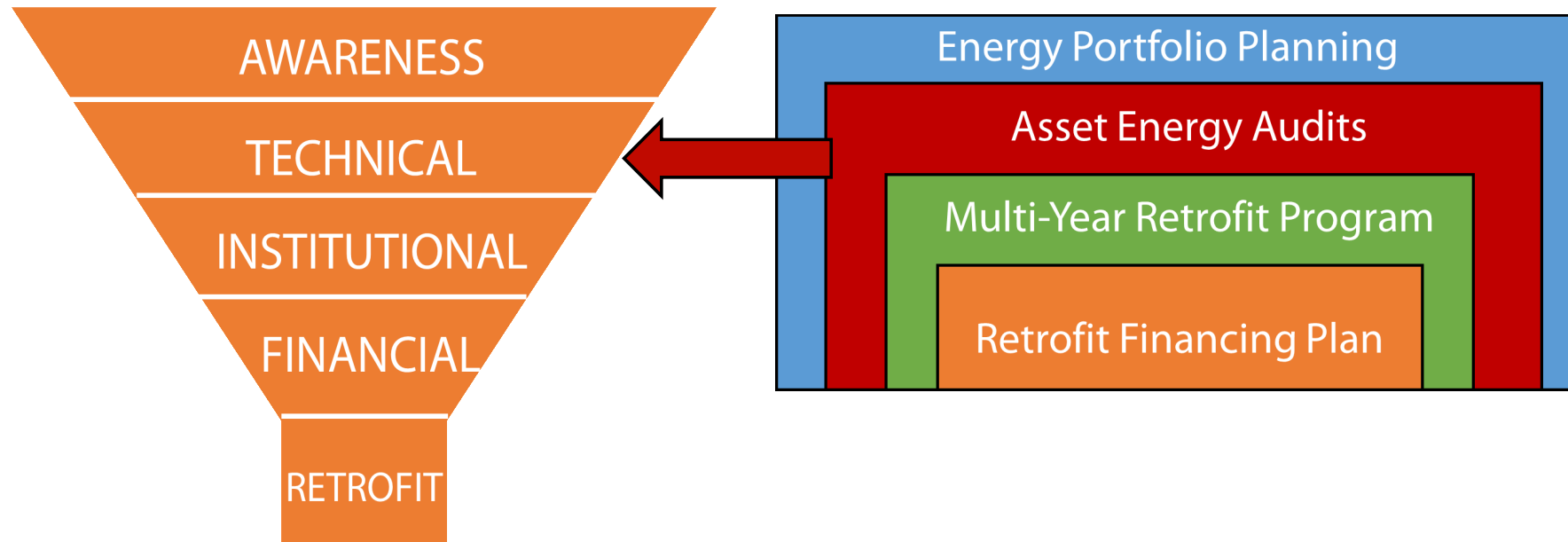
Step 1 – Assess

Develop portfolio-wide energy needs assessment to identify and prioritize buildings that need energy upgrades.



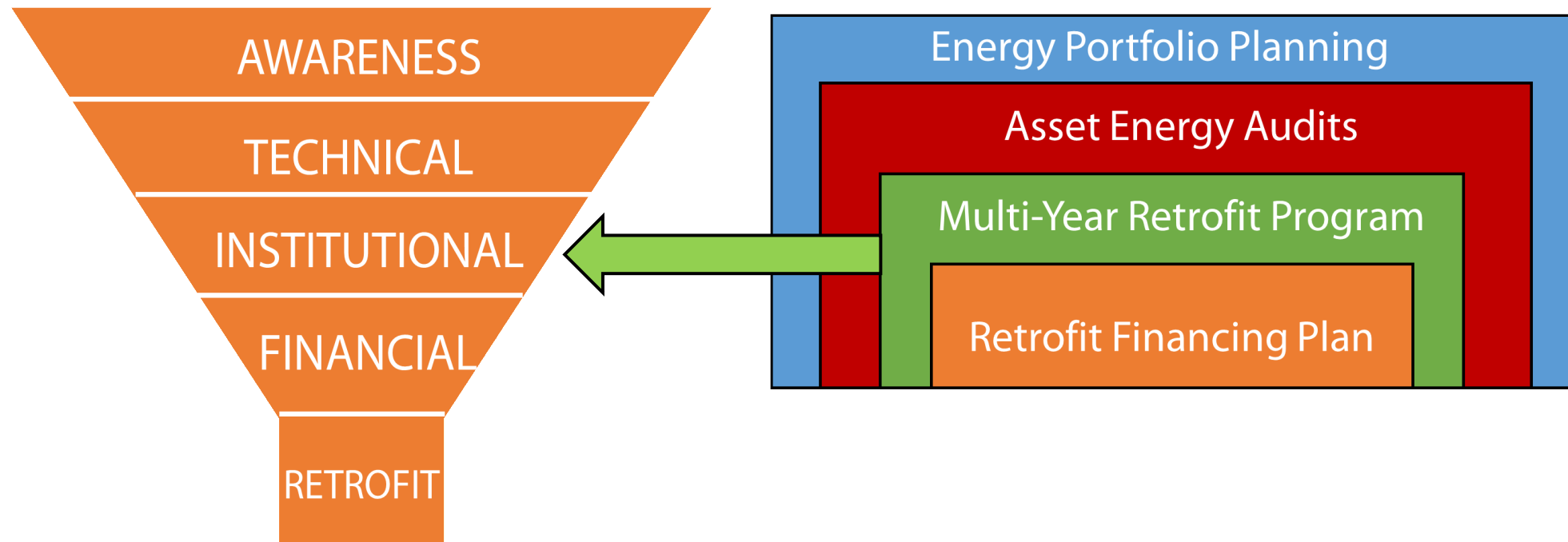
Step 2 – Technical Audit

Perform energy audits to identify savings opportunities.



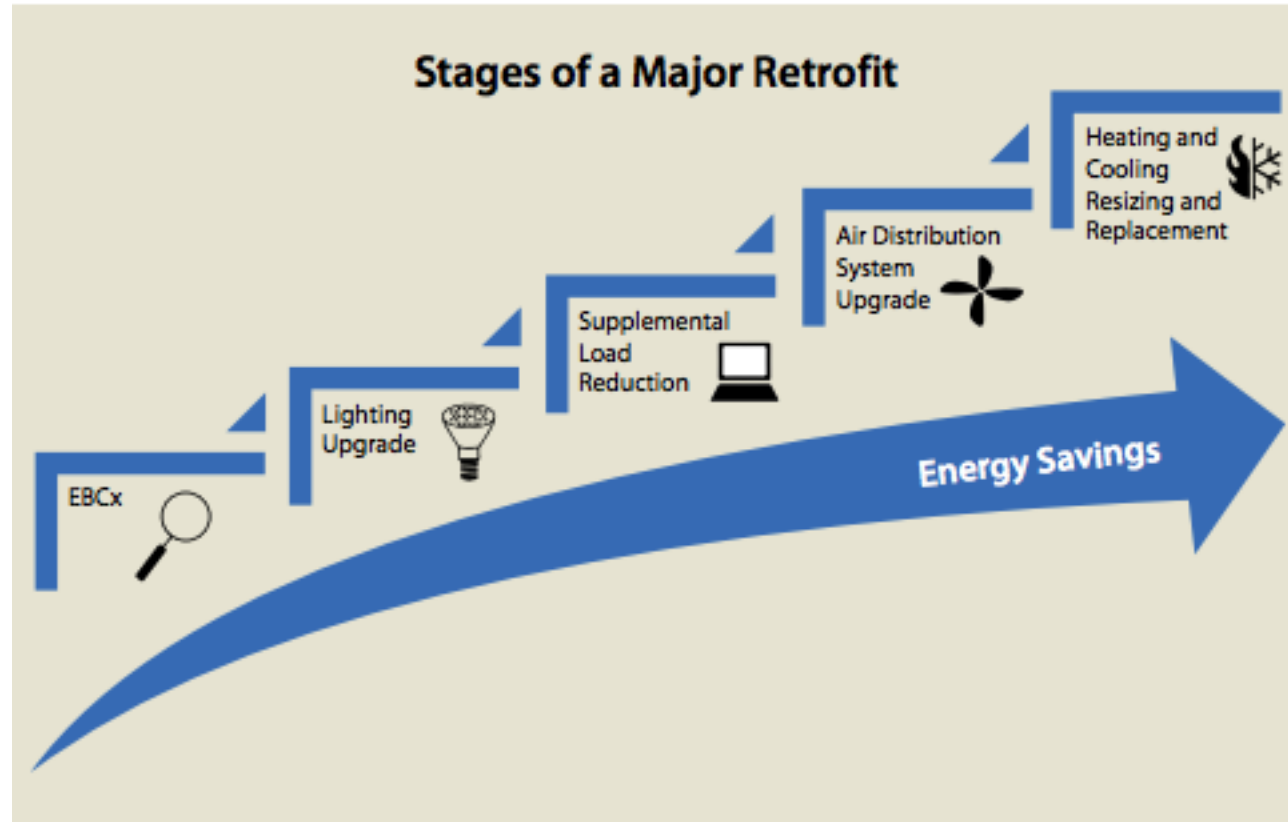
Step 3 – Multi-Year Program

Develop a long term plan for making upgrades and retrofits.



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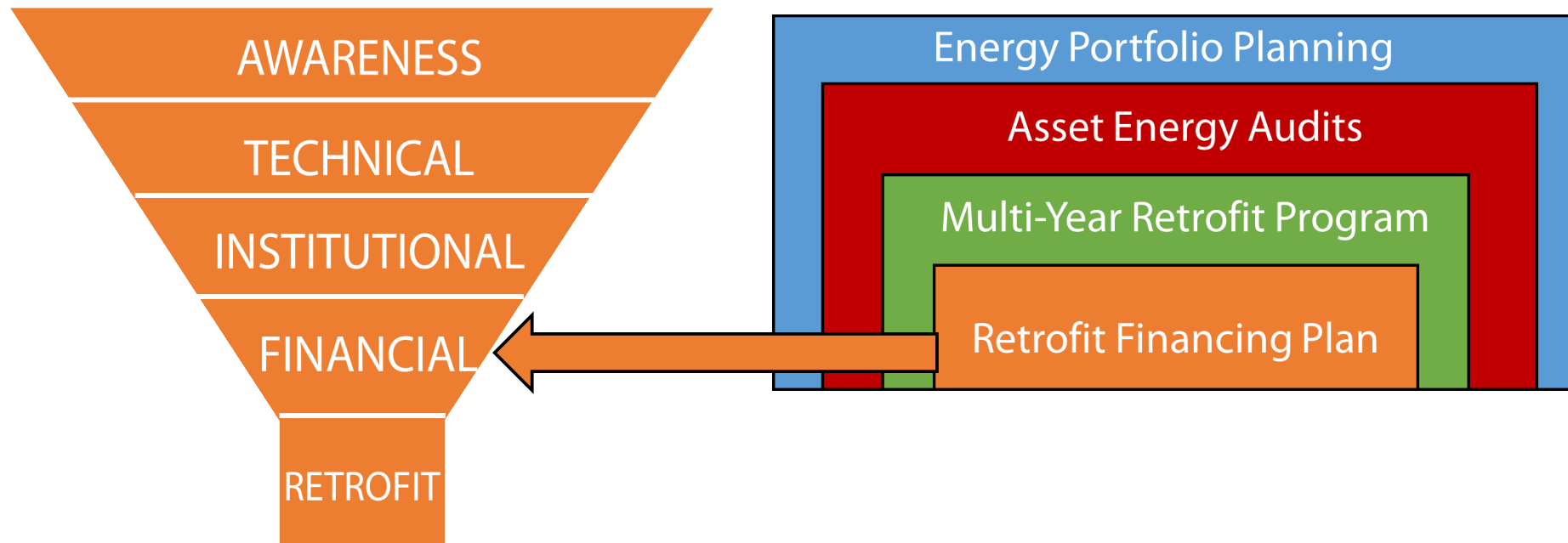


Source - NRCAN



Step 4 – Build a Business Case

Develop business case and funding strategy (capital, green bank loans, funding opportunities, CDFI.)



Acknowledgements:

- Project sponsored by the Ontario Ministry of Housing
- Project Completed in partnership between the TRCA Sustainable Technology Evaluation Program (STEP) and Evergreen CityWorks

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CEKAP

Community Energy Knowledge and Action Partnership

UNIVERSITY
of GUELPH

SSHRC  CRSH

Mitacs
Accelerate



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FULL REPORT -
bit.ly/ONPHA_2017_Energy



Unhappy Rate Payer after reviewing Utility Bill



Northern Ontario
2-storey walk-up
with Mansard Roof
Structure
Built: 1975
16 single bedroom
units
Electric heat.
R-12 insulation in
some parts, R-1 in
others



The Issues:

- High utility bills – financially unsustainable
- Freezing Pipes – failures resulting in significant tenant imposition and interior finish damages resulting in unplanned interior finish repair and replacement
- Ice damming – Tenant safety concern as ice falls during freeze/thaw cycles repeat.
- Failing exterior cladding – due to ice dams
- Failing Gutter systems – due to ice dams
- Failing Brick Cladding – due to freeze/thaw cycle of ice dams



Funding that is needed and helps

- The Social Housing Improvement Program was provided to Service Mangers and is a 50% Federal, 50% Provincial program funding social housing rehabilitation such as this one.
- The 2016 Social Infrastructure Fund (SIF) provided over \$209 Million in renovation and retrofit dollars for social housing buildings.
- The Manitoulin-Sudbury DSB split the approximately \$350,000 fund it received between the 5 non-profits in the district and the one housing building in this presentation.



Renovation: gaffs and surprises



More like Demo than Reno Unplanned railing work



Spray Foam and insulation



Insulated,
sheathed
and
papered





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