Renewable City Strategy – Approved in 2015

100% of energy used is renewable by 2050

New buildings required to achieve zero emissions by 2030 or earlier
Zero Emissions Building Plan – Approved in 2016

**High Performance Building**
- GHG limit achieved by minimizing heat loss
- Enables simple heating system design

**Low Carbon Energy System**
- GHG limit achieved by combining efficiency with low carbon energy supply
- Uses advanced technologies
False Creek NEU Overview
(Operational Since 2010)

• Supplies thermal energy for space heat & hot water

• Owned & operated by the City, with independent oversight by Expert Panel

• 70% of energy from renewable sources (waste heat recovered from sewage + bio-methane)

• Financially self-sustaining, delivering cost-effective renewable energy
Benefits

- Secures 100% renewable energy outcomes, eliminating the future need for costly and disruptive retrofits to buildings
- Highly resilient, adaptable to wide range of existing and future technologies
- Construction and maintenance cost savings for buildings, and frees up space for green roofs and amenities
Service Area

- 32 connected buildings
- 9 buildings in-stream
- Customer base has grown 300% since 2010
- 5.2M sqft of connected floor space
Sewage Heat Recovery - How it Works

1. Sewage is filtered to remove solids
2. Filtered sewage passes through heat pump evaporators (shell & tube heat exchangers)
3. Two heat pumps – sewage flows in series & district heat water flows in series or parallel (output 65-80° C)
4. Sewage flow reversed periodically to prevent heat exchanger fouling
5. Effluent mixed with filtered solids and sent to treatment plant
6. Boilers used for peaking & backup
Sewage Heat Recovery Expansion

- Preliminary engineering underway to increase sewage heat recovery capacity by 5 MW

- Challenges:
  - Securing adequate sewage
  - Plant space constraints

- Opportunities:
  - Alternative sewage filtration
  - Lower temp heat pumps
  - Thermal storage
In Feb 2018, City Council approved expansion plans to secure 100% renewable energy outcomes for ~22 million ft$^2$ of buildings.
Role of the City

- Expansion plan is based on City ownership of the distribution network, and existing False Creek Energy Centre
- This maintains direct control to achieve GHG performance targets, without provincial regulation
- Flexibility for private sector investment in energy production
Energy Source Options for Expansions

• Business case evaluated expanded use of sewage heat

• Other potential energy sources:
  – Downtown Fuel Switch Project
  – Waste heat from data centres and customer buildings
  – Renewable natural gas
  – Small-scale technology demonstration projects
Waste Heat Opportunities

• 27MW of low carbon capacity needed at build-out (including all study areas)
Technical Review for Expansion Areas

1. NEU Technology & System Design
   - Explore lower temperature approaches for expansion areas to maximize efficiency & waste heat recovery potential

2. Design Requirements for Buildings
   - Explore opportunities for increased flexibility in building-side mechanical design requirements

3. Sharing of Economic Benefits
   - Connection fee to share economic benefits of connection between developers and utility customers
SUMMARY

The Zero Emissions Building Plan significantly lowers GHG emissions in new buildings. The NEU provides unique opportunities:

1. High level of City control to achieve Renewable City Strategy objectives for pre-2030 buildings

2. Ability to leverage resource recovery opportunities, including sewage heat and other local waste sources

3. A highly adaptable and resilient energy solution for buildings
NEXT STEPS

• **Sewage Heat Expansion:**
  
  • Q4, 2018: initiate procurements *(pending status of other low carbon options)*
  
  • 2019 – 2020: detailed design and construction

• **Distribution System Expansion:**
  
  • **2019**: Mt Pleasant
  
  • **2020 - 2021**: NE False Creek and Innovation Hub

• **Technical Optimization Review:**
  
  • complete Q3 2018