



SEÑÁKW

Building a Regenerative Community

Revery | Kasian | AME | Reshape |
Creative Energy | Peak Construction Group

zeic

ZERO EMISSIONS INNOVATION CENTRE

MORE SOLUTIONS, LESS CARBON.

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Agenda

Mingling/Networking

(15min)

Land Acknowledgement & Contributors

(3min)

01 Project Overview / Sustainability Framework

(17min)

02 Low Carbon Initiatives

(10min)

03 District Energy

(10min)

Q&A

(20min)

Walk to site

(5min)

Site / Perimeter Tours

(60min)

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Land Acknowledgement

Sen'ákw (noun): “The place inside the head of False Creek”

Sen'ákw (verb): “The start of something beautiful; respect for nature, for indigenous peoples, for healing, and for a new path forward”



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Contributors

reveryARCHITECTURE

kasian 

A M E Group

RESHAPE
STRATEGIES

CREATIVENERGY
YOUR COMMUNITY ENERGY PARTNER

 GLOTMAN · SIMPSON
CONSULTING ENGINEERS


PEAK
CONSTRUCTION GROUP

PUBLIC
WORK

 NCH'KA'Y



Skwxwú7mesh
Úxwumixw

 westbank



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01

Project Overview / Sustainability Framework

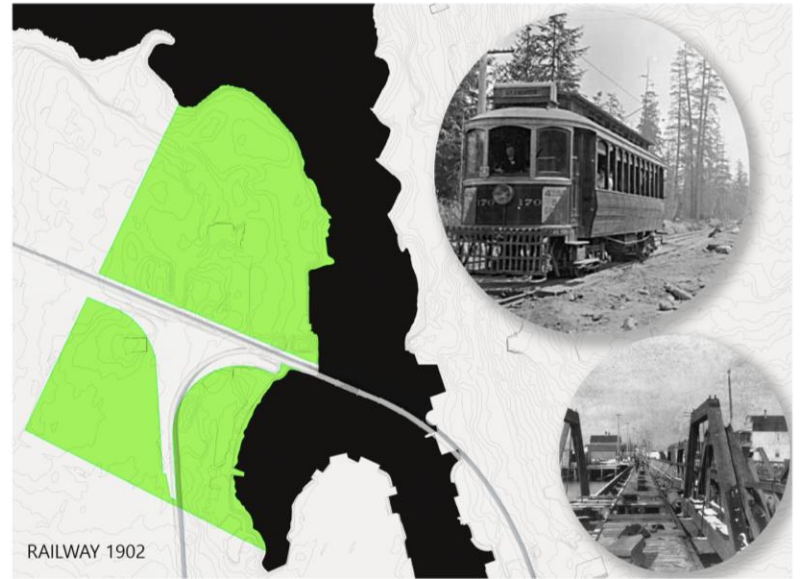
Senakw – A Transformative vision



Objectives

- **City-Building** - Transit-oriented mixed-use community – a transformative injection of new rental housing supply
- **Legacy** project for the Squamish Nation reflecting its history and culture
- **Climate leadership** demonstrated on a global scale
- **Economic benefits:** significant generation for the Squamish Nation to allow it to meet pressing housing, education and social service needs
- **Reconciliation:** an indigenous-private sector collaboration that furthers national reconciliation on a massive scale





10.48 Acres

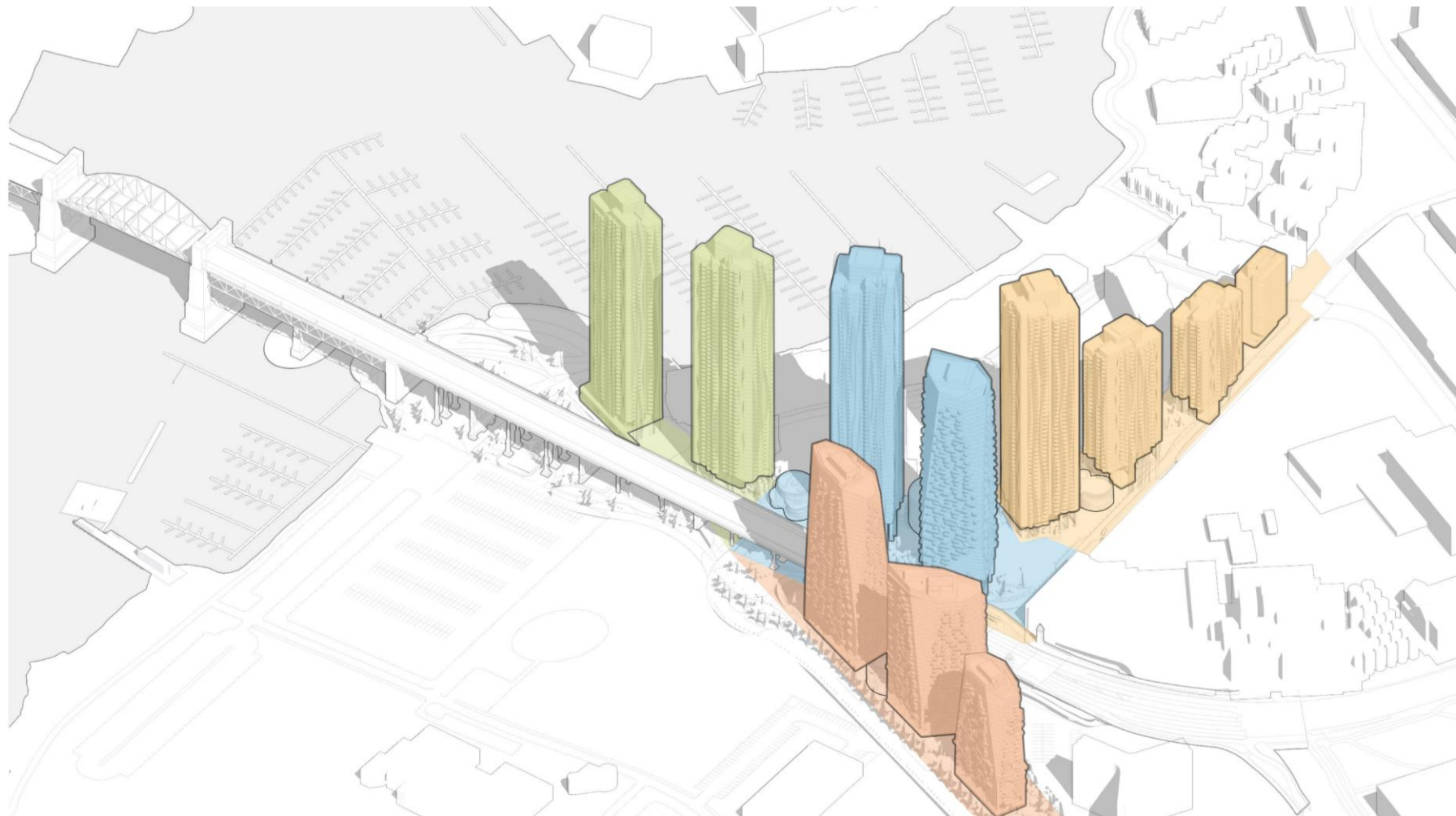
Site Area

6,000

Total Number of Units

~4,000,000 SF

Total Area





Economic Sustainability

- **Mixed use community:**
 - Residential**
 - Commercial / retail**
 - Office**
 - Public amenities & greenspace**
- **Economic Independence for the Squamish Nation**
- **Long-Term value**
- **Housing**
- **Generation of jobs, training and opportunities for the Nation**

Cultural Sustainability

- Indigenous-based values

Nature

Well-being

Kinship

- Embedded Values, Culture & Spirit of the Squamish Nation
- Working in Step with Nature





Site Strategy

- **Typology: 'Village In the Park'**

Liberating the ground plane

Celebrating the significance of the Land

Creating movement and porosity through the site



Building Typology

- **Typology: 'Village In the Park'**

**Natural & Functional
Landscapes**

Active Social Spaces

**Opportunities for interaction
and connectivity**



Site Integration

- **Typology: 'Village In the Park'**

Under the bridge

Social and cultural venues

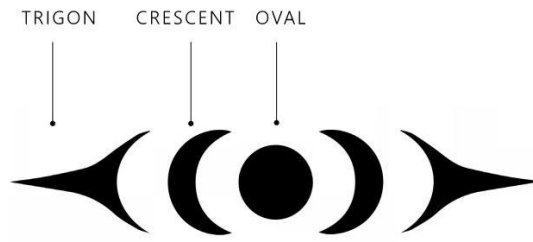
Recreational opportunities



Social Sustainability

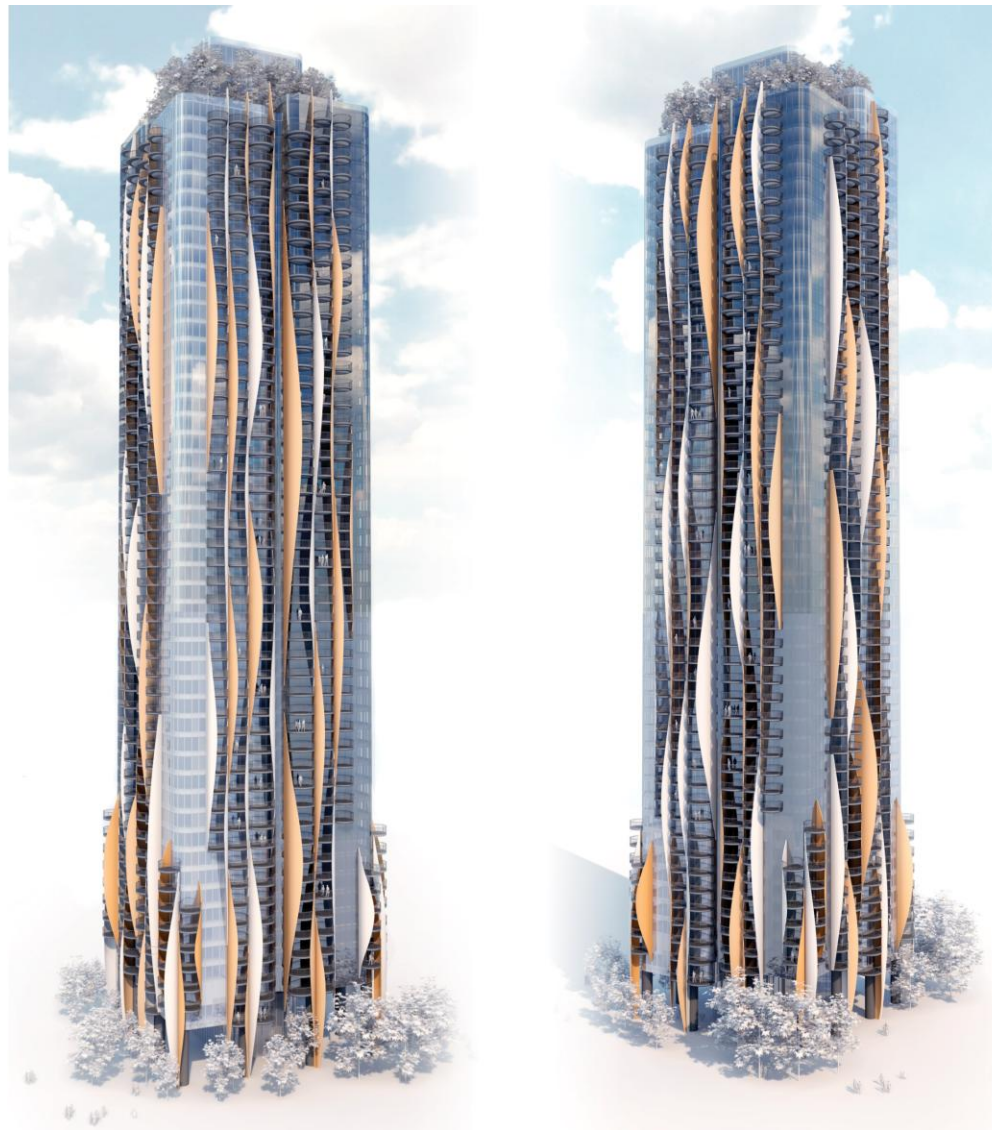
- Health/ wellness
- Activating community
- Communal spaces
- On-site food assets





Art / Culture Integration

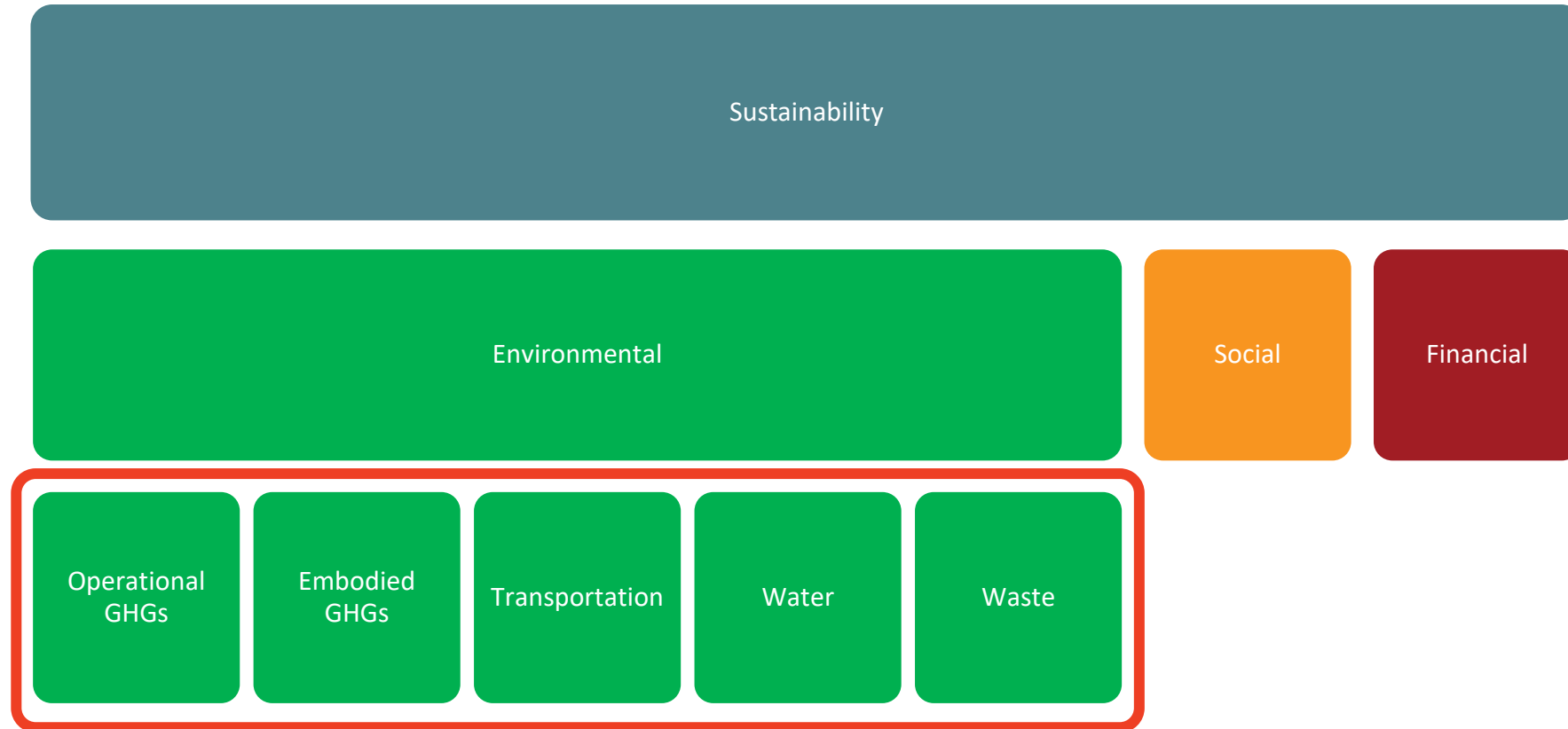




Art / Culture Integration

Sen'ákw – Environmental Sustainability

Scope



Sen'ákw – Environmental Sustainability

Frameworks



One Planet Living



LEED Neighbourhood Development



Living Community Challenge



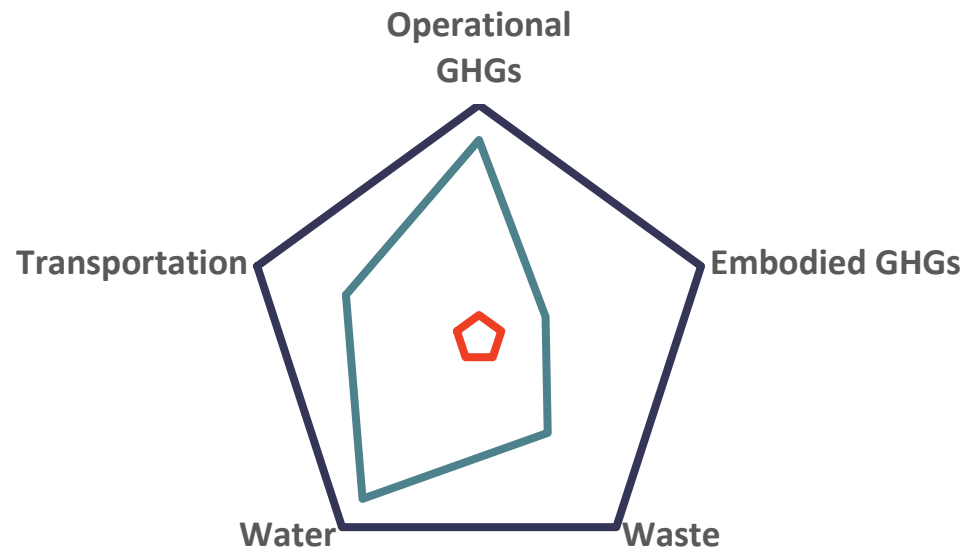
BREEAM



City of Vancouver Large Sustainable Sites Requirements

Sen'ákw – Environmental Sustainability

Self-Determined Project Priorities



— Benchmark

— Base Design

— Advanced Performance

BASE DESIGN

Outcomes:

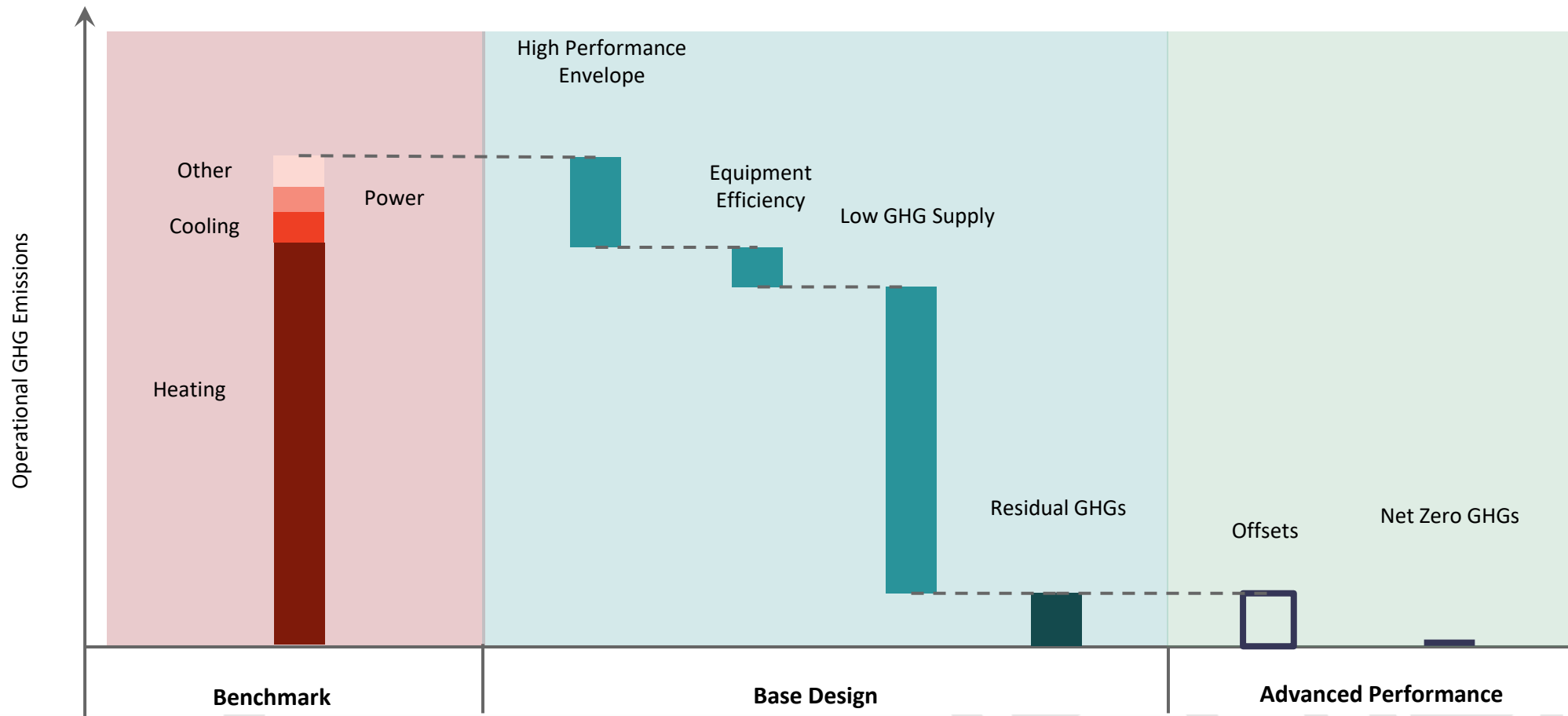
- ~90% reduction in Operational GHGs
- 10% reduction in Embodied GHGs
- 50% reduction in building energy use
- ~90% capture of rainfall
- 30% water use reduction
- Dramatic reduction in transportation GHGs due to proximity from public transportation and pedestrian / bike paths
- Enhanced green space

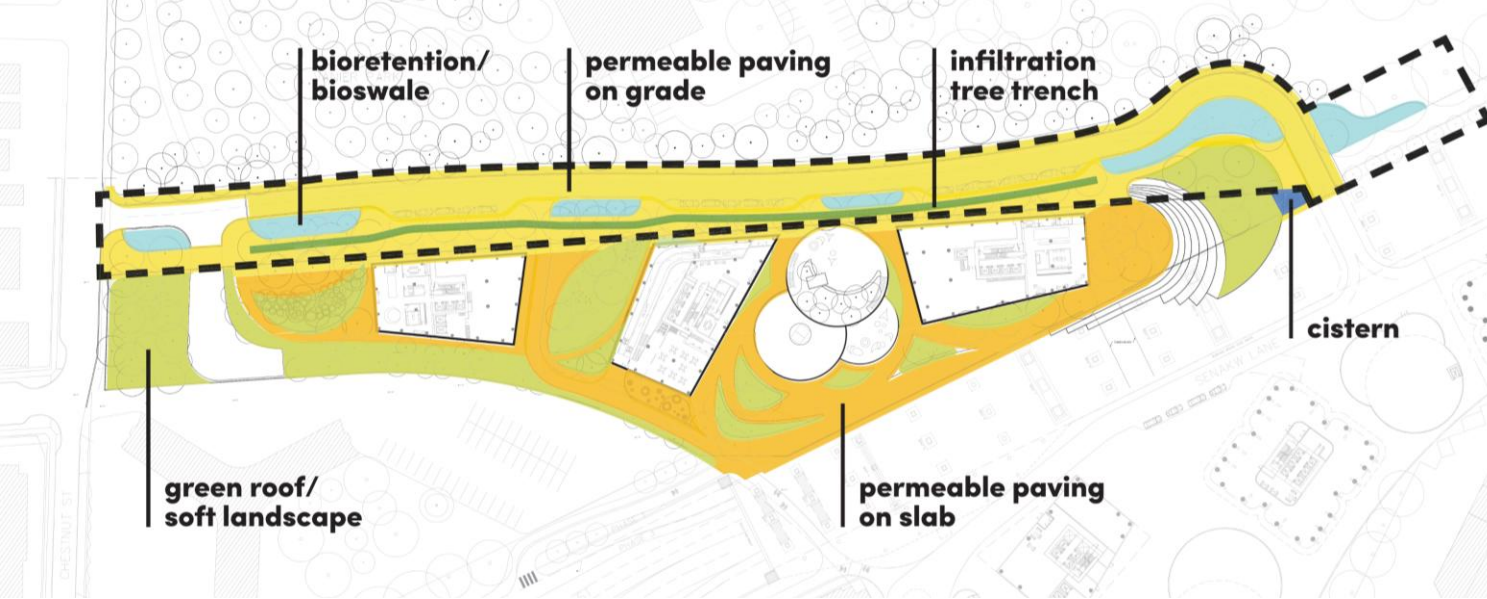
Measures:

- Advanced building envelopes
- High-efficiency in building systems
- Low carbon district energy system
- Low flow fixtures
- Advanced bike parking and infrastructure
- 100% of parking stalls wired for electric vehicles

Sen'ákw – Environmental Sustainability

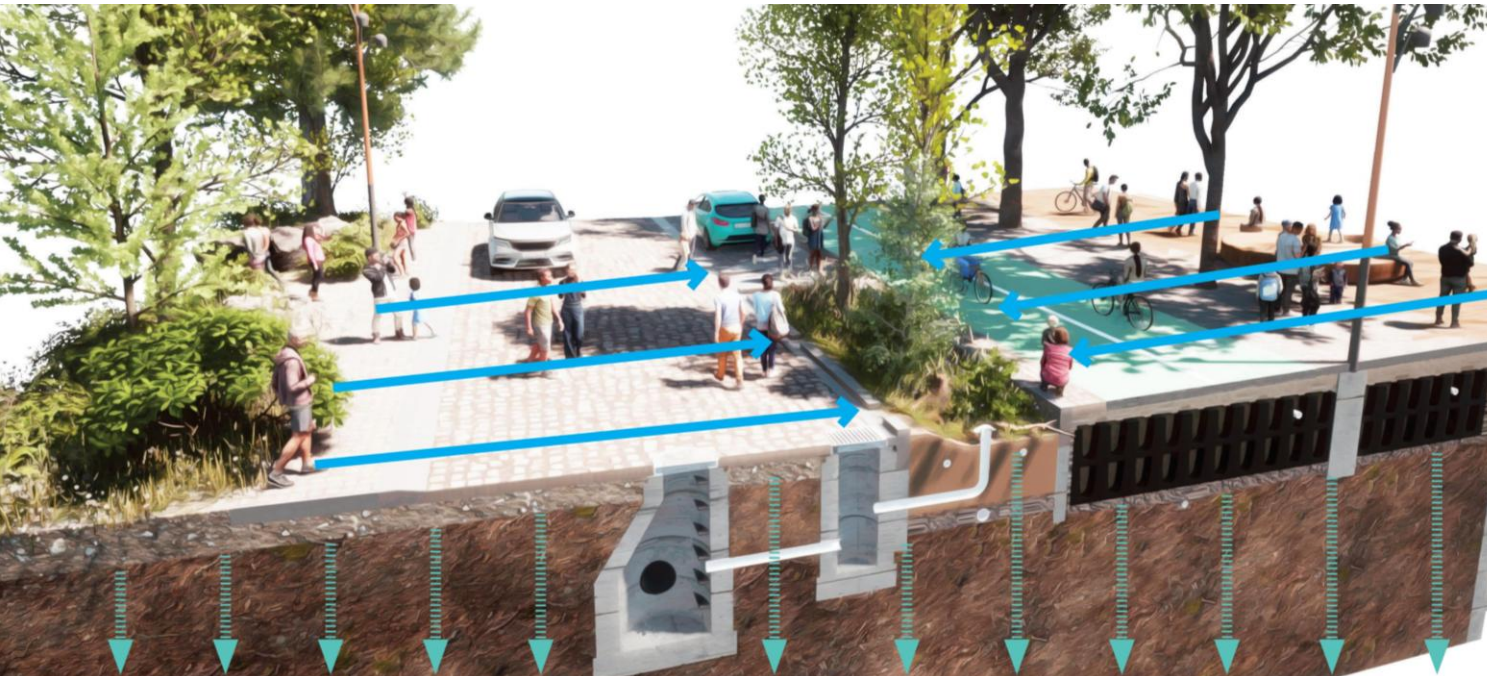
Focus on Operational GHG Emissions,
and a Balance Between Supply and Demand Measures

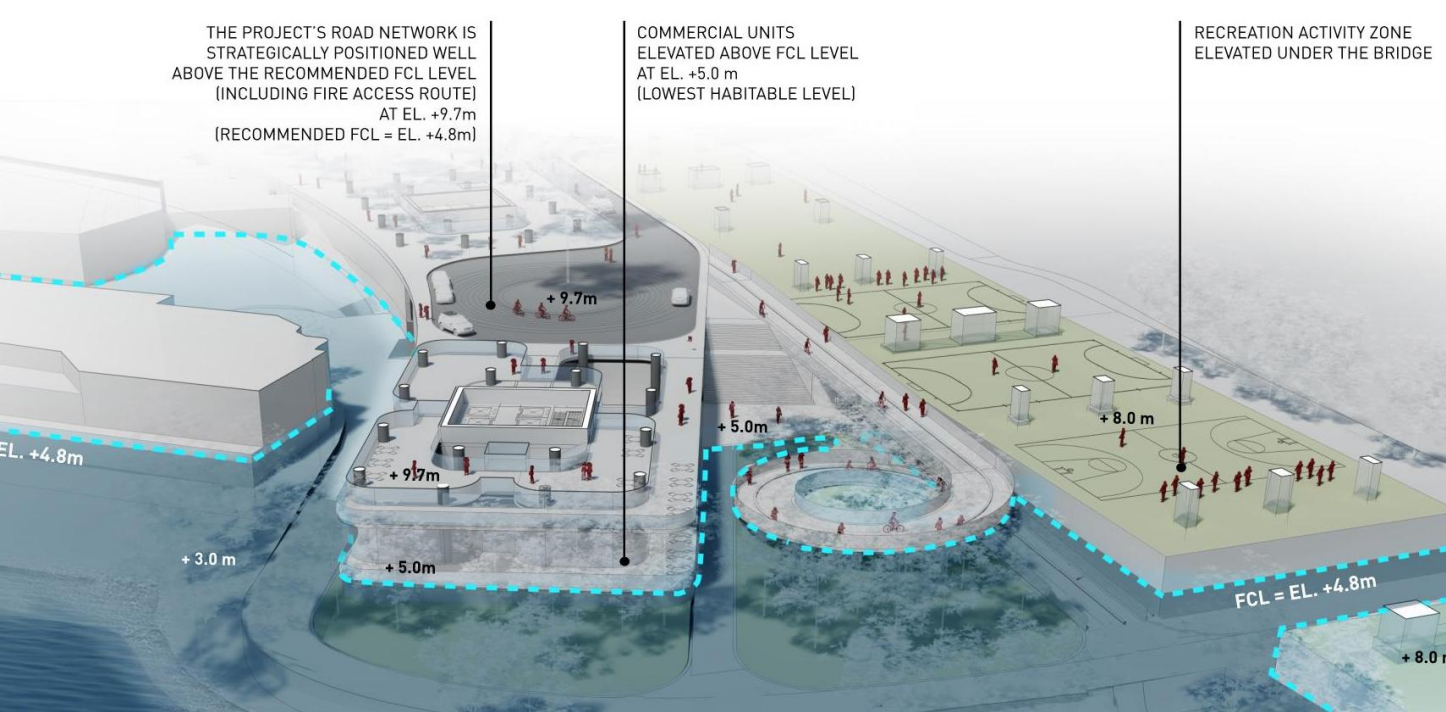




Environmental Sustainability

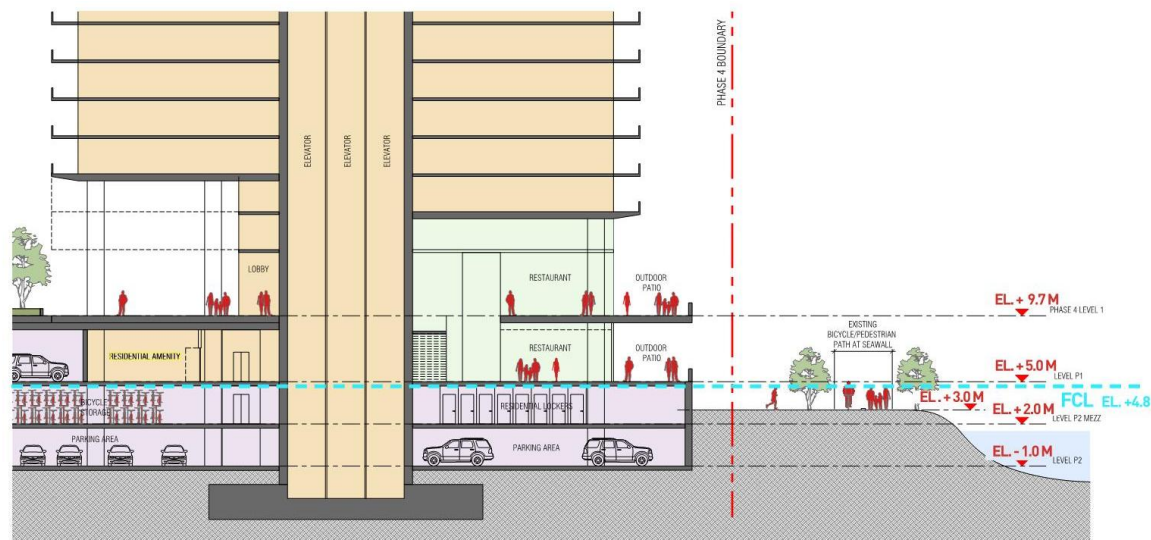
- Water-Wise Development
- Stormwater Detention and Retention
- Functional Landscapes
- Social / Natural integration





Climate Resiliency

- Design for flood control mitigation
- Design for Sea-Level Rise
- Community that works with water
- Integration of Green/Blue systems



Green Mobility Bike Network



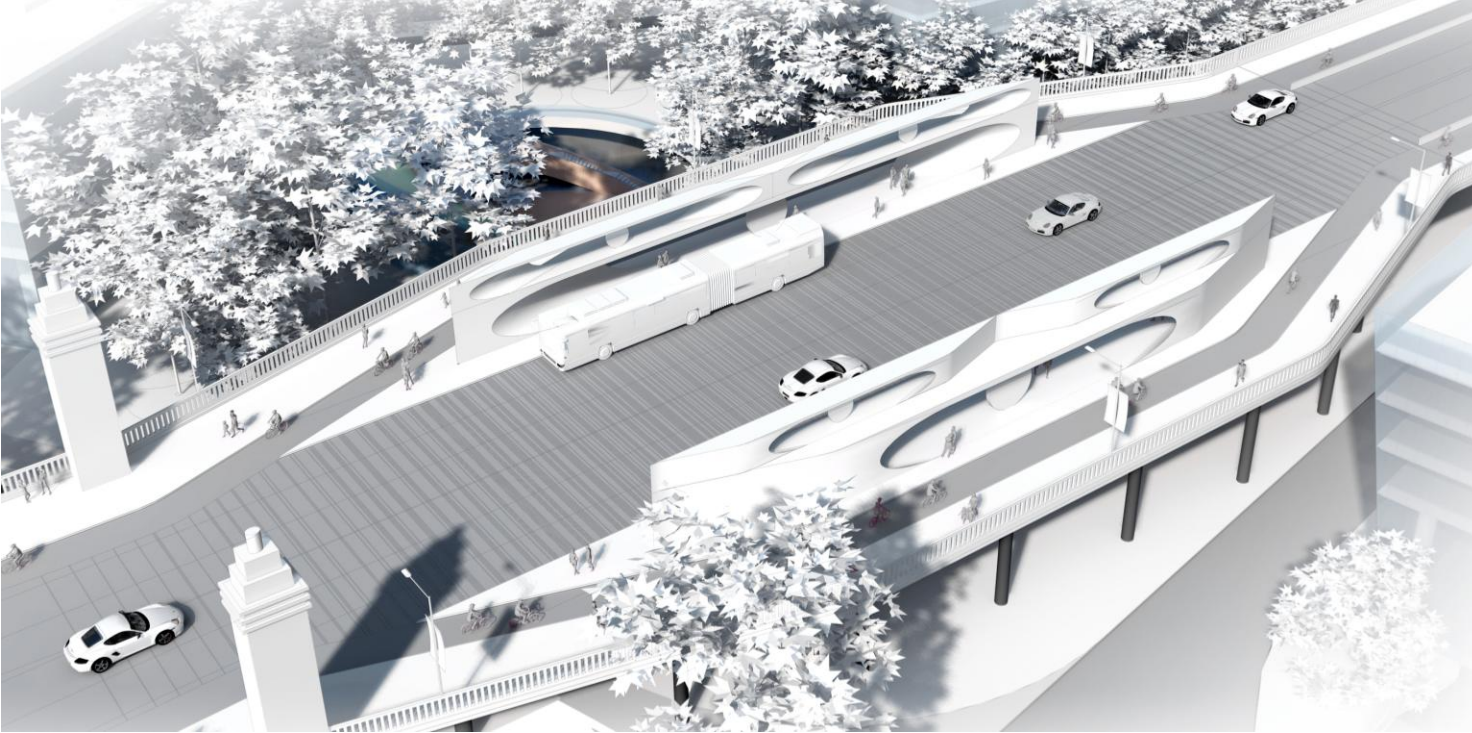
- Extensive Bike Network / Infrastructure
- U/G secured bike storage housing ~4,500 bikes with dedicated access and facilities



Green Mobility Bike Network

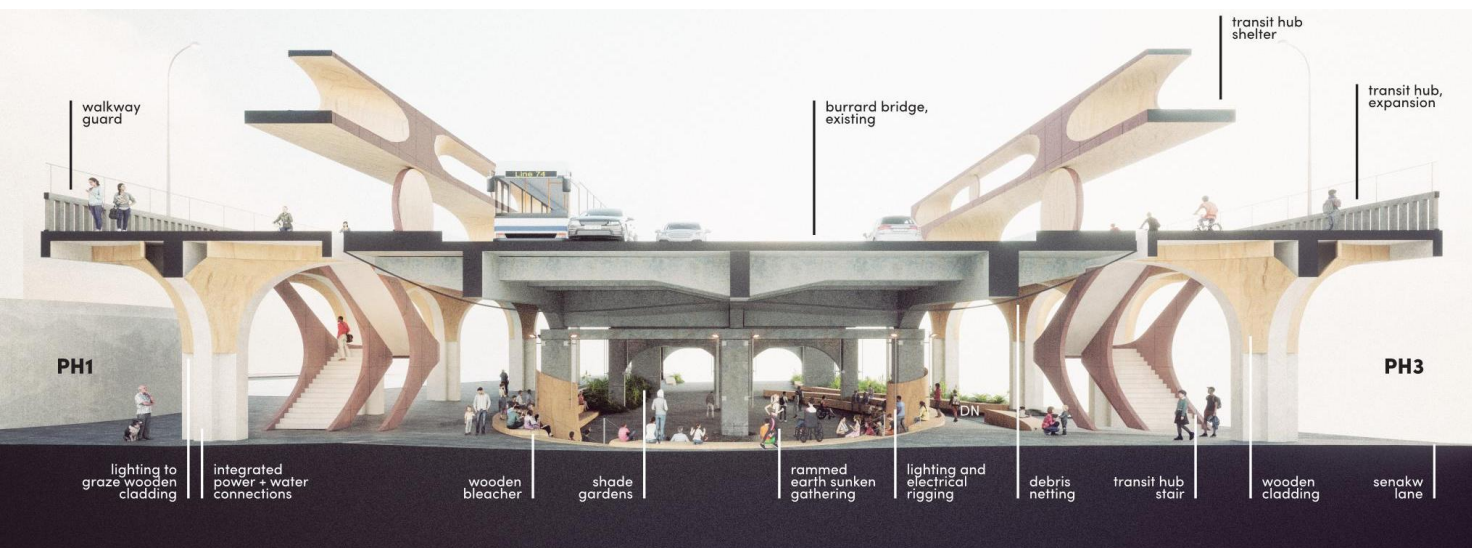
- End-of-trip facilities
- Bike Club and Café
- Repair Hub
- Dedicated access





Transit Hub

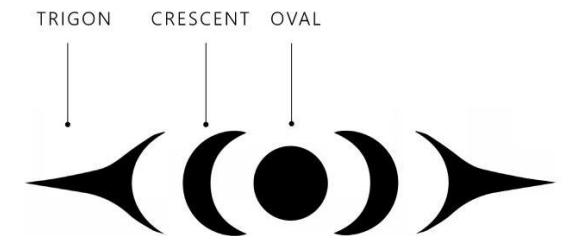
- Iconic Gateway showcasing new Green Infrastructure
- Connecting The City Through Culture and Transport





Transit Hub

- Promoting Connectivity
- Healthy, vibrant, active community
- Culture integration





Alternative Transportation

- Considerations for future Aqua bus service
- Considerations for future Streetcar station



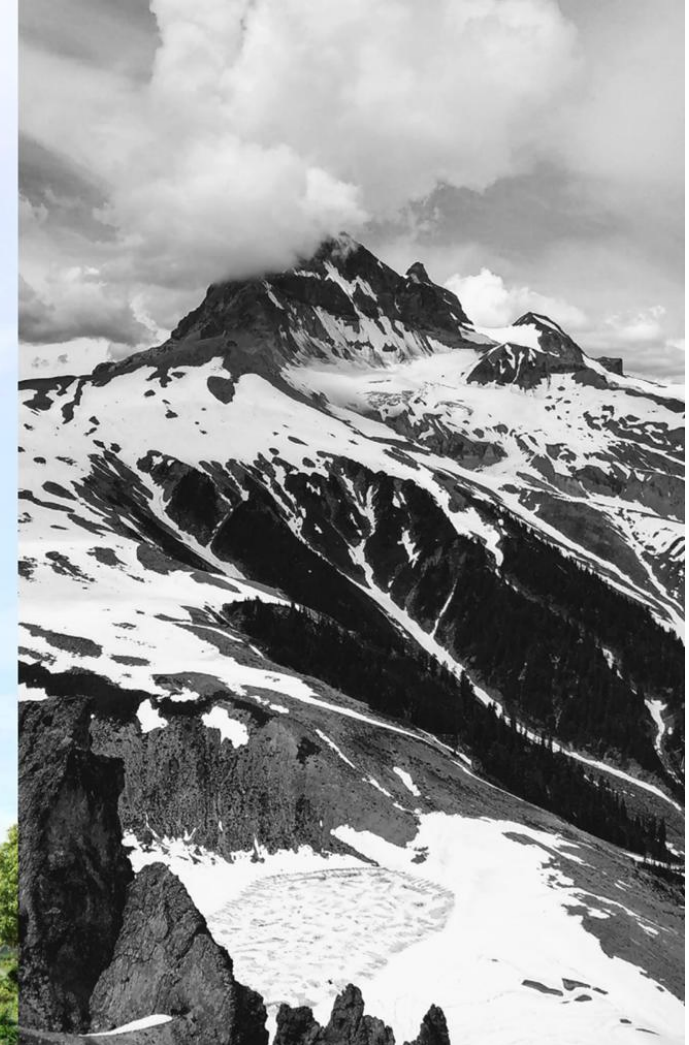


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02

Low Carbon Initiatives

Operational Carbon



Operational Carbon: Building Performance Metrics



BC Energy Step Code: Step 3



CMHC: Energy and Greenhouse Gas Savings

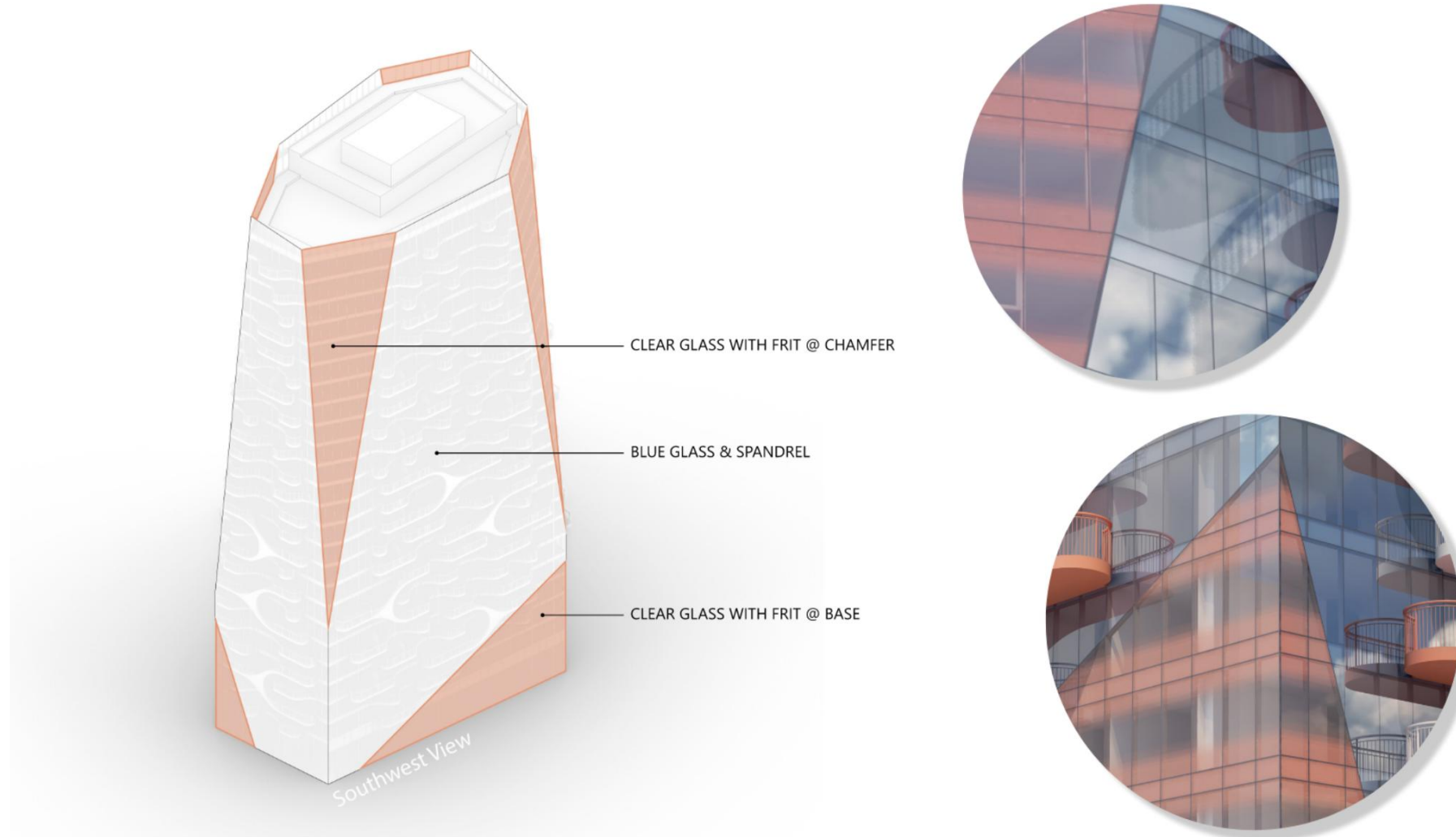
	Energy Use TEUI kWh/m ² /y	Heat Demand TEDI kWh/m ² /y	GHGI kgCO _{2e} /m ² /y
Step 3 Target	120	30	-
Project	68	28	1.1

Operational Carbon: Building Performance Strategies



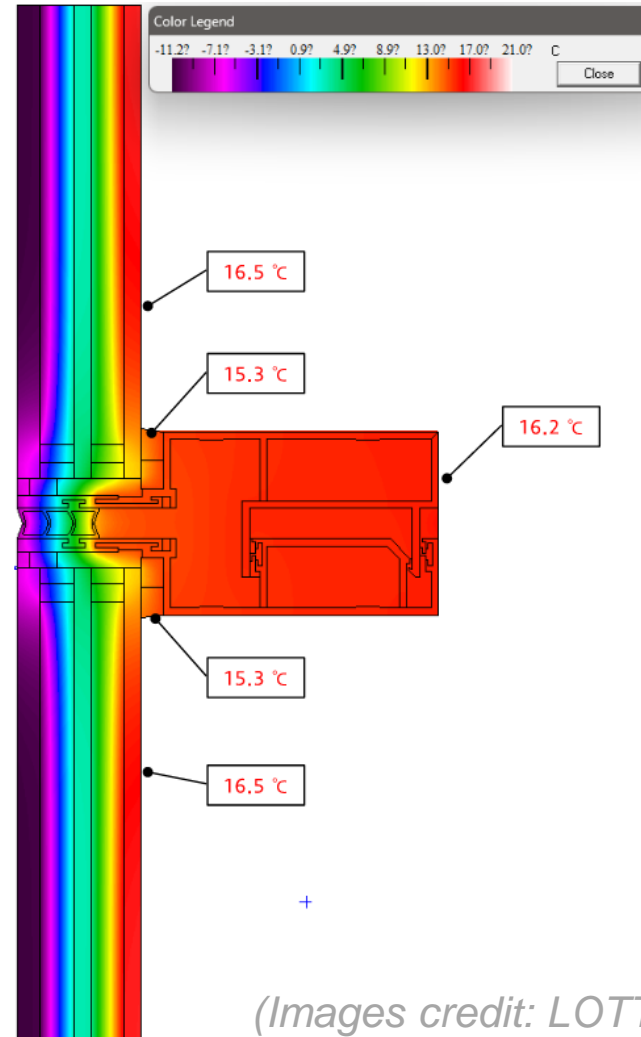
- District Energy Plant
Heat pump system with simultaneous heating and cooling
- In-suite heat exchanger panels with on-demand hot water
- Significant extent of triple-glazed windows
- High efficiency heat recovery on ventilation air (ERV)
- Low flow water fixtures (26% reduction from code)

Operational Carbon: High Performing Curtain Wall

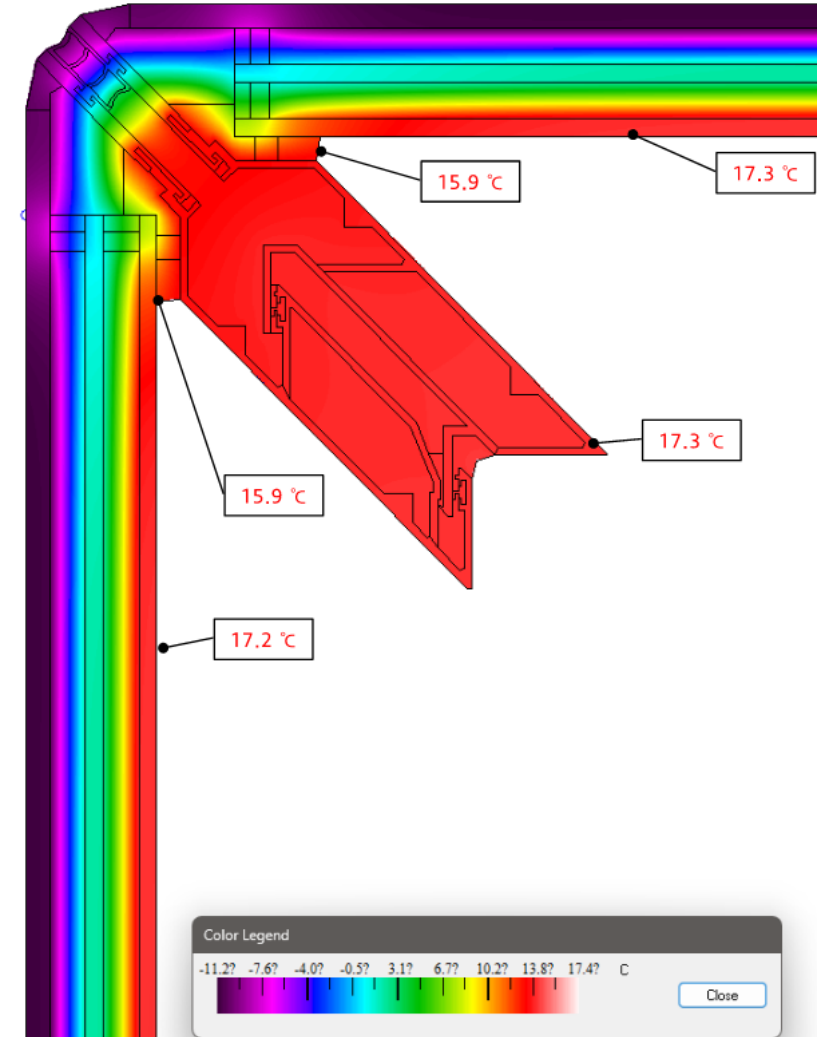


High Performing Curtain Wall - Design

- U-0.24, SHGC-0.25 curtain wall
- Effective R-3.7 walls
- Effective R-20.4 roof
- 0.20 L/s/m2 of façade air leakage rate
- 70% efficient heat recovery ventilators (ERVs) for residential, 77.4% for the pavilion central ERV.



(Images credit: LOTTE)




High Performing Curtain Wall - Design

- Performance values and samples from Lotte reviewed by RDH and the Architecture team.

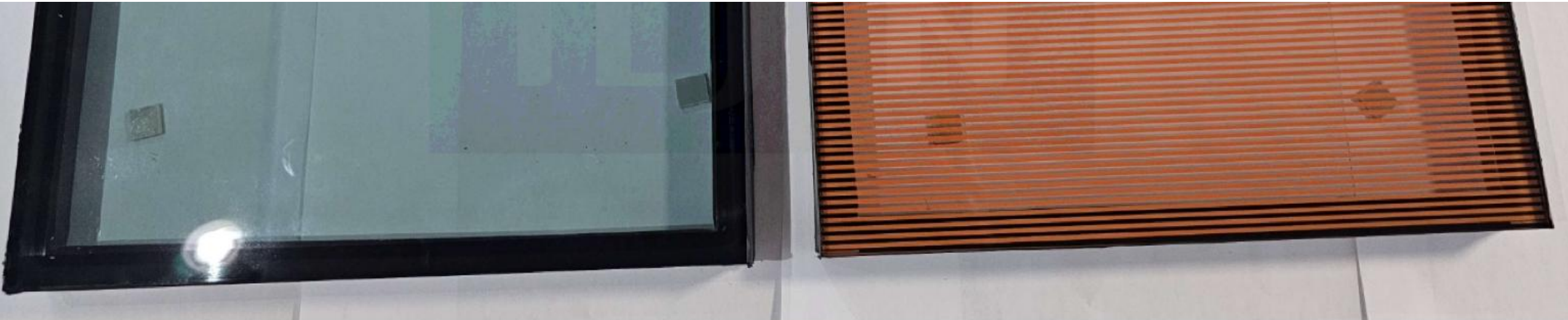


PROJECT		Senakw_P1
ITEM	NO.	VGL1
	PRODUCT	CW IGU_Control sample
	Description	8mm Clear FT/HST with (YQE-0156) on #2 +12mm Air spacer (TGI Black Warm Edge Spacer with 90% Argon infill) +6mm Clear HS +12mm Air spacer (TGI Black Warm Edge Spacer with 90% Argon infill) +6mm Clear FT/HST with Low-E (YME-0185) on #5
		


PROJECT		Senakw_P1
ITEM	NO.	VGL2
	PRODUCT	CW IGU_Control sample
	Description	8mm Low-Iron FT/HST with Silk Screen Ceramic Frit on #2 (Ceramic Frit Color: SW-6635, 1.5mm Strip +2mm Space) +12mm Air spacer (TGI Black Warm Edge Spacer with 90% Argon infill) +6mm Low-Iron HS with Low-E (YNE-0675) on #3 +12mm Air spacer (TGI Black Warm Edge Spacer with 90% Argon infill) +6mm Low-Iron FT/HST with Low-E (YME-0685) on #5
		

High Performing Curtain Wall - Design

- Performance values and samples from Lotte reviewed by RDH and the Architecture team.



PROJECT		Senakw_P1
ITEM	NO.	SGL1
	PRODUCT	CW IGU_Control sample
	Description	8mm Clear FT/HST with (YQE-0156) on #2 +12mm Air spacer (TGI Black Warm Edge Spacer with 90% Argon infill) +6mm Clear HS
		

PROJECT		Senakw_P1
ITEM	NO.	SGL2
	PRODUCT	CW IGU_Control sample
	Description	8mm Low-Iron FT/HST with Silk Screen Ceramic Frit on #2 (Ceramic Frit Color: SW-6635, 1.5mm Strip +2mm Space) +12mm Air spacer (TGI Black Warm Edge Spacer with 90% Argon infill) +6mm Low-Iron HS with (YNE-0675) on #3
		

High Performing Curtain Wall – Performance Mockup Unit

- Performance Mockup Unit (**PMU**) developed in South Korea.
- Consultants attended the PMU tests, which included: air tightness, water penetration under static and dynamic pressure, structural performance under air pressure (positive and negative), horizontal and vertical movement, among others.



High Performing Curtain Wall – Performance Mockup Unit



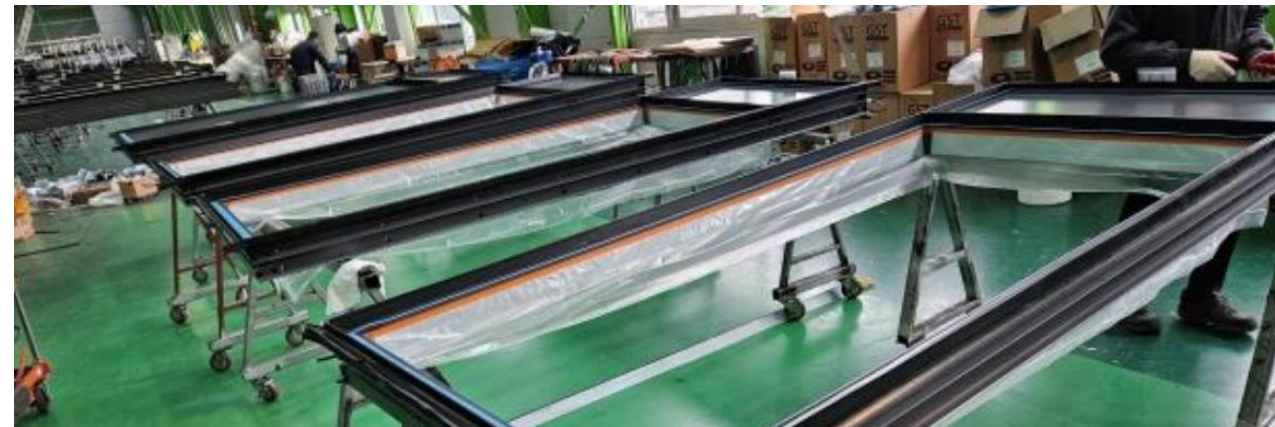
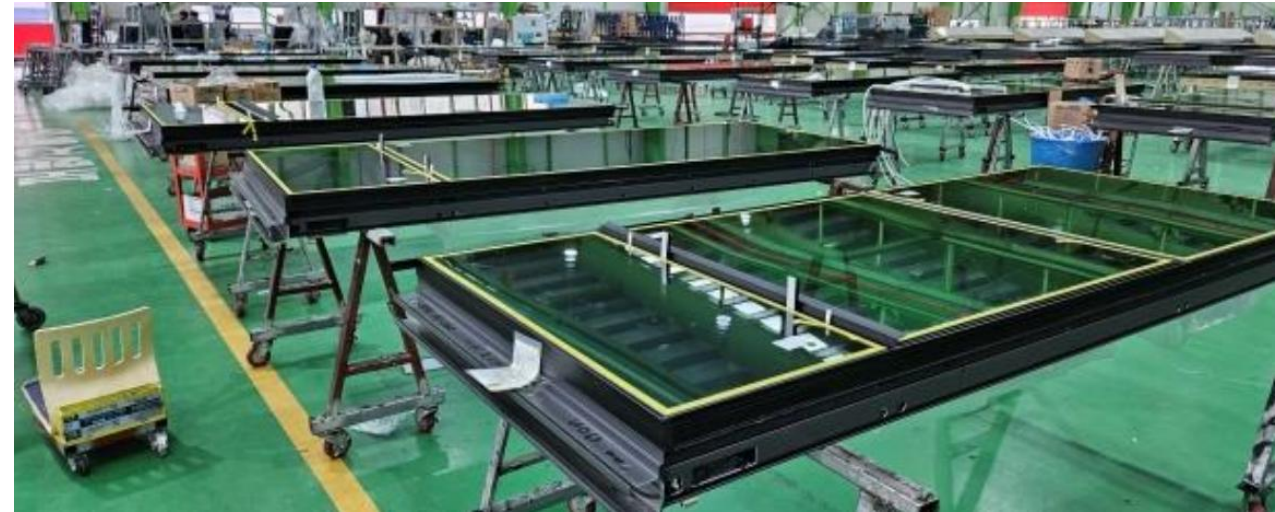
High Performing Curtain Wall – Visual Mockup Unit

- For the review of the **aesthetic** aspects of the design.



High Performing Curtain Wall - Fabrication

- Work at the Lotte factory. Atlas Façades as the representative in South Korea to review the ongoing production.



High Performing Curtain Wall - Installation

- Arrival of curtain wall shipments. Panels ready to be installed.



High Performing Curtain Wall - Installation

- Use of spider crane to lift the panels.



High Performing Curtain Wall - Installation

- Starter track and finished curtain wall installation.

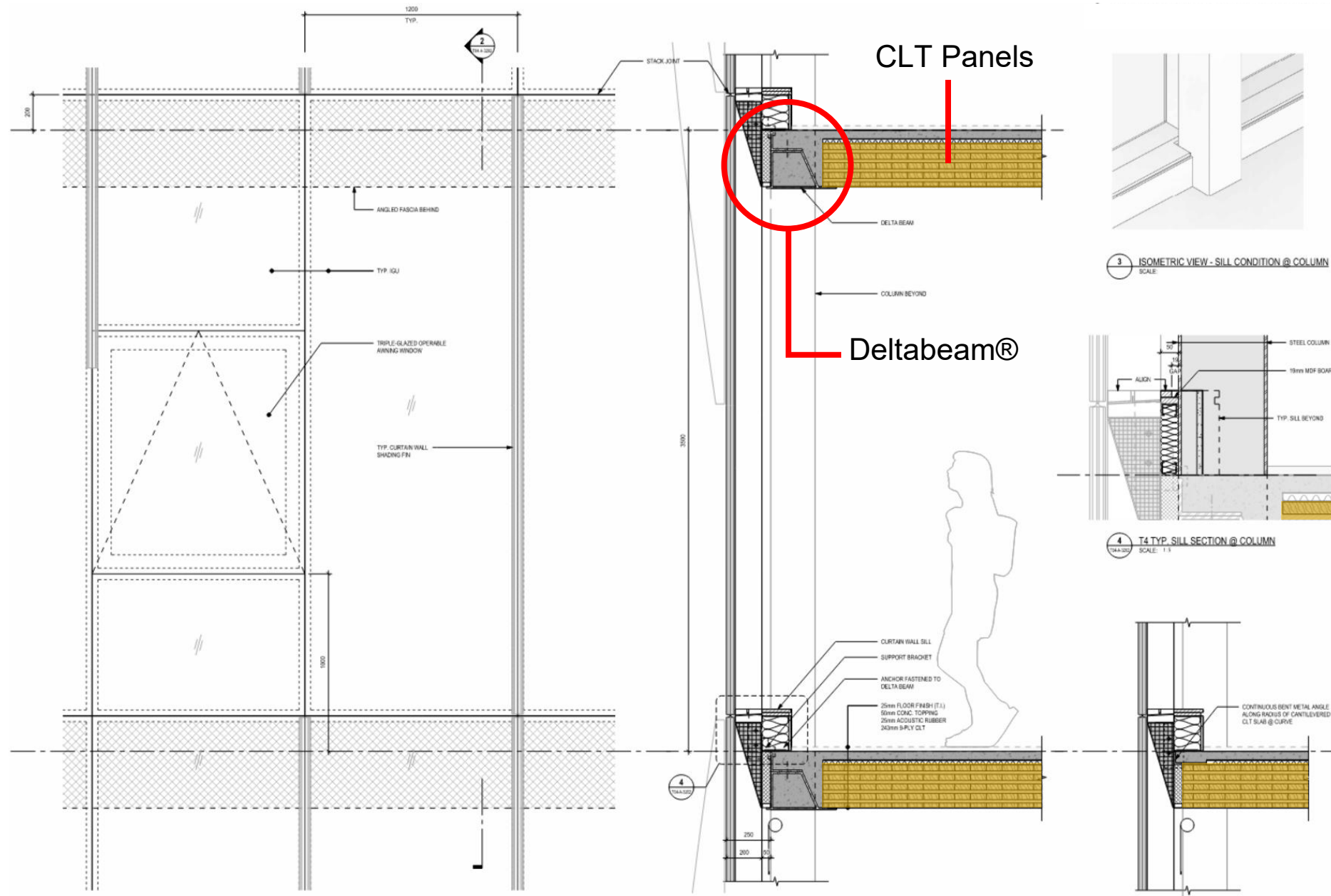


Embodied Carbon

Hybrid mass timber for Tower 4

- Use of CLT panels for floor slabs.
- Use of Deltabeam® or similar structure.



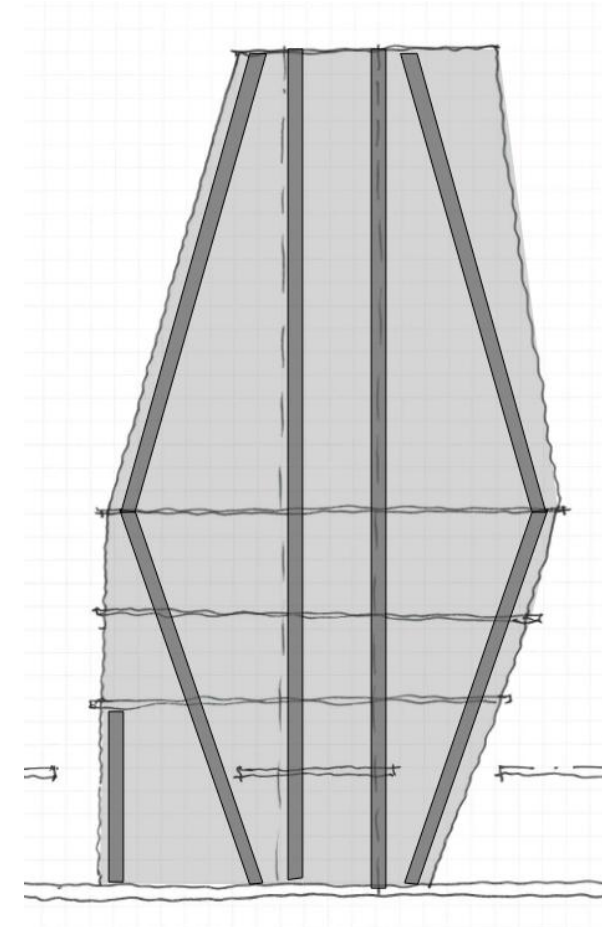
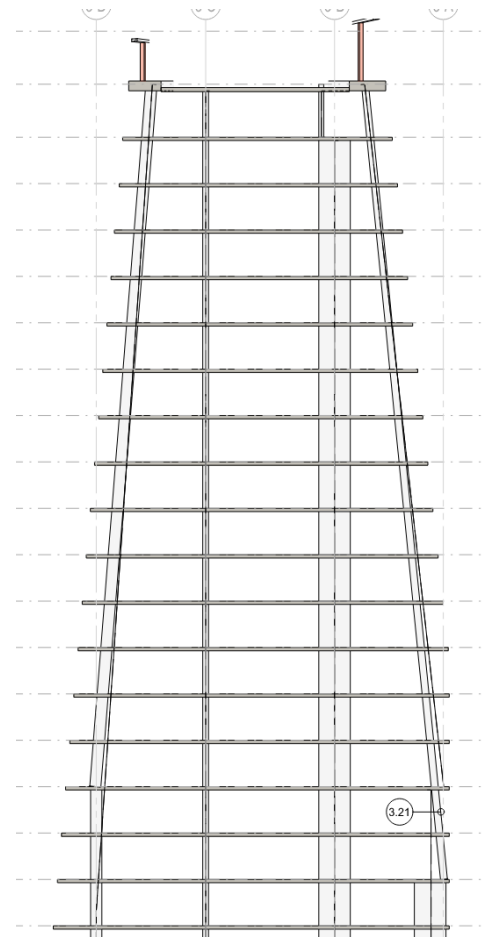


Embodied Carbon

Strategies to reduce building materials

Mountain Towers

- Majority of columns continue to foundation without transfer beams/slabs.
- Sloped columns are laid out to balance the building as much as possible. Opposing slopes along the same grid.
- Removed the base chamfers to reduce structural demands on core

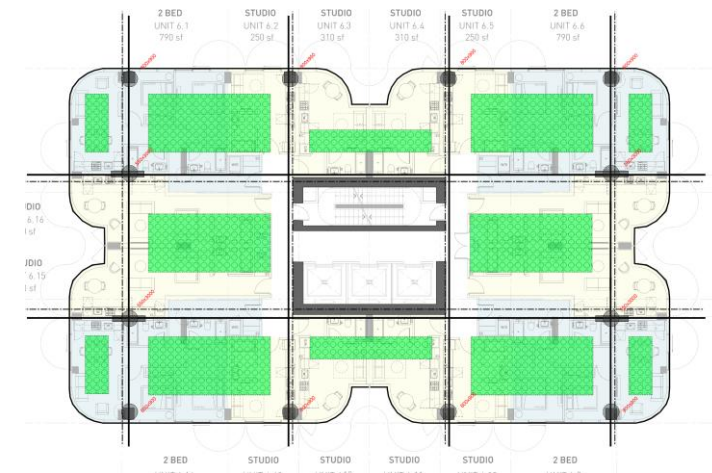
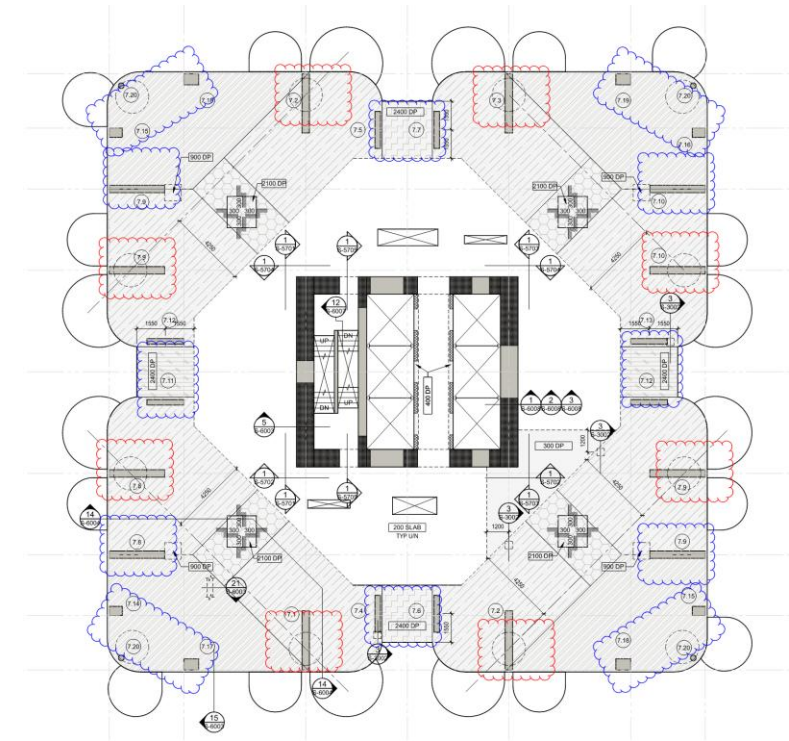


Embodied Carbon

Strategies to reduce building materials

Long Towers

- Tower columns transfer but laid out to transfer every other column rather than all.
(Refer to diagram: blue transfers, red continues down to foundation)
- Bubble deck + PT studies, not adopted but reviewed for rectangular and square floor plates to reduce column quantities and eliminate all transfers.



Embodied Carbon

Strategies to reduce building materials

**Reduced parking =
Reduced building
basements**

- Due to the reduction in vehicle parking, the required number of underground basements for parking was reduced to only one, which is significantly different from conventional developments that usually have several basements for parking.



Other Low Carbon Initiatives

Water use reduction

- **Indoor water** use reduction – low flow/flush fixtures:
 - Lavatory faucets: 1.2gpm
 - Kitchen sink faucets: 1.5 gpm
 - Toilets: 1.28 gpf
 - Showers: 1.5 gpm
 - High efficiency laundry machines
 - High efficiency dishwashers
- **Outdoor water** use reduction – capture of rainfall:
 - Phase 1 cistern size is set to provide enough storage to last for 3 to 4 weeks of peak irrigation demand during Vancouver's typical summer drought season.



Other Low Carbon Initiatives

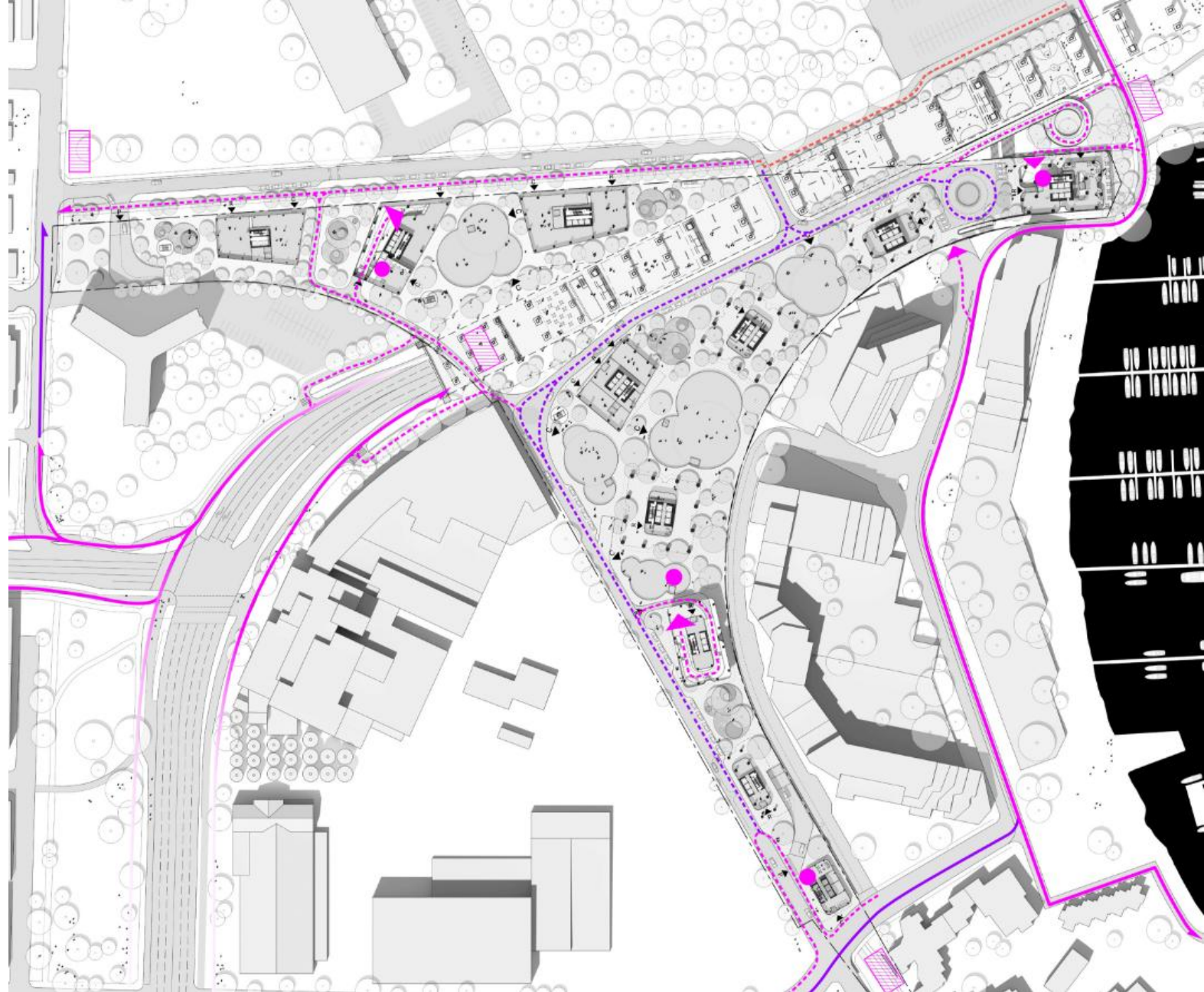
EV Charging Stations

- Senákw will be a car-light community.
- 100% of residential parking stalls will be EV-ready with level 2 chargers.



Other Low Carbon Initiatives

Bike Hub



Other Low Carbon Initiatives

Burrard Transit Hub



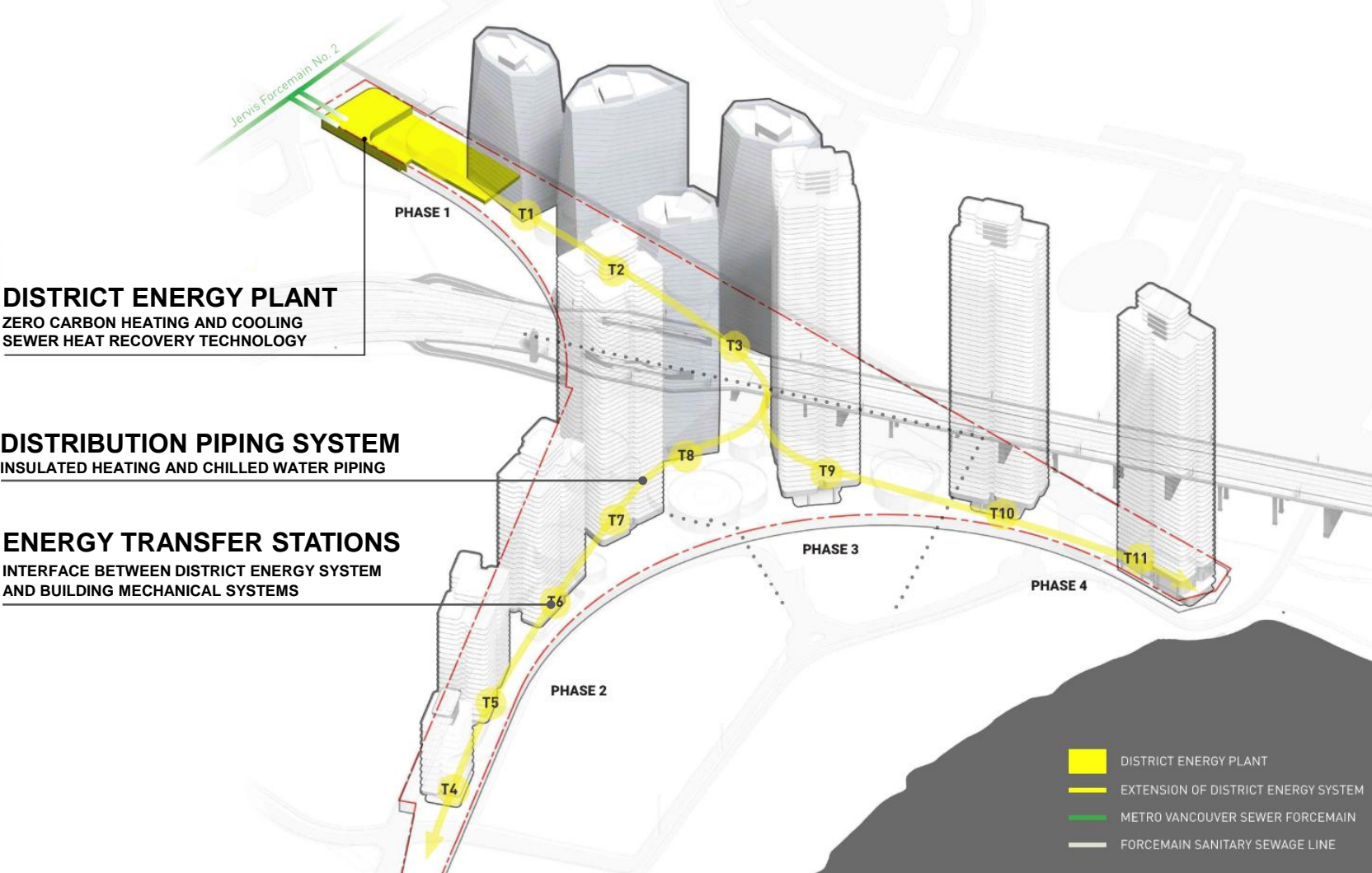


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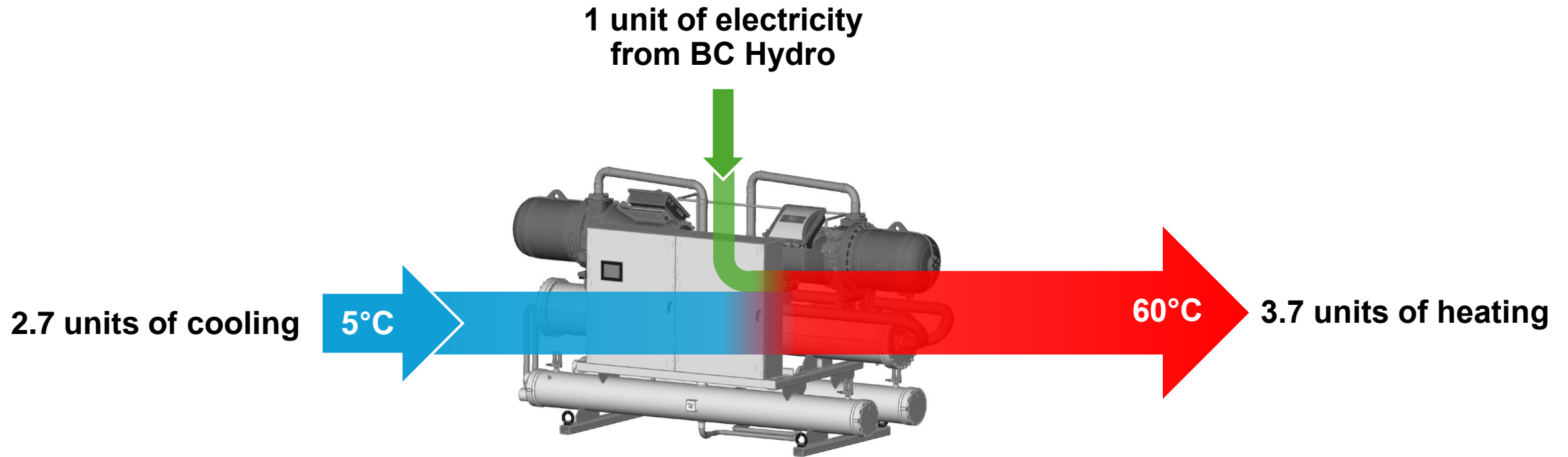
03

District Energy

Sen'ákw District Energy System Overview



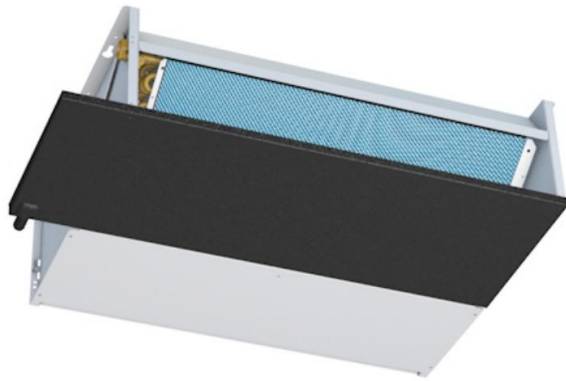
Technology – Heat Pumps



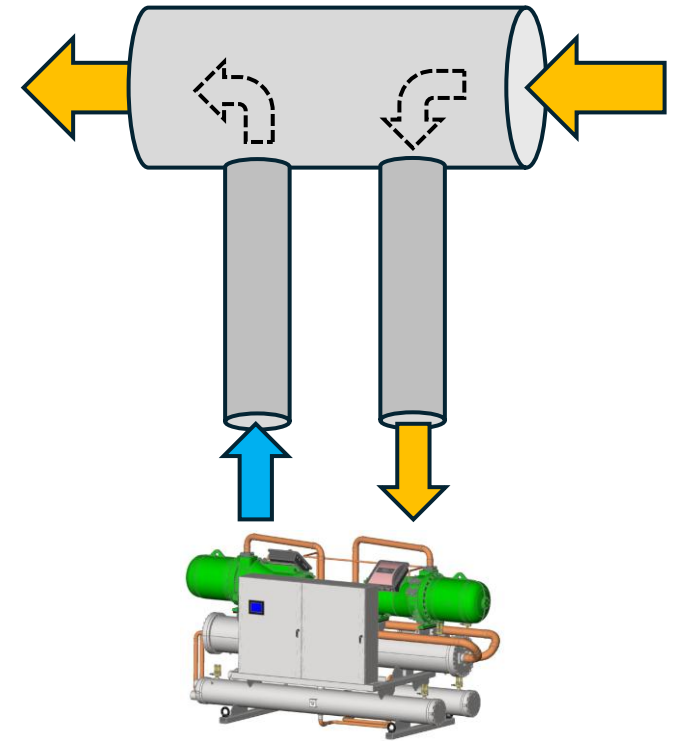
370% heating efficiency compared to gas boilers at ~90% and electric boilers at 99%

Heat Pumps – Where does the heat come from?

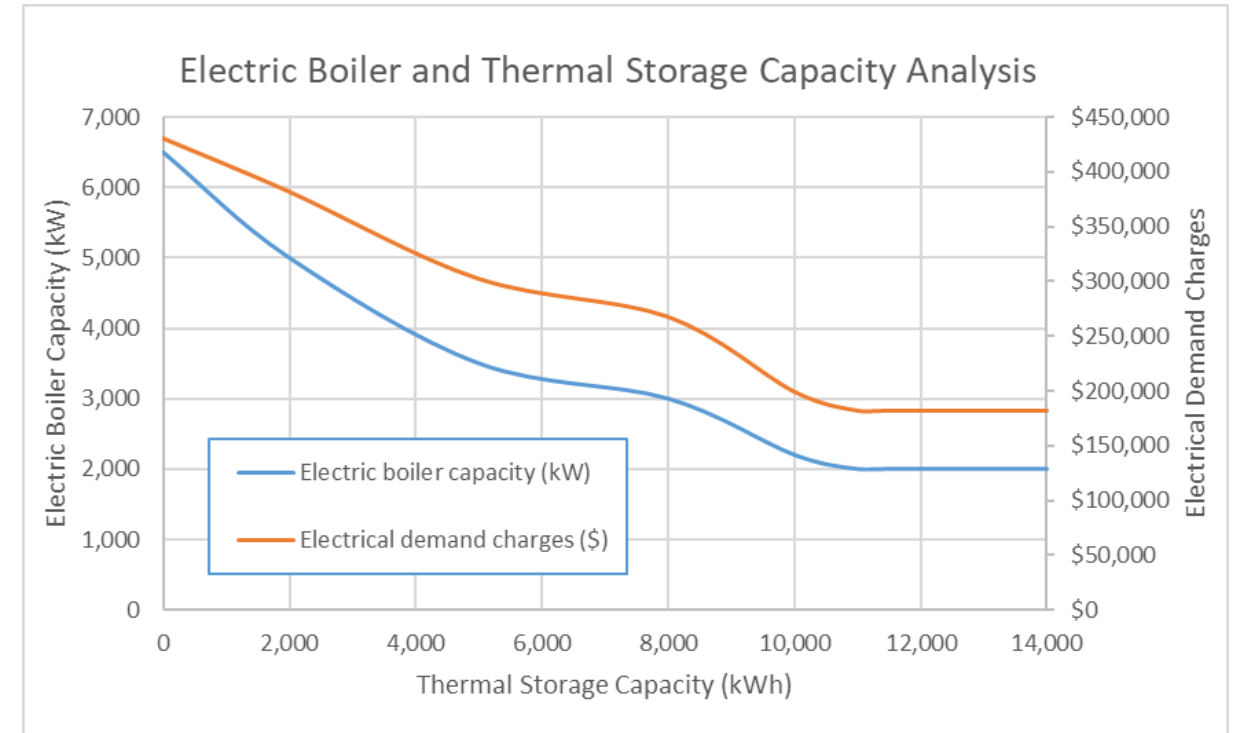
Cooling in the buildings



Metro Vancouver Sewer Forcemain

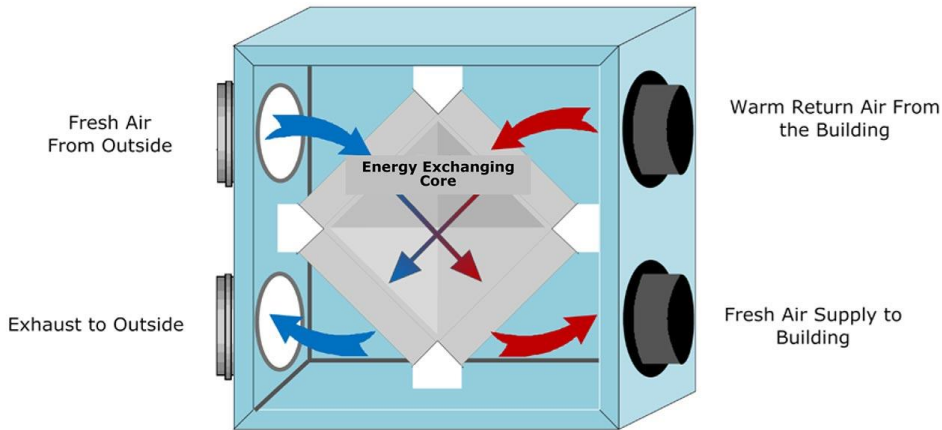
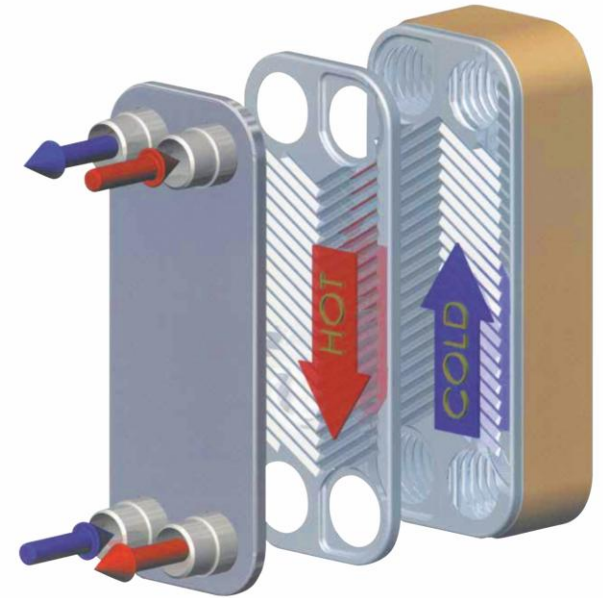


Technology – Electric Boilers and Thermal Storage



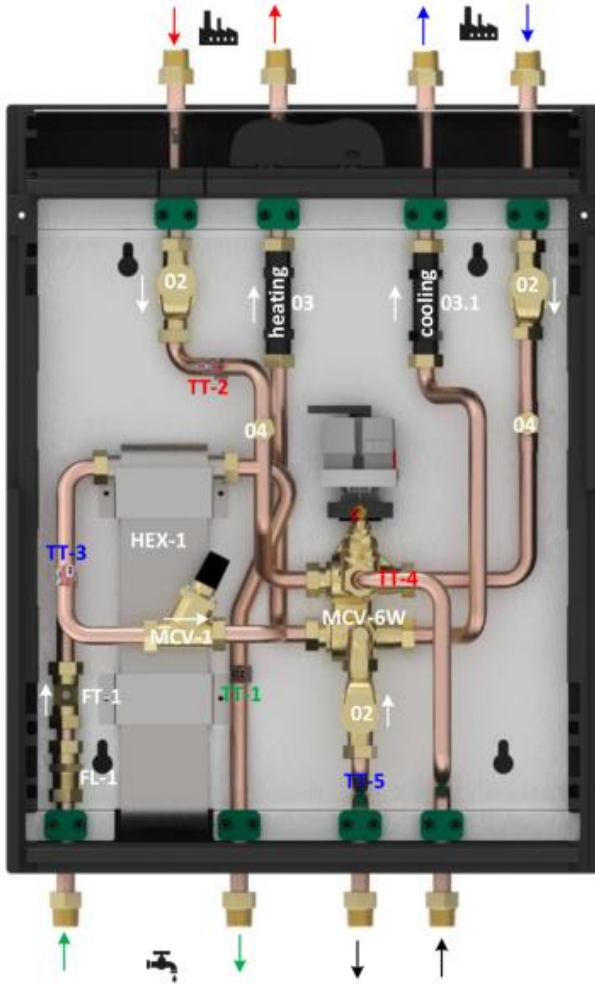
Building Mechanical System

- Discrete heating and cooling systems are provided, served from the DES plant through an ETS (Energy Transfer Station).
- Heating and chilled water will be distributed Fan Coils throughout the building.



- High efficiency heat recovery on ventilation air (ERV) installed in each suite

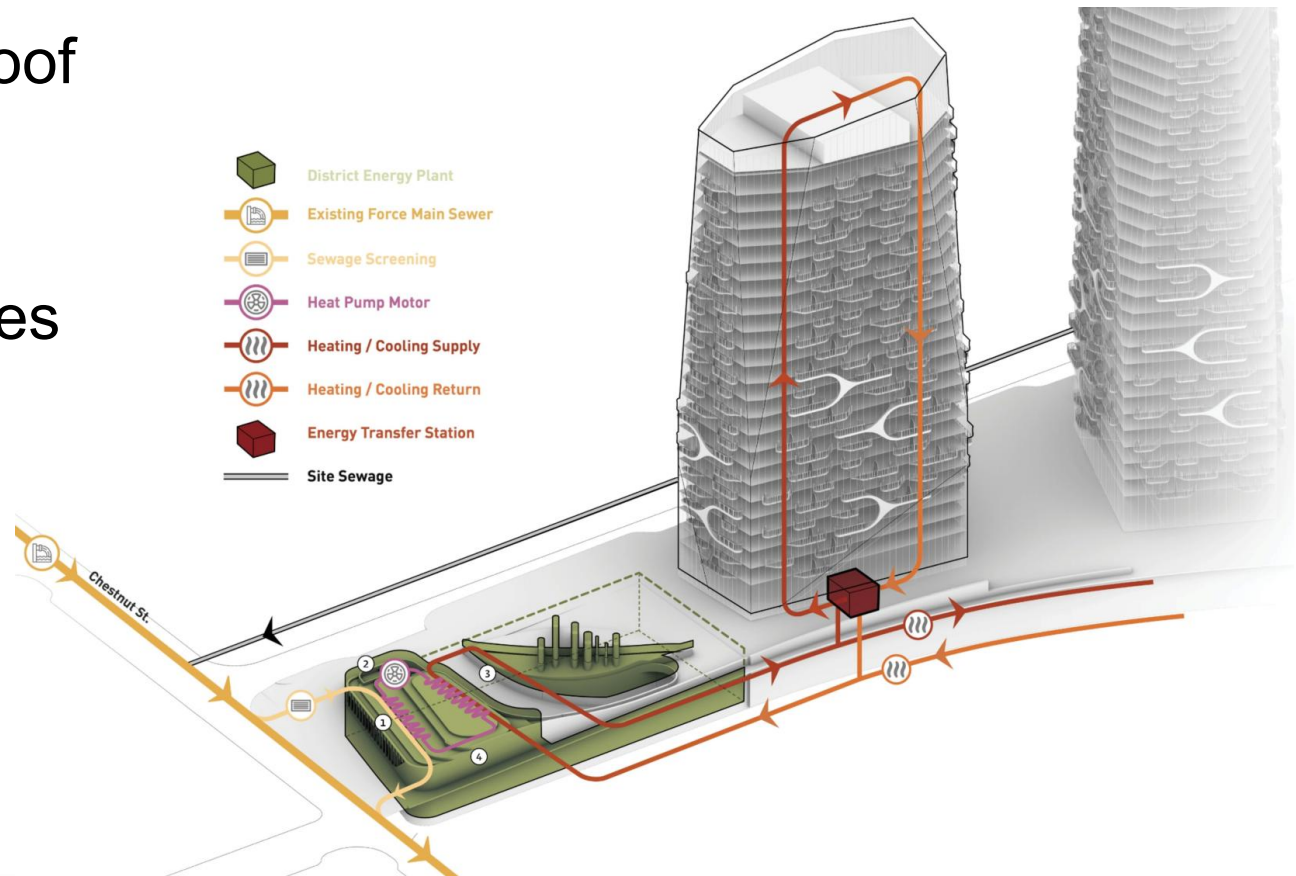
Domestic Hot Water Design



- Energy Transfer Panel
 - In-suite heat exchanger panels with on-demand hot water
 - Minimizes distribution and heat losses
 - Eliminates recirculation pumping and losses

Why District Energy for Sen'ákw?

- Limited mechanical space in each building
- Mechanical equipment on only one roof
- Reliability and dedicated operators
- Allows access to sewer heat resources
- Long term cost stability
- 30% reduction in electrical load



Sustainability and innovation on display





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Thank You

Revery | Kasian | AME | Reshape |
Creative Energy | Peak Construction Group