

COV Building Portfolio Energy Management Strategy

Presentation to Council
Feb 02, 2016



The purpose of the presentation is to update council on our efforts to reduce greenhouse gas emissions from city facilities.



Sunset Community Centre + child care

1. COV Facilities Portfolio
2. Purpose of Facilities Energy Management Strategy
3. GHG Reduction Progress to Date
4. COV Civic Building Energy Management Strategy
 - Energy Retrofits
 - Continuous Optimization
 - High Performance New Buildings
 - Staff Engagement
 - Organizational Potential
 - Renewable Energy



Killarney Ice Rink

COV Facilities Portfolio (Including PEF):

Ownership	Number of Buildings	Floor Area (ft ²)
City Owned	558	10,524,000
Leased by COV	30	574,000
Operated by COV	10	258,000
Total	598	11,356,000



Van Dusen Visitor's Centre

Services:

- Cultural
- Entertainment and Exhibition
- Childcare
- Social
- Housing
- Libraries
- Recreation
- Parks
- Administration
- Service Yards
- Police
- Fire

Demonstrate leadership in achieving city wide goals and targets:



Greenest City Action Plan

Green Buildings:

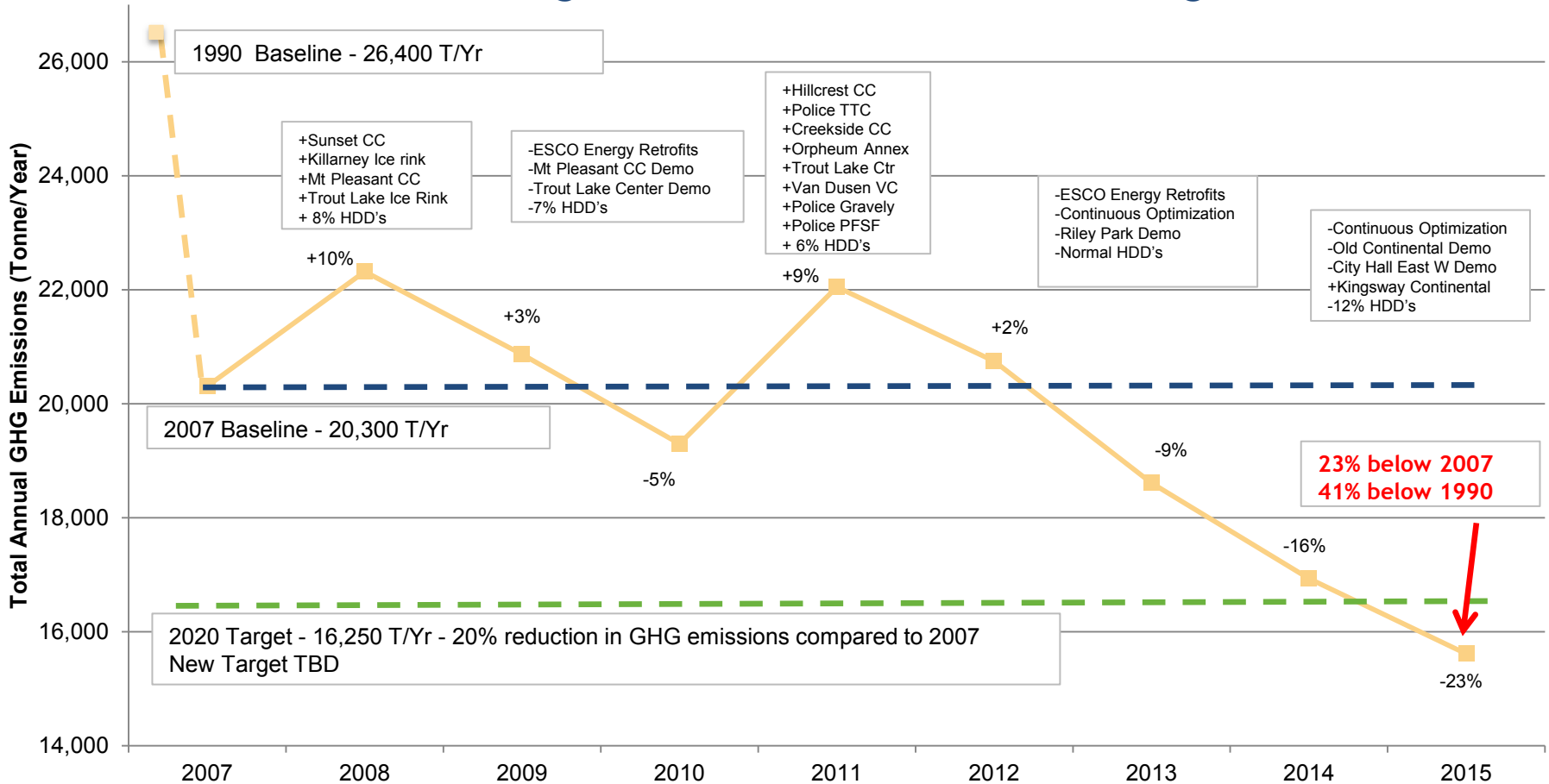
- Reduce GHG emissions in existing buildings by 20% by 2020
- Require all buildings constructed from 2020 onward to be carbon neutral in operations



Renewable City Strategy

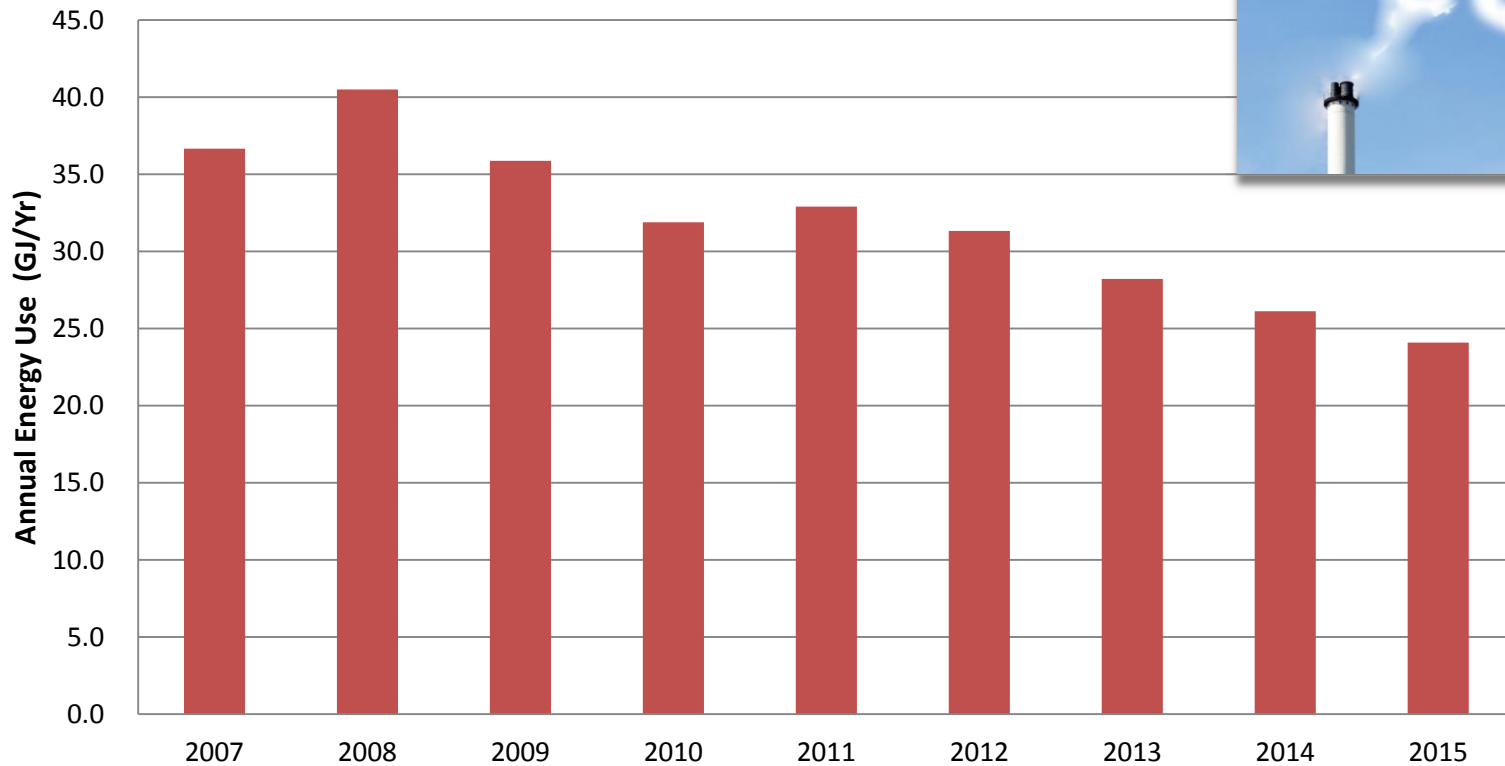
- Reduce GHG emissions by 80% by 2050
- Derive 100% of the energy used in Vancouver from renewable energy sources by 2050

COV Civic Buildings - GHG Emission Reduction Progress



➤ **23% reduction in GHG emissions to date compared to 2007 despite a 20% increase in city owned building floor area**

GHG Intensity (kg CO₂/m² Floor Area)



- GHG emission intensity for REFM buildings has **decreased by 34%** since 2007.
- Portfolio floor area has increased by 20% since 2007

1. Energy Retrofits

- Building energy retrofits and capital improvement projects
- 6 to 10% GHG reduction

2. Continuous Optimization

- Building control tune-ups
- 6 to 10% GHG reduction

3. New Buildings

- Energy and GHG performance standards
- 5 to 10% GHG reduction for renewal

4. Staff Engagement

- Behavioral change Projects
- 1 to 5% GHG reduction

5. Organizational Potential

- Council/CMT decisions related to new additions, renewal, disposal, and demolition of facilities
- 5 to 10% short term potential GHG reduction

6. Renewable Energy

- Switching to low carbon fuel sources - solar, biomass, RNG, low carbon district energy
- 10 to 25% or greater potential GHG reduction



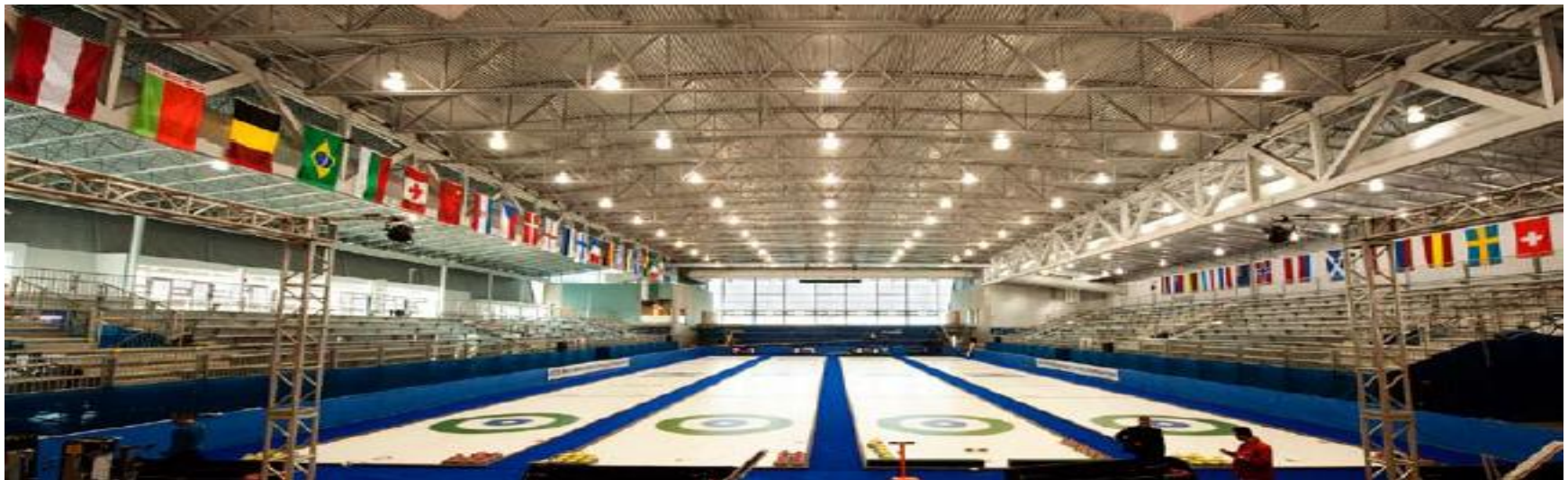
Creekside Community Centre + child care

Energy Retrofits

- Retrofit of HVAC, building envelope, lighting, and other energy consuming systems

Projects

- ESCO (Energy Service Company) Retrofit Program 2006 to 2012:
 - 31 of largest city owned buildings retrofit (35% of portfolio area)
 - 10% GHG reduction, \$500K per year annual cost savings
- Current Targeted Energy Retrofits:
 - Larger capital projects identified through benchmarking, energy audits and Continuous Optimization
 - Ongoing capital maintenance projects



#	Building	GHG Reduction (%)
1	Kerrisdale Arena	65%
2	Sunset Nursery	52%
3	Museum/Archive	51%
4	Templeton Pool	44%
5	Renfrew CC	38%
6	Hastings CC	36%
7	Kensington CC	36%
8	Kitsilano Arena	34%
9	Sunset Arena	32%
10	West Annex	29%
11	Langara Golf Course	29%
12	City Hall	28%
13	Second Beach Pool	28%
14	Parks Admin Bldg	27%
15	Kitsilano Pool	27%
16	False Creek CC	27%
17	New Brighton Pool	26%
18	Vancouver Aquatic C	24%

#	Building	GHG Reduction (%)
19	West End CC	24%
20	National Yard	22%
21	Bloedel Conservatory	21%
22	Manitoba Yard	16%
23	Round House CC	16%
24	Lord Byng Pool	15%
25	Ray-Cam	14%
26	Douglas Park CC	14%
27	McCleery Golf Course	14%
28	Marpole-Oakridge CC	11%
29	Library Square	7%
30	Champlain Heights CC	7%
31	Kitsilano CC	5%
32	Fraser View Golf Course	3%
33	Dunbar CC	3%
34	Kerrisdale CC	2%
35	Evans Yard	1%
36	Vandusen Gardens	1%

Current Energy Efficiency Capital Projects

1	Killarney CC	Boilers, heat recovery, ventilation, UV water treatment retrofits	43	Hastings Community Centre	Controls upgrade
2	Hillcrest CC	Pool heat exchangers, ventilation, UV water treatment	44	Kitsilano Arena	Parking lot LED lighting
3	QET/Playhouse & Orpheum	Lighting Retrofits	45	Gathering Place Cafeteria	RTU1 and 2 Replacement with CO2 Control
4	Orpheum	Electrical Panels and Lighting Retrofit	46	Hillcrest CC	Air Curtain
5	QET/Orpheum	DDC Lighting Control Upgrade	47	Animal Control Shelter	Replace two boilers
6	Kits, 2nd Beach, New Brighton Pools	Pool windbreaks	48	Ramada Hastings	56 Packaged Terminal Air Conditioning Units
7	Museum of Vancouver	Control system upgrade	49	Lost Lagoon Fountain	Pump and lighting retrofit
8	Library Square	Chiller VFD's and Control upgrade	50	2780 W Broadway	Lighting Retrofits
9	Manitoba works Yard	DDC Control Upgrade	51	Dunbar CC	Boilers Replacement & DDC System
10	National Yard	DDC control Upgrade	52	Kitsilano CC	Boilers Replacement & DDC System
11	Sunset CC	Fancoil and DDC control upgrade	53	Douglas Park CC	Boiler Replacement
12	Bloedel Conservatory	Lighting Audit/Coloured LED's	54	West Point Grey CC	Boiler Replacement
13	Clean Energy Canada Solar	Solar PV on City Buildings	55	P5 & P9 Southeast False Creek	Solar Retrofits
14	Hillcrest CC	Lighting Audit	56	VanDusen Visitor Center	Energy Export Retrofit
15	Hillcrest CC	Brine Piping Insulation	57	Library Square	Chiller Pump VFD's & Controls
16	Museum of Vancouver	Lighting Audit	58	Vancity	Lighting Retrofit
17	Roundhouse CC	Lighting Retrofit	59	Sunset CC	Gym AHU VFD's
18	Library Square	Lighting Retrofits	60	450-456 W Broadway	Lighting Retrofit - T-12's
19	2780 E Broadway	Boilers, AHU, DDC Control System Upgrade	61	Bloedel Conservatory	Glazing, Doors
20	2780 E Broadway	Lighting Audit	62	New Continental	High Efficiency Boiler
21	2780 E Broadway	Tenant Sub Metering	63	Gathering Place Heat Pumps	Replacement of 28 Heat Pumps
22	VPD Cambie CFL Potlights	Lighting CFL to LED	64	Firehall #19	Unit Heater upgrades
23	Lost Lagoon Fountain	Pump and lighting retrofit	65	Orpheum	Chiller Replacement & AHU VFD's
24	VanDusen	Net Zero Energy Study	66	Queen Elizabeth Theater	Chiller Replacement
25	Memorial Change Rooms	Boiler Replacement	67	Gathering Place	LED Lighting retrofit
26	Manitoba Works Yard	Replacement of 25 radiant heaters in EQS and QSL buildings	68	456 Industrial	High Efficiency RTU's
27	Grandville Hotel	Double Pane Windows	69	457 Industrial Lighting	Exterior LED lights
28	Kits Pool	Replace Pool Boiler	70	281 Industrial	New boiler and lighting
29	Kerrisdale CC	Replace two RTU's	71	Kiwassa Neighbourhood House	Replacement of 3 RTU's
30	Douglas Park CC	Space heating boiler and dhw boiler	72	Waterfront Lights and Fan	Power Factor Correction
31	Polic Tactical Training Centre	Two boilers	73	Queen Elizabeth Theater	Power Factor Correction
32	PNE - Agrodome (Rink/Arena)	Replace Dominion Bridge boiler and two DHW boilers	74	Orpheum Theater	Power Factor Correction
33	PNE Garden Auditorium	Replace three boilers	75	Computer Green IT program	Computers, Servers, Power Management, Printer Optimization
34	Marpole Place	Replace Superhot boiler	76	450 West Broadway	RTU Replacement - 2x3 tonne
35	Rose Court	Furnaces	77	2780 W Broadway	Replacement of four rooftop units
36	Fraserview Branch Library	Three condensing furnaces	78	CBC 750 Hamilton St	Lighting Retrofit
37	Barclay Heritage Square	Furnaces to electric baseboard	79	Killarney Rink	Heat pump heat recovery adjustments
38	Carnegie CC	Replace hydronic MAU unit with Heat Pump	80	Orpheum Annex	Power Factor Correction
39	PNE Colliseum	Replace 29 Heat pumps and cooling tower	81	Hillcrest	Icerink Brine Piping Insulation
40	2780 E Broadway	Replace multiple packaged RTU's	82	Roundhouse CC	Efficient Heating loop pumps
41	Kent transfer station	Replace two heat/cool RTU's	83	Kerrisdale Arena	Ice rink heat recovery repair
42	Dunbar CC	Replace three RTU's			

Projects:

- BC Hydro Partnership - 21 large buildings
- Numerous in-house optimization projects
 - (Police TTC, Bloedel, VanDusen, P5&P9 solar, Killarney Rink, 2780 E Broadway, 312 Main, etc.)

Process Improvements:

- New Optimization manager position created in Facilities Operations
- Dedicated optimization DDC Tech reports to new Operations Manager

Business Case:

- Phase 1 COP \$500K implementation cost, 1.5 year payback, 13% energy savings,
- Phase 1 estimated to achieve 854 T/Year GHG Savings = 4% of total portfolio emissions

COP Phase 1 Sites
• City Hall Campus-City Hall & East Wing
• City Hall West Annex-Vancity
• Museum of Vancouver
• Library Square-Library & Tenants
• Manitoba Works Yard
• National Works Yard
• Mt Pleasant Community Center
• Vancouver Aquatic Centre
• The Sunset Community Centre
COP Phase 2 Sites
• Orpheum Theatre
• Queen Elizabeth Theatre
• Hillcrest Community Center
• Killarney Community Center
• Kerrisdale Community Center
• Renfrew Community Centre
• Kitsilano Community Center
• Dunbar Community Center
• Police Tactical Training Center
• Vancouver Police Dept Graveley
• Vancouver Police Dept Cambie
• 450 West Broadway



Police Tactical Training Center and PFSF Optimization



2011 to 2015

- 43% Natural Gas Reduction
- 9% Electricity Reduction
- 42% GHG Reduction

City Hall - Optimization and Renewable Natural Gas

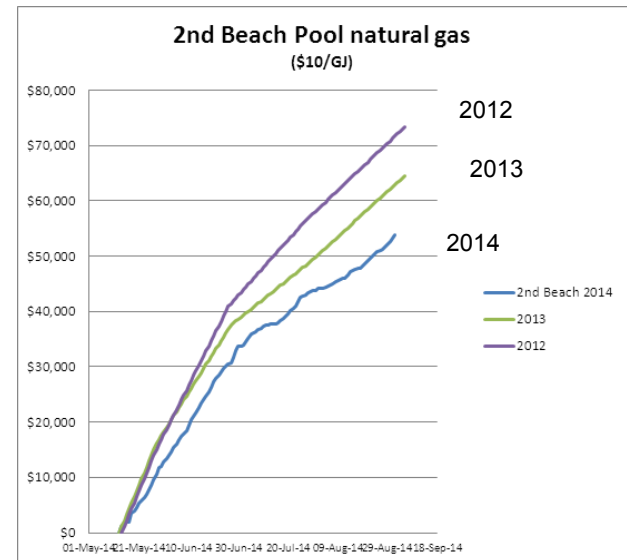
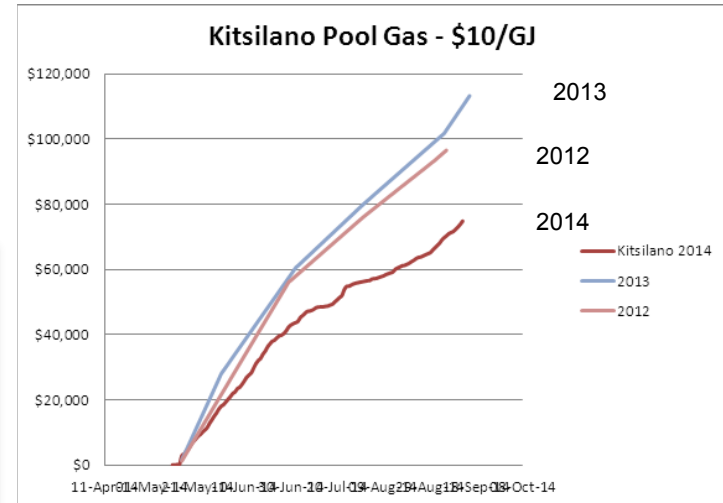


2006 to 2014

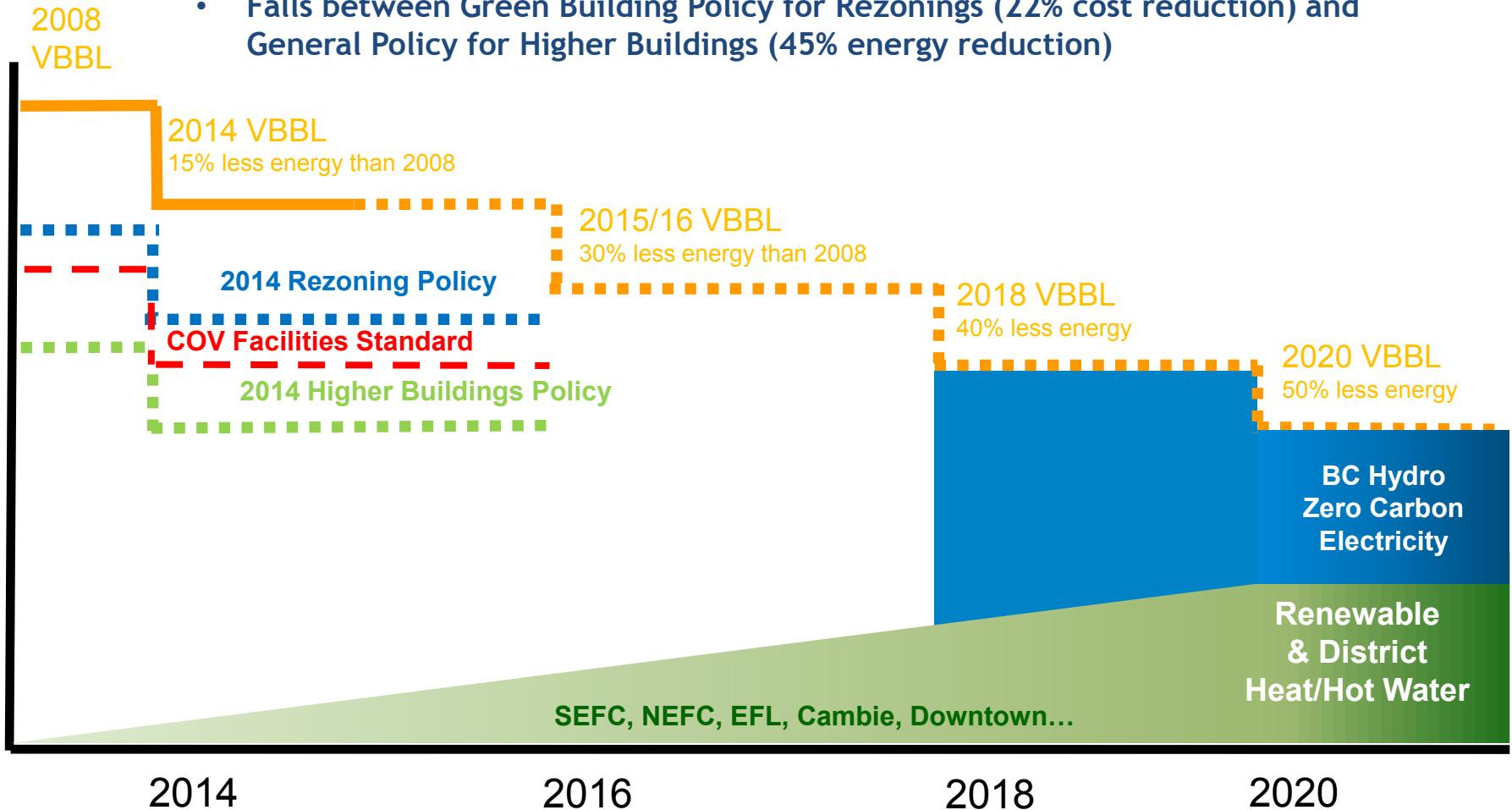
- 27% Gas Reduction
- 33% Electricity Reduction
- 92% GHG Reduction

Second Beach and Kits Pool Windbreak Project

- 30% reduction in natural gas consumption & GHG Emissions
- \$45k/year cost savings over summer 2014



- Current City owned new building requirement - “LEED Gold Certification + 30% lower energy consumption than the current VBBL”
- Falls between Green Building Policy for Rezonings (22% cost reduction) and General Policy for Higher Buildings (45% energy reduction)



Demonstrating Support for City's Zero Emission New (ZEN) Buildings Plan

Pilot projects:

- Firehall No.17 - Passive House Certification
- New City Owned Childcares - Potential for Passive House Certification



Firehall No.17- Proposed Rendering



Trout Lake Community Centre + rink + child care

Energy Champions Program

- 40 Energy Champions at 26 Parks Board sites and 14 Libraries
- Monthly Staff Engagement Campaigns
- Consultant Funded by BC Hydro



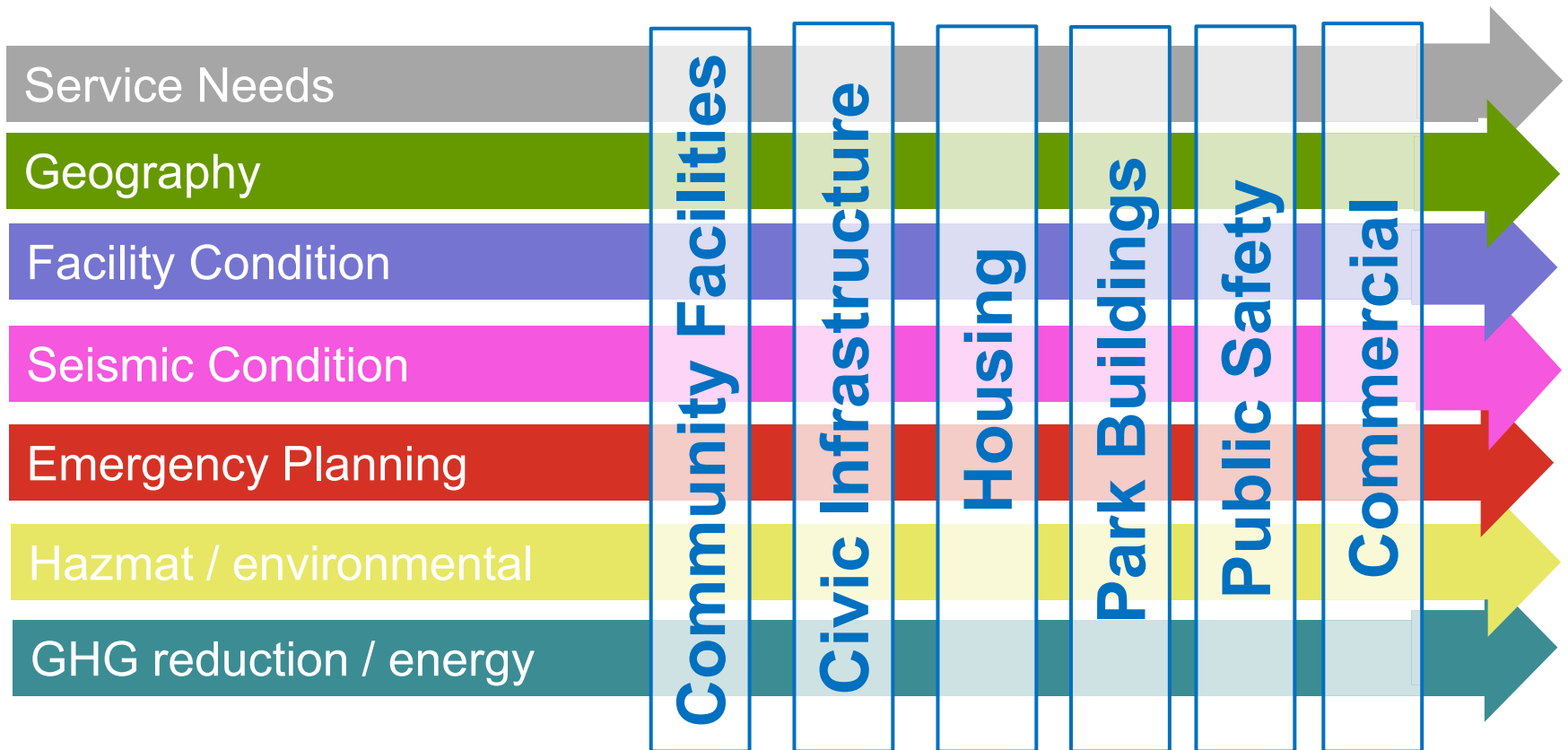
REFM Green Team

- 8 REFM staff from planning, development, and operations
- Deliver staff engagement programs supporting the REFM Departmental Action Plan for Green Operations



Strategy 5 Organizational Potential

Key Decisions: *Renewal? Disposal? Upgrade? New?*



Renewable Energy/Low Carbon Fuel Source Opportunities to meet 2050 target of 100% renewables:

- Biomass Boilers
- Solar PV / Thermal
- Biogas / Renewable Natural Gas
- District Energy
 - Creative Energy downtown core - low carbon conversion
 - Cambie Corridor low carbon district energy

GHG Reduction from Low Carbon District Energy

	GHG Savings (T/Y)	GHG Reduction %
Creative Energy - Central Heat		
Queen Elizabeth Theatre	399	2.1%
Central Library	254	1.3%
Roundhouse Community Centre	112	0.6%
150 Water/151 Cordova VFS	188	1.0%
Aquatic Center	726	3.8%
Sub Total	1,679	8.8%
Cambie Corridor		
Mt Pleasant CC	363	1.9%
City Hall	363	1.9%
Van City	35	0.2%
450 W Broadway	200	1.1%
VPD Cambie	109	0.6%
Hillcrest CC	1,391	7.3%
Manitoba Works Yard	885	4.7%
Sub Total	2,461.4	17.6%
Total	4,141	26.4%



Thank You

For more information contact:
Craig Edwards, Manager of Energy and Utilities
craig.edwards@vancouver.ca

