

Win-Win!

Improve Quality while Saving Energy

June 3, 2025

Steve Fetterly, P.Eng., CPD Associate <u>sfetterly@impacteng.ca</u>

Aspirational Ideas, Practical Implementation



1. Introduction

Impac

- 2. Background
- 3. Industry Trends & Incentive Programs
- 4. Solutions: energy, cooling and ventilation
- 5. Project Examples
- 6. Conclusion & Key Takeaways
- 7. Q & A



Impact Engineering is a team of Mechanical, Electrical & Energy Engineers.

We are comprised of six (6) Professional Engineers across a team of 22 professionals.

Our approach:

- Decarbonize building operations
- Reduce operating costs
- Improve comfort



Ben Mills P. Eng., CEM, CPHD Founding Principal



Kenneth McNamee P. Eng., MSc., CEM, CMVP Principal



Jason Le P. Eng., CEM Director of Engineering







Steve Fetterly P. Eng., CPHD Associate, Sr. Mechanical Eng.



Natasha Samson P. Eng. Sustainability Specialist



At Impact, we focus on the delivery of projects that improve system resilience & safety, while finding opportunities to reduce energy consumption and carbon emissions.

Energy & Carbon

- Energy Modelling
- ASHRAE Level 1-3 Energy Audits
- Net Zero Carbon Studies
- Measurement & Verification
- Recommissioning Studies

Mechanical Engineering

- HVAC, Fire & Plumbing Design
- Zero Carbon New Construction
- Mechanical System Retrofits
- Mechanical System Assessments
- Building Information Modelling (BIM)

Electrical Engineering

- Power, Lighting, Fire Alarm Design
- Arc Flash & Power Quality Studies
- Elect Condition Assessments
- Renewable Power & EV Assessments
- MV Campus Distribution











Background



- Increasing senior population / densification
- Expanded capacity requires more equipment, electrical capacity, energy
- Rising temperatures & increasing wildfires
- Energy costs & regulations on usage / GHGs
- Finite capital & operating budgets

B.C. falls behind in meeting needs of seniors as population grows, seniors advocate says

Seniors' advocate Dan Levitt asks for cross-ministry strategy to help seniors whose numbers are increasing

Dirk Meissner · The Canadian Press · Posted: Dec 11, 2024 7:38 PM PST | Last Updated: December 11, 2024



B.C. seniors' advocate Dan Levitt speaks at a news conference on Wednesday, where he talked about a report on the province's seniors' population. (Dirk Meissner/The Canadian Press)









Healthcare CSA Z317.2

Multi-Unit Residential Buildings

BCBC 2024: Temp limit of 26C in each dwelling unit VBBL 2025: Mechanical cooling in all new MURBs



A Warming Climate - BC Context





All Time Records Again!				
ytton (Canadian Record)	New 47.9°	^{Old} 46.6°		
Kamloops	45.8°	44.0°		
Abbotsford	42.9°	41.5°		
Kelowna	42.9°	41.5°		
Victoria A.	39.4°	37.7°		

Design Temp (July 2.5%) - BCBC
35°C (Lytton)
34°C (Kamloops)
29°C (Abbotsford)

33°C (Kelowna)

24°C (Victoria)





The current CoV guidelines for Passive Cooling state that the interior dry bulb temperature of occupied spaces cannot exceed specified acceptability limits (80%) for more than 200 hours per year, and 20 hours for vulnerable populations. The acceptability limits for Vancouver are outlined below and are based on a methodology defined in ASHRAE Standard 55.

Month	80% Acceptability Limit	
April	N/A (Mean temperature too low)	
May	25.2 °C	
June	26.1 °C	
July	26.9 °C	
August	26.9 °C	
September	25.2 °C	
October	N/A (Mean temperature too low)	



Industry Trends



- GHG Emission Reductions from buildings
- Fuel Switching (Low Carbon Electricity, Renewable Natural Gas)
- CleanBC Roadmap to 2030
 - All new buildings to be **zero carbon** by 2030
 - \circ $\,$ After 2030, all new space and water heating equipment to

be highest efficiency (>100%)



Reporting period for large multi-family buildings

Impa

Size of multi-family building	Data year	Reporting deadline
Greater than or equal to:9,290 square metres100,000 square feet	2024	June 1, 2025
Greater than or equal to:4,645 square metres50,000 square feet	2025	June 1, 2026

Types of buildings that are considered to be multi-family buildings

Review definitions building types in ENERGY STAR® Portfolio Manager® [7]

Multi-family building type	Related building type in ENERGY STAR® Portfolio Manager®
Care occupancies (Group B3 occupancy under Vancouver Building By-law)	 Healthcare: Ambulatory surgical centre Outpatient rehabilitation/physical therapy Residential care facility
Residential occupancies (Group C occupancy under Vancouver Building By-law)	Lodging/residential: • Hotel • Multi-family housing • Residence hall/dormitory • Senior living community



Vancouver Coastal Health

Embedding Low Carbon Resilience into Cooling Infrastructure Strategies

- 1. Baseline Establishment
- 2. Climate Ready Cooling Load Analysis
- 3. Electrical Distribution Assessment
- 4. Decarbonization & Energy Management Strategies
- 5. Project Prioritization Deliverable





Incentive Programs



Incentive Funding & Financing



BC Hydro



Enhanced Seniors Care for Climate Action | 2024-25









- → Commercial custom: **\$37,500** energy study + **\$500,000** installation
 - Energy efficiency: controls optimization, variable speed drives, etc.
 - Gas savings with heat recovery systems i.e. heat recovery chillers
- → Dual fuel rooftop units: **\$150,000**
- → Gas absorption heat pumps: **\$200,000**







- → Opportunity assessment: **\$5,000**
- → Feasibility study: **\$30,000**
- → Rebates for equipment upgrades: \$750,000^{*} for each site
- → Electrical service upgrade rebate: **\$200,000**









Eligible measures

- Lighting upgrades
- □ Heat pumps for space heating & cooling
- □ Heat pumps for domestic hot water heating
- □ Heat pump Make Up Air units for ventilation
- □ Variable speed drive motors
- Parkade CO controls
- □ High efficiency glazing
- **D** Electrical service upgrades





- → Commercial Energy Studies & Audits
 - Company-wide electricity usage > 2 GWh
 - Integrated Energy Audit: 100% funded
 - Feasibility Study: 50% or 100% funded

- → Solar PV and battery storage
 - **\$20,000**; or
 - **\$100,000** for social housing





Solutions







In-suite Heat Pump



Mini-Split Heat Pump



PTACs

- Individual suite temperature control
- Heat pumps provide high efficiency heating and cooling (reduced GHG emissions)
- No ducting required
- Costs from \$10,000 \$15,000 per suite



Heating / Cooling - Heat Pumps (Central)





- Central system / plant upgrades can be cost effective with large impact
- Plan with maintenance / replacement schedules
- VRF options for electric plant, gas engine, hybrid refrigerant-to-water system



Ventilation / Air Systems









Heat Pump RTU

Central heat recovery

Distributed HRVs

- MERV 13 filters for wildfire smoke
- HRV bypass option during warm temperatures



Domestic Hot Water Heat Pumps





Heat Pump Skids



Hybrid / split system



Gas Absorption Heat Pump

- Lots of heat pump options now available in varying sizes / capacities / refrigerants
- Solution depends on building i.e. integration with heating hot water system



Low Cost Energy Measures





Building Recommissioning



Lighting & controls



Variable speed drives



LUX Laundry System



Demand control ventilation







Structural Capacity



Electrical Capacity



Existing Systems



Project Examples





Youville Residence

Long Term Care Facility (Vancouver)

GHG Reductions + Cooling

- 1969
- 6 storeys
- 42 seniors + 37 residents needing specialized mental health services
- Natural gas boilers for heating
- No cooling







Youville Residence

Long Term Care Facility (Vancouver)

GHG Reductions + Cooling

- Condensing boiler plant upgrade
- High temperature air-to-water heat pumps
- Heat recovery ventilation
- Heat pump air-handlers
- New DDC system







Youville Residence

Long Term Care Facility (Vancouver)

GHG Reductions + Cooling

- Condensing boiler plant upgrade
- High temperature air-to-water heat pumps
- Heat recovery ventilation
- Heat pump air-handlers
- New DDC system





Project Example 2



Healthcare

George Derby Centre

Long Term Care Facility (Burnaby)

Energy Savings + Improved Ventilation

- 1988
- 2 storeys
- 300+ beds
- 130,000 sq.ft.
- Natural gas boilers for heating
- Limited cooling via common area water-source heat pumps + cooling tower





Project Example 2



Healthcare

George Derby Centre

Long Term Care Facility (Burnaby)

Energy Savings + Improved Ventilation

- Condensing boilers for heating & DHW
- Water-source heat pump for DHW pre-heat
- New HRVs for improved ventilation
- VFDs on air handling units
- New DDC system
- Recommissioning and controls sequences







Project Example 2



Healthcare

George Derby Centre

Long Term Care Facility (Burnaby)

Energy Savings + Improved Ventilation

- Condensing boilers for heating & DHW
- Water-source heat pump for DHW pre-heat
- New HRVs for improved ventilation
- VFDs on air handling units
- New DDC system
- Recommissioning and controls sequences







Holy Family Hospital

Acute Care + Long Term Care (Vancouver)

80% GHG Reduction + Expanded Cooling

- 1947
- 2 storeys
- 65 acute beds + 126 long term care beds
- 121,000 sq.ft.
- Natural gas boilers for heating
- Chilled water system for cooling







Holy Family Hospital

Acute Care + Long Term Care (Vancouver)

HVAC Upgrades

- Thermal Gradient Header system
- Heat Recovery Chillers
- Electric and condensing boilers
- Exhaust Heat Recovery AHUs
- Switchover coils
- Optimized controls









Holy Family Hospital

Acute Care + Long Term Care (Vancouver)

Electrical Upgrades

- Cooling (New Chillers)
- Kitchen equipment switch to electric
- LED Lighting Upgrade
- Solar PV







Holy Family Hospital

Acute Care + Long Term Care (Vancouver)

Results

- Leveraged assets (within electrical capacity)
- Upgraded infrastructure (generator + solar)
- Resilience: New equipment, cooling, filtration, expansion
- 80% reduction in GHG emissions





Conclusion





Summary

- Increasing demand for long term care
- Need to improve climate resilience
- Energy regulations
- Available incentive funding
- Cooling, ventilation, and energy solutions
- Project examples / case studies

Key Takeaways

- Energy savings opportunities with recommissioning
- Leverage existing assets for cooling
- Best solutions specific to each building
- Plan for equipment failure
- Take advantage of incentive programs
- Act (plan) now!

Thank you - Q & A

Steve Fetterly, P. Eng., CPHD Associate 604-339-2650 <u>sfetterly@impacteng.ca</u>