NEW WESTMINSTER

Sapperton District Energy System

A Unique Opportunity for Renewable Heat

IDEA 2014 | Moving Energy Forward

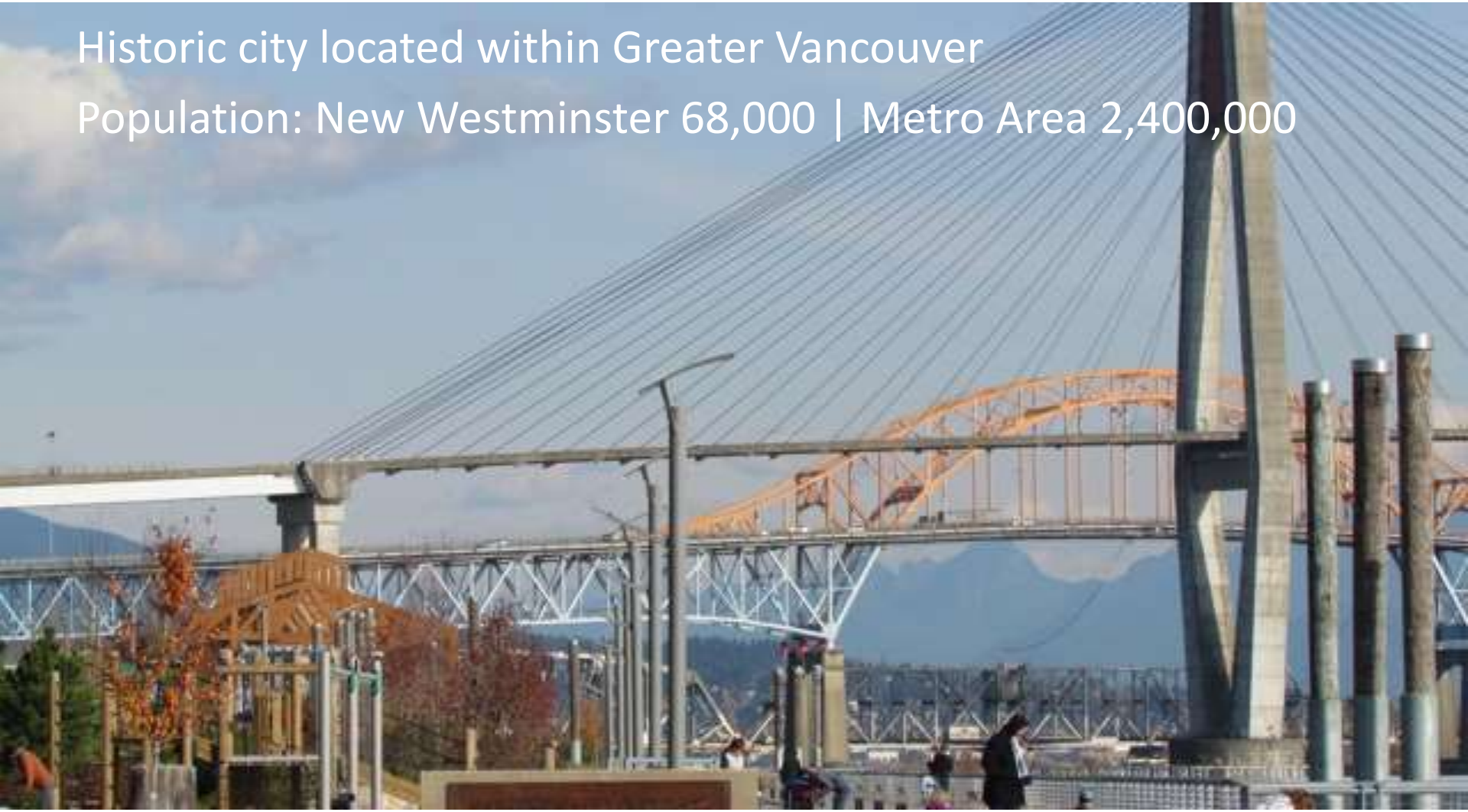
Seattle | June 8-11 | 2014

Today's Presentation

Format

- Favourable context for a low-carbon DES
  - Provincial and local government policy on GHG emissions
  - Redevelopment context
  - Area stakeholders
- Energy demand and DES concept
- Renewable heating options
  - Biomass assessment
  - Sewer heat assessment
- Triple Bottom Line analysis
- Questions and discussion

City of New Westminster - Overview



Historic city located within Greater Vancouver

Population: New Westminster 68,000 | Metro Area 2,400,000

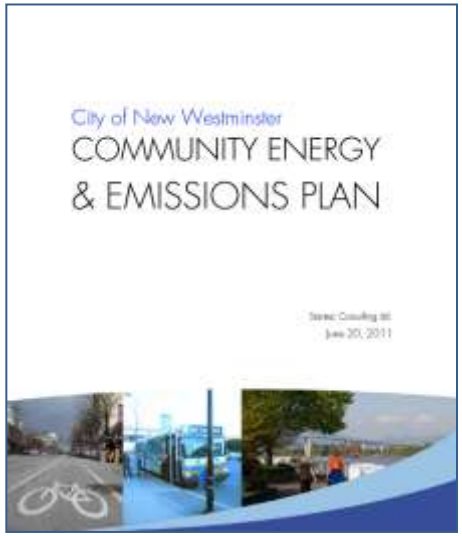
City of New Westminster - Overview

Sapperton District Energy System

Policy Context

Why is the City considering district energy?

- City policy supports the development of clean, low-emission renewable energy systems
- Investment in sustainable infrastructure
- Large reduction in annual GHG emissions
- Reduce reliance on fossil fuels
- Diversify New Westminster Electric Utility revenue sources



Sapperton District Energy System

Policy Context

188 local governments in British Columbia have signed the Climate Action Charter

Official Community Plan target is to reduce GHG emissions by 43,000 tonnes CO_2e annually by 2030 (minimum 15% reduction from 2007)

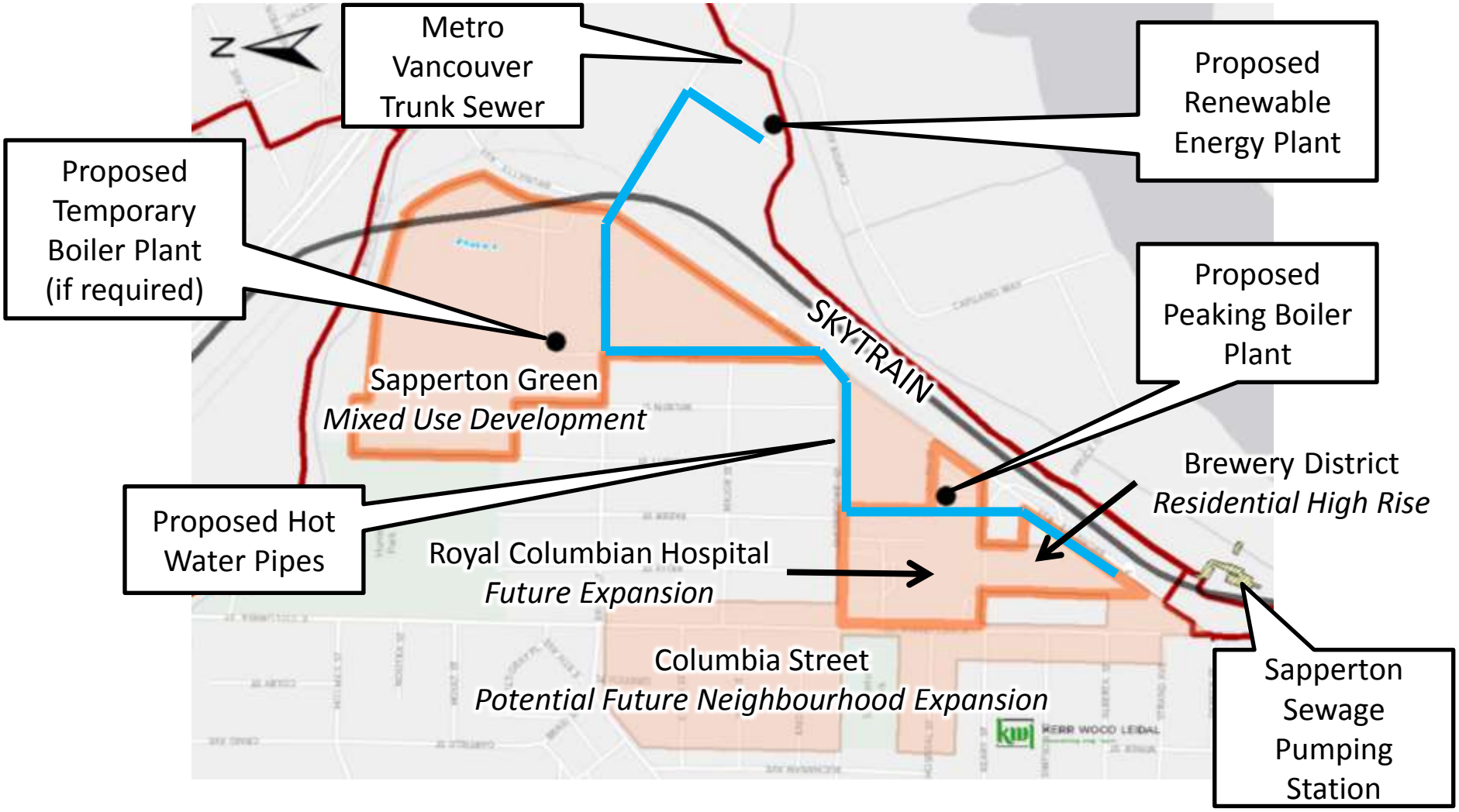
Transport 23,650 t CO_2e

Buildings 17,630 t CO_2e

Waste 1,720 t CO_2e

Sapperton District Energy System

Proposed Service Area



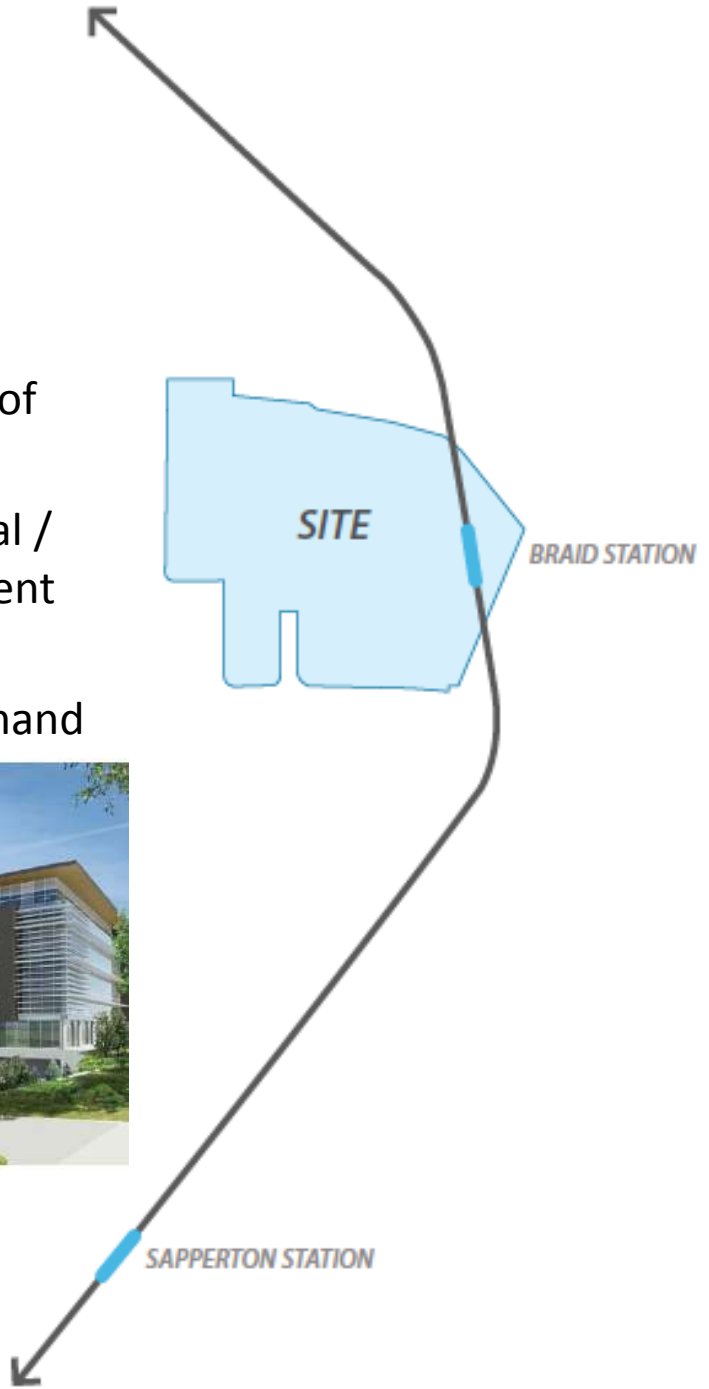
Sapperton Green

Transit-Oriented Development

Major redevelopment of former industrial site

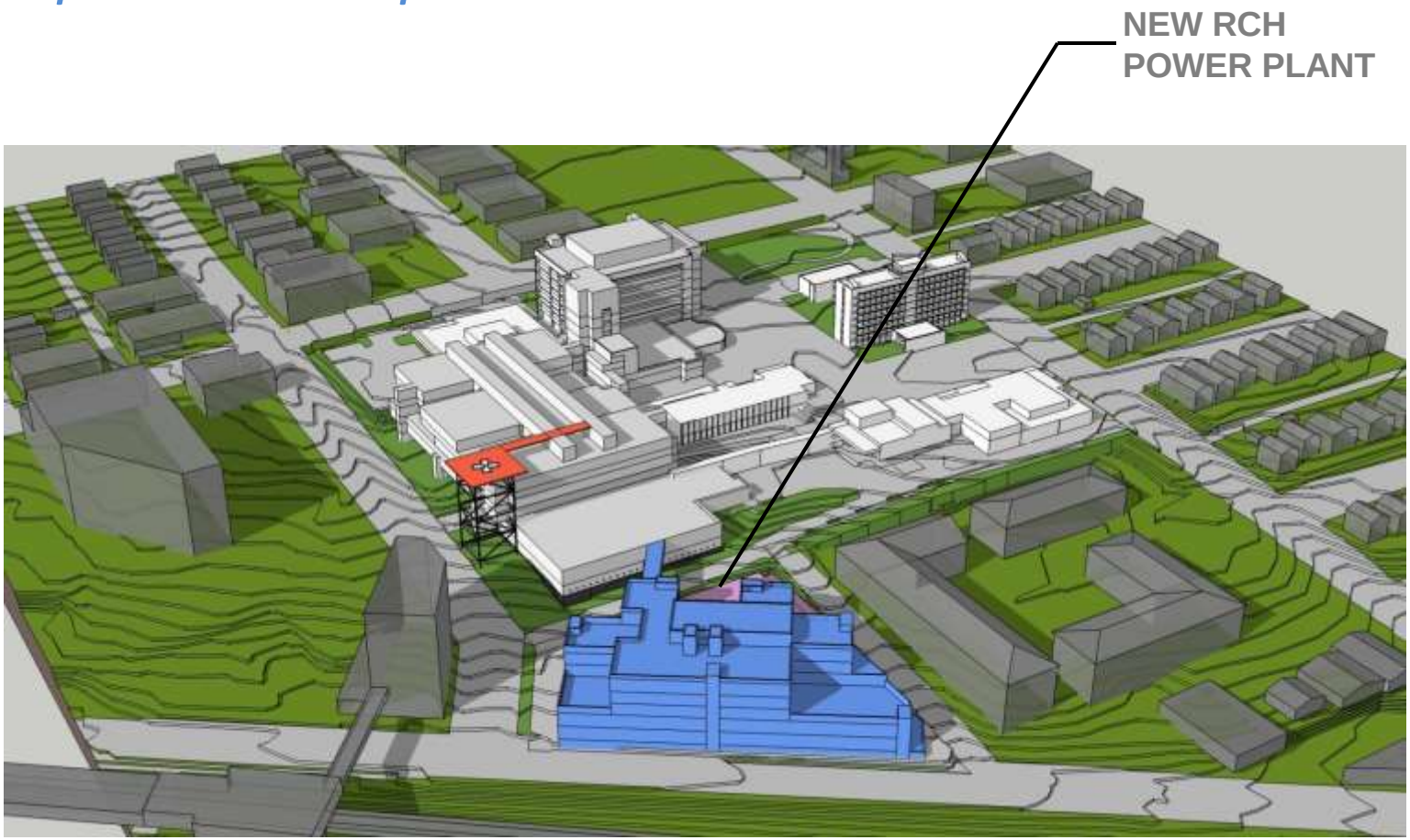
Green mixed residential / commercial development (3.3-million ft^2)

14 MW Peak Heat Demand



Royal Columbian Hospital

'Component A' Expansion



- New Mental Health Centre
- New Parkade
- New Energy Plant

Brewery District

Transit-Oriented Development

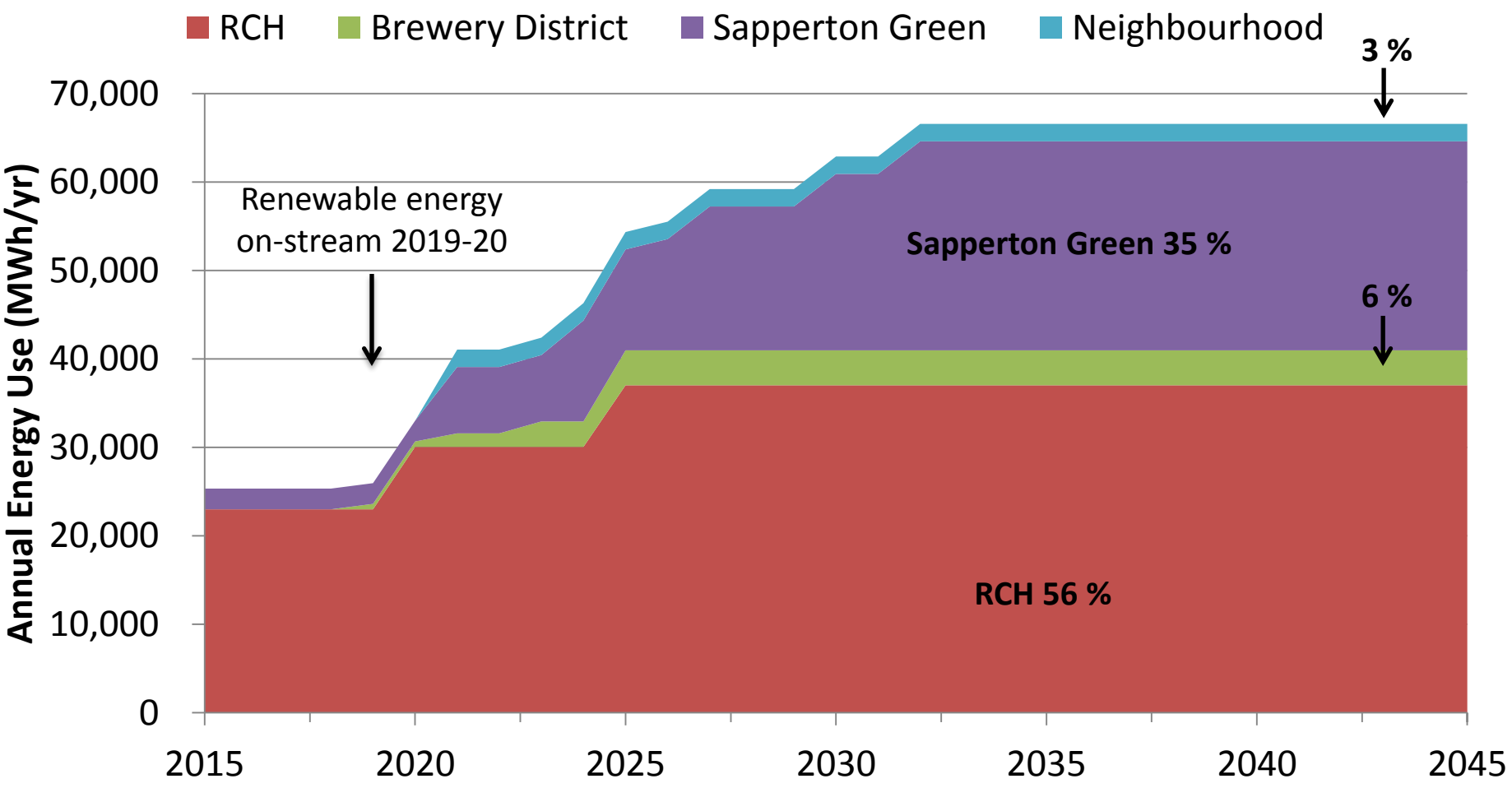
Sapperton District Energy System

Current Concept

Diversified Peak Heat Load (MW)	**26**	
Annual Heating Demand (MWh)	**67,000**	
Renewable Options	Sewer Heat	Biomass
Renewable Size	4 x 2 MW	1 x 8 MW
Peaking Boiler Size	4 x 4.9 MW + 2 x 1.1 MW	
Annual Renewable Energy Supplied	75%	71%

Sapperton District Energy System

Annual Heat Demand Forecast



Technical Approach

Biomass Technology Screening

Key Criteria

▪ Supply Temperature	< 95°C
▪ Turndown Ratio	5:1
▪ Fuel Requirements	Clean Wood Waste
▪ Emissions Controls	Multi-cyclone w/ ESP
▪ CHP Opportunities	Organic Rankine Cycle

Technical Approach

Biomass Plant Configurations

Commercial Boilers – Multiple Units

Combustor / Gasifier – Twin Units

Combustor / Gasifier – Single Unit

Technical Approach

Biomass Fuel and Emissions Control

Clean wood waste recovered from Demolition/Land Clearing/Construction (DLC) sources (18-50% moisture)

Electrostatic precipitator to remove particulates

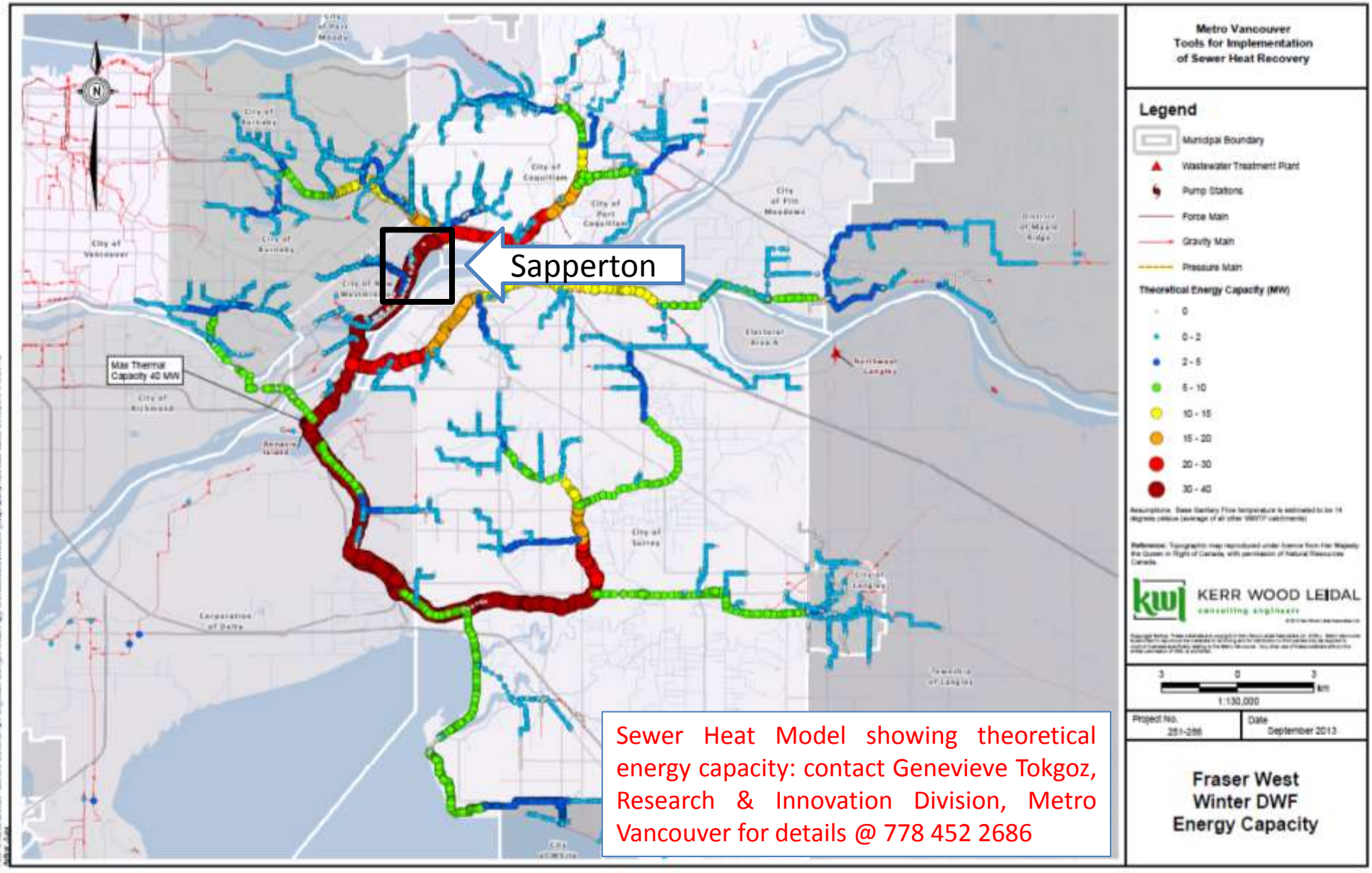
Air quality impact study recommends two-stage combustion (or equivalent performance) to achieve minimum particulate emissions, as well as lower CO and NOx emissions

Wood chip fuel storage at UBC Bioenergy Research Facility

http://en.wikipedia.org/wiki/Electrostatic_precipitator#mediaviewer/File:Elektrofilter_Maria_Gugging.jpg

Sewer Heat Resource Assessment

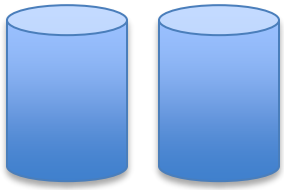
Heat Mapping – Metro Vancouver



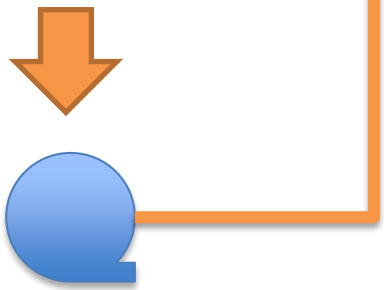
Technical Approach

Sewer Heat Recovery Process

Grit / Grease Removal Chamber



2 mm Screens



Sewage Pumps

High-Temperature Heat Pumps
(LWT 75 ºC to 80 ºC)

Technical Approach

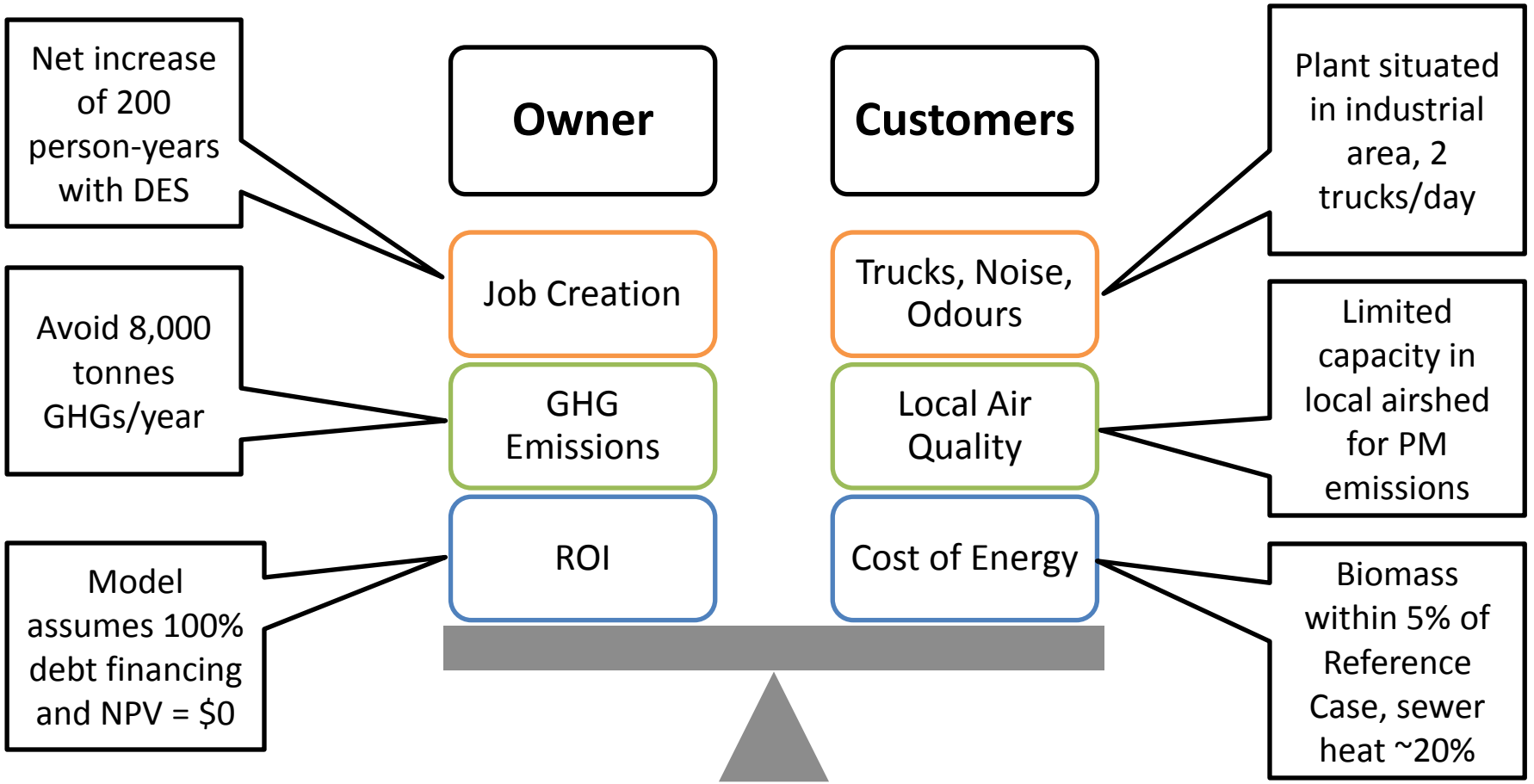
Reference Case

A benchmark for comparison with renewable energy options

Royal Columbian Hospital	Residential / Commercial
Existing steam plant at end-of-life New boiler plant proposed for hospital expansion	**Residential –** Gas DHW + Makeup Air, Electric Baseboards in suites **Commercial –** Gas Boilers
100% Natural Gas	70% Natural Gas + 30% Electricity

Note: BC's electricity has a very low GHG emissions factor (25 kg/MWh)

Triple Bottom Line Analysis



Triple Bottom Line Results

	Reference Case	Biomass	Sewer Heat Recovery
Return on Investment	n/a	100% Debt Financing (nil)	
Energy Cost	✓	✓	
GHG Emissions		✓	✓
Air Quality	✓		✓
Job Creation		✓	✓
Community Impacts	✓	✓	✓

Key tradeoff at this stage is energy cost versus air quality impacts

Next Steps

- Complete community consultations
- Initiate rate designs and preliminary designs
- Obtain approvals from City Council
- Grant funding opportunities

NEW WESTMINSTER

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Questions and Discussion

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