

Energy and GHG Reduction in BC Housing Projects

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BCBEC Luncheon

October 30, 2008

A Housing Strategy for British Columbia

What is BC Housing's Green Plan?

livegreen 

livegreen: A Sustainability Action Plan

“BC Housing is committed to leading North America in developing and managing environmentally sustainable social housing.”



HOUSING MATTERS

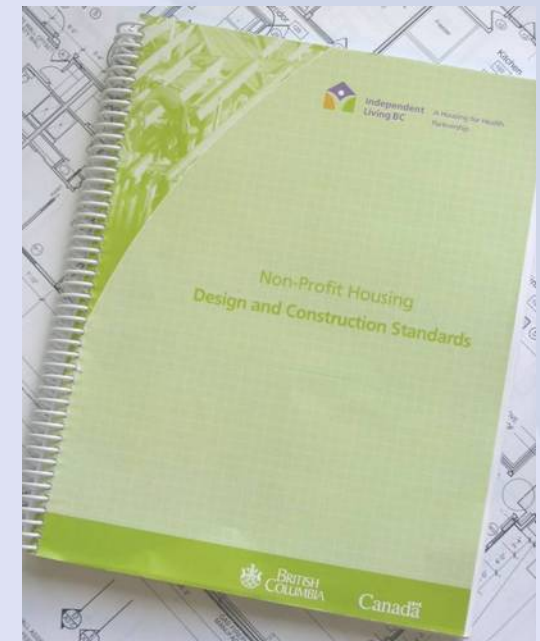


Green Plan Priorities:

1. Build all New Social Housing to a LEED Gold Standard and to be Low in Greenhouse Gas Emissions
2. Reduce Energy Consumption and Greenhouse Gas Emissions
3. Reduce Resource Consumption and Waste
4. Create and Support a livegreen Culture Among Employees
5. Increase Environmental Awareness and Action Among Stakeholders and Tenants

BC Housing New Construction Sustainability Strategy

- *LEED Gold Certification*
- *Minimum six LEED points for Optimised Energy Performance (47% below MNECB)*
- *Maximum of 10% end use energy from fossil fuels*
- *Minimum EnerGuide 80 for small buildings*



Where are the 12 sites and what is proposed for them?

Located throughout the City of Vancouver, the proposed 12 sites are zoned or designated for apartment buildings. Most of the buildings will have a mix of both social and supportive housing units. One third to one half of the apartments at each location will provide supportive housing for individuals with mental health issues and/or those recovering from substance abuse, referred by a service provider. The other units will help house low-income individuals.



"I was always scared when I was living before. Now I have a beautiful room and I feel safe."
— Li Shan, Sevens Place



"Living here is about learning to live on your own, to pay, cook, it's also about learning to live in a community and good neighbour."
— Scott Fraser Street

1134 Burrard Street
100+/- studio apartments
One third to one half of the apartments will be occupied by young people referred and supported by youth services or by people with mental illnesses and/or those recovering from substance abuse referred by a service provider. Priority will be given to those living in shelters and SRO hotels in Downtown South.
The Province and the City will work with Family Services of Greater Vancouver and the Ministry of Children and Family Development to incorporate the existing youth services in the new building.

505 Abbott Street
120 studio apartments
Priority will be given to those living in shelters, SRO hotels and rooming houses in the Downtown Eastside.

1233-1251 Howe Street
100 studio apartments
Priority will be given to those living in shelters and SRO hotels in Downtown South.

590 Alexander Street
100 small studio apartments
Priority will be given to those living in shelters and SRO hotels in the Downtown Eastside. Amenity space will be provided to accommodate a common kitchen and dining area, and the necessary support capacity for a housing first or low barrier project for all residents.
The existing Marie Games Place 76 unit social housing project is to be demolished. As part of the area zoning review, the City will explore the opportunity to increase the site's buildable density from 2.5 to 5.0 FSR.

606 Powell Street
100 studio apartments
Priority will be given to those living in shelters and SRO hotels in the Downtown Eastside.
The City, the Province, and the neighbouring community will discuss rezoning this site for greater density and height than currently permitted, as well as for possible commercial use on the ground floor.

1607-1615 West 7th Avenue
70+/- studio apartments
One third to one half of the apartments will be occupied by people with mental illnesses referred by a service provider. Priority will be given to those living in Fairview and Kitsilano.
The Province and the City will work with Vancouver Coastal Health and Motivation Power and Achievement Society (MPA) to develop the building program and design for a mental health drop-in centre on the first and second floors.

1308 Seymour Street
100 studio apartments
Priority will be given to those living in shelters and SRO hotels in Downtown South.

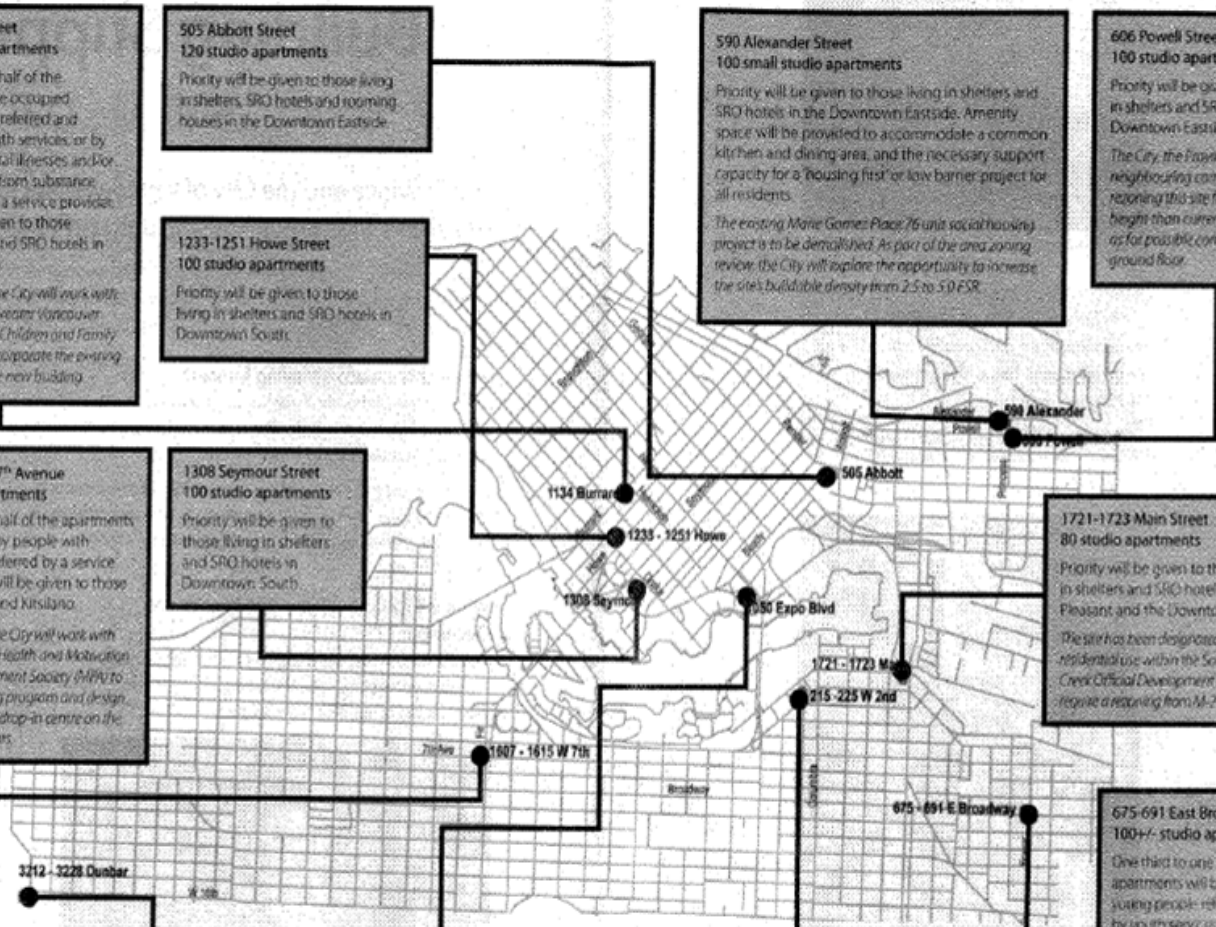
1721-1723 Main Street
80 studio apartments
Priority will be given to those living in shelters and SRO hotels in Mt. Pleasant and the Downtown Eastside.
The site has been designated for residential use within the South East False Creek Official Development Plan and will require a rezoning from M-2 Industrial.

3588-3596 West 16th Avenue / 3212-3228 Dunbar Street
50+/- studio apartments
One third to one half of the apartments will be occupied by people with mental illnesses referred by a service provider. Priority will be given to those living in Dunbar, West Point Grey and Kitsilano.

1050 Expo Boulevard
100 studio apartments
Priority will be given to those living in shelters and SRO hotels in Downtown South. If more unit can be accommodated within the height and floor space limits, a zoning text amendment to increase the unit count may be considered.

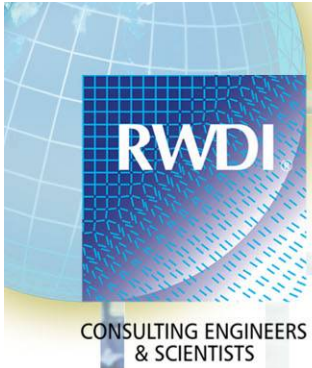
215-225 West 2nd Avenue
80 studio apartments
Priority will be given to those living in shelters and SRO hotels in Mt. Pleasant and the Downtown Eastside.
The site has been designated for residential use within the South East False Creek Official Development Plan and will require rezoning from M-2 Industrial.

675-691 East Broadway
100+/- studio apartments
One third to one half of the apartments will be occupied by young people referred and supported by youth services, or by people with mental illnesses and/or those recovering from substance abuse referred by a service provider. Priority will be given to those living in shelters and SRO hotels in Mt. Pleasant and along the Broadway corridor.
The City will explore rezoning opportunities as part of the current Mt. Pleasant planning process and the potential to add market housing on the site.

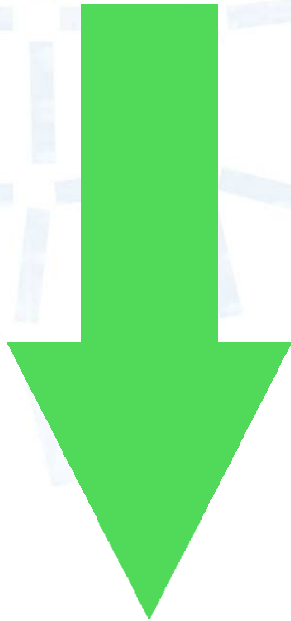


14 City of Vancouver Sites - Design Charettes

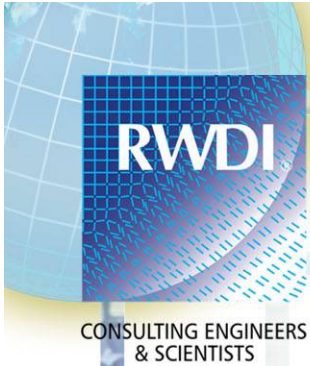




Design Process



1. **Load reduction**
2. Efficient systems
3. Renewables



ASHRAE Minimum Requirements

- Based on ASHRAE 90.1-1999 (LEED Canada NC v1.0) Minimum requirements:

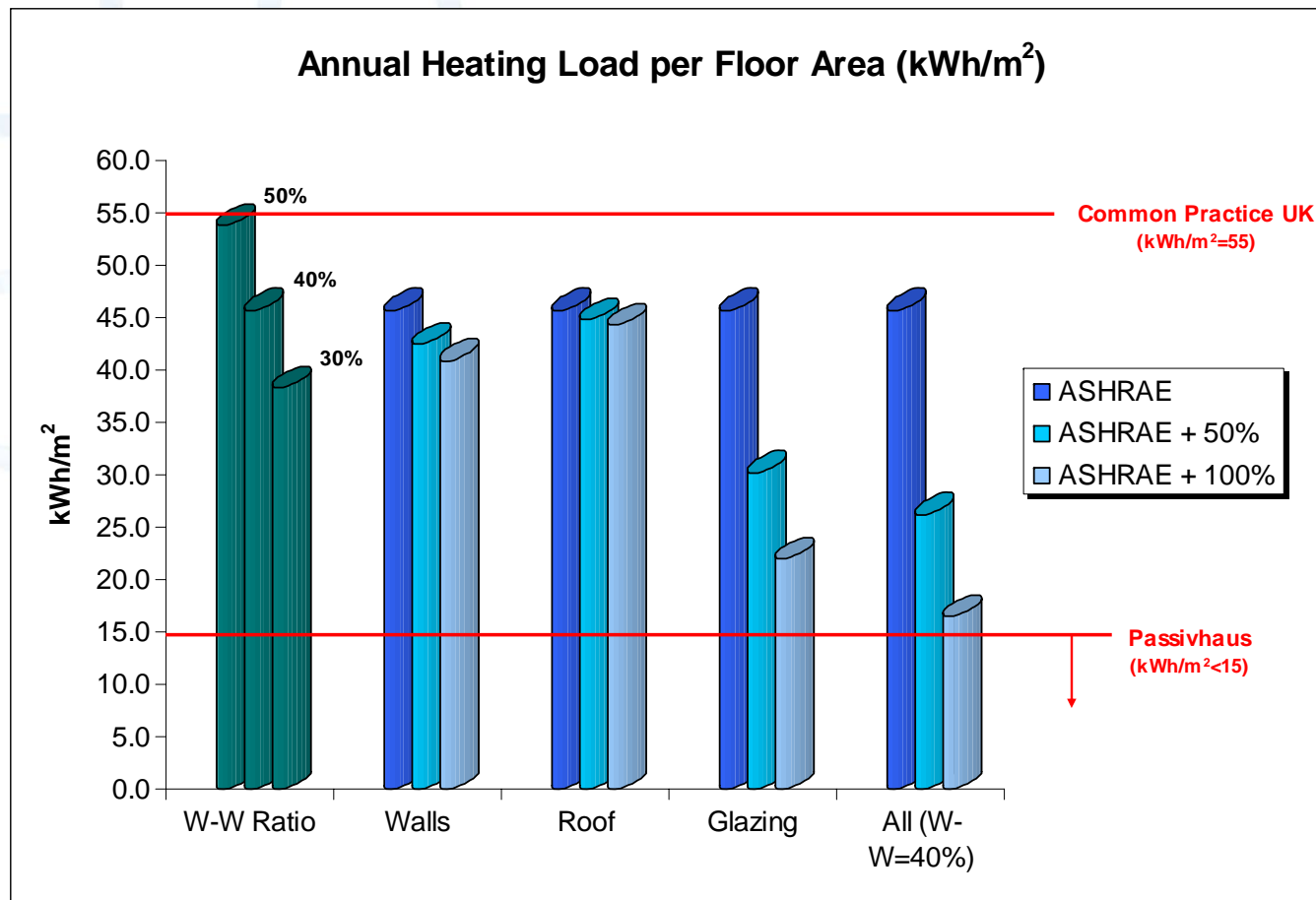
	R-Value – Metric (W/m ² K)	R-Value – Imperial (Btu/hrft ² F)
Walls	2.3	13.1
Roof	3.3	18.7
	U-Value – Metric (W/m ² K)	U-Value – Imperial (Btu/hrft ² F)
Glazing	3.29 (SHGC=0.49)	0.58 (SHGC=0.49)



CONSULTING ENGINEERS
& SCIENTISTS

Heating Load Comparison

Measure	Window to Wall Ratio	Wall Insulation	Roof Insulation	Window U Value	Combined
% Savings	29%	11%	3%	52%	64%



70% Window to Wall Area



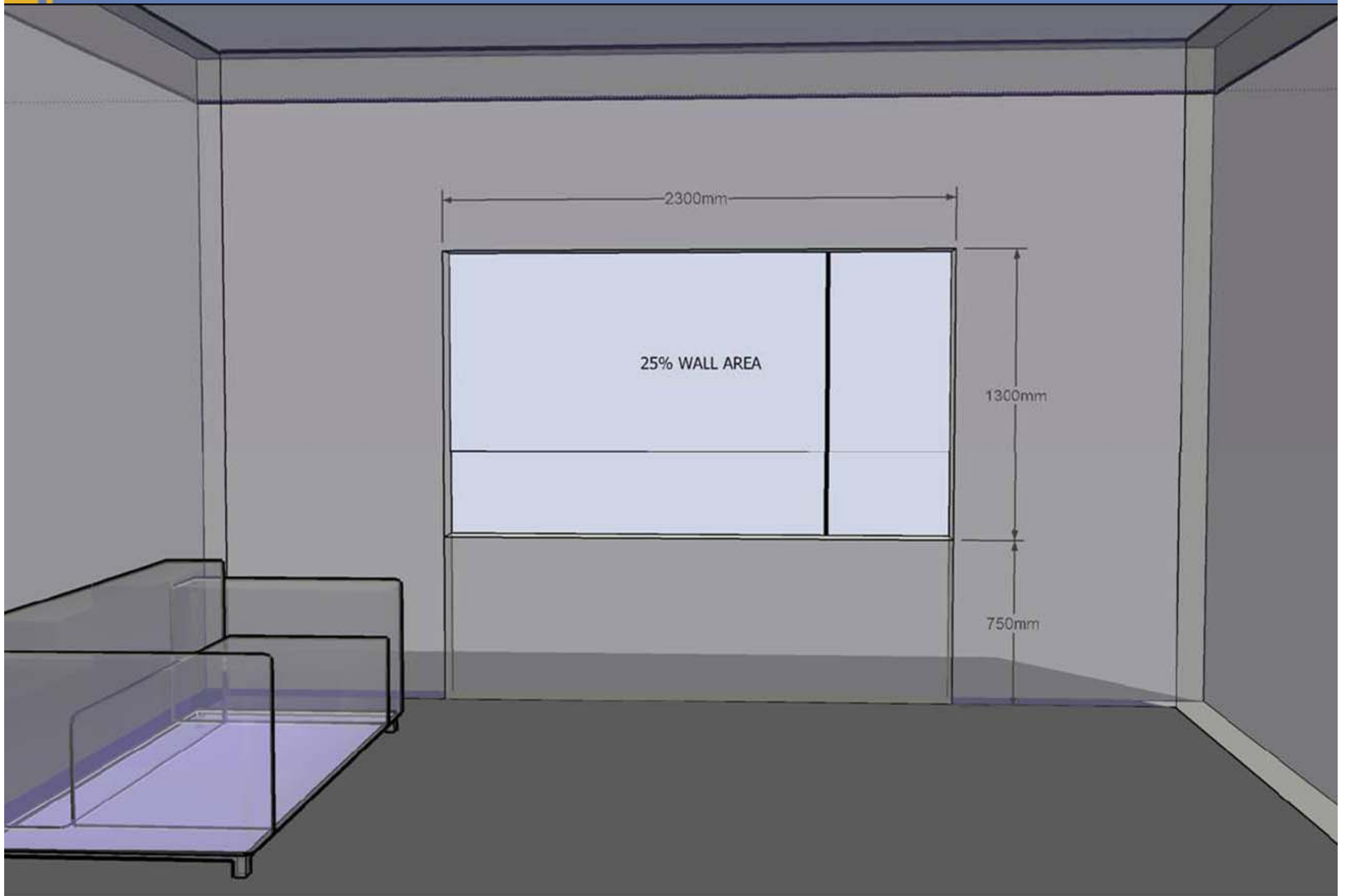
40% Window to Wall Area - Sliding Patio Door

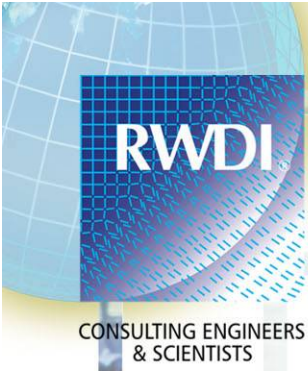


40% Window to Wall Area - Window



25% Window to Wall Area

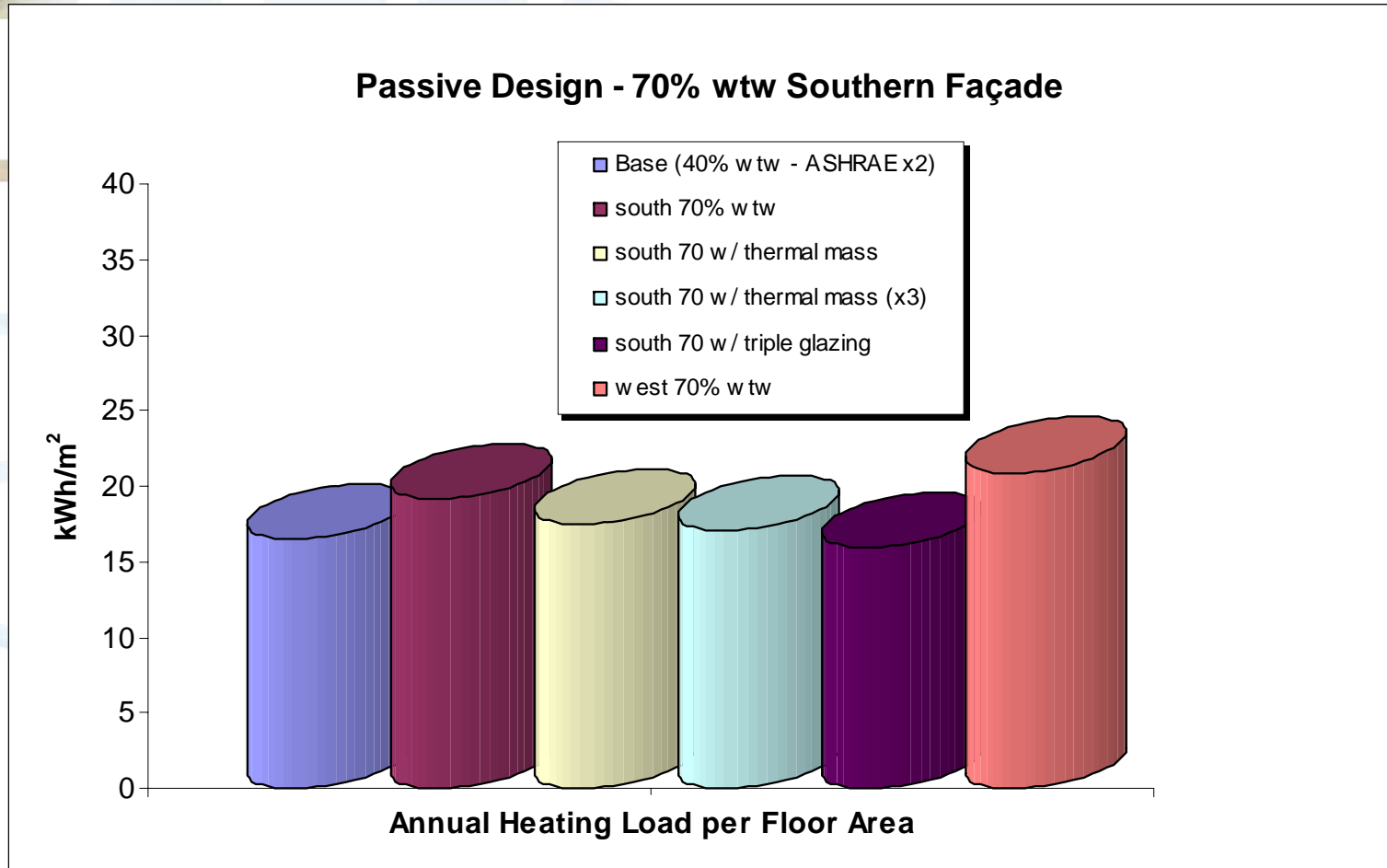




Passive solar heating

Measure	Increase South WtW ratio	+ Thermal Mass	+ More Thermal Mass	Plus Triple Pane	Increase West WtW ratio
% Savings	-16%	-6%	-3%	+4%	-27%

Passive Design - 70% wtw Southern Façade

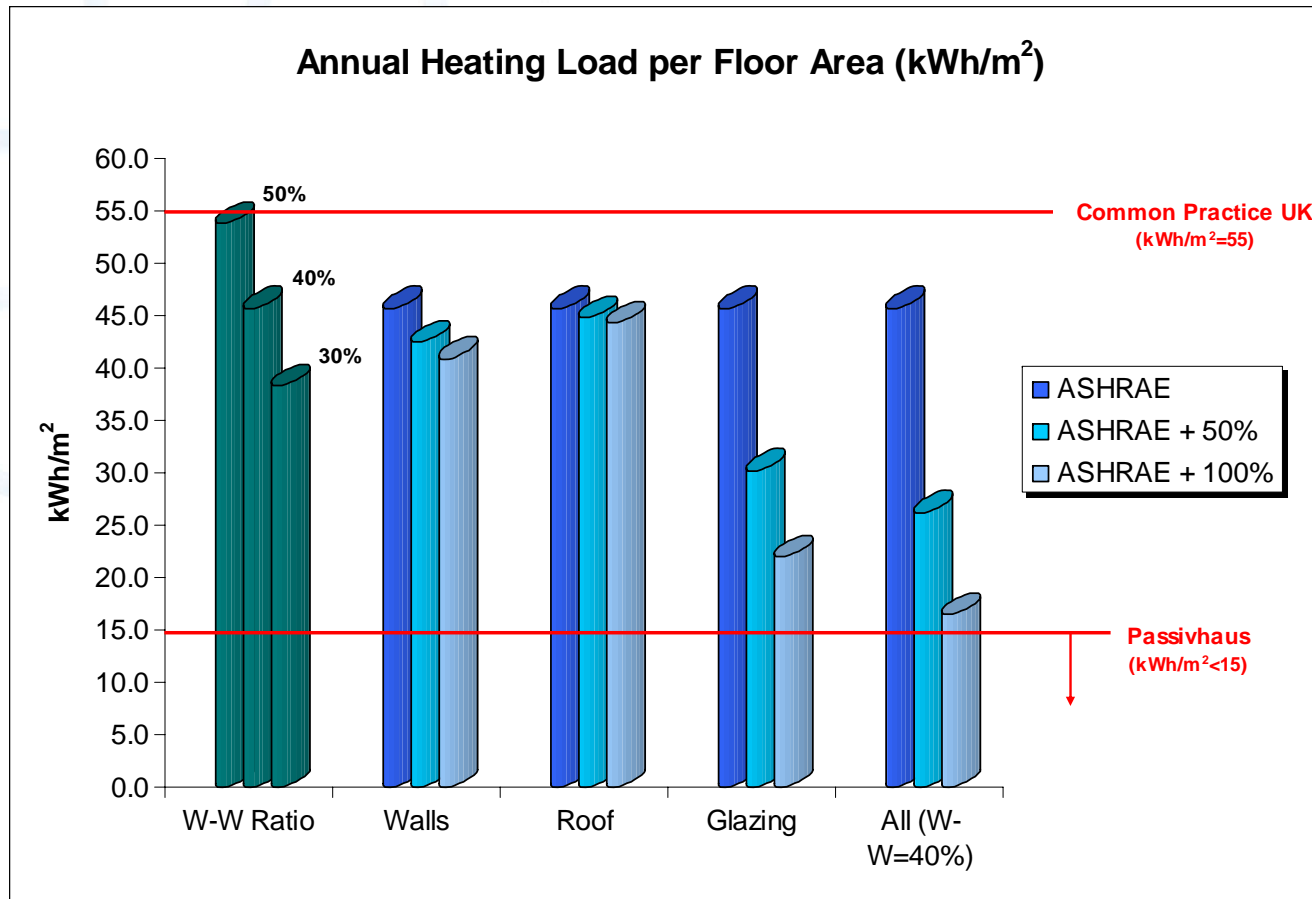




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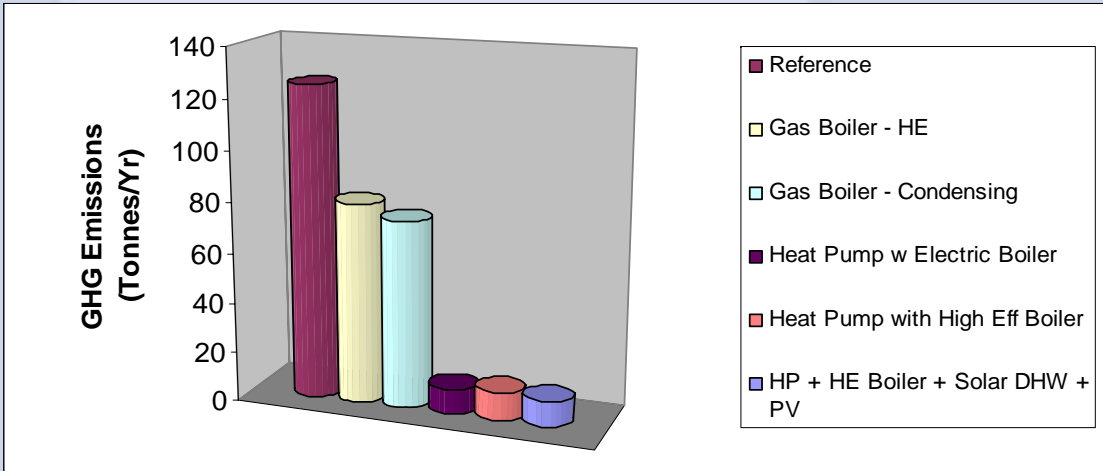
Heating Load Comparison

Measure	Window to Wall Ratio	Wall Insulation	Roof Insulation	Window U Value	Combined
% Savings	29%	11%	3%	52%	64%



14 City of Vancouver Sites - Efficient Systems & Renewables

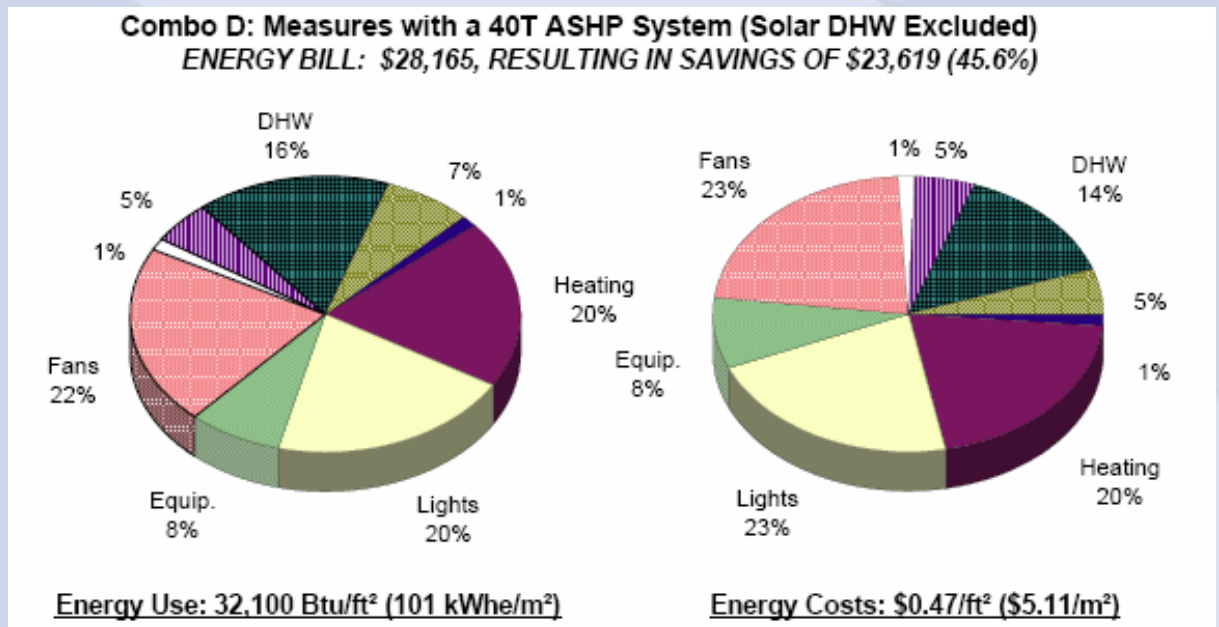
2 x ASHRAE Envelope
 +
Heat Recovery Ventilation
 +
Mechanical System Options
 +
Solar DHW & PV



	Reference	Gas Boiler (HE)	Gas Boiler (Cond)	Heat Pump w Elec Boiler	Heat Pump w HE Gas Boiler	Heat Pump w HE Gas Boiler
% Below MNECB	0	31	35	48	50	53
# LEED Points	0	2	3	6	6	7
% Fossil Fuel	0	55	50	0	6	5
% GHG Reduction	0	36	40	92	91	92

14 City Sites - Typical Results

- 40% Window to Wall Ratio
- R18 Effective Walls
- U = .35 to .55 Windows
- 70% Eff. Heat Recovery Ventilation
- Air Source or Ground Source Heat Pumps for space heat & DHW
- Gas boiler backup
- Solar DHW some sites





Pacific Boulevard South

Garage Bridge



New Buildings - LEED Certified

Woodlands (Victoria Heights)

34% less than MNECB

2.5% incremental cost

13 year payback on energy features

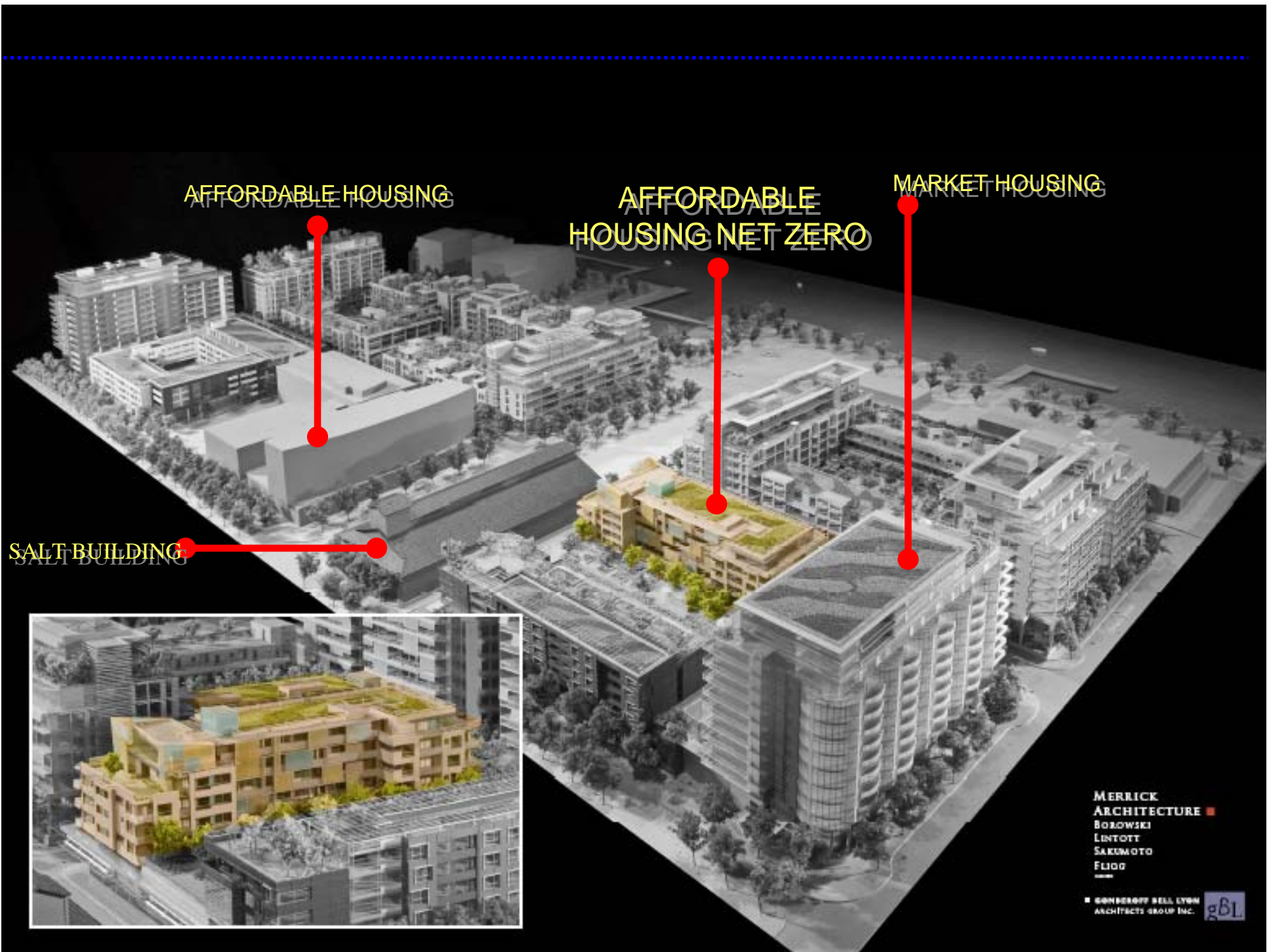


New Buildings - LEED Gold Certified

Ksan House - Terrace - Emergency Shelter and Transitional Housing



- 66% energy savings
- 85% GHG reduction
- 55% water use reduction



AFFORDABLE HOUSING

AFFORDABLE HOUSING NET ZERO

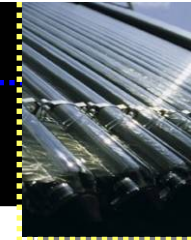
MARKET HOUSING

SALT BUILDING

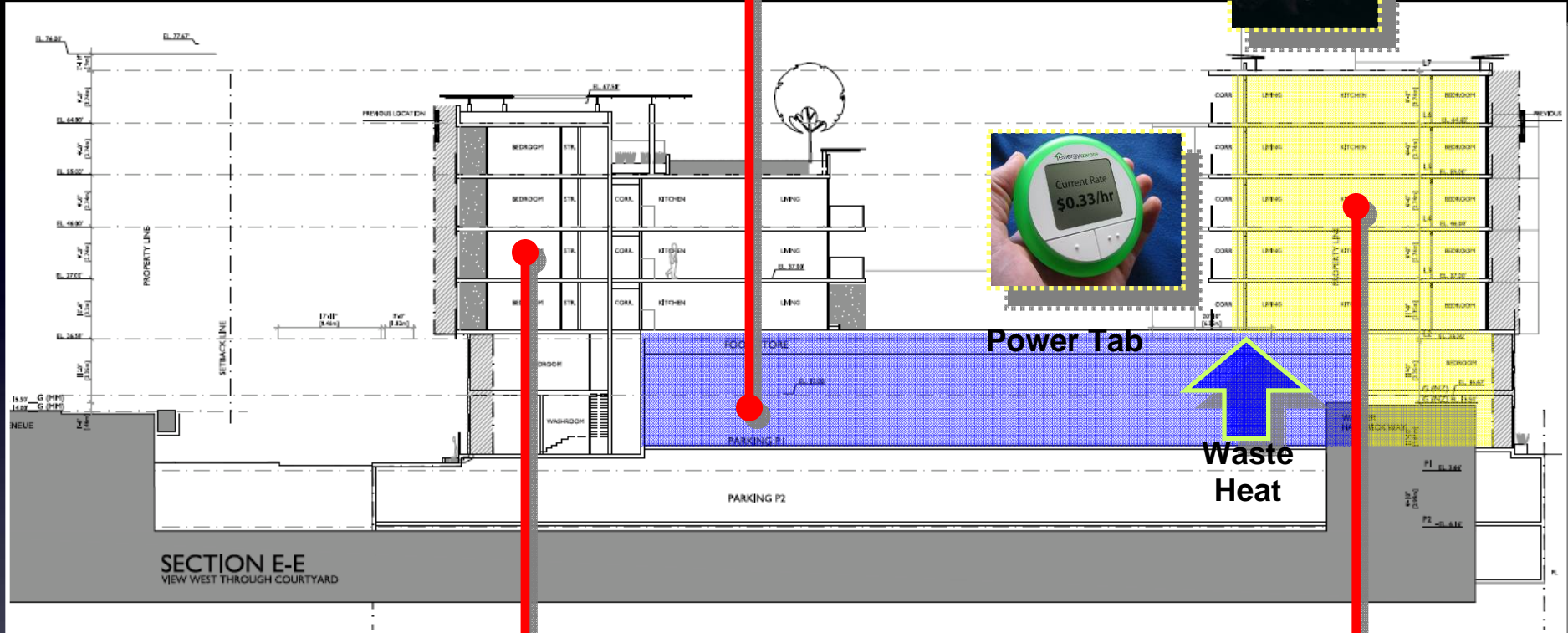
MERRICK ARCHITECTURE
BOBOWSKI
LINTOTT
SAKUMOTO
FLIOG

SKIDMORE OWINGS & MERRILL ARCHITECTS GROUP INC. **gBL**

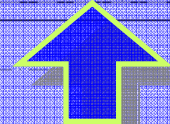
Solar DHW



GROCERY STORE



Power Tab



Waste Heat

SECTION E-E
VIEW WEST THROUGH COURTYARD

MODEST MARKET HOUSING



Capillary Heating

50,000 SQ FT

60 UNITS

NET ZERO BUILDING

Public Housing Energy Retrofit Pilot Project

Analysis of Energy Conservation Measures for Directly Managed Portfolio

Five Sites Pilot Project



Prepared For:
BC Housing Management Commission

July 2006
Project 2006025
Version 3.0



PRISM ENGINEERING LTD.
#200 - 4021 East Hastings Street
Burnaby, BC V5C 2J1
Phone: (604) 298-4858
Fax: (604) 298-8143
www.prismengineering.com

- 32 buildings in five lower mainland BC sites
- Energy use - \$1.0 M/yr
- Energy savings - \$160 K/yr
- Retrofit cost - \$1.3M
- Payback – 8 years

Non Profit Housing Energy Retrofit Pilot

Analysis of Energy
Conservation Measures for
Eight Sites in BC Housing's
Non-Profit Portfolio



June 2006
Project No: 2006067
Version 1.0

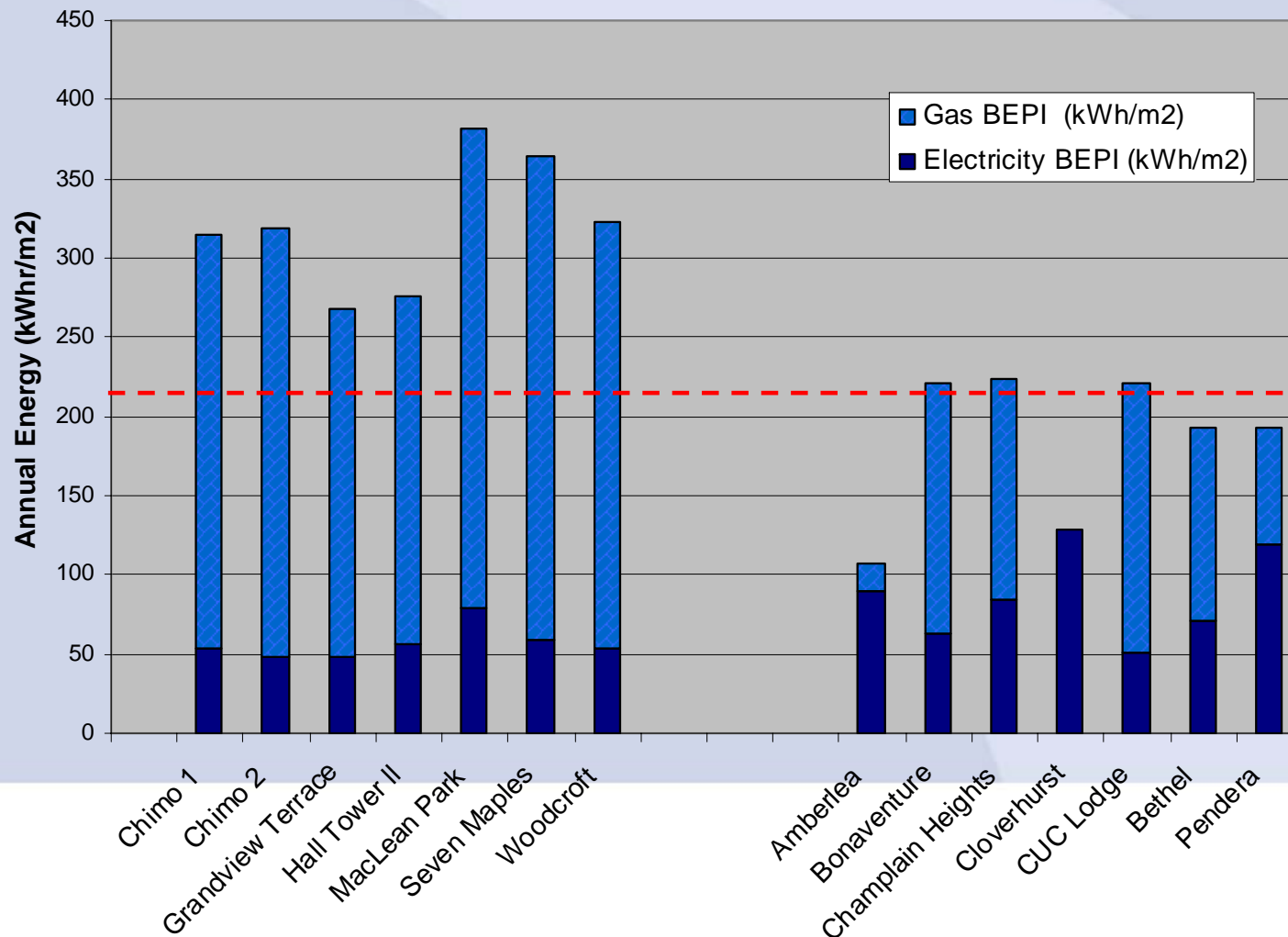


#200 – 4021 East Hastings Street
Burnaby, BC V5C 2J1
Phone: (604) 298-4858
Fax: (604) 298-8143
www.prismengineering.com

- 17 buildings in 8 sites in Vancouver, Victoria, and Dawson Creek
- Energy Use \$300 K/Year
- Energy savings - \$50 K/yr
- Retrofit cost - \$400 K
- Payback – 8 years

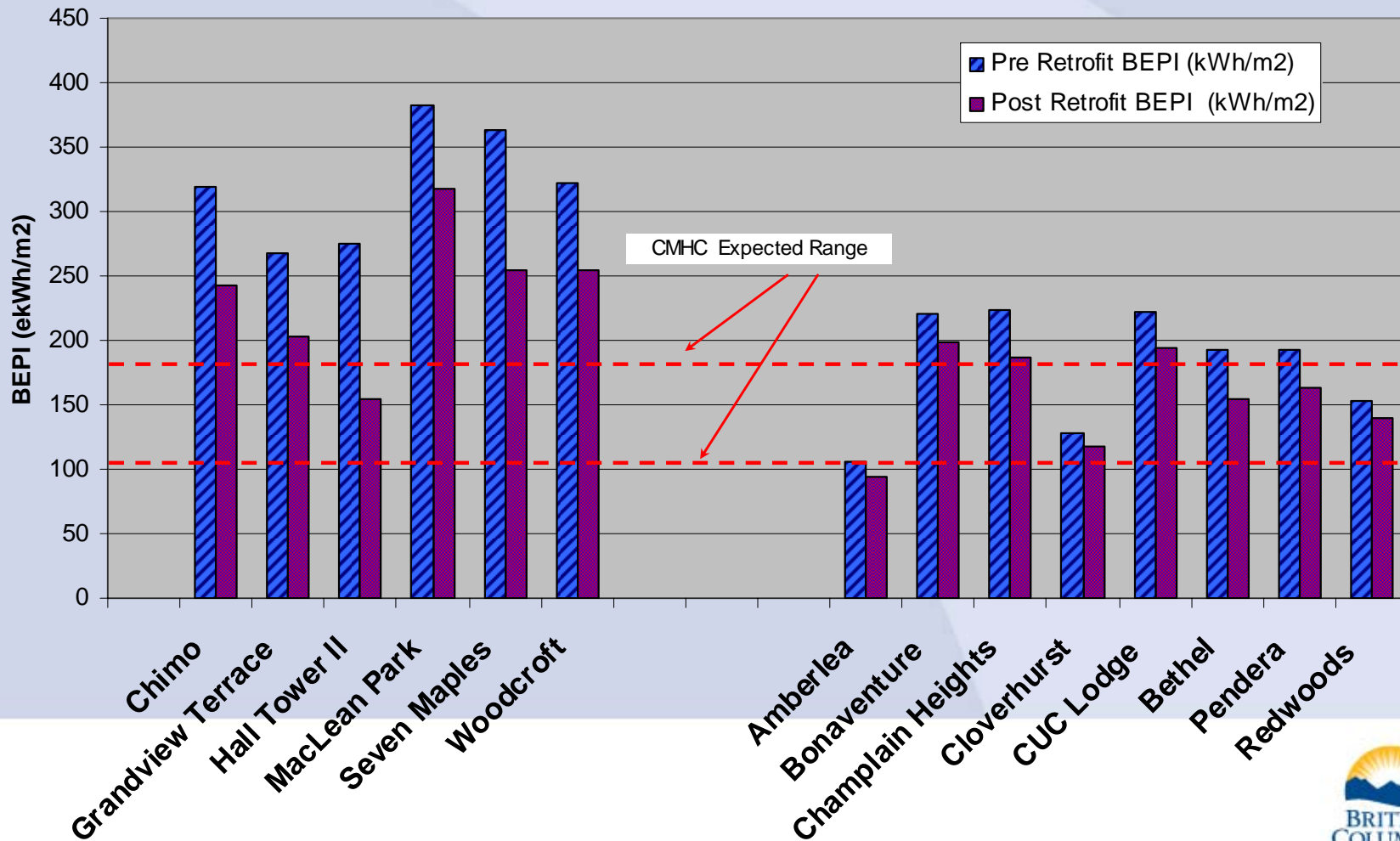
Energy Retrofit Pilot

Pre Retrofit Building Energy Performance Index (BEPI)



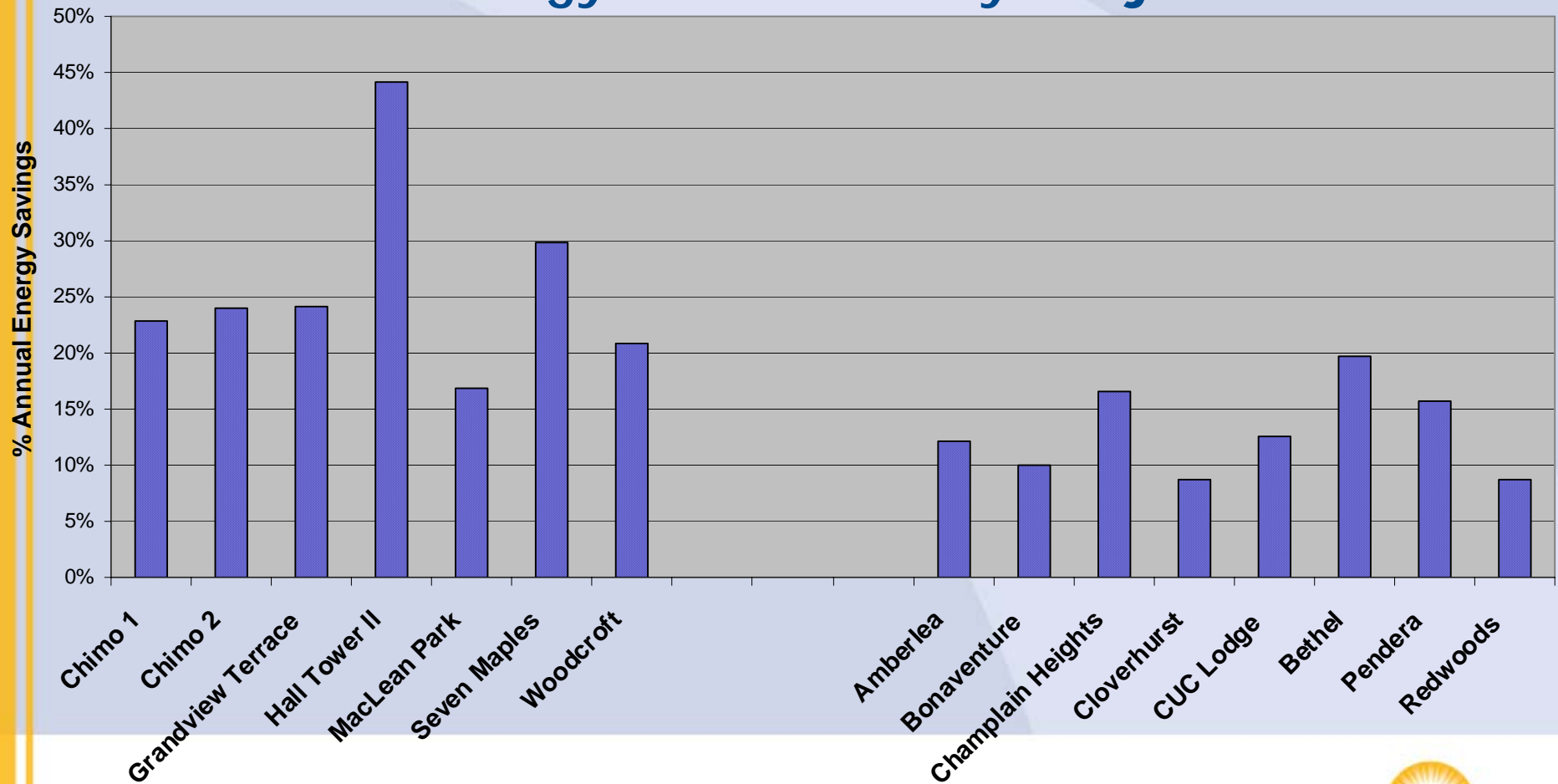
Energy Retrofit Pilot

Pre & Post Retrofit Building Energy Performance Index (BEPI)



Energy Retrofit Pilot

% Energy Reduction By Project



Hall Tower 2

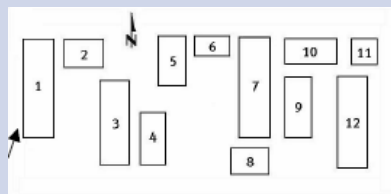


	Elect	Gas	Water	Total
Common	\$15,932	\$ 79,431	\$ 60,000	\$ 155,363
Tenant	\$ 21,243	-	-	\$ 21,243
Total	\$ 37,175	\$ 79,431	\$	\$ 176,607

	Electricity Savings	Gas Savings	Water Savings	GHG Savings
Measure	%	%	%	%
Condensing Boiler + DHW Combo		24%		23%
Window Replacement		17%		16%
DDC Controls		5%		5%
Low Flow Fixtures Replacement		2%		2%
Common Area Lighting Retrofit	2%			0.1%
Tenant Lighting Retrofit	9%			0.3%
Total	11%	48%	%	47%

BEPI Pre Retrofit (kWhr/m2) 276
 BEPI Post Retrofit (kWhr/m2) 165

Champlain Place



**100 Units,
2 apartments + 9 TH
Blocks**

	Elect	Gas	Water	Total
Common	\$ 5,670	\$ 77,302	\$ 24,737	\$ 107,709
Tenant	\$ 32,916	-	-	\$ 32,916
Total	\$ 38,586	\$ 77,302	\$ 24,737	\$ 140,625

	Electricity Savings	Gas Savings	Water Savings	GHG Savings
Measure	%	%	%	%
Heat Pumps - Townhouses	-29%	42%		39%
Window Replacement		12%		12%
Condensing Boiler + DHW Combo		8%		8%
Low Flow Fixtures Replacement		5%	26%	5%
Exterior wall insulation - add 4"		4%		4%
DHW Heater Replacement - Townhouses		4%		4%
DDC Controls		2%		1.5%
Tenant Lighting Retrofit	20%			0.7%
Common Area Lighting Retrofit	2%			0.1%
Total	-8%	74%	26%	76%

BEPI Pre Retrofit (kWhr/m2) 233
BEPI Post Retrofit (kWhr/m2) 108

Retrofit Project Energy & Water Retrofit Measures - Easy

1)	High Efficiency Windows
2)	Ceiling insulation in accessible attics
3)	Air Sealing
4)	Fluorescent Lighting Retrofits - Common Areas and Suites
5)	Incandescent Lighting Retrofits - Common Area and Suites
6)	Exterior Lighting
7)	Lighting Controls
8)	Showerheads
9)	Toilet Replacement
10)	Water Meter Installation



CAM Project Energy & Water Retrofit Measures - Specialty Expertise and Analysis Required

- | | |
|----|---|
| 1) | Exterior Insulation & Triple Pane Windows |
| 2) | High efficiency heating and DHW boiler replacement |
| 3) | Heat pumps |
| 4) | Heating and Domestic Hot Water (DHW) Controls |
| 5) | Pumps and Motors |
| 6) | Solar Hot Water Systems |



Energy Retrofit Program - Next Stages



Energy and Water Audits

- 50% of all public housing sites

Energy and Water Retrofits - Directly Managed

- Target 50% reduction in GHG emissions

Energy and Water Retrofits - Non Profits

Energy and Water Retrofits - Group Homes