CITY OF VANCOUVER

COUNCIL REPORT

Report Date: October 21, 2025
Contact: Mark Schwark
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RTS No.: 18251
VanRIMS No.: 08-2000-20
Meeting Date: November 12, 2025
Submit comments to Council

TO: Vancouver City Council

FROM: General Manager of Engineering Services

SUBJECT: 2026 False Creek Neighbourhood Energy Utility Customer Rates

Recommendations

A. THAT Council approve, in principle, the proposed amendments to the Energy Utility System By-law No. 9552 (the "By-law"), generally as set out in Appendix A, including:

i) updated 2026 customer levies and charges;

ii) the creation of two new service classes offering Neighbourhood Energy Utility ("NEU") customers the option of higher blends of renewable energy; and

iii) the establishment of rate riders associated with the new optional service classes.

B. THAT Council instruct the Director of Legal Services to bring forward for enactment the necessary amendments to the Energy Utility System By-law, generally as set out in Appendix A.

Purpose and Executive Summary

This report seeks Council approval of the recommended 2026 customer rates for the False Creek Neighbourhood Energy Utility ("NEU"), which incorporates a 3.2% net increase over 2025. This will result in a cost increase of $36 per year (from $1,125 to $1,161 per year) for an average 75 square metre (800 square feet) suite.

Staff also seek Council approval to establish two new optional service classes based on an energy supply consisting of 88% and 100% renewable energy to complement the NEU's current service offering that reflects an energy supply that targets 70% renewable energy.

The rate increases and development of the new services classes and associated rate riders have been endorsed by the Neighbourhood Energy Expert Panel, which provides the City with independent, expert advice on NEU rate setting.

Council Authority/Previous Decisions

Between 2006-2010, Council approved a set of governance and rate-setting principles (Appendix C), approved the establishment of an independent Neighbourhood Energy Expert Panel to advise staff and Council on future NEU rate adjustments, and instructed staff to report back to Council annually on rate adjustments.

In July 2015, following the first comprehensive rate review, Council adopted key performance indicators (KPIs) and targets for NEU rate setting under the commercial utility rate model. In June 2023, following a second comprehensive rate review, Council approved updates to the NEU rate design and KPIs.

In November 2024, Council approved amendments to the Building By-law to align energy and emissions performance compliance paths for small and large buildings with the BC Zero Carbon Step Code (EL-4 and EL-3, respectively), effective March 1, 2025.

City Manager's Comments

The City Manager concurs with the foregoing recommendations.

Context and Background

The NEU provides low carbon thermal energy (heat and hot water) to buildings within the NEU service area (Appendix E) which includes Southeast False Creek, the False Creek Flats, Northeast False Creek, and parts of Mount Pleasant. NEU Customer rates are set via a commercial utility model, recovering all NEU costs, including a return on invested capital, guided by Council-adopted key performance indicators ("KPIs") and targets.

The NEU began operation in January 2010 and currently services 47 residential, commercial, and institutional buildings, with 667,000 square metres (7,180,000 square feet) of floor area. Full system build-out is forecast at ~2,000,000 square metres (21,530,000 square feet) of floor area based on current development forecasts.

The NEU currently targets delivering 70% of its energy from renewable sources, including sewage waste heat and renewable natural gas (RNG). While this level of service has significantly reduced community greenhouse gas (GHG) emissions to date, several factors are driving the need for new service offerings:

- Stricter GHG emissions limits under the 2025 Vancouver Building By-law (Zero Emissions Building Plan (ZEBP) Building Energy and Emissions Performance)
- Customers voluntarily seeking fully decarbonized energy options

In response to these drivers, the proposed Enhanced Green Heat Program ("EGH Program"), subject to Council approval, introduces tiered, opt-in service classes offering higher renewable energy blends. This allows customers to select their thermal energy subscriptions to align with their needs, while maintaining fairness by assigning costs to those who benefit.

By advancing the NEU's transition to 100% renewable energy, the EGH Program strengthens the NEU's leadership in low carbon district energy, expands customer choice, and enhances the competitiveness of developments in the service area.

Appendices B and C provide additional details on the NEU's services, technology, levelized rate structure, environmental performance indicators, financial performance indicators, NEU rates relative to other energy providers, and its ownership, operating and governance model. Appendix F contains background analysis on the development of the EGH Program prepared by *Reshape Infrastructure Strategies (Reshape)*.

Discussion

Customer Rates

The NEU recovers its costs through customer rates and a connection levy. In accordance with the rate setting principles and Key Performance Indicators, staff recommend that NEU customer rates increase by 3.2% over 2025 rates, as shown in Table 1. A 3.2% increase is equivalent to a 1.2% increase above the system's long-term inflation forecast of 2%. This 1.2% escalation factor enables the NEU to maintain rates that are predictable and affordable while keeping the NEU on track to recover its costs over time in accordance with the commercial utility rate models levelized rate approach (see Appendix B).

This 3.2% increase will result in a cost increase of $36 per year (from 1,125 to $1,161 per year) for an average 75 square metre (800 square feet) suite with an average energy demand of 8.2 megawatt-hours (MWh) per year.

TABLE 1. NEU 2025 AND RECOMMENDED 2026 CUSTOMER RATES

	2025	2026 PROPOSED	% CHANGE
Class 1 (Residential and Mixed Use Residential within SEFC)[a]			
Fixed Capacity Levy	$0.674 per m^2 per month	**$0.696 per m^2 per month**	3.2%
Variable Energy Use Charge	$63.151 per MWh	**$65.172 per MWh**	3.2%
Net Effective Rate[b]	**$137.0 per MWh**	**$141.4 per MWh**	**3.2%**
Class 2 (Residential and Mixed Use Residential Outside SEFC) and Class 3 (Non-Residential)			
Fixed Capacity Levy	$10.141 per KW peak demand per month	**$10.466 per KW peak demand per month**	3.2%
Variable Energy Use Charge	$63.151 per MWh	**$65.172 per MWh**	3.2%

NOTES TO TABLE

a. Residential and Mixed Use Residential buildings in SEFC applying for a building permit after July 1, 2023 are classified as Class 2 customers.

b. Net effective rate is based on a reference building with an annual energy demand of 109 KW.hr per square metre of floor area. Actual effective rates will vary due to differences in building energy performance.

Enhanced Green Heat Program

a) Proposed Classes of Service

The EGH Program introduces opt-in service classes, enabling customers to select renewable thermal energy subscriptions that align with their needs and sustainability goals. This approach

supports regulatory compliance, accelerates building decarbonization, and provides clear, actionable options for customers. Verification of renewable content and emissions performance for each service class will be conducted in accordance with applicable City requirements for new construction and existing buildings, ensuring that environmental claims are robust and auditable.

TABLE 2: PROPOSED NEU SERVICE CLASSES

Proposed NEU Service Classes	Standard Green Heat	Enhanced Green Heat	100% Renewable Energy
Renewable Energy Blend	70%	88%[a]	100%
Emissions Factor (kg CO2/MWh)	70	30	5[b]
Who it's designed for	Existing buildings connected to the NEU	New buildings opting to use EGH to meet VBBL GHG limits	Customers voluntarily seeking full decarbonization

NOTES TO TABLE

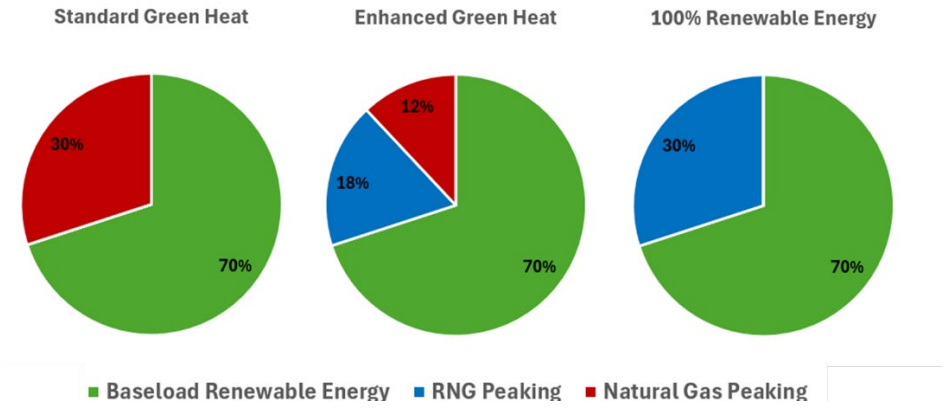
a. Developed with input from local energy modellers to align with ZEBP GHG limits.

b. The emissions factor for the 100% Renewable Energy service class depends on BC Hydro and FortisBC values, which are outside the NEU's control. Electricity and RNG emissions factors used in the 2025 calculations are based on the Climate Action Secretariat Emission Factor Catalogue (2024 Reporting Year): 9.9 kg CO_2e/MWh for BC Hydro and 1 kg CO_2e/MWh for FortisBC RNG.

b) Renewable Energy Supply

While work is underway to evaluate the feasibility of multiple renewable energy sources identified in the NEU's decarbonization roadmap, RNG will serve as the interim resource to achieve higher renewable energy blends. This approach enables immediate implementation using existing NEU infrastructure, leverages the subsidized FortisBC RNG rate, and secures supply through the City's first right of refusal on RNG generated from the Vancouver landfill. Figure 1 illustrates the targeted proportional contributions of baseload renewable energy (primarily sewer heat recovery but also including RNG and waste heat from buildings), RNG, and natural gas for each service class.

Figure 1: Illustrative Fuel Mix for Proposed NEU Service Classes



c) Rate Setting and Cost Effectiveness

To recover the costs for the Enhanced Green Heat and 100% Renewable Energy service classes, a rate rider applied in addition to the standard energy charge is proposed, ensuring costs are fairly allocated across service classes. The rate rider reflects the incremental cost of

RNG relative to natural gas under FortisBC's current RNG pricing, which notably benefits from subsidization. No capacity charge or connection fee adjustments are proposed at this time, as the EGH Program would initially leverage existing NEU infrastructure and RNG without the need for investing new capital.

The proposed rate riders and projected per-suite costs are summarized in Table 3, illustrating that higher renewable energy service classes can be achieved at modest incremental cost compared to Standard Green Heat. As detailed in the analysis by *Reshape* (Appendix F, Figures 2 and 3) and reflected in Table 3, new buildings subscribing to the enhanced renewable service classes are forecast to pay less per month than an existing NEU customer, reflecting higher building energy performance and reduced overall energy consumption in new construction. The forecast monthly costs for existing and new customers are highlighted in the table to illustrate this comparison. There is no cross-subsidization between service classes; each class is designed to recover its own costs through the applicable rate structure. Even if Fortis's RNG subsidy were removed, the analysis indicates that the Enhanced Green Heat Program service classes would remain cost-effective for new development.

Table 3: NEU Service Class Rate Riders and Projected 2026 Monthly Costs

Proposed NEU Service Classes	Standard Green Heat	Enhanced Green Heat	100% Renewable Energy
Renewable Energy Blend	70%	88%	100%
Emissions Factor (kg CO2/MWh)	70	30	5
Rate Rider ($/MWh)[a]	$0	$5.78	$9.73
Net Effective Rate ($/MWh)[b]	$141	$147	$151
Existing Customers ($/month per suite)[c]	**$97**	$100	$103
New Customers ($/month per suite)[c]	$84[d]	**$87**	$89

NOTES TO TABLE:

a. Rate riders reflect the incremental cost of RNG relative to natural gas, using RNG's current subsidized pricing scheme, and are applied in addition to the Energy Charge ($/MWh) for NEU service.
b. Net effective rate is based on a reference building with an annual energy demand of 109 KWh per square metre of floor area. Actual effective rates will vary due to differences in building energy performance.
c. Projected costs are based on analysis by *Reshape* and reflect a "typical" building scenario for existing and new NEU customers, including assumptions on suite size, energy usage, and building characteristics.
d. A new building selecting the NEU's Standard Green Heat would need to achieve a thermal energy demand intensity lower than the VBBL performance limit to meet the required GHG limits.

d) Developer Cost Savings

The EGH Program provides developers with a ready-made, low-risk pathway to deliver zero- or low carbon buildings. By connecting to the NEU, developers can meet ZEBP regulatory requirements while shifting capital-intensive heating system costs to long-term, predictable thermal energy rates for future residents. This "plug-in" approach simplifies on-site operations, reduces the complexity of designing and installing low carbon heating systems, and lowers ongoing maintenance liabilities.

According to analysis by *Reshape* (Appendix F), by avoiding the need for on-site heating equipment, connecting to the NEU significantly reduces development capital costs, saving developers an estimated $3.7 million dollars based on a representative high-density

development in the NEU service area, even after accounting for the NEU Connection Levy. These savings offer developers in the NEU service area a financial and market advantage by leveraging NEU infrastructure. Developer cost savings and EGH Program capital requirements will be monitored to inform fair and proportional cost allocation as the program evolves.

e) Implementation and Monitoring

By leveraging existing NEU infrastructure and RNG as an interim resource, the EGH Program minimizes upfront capital requirements, limiting financial exposure for the NEU. This enables immediate implementation without affecting the financial performance of the NEU or imposing costs on customers who remain on Standard Green Heat.

While RNG provides an immediately available pathway to increase renewable content, it is subject to market price volatility and potential changes in FortisBC subsidies. To mitigate financial risk, the NEU will monitor customer subscriptions to higher renewable energy service classes, adjusting RNG procurement to align with actual demand. Billing and forecasting models will be updated regularly to reflect subscription levels, renewable content, and procurement requirements, ensuring that incremental RNG costs are accurately recovered through the rate riders.

The City's Landfill RNG rights support a stable RNG supply for the foreseeable future. As additional renewable energy opportunities from the NEU Decarbonization Roadmap become viable, they will be phased in to diversify the energy supply and reduce reliance on RNG. Over time, the allocation of costs between energy, capacity, and connection charges may be refined to reflect evolving fuel and infrastructure investments.

The proposed rate riders provide a transparent and predictable mechanism to recover these costs while maintaining alignment with NEU's existing rate structure. Overall, the EGH Program supports long-term rate stability and preserves financial neutrality for the NEU. It provides customers with clear renewable energy choices while maintaining transparency across service classes and advancing the NEU's transition to 100% renewable energy in alignment with City climate objectives.

Environmental Performance Update

The NEU currently targets to produce 70% of its energy from renewable sources and is on track to meet this target in 2025 using a blend of renewable sources including sewage heat recovery, RNG, and waste heat recovered from customer buildings resulting in 7,070 tonnes of GHG emission reductions compared to a 2007 baseline (Appendix B). The introduction of the proposed Enhanced Green Heat Program will enable further decarbonization of buildings within the NEU service area.

NEU Expert Panel Input

The Expert Panel, established by Council in 2010, provides objective expert advice to ensure that the rate structure, annual rates and any new rate policy for the NEU are consistent with Council's approved rate setting principles. The Panel has endorsed the 2026 rate increases, establishment of the Enhanced Green Heat Program, and associated By-law amendments as recommended in this report (Appendix D).

Staff would like to acknowledge the contributions of the Expert Panel because its advice helps ensure that rate increases reflect an appropriate balance between cost recovery and fair and competitive rates for energy services delivered.

Financial Implications

Customer Rates

Table 4 compares 2025 revenues and expenses as forecast at the end of September for the 2025 Operating and Capital Budgets under the commercial utility model.

TABLE 4. 2025 NEU REVENUES AND EXPENSES, BUDGET COMPARED TO YEAR-END FORECAST BASED ON THE COMMERCIAL UTILITY RATE MODEL ($ MILLIONS)

	2025 Budget	2025 Forecast	$ Variance	% Variance	2026 Proposed
Revenues and Recoveries					
Capacity Levies	$ 5.2	$ 5.4	$ 0.2		$ 5.4
Energy Use Charges	4.0	$ 4.0	0.0		4.0
Total Revenues	**$ 9.2**	**$ 9.4**	**$ 0.2**	**2%**	**$ 9.4**
Operating Expenses					
Natural Gas & Electricity	$ 2.8	$ 2.8	$ 0.0		$ 2.4
Staff, Maintenance, Overhead & Other[1]	1.8	1.8	0.1		1.9
Total Operating Expenses	**$ 4.6**	**$ 4.7**	**$ 0.1**	**3%**	**$ 4.3**
Financing Expenses[1]					
Interest Expense	$ 1.4	$ 1.2	$ (0.2)		$ 1.5
Return on Equity	2.1	1.7	(0.3)		1.9
Depreciation	1.7	1.5	(0.2)		1.6
Total Financing Expense	**$ 5.2**	**$ 4.5**	**$ (0.7)**	**-14%**	**$ 5.1**
Total Expenses	**$ 9.8**	**$ 9.2**	**$ (0.6)**	**-6%**	**$ 9.3**
Operating (Shortfall) / Surplus	**$ (0.6)**	**$ 0.2**	**$ 0.8**	**-132%**	**$ 0.1**
Capital Costs	**$ 8.9**	**$ 2.0**	**$ (6.9)**	**-77%**	**$ 3.1**

[1] Reflects costs under the commercial utility model

[2] Table may not sum due to rounding

The main cause for the difference between 2025 budget and the 2025 actuals projected to year-end is as follows:

1. *Financing Costs*: A $6.9M reduction in capital spend, primarily driven by delays in development that impacted the timing of new peaking capacity installation and network expansion, resulted in financing expenses coming in 14% ($0.7M) under budget.

Overall, NEU revenues are forecast to exceed expenses by $200K.

Enhanced Green Heat Program

The EGH Program is designed to be cost-neutral for the NEU, while providing customers with additional renewable energy options that are operationally and economically efficient. Incremental costs associated with replacing natural gas with RNG are recovered through rate riders applied only to customers who select higher renewable energy service classes. These rate riders are set to recover the additional fuel cost on a pass-through basis.

Legal Implications

If the Recommendations in this report are approved by Council, Legal Services will bring forward for Council's consideration amendments to the By-law to implement the changes. The proposed amendments are authorized by the Vancouver Charter, including section 300.1.

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APPENDIX A

**ENERGY UTILITY SYSTEM BY-LAW DRAFT AMENDMENT
BY-LAW NO.**

**A By-law to amend Energy Utility System By-law No. 9552
regarding 2026 fees and services**

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This By-law amends the indicated provisions of the Energy Utility System By-law.

2. Council inserts the following definition into section 1.2, before the definition of "applicant":

> ""100% Renewable Energy" means a service class achieved by offsetting all natural gas use with renewable energy, thereby further reducing greenhouse gas emissions intensity for subscribers;".

3. Council inserts the following definition in section 1.2, in correct alphabetical order:

> ""Enhanced Green Heat" is a service class achieved by offsetting a greater portion of natural gas use with renewable energy than Standard Green Heat, thereby reducing greenhouse gas emissions intensity for subscribers;"; and
>
> ""Standard Green Heat" is a service class achieved by offsetting natural gas use by targeting 70% renewable energy;".

4. Council strikes the "and" at the end of subsection 4.1(b)(vii).

5. Council strikes the ";" at the end of subsection 4.1(b)(viii) and replaces it with ", and".

6. Council adds new subsection 4.1(b)(ix) as follows:

"(ix) service class subscription based on percentage renewable energy blend;"

7. Council strikes section 8.9, which reads:

"**Variation in matters affecting levy**

8.9 With respect to a designated building:

(a) an owner may apply, no sooner than the end of the second February after full occupancy of the designated building to increase or reduce peak heat energy demand subscription as submitted under section 4.1(b) (i), (ii), and (iii), but may make no more than one such application every three years;

(b) any approval under 8.9 (a) is subject to review and approval by the City Engineer to ensure that the energy utility system can accommodate the requested adjustment based on system capacity and the financial impact to the utility; and

(c) the City Engineer may notify the owner that the City Engineer is varying the estimated peak heat energy demand; and, if the City Engineer is of the opinion that, as a result of any such variation, the amount of the levy for the designated building should increase or decrease, the City Engineer may order such increase or decrease to take effect on a date specified by the City Engineer after taking into account the incremental costs to the city as a consequence of the variation.",

and replaces it with:

"**Variation in matters affecting levy and charges**

8.9 With respect to a designated building:

(a) an owner may apply to the City Engineer, no sooner than the end of the second February after full occupancy of the designated building to increase or reduce peak heat energy demand subscription as submitted under section 4.1(b) (i), (ii), and (iii), but may make no more than one such application every three years;

(b) an owner may apply to the City Engineer to increase or reduce their service class subscription that was estimated under subsection 4.1(b)(ix), provided the service class meets or is below the greenhouse gas limits imposed by the Vancouver Building By-law at time of building permit, and a written request is submitted at least 90 days prior to the end of the calendar year, but may make no more than one such application every three years;

(c) any approval under 8.9 (a) or (b) is subject to review and approval by the City Engineer to ensure that the requested service aligns with greenhouse gas limits imposed by the Vancouver Building Bylaw at time of building permit, and that the energy utility system can accommodate the requested adjustment based on system capacity and the financial impact to the utility; and

(d) the City Engineer may notify the owner that the City Engineer is varying the estimated peak heat energy demand or the service class subscription based on percentage renewable energy blend; and, if the City Engineer is of the opinion that, due to such variation, the amount of the levy or charge for the designated building should increase or decrease, the City Engineer may order such increase or decrease to take effect on a date specified by the City Engineer after taking into account the incremental costs to the city caused by the variation.".

6. Council strikes "Schedule C", and replaces it with the "Schedule C" attached to this By-law.

7. This By-law is to come into force and take effect on January 1, 2026.

ENACTED by Council this day of , 2025

Mayor

City Clerk

"SCHEDULE C"

LEVIES AND CHARGES

PART 1 – Connection levy

Effective Date	Jan. 1, 2026	Jan. 1, 2027
Fixed Portion per Energy Transfer Station	$123,873	$136,260
Variable Portion per Energy Transfer Station	$146 per kW of the peak heat energy demand as approved under section 4.3	$161 per kW of the peak heat energy demand as approved under section 4.3

PART 2 – Monthly capacity levy

Class 1 - SEFC residential or mixed use residential building where the first building permit for the building is applied for before July 1, 2023	$0.696 per m², per month
Class 2 - Residential or mixed use residential building located outside SEFC, and SEFC residential or mixed use residential building where the first building permit for the building is applied for on or after July 1, 2023	$10.466 per kW of peak heat energy demand, per month
Class 3 - Non-residential building	$10.466 per kW of peak heat energy demand, per month

PART 3 – Energy charges

Energy charge (Standard Green Heat)	$65.172 per MW hour
Rate rider for Enhanced Green Heat Customers[a]	$5.78 per MW hour
Rate rider for 100% Renewable Energy Customers[a]	$9.73 per MW hour

PART 4 – Energy credits

Credit for heat energy returned to energy transfer station	$65.172 per each MW hour multiplied by 50%

Bills are to be issued monthly and should be sent out within 60 days of the end of the billing period.

[a] Rate rider is applied in addition to the Energy Charge (Standard Green Heat)

APPENDIX B

OVERVIEW OF THE CITY OF VANCOUVER'S FALSE CREEK NEIGHBOURHOOD ENERGY UTILITY, BY-LAW AND PERFORMANCE INDICATORS

On March 2, 2006, Council approved in principle the creation of the NEU to provide space heating and domestic hot water services to Southeast False Creek (SEFC) buildings. Council's decision was based on a business case that was developed with consulting support from experts in district energy and utility economics.

The NEU currently targets producing 70% of its energy from renewable sources, such as sewage waste heat and renewable natural gas (RNG). This results in substantial greenhouse gas (GHG) emission reductions compared to traditional methods of providing heat and hot water to buildings in which the NEU offers the following unique benefits:

- it provides long-term flexibility to adapt to new low carbon technologies and provides the City with direct long-term control to secure a 100% renewable energy target for connected buildings;
- it enables the utilization of local renewable energy that may not otherwise be economically viable at the building scale; and
- it provides opportunities to retrofit existing gas-heated buildings with renewable energy.

The NEU Technology

The primary energy source for the NEU is sewage waste heat recovery, in which sewage waste heat is captured and used to heat water at the False Creek Energy Centre (referred to in this appendix as the False Creek Energy Centre). This facility, located under the south end of the Cambie Street Bridge, at 1890 Spyglass Place, also includes an integrated sewage pump station. While the Energy Centre derives most of its energy from sewage heat recovery, natural gas boilers are used for back-up purposes, and to provide supplemental energy on the coldest days of the year. In 2021, a satellite peaking plant was installed in Mount Pleasant to support growth of the system in the area and enhance system resiliency.

From the False Creek Energy Centre, a network of underground pipes (termed the "Distribution Pipe System," or DPS) delivers the heated water to buildings connected to the network. Energy Transfer Stations (ETS) located within each connected building control space heating and domestic hot water for distribution by the (customer owned) building mechanical system.

Metering is incorporated in the ETS's for energy measurement and billing purposes. Four of the ETS's also enable customer-generated energy (from solar and waste heat) to be distributed to the wider neighbourhood.

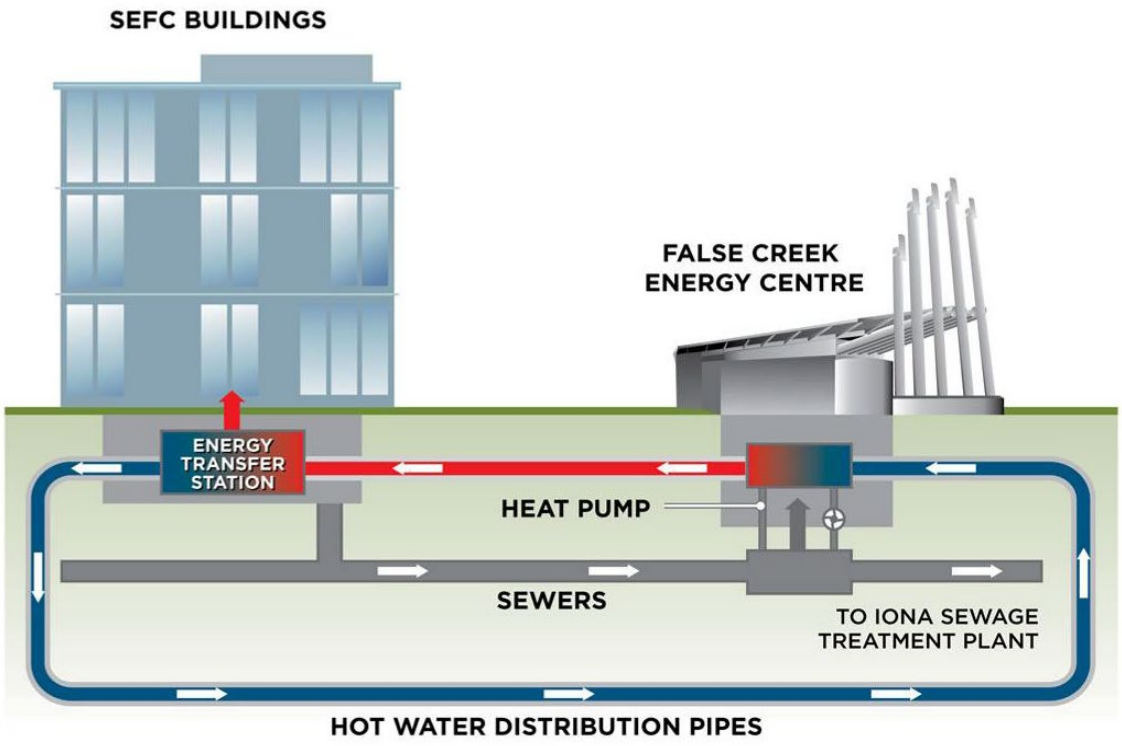
In summary, there are four components to the NEU's infrastructure, illustrated in Figure 1 below.

- *False Creek Energy Centre & Satellite Peaking Plants*: Generates hot water through sewer waste heat recovery and natural gas boilers (which use a blend of renewable and conventional natural gas). Owned and operated by the NEU.
- *Distribution Pipe System* (DPS): A set of underground pipes that deliver hot water to connected buildings. Owned and operated by the NEU.

- *Energy Transfer Stations (ETS):* Heat exchangers within each connected building that use hot water delivered to the building via the DPS to generate heat and domestic hot water for individual consumers and building common spaces. Owned and operated by the NEU.
- *Building Mechanical Systems:* All infrastructure within a building (except for the ETS) that comprises the system that delivers heat and hot water to individual consumers and building common spaces. Owned and operated by the building owner(s).

It is noted that, for market residential buildings, the NEU bills strata corporations, and they in turn are responsible for allocating NEU costs among individual unit owners. It is up to each strata corporation to determine the basis for these allocations. Some buildings connected to the NEU have sub-metering systems installed that measure energy consumed by each unit. NEU rates do not include any costs associated with sub-metering systems owned by strata corporations.

FIGURE 1. NEU CONCEPT DIAGRAM



Legislative Authority & Governance

The Province of British Columbia amended the Vancouver Charter in the spring of 2007 to provide the City with authority to provide energy utility services. Subsequent to this, the City enacted the *Energy Utility System By-law* ("By-law"). As with the City's water, sanitary sewer and solid waste utilities, City Council is the regulatory body for the NEU; municipal utilities are not regulated by the BC Utilities Commission.

Energy Utility System By-law

On November 15, 2007, Council enacted the Energy Utility System By-law No. 9552. On March 5, 2009, Council approved amendments to the By-law, including the establishment of 2009 rates and fees for the NEU.

In June 2012, Council approved the amendment to the By-law to expand the NEU service area to include the Great Northern Way Campus Lands and adjacent lands in the False Creek Flats South Area.

In April 2018, Council approved the amendment to the By-law to expand the NEU service area to include parts of Mount Pleasant, the False Creek Flats, and Northeast False Creek.

In June 2023, Council approved recommendations from the NEU Comprehensive Rate Review, which included adoption of updates to the NEU rate design and KPIs.

NEU Rate Design

The NEU currently recovers its costs using three different rate classes to ensure that NEU costs are equitably distributed among different customers:

i. Residential and Mixed Use Residential buildings within the Southeast False Creek ("SEFC") Official Development Plan area that applied for building permit prior to July 1, 2023;
ii. Residential and Mixed Use Residential buildings outside of SEFC and SEFC residential or mixed use residential buildings that applied for building permit on or after July 1, 2023; and
iii. Non-Residential Buildings.

Rates are comprised of a fixed and variable component, as is common practice in the utility industry:

ENERGY USE CHARGE - This monthly charge is based on amount of energy consumed

(measured in megawatt-hours, or "MWh"), and varies with energy use accordingly (termed the "Charge" in the By-law). The NEU's variable cost of energy will be recovered via the Energy Use charge, and through this, a property will be charged for the amount of energy consumed in each billing period.

CAPACITY LEVY – This monthly charge is based on either floor area, which is measured in square metres, or subscribed capacity (measured in kilowatts) depending on rate class.

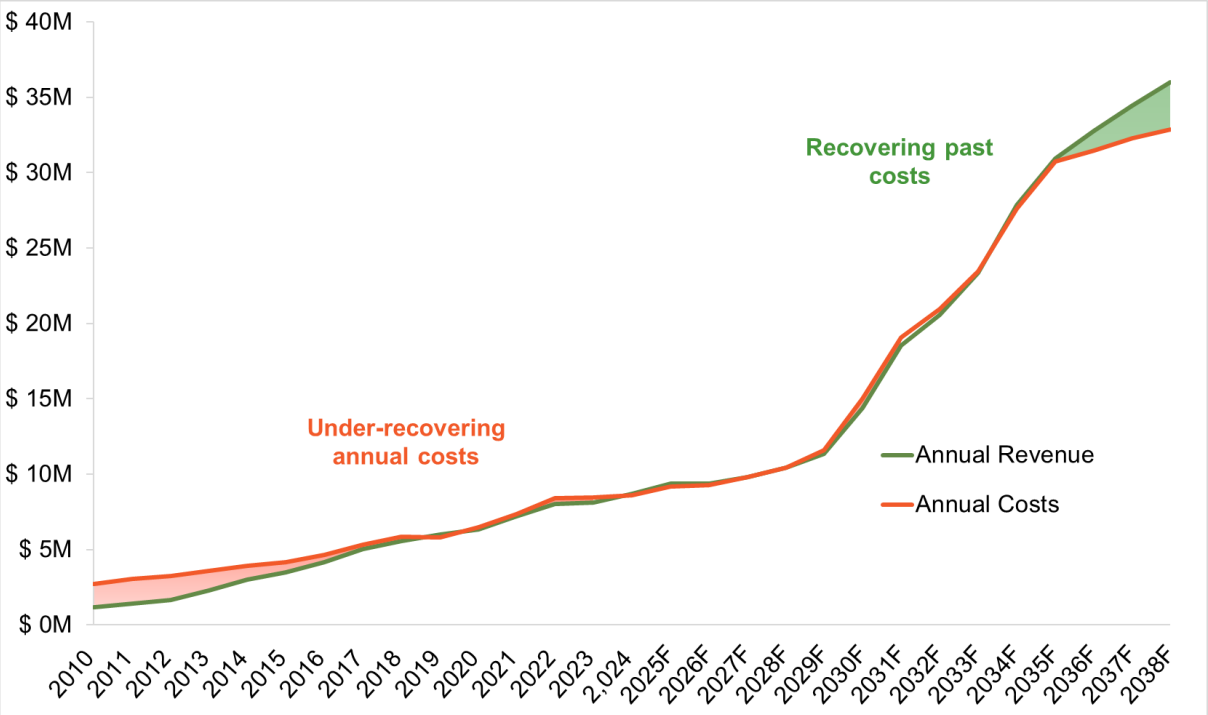
This charge reflects each buildings peak energy demand; the NEU's fixed costs are recovered via the Capacity Levy, and this charge does not vary with a customer's energy use.

Levelized Rate Structure

To provide competitive and stable rates for the NEU customers, rates are established based on a levelized rate approach. As illustrated in Figure 2 below, rates are set to under-recover annual costs in the early years of the NEU's operation when the customer base is small, and to gradually recover past costs when the customer base is fully established. This approach ensures that infrastructure costs are more equitably distributed between the initial customers

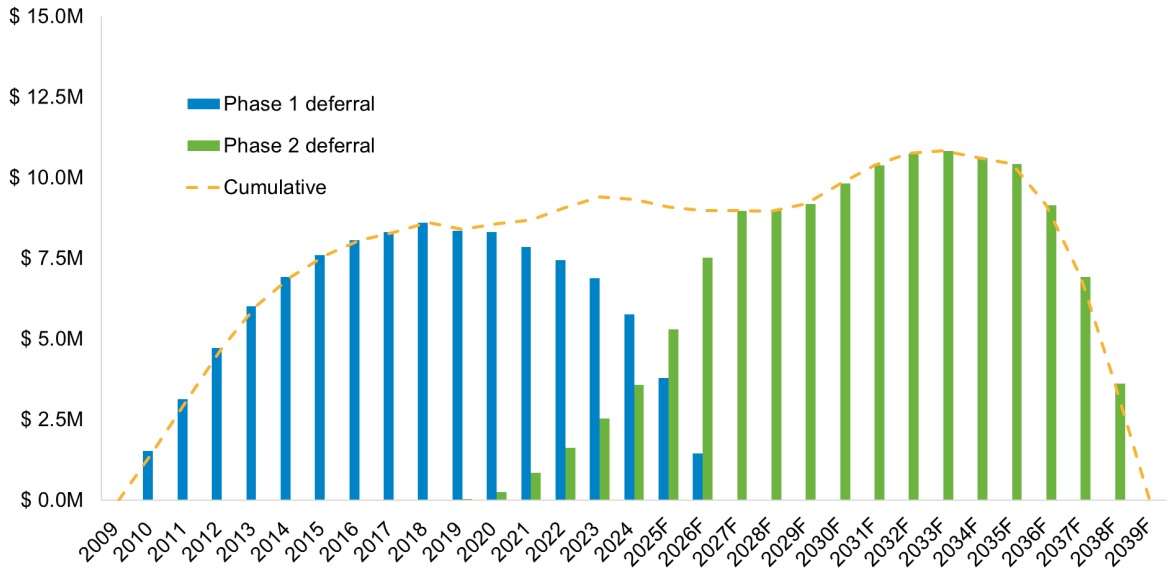
and those who connect in later years. This is a common practice by privately owned utilities regulated by the BC Utilities Commission ("BCUC").

FIGURE 2: LEVELIZED RATE APPROACH



To ensure that the balance of under-recovered costs (Figure 3) can be recovered within a reasonable timeframe and in line with the Council adopted KPIs, annual rate increases under the levelized rate approach include two components: an inflationary increase and a Rate Escalation Factor. The Rate Escalation Factor is applied above the systems long-term inflation forecast of 2%, to ensure all of the system costs under the NEU's commercial utility model are met over the long-term. Using this approach enables the NEU to maintain rates that are competitive and predictable.

FIGURE 3: CUMULATIVE BALANCE OF UNDER-RECOVERED COSTS UNDER LEVELIZED RATE APPROACH



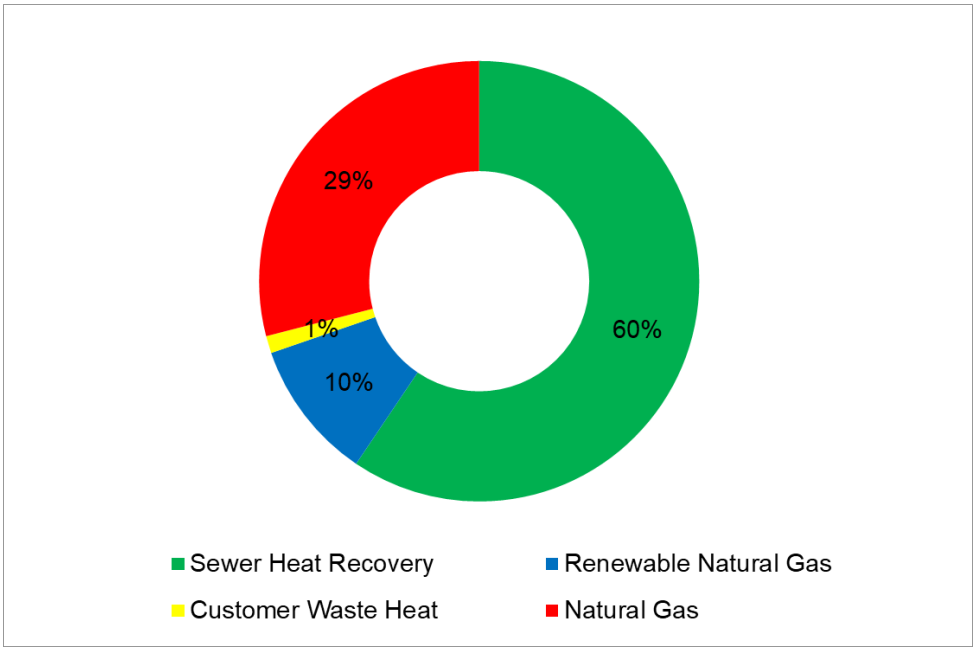
NOTES TO FIGURE:
Phase 1 deferral: original investment in the false creek energy centre and distribution network in SEFC
Phase 2 deferral: investments to expand the distribution network beyond SEFC and expand generation capacity

The information presented in this report assumes that the NEU will continue to implement the Council approved 2018 expansion plan. To support the expansion plan and maintain the 70% renewable target, future capital investments in the scale of $85M for thermal energy generation and $40M for distribution infrastructure are estimated based on modelled development forecasts and the associated generation facilities, distribution network, and ancillary infrastructure that is required. Future investments will be determined through the Council approved NEU expansion decision framework which, at each major investment decision point, considers the optimal NEU business, ownership and operating model with respect to energy generation and distribution, emerging technology and options to best achieve desired GHG outcomes, and funding availability.

Environmental Performance Indicators

The NEU currently targets to produce 70% of its energy from renewable sources. The NEU is forecasting to deliver 71% of its energy from renewable in 2025 using a blend of renewable sources including sewage heat recovery, RNG, and waste heat recovered from customer buildings as shown in Figure 4. The NEU's GHG reduction forecast for 2025 is 7,070 tonnes CO_2, compared to a 2007 baseline.

FIGURE 4: 2025 ENERGY GENERATION SOURCES

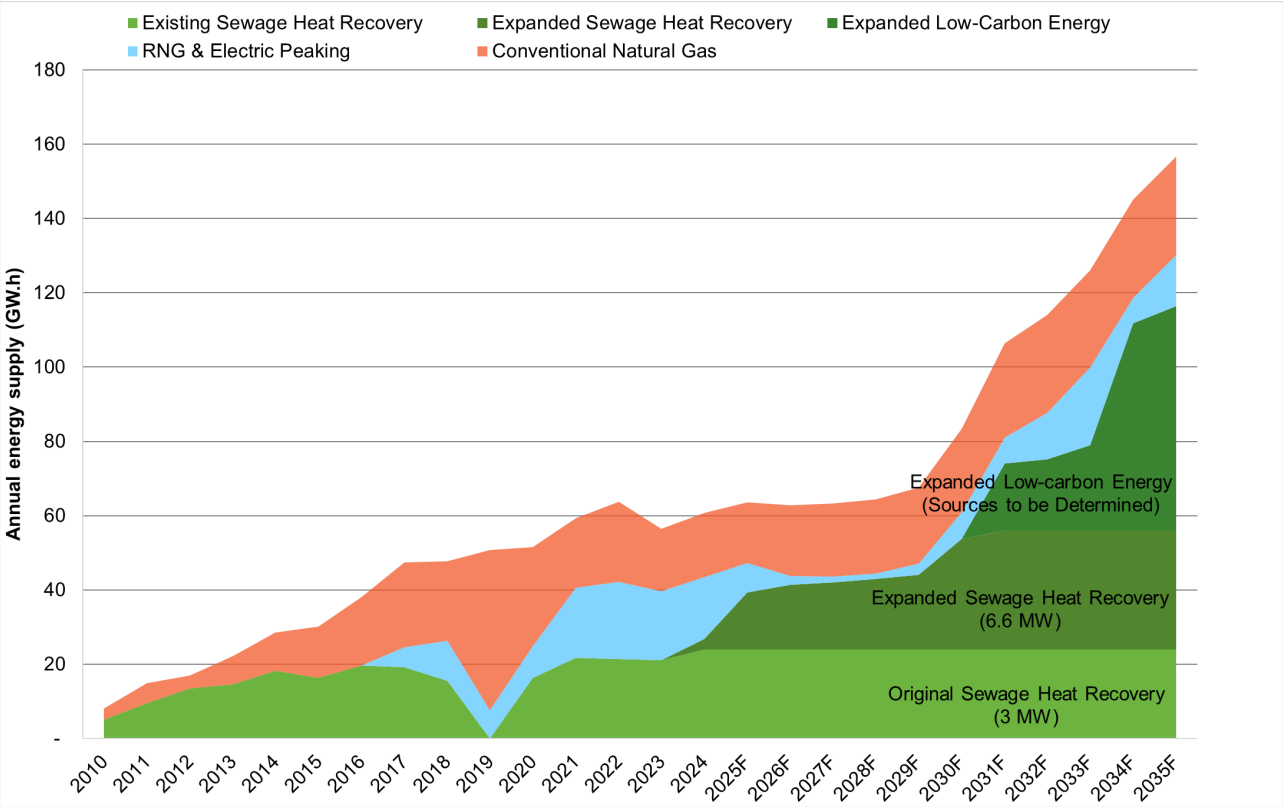


Looking ahead, the NEU has a growing customer base and energy demand that will require additional sources of low carbon energy generation. Figure 5 below illustrates the forecast energy demand and required energy sources over time.

Projects/initiatives underway to maintain environmental performance of 70% renewable energy while meeting increased customer loads include:

- Expansion of the sewage heat recovery system: This project was completed in Q1 2025 adding 6.6 MWh of reliable, high efficiency baseload energy capacity.
- Long-term RNG agreement: In 2023, the NEU extended its long-term RNG supply agreement with FortisBC for 5-years, ensuring continued access to RNG at a discounted rate. In addition, the Vancouver Landfill Gas project will provide the City with a first right of refusal over the RNG generated. This resource can be used as a bridging fuel between investments in low carbon energy sources and support decarbonization of peak loads.
- Decarbonization Roadmap: As part of the City's Climate Emergency Action Plan, the NEU is exploring opportunities to transition to 100% renewable energy by 2030. In 2024 a decarbonization roadmap study was completed which has identified low carbon resources and technologies best suited to meet the future energy demand of the system and for fully transitioning the utility away from fossil fuels by 2030. Detailed feasibility analysis of identified low carbon energy opportunities is now underway.

FIGURE 5: NEU ENERGY SUPPLY FORECAST



Beyond the greenhouse gas emissions benefits, the NEU also provides environmental co-benefits:

- the economies of scale associated with NEU allow the utility to tap into local renewable heat sources that would otherwise not be available to an individual building, such as waste heat recovery from sewage, commercial cooling, and data centres;
- the NEU offers a platform for the recovery of waste heat from customer buildings, providing an opportunity for customers to earn a modest revenue stream by selling their waste heat into the NEU system while allowing the waste heat to be reused locally by the neighbourhood;
- the NEU allows buildings to minimize the need to locate heating equipment on roof-tops, leaving more space for green roofs which help to reduce rainwater run-off and the heat island effect;
- with continued urban growth and the electrification of buildings and transportation, the provision of thermal energy through the NEU reduces future burden on the electrical grid and contributes to the resiliency of our broader energy systems; and
- the NEU has proven to be an effective platform to apply City leadership and demonstrate new low carbon technologies to enhance adoption by others as is evident by the significant increase in sewer heat recovery utilization across BC since the NEU pioneered the technology in Canada in 2010. The NEU routinely hosts tours and workshops to share lessons learned with Municipalities, Universities, Consultants, Developers, and the like to help enable confident investments in low carbon outcomes.

Financial Performance Indicators

This section provides an update on the financial performance of the NEU, based on the commercial utility rate model, as well as a comparison of the customer rates against various benchmark utilities.

In June 2015, Council adopted KPIs and targets for the NEU. These KPIs are used to track long-term financial performance of the utility, and to guide future rate setting. One KPI (maximum balance of under-recovered costs) was updated in December 2018 to accommodate NEU expansion areas approved by Council in February 2018. In June 2023, based on the recommendations from the Comprehensive Rate Review, the KPI's were updated to include a distinct deferral account for NEU expansion with its own recovery timeline of 25 years.

The main changes in 2025 that impacted NEU financials and the associated KPIs are outlined below:

1. Carbon tax: in alignment with the federal and provincial updates, the fuel price forecast for natural gas and RNG has been updated based on the elimination of the carbon tax
2. Updates to near-term electricity rate forecast to align with the 3.75% rate increase announced by BC Hydro for 2025-2026
3. Updates to the development forecast:
    a. Development timelines were adjusted based on delays to the development forecast
    b. Timing of planned NEU infrastructure was adjusted to align with updated development forecasts
4. Updates to capital spend forecast for infrastructure renewal to align with NEU Asset Management Plan
5. The introduction of electric boilers as future peaking resources to diversify the NEU energy portfolio

Table 1 below illustrates the impacts of these changes by comparing the current KPIs to last year's forecast. These updates result in a reduced max balance of under-recovered costs, but an increase to the overall recovery timeline. The NEU remains on target for all KPIs.

TABLE 1: NEU KPIs

	Last Forecast Nov '24	**Current Forecast**
Maximum Balance of Under-Recovered Costs *Target: not to exceed $15.0 M*	$14.0M	**$ 11.3 M**
Recovery Timeline for Under-Recovered Costs *Target: Deferral 1: not to exceed 25 years (2034) Deferral 2: not to exceed 25 years (2044)*	Deferral 1: 18 years (2027) Deferral 2: 18 years (2037)	**Deferral 1: 18 years (2027) Deferral 2: 20 years (2039)**
Escalated Rate Increases[1] *Target: Rate Escalation Factor to be eliminated when annual revenues exceed annual costs*	3.2% thru 2031	**3.2% thru 2033**

Notes to table

1. Includes long-term average inflation of 2%

Comparison of NEU Rates to Other Energy Providers

One of Council's approved governance principles is that *"... the utility will strive to establish and maintain customer rates that are competitive with the long-term capital and operating costs of other heating options available to customers."* When the NEU started operation in 2010, a target was set to limit its rates to no greater than a 10% premium above the BC Hydro rate.

To assess the competitiveness of the NEU, staff examined what a typical NEU customer would pay compared with other energy providers. Table 2 includes comparisons with BC Hydro and a range of thermal energy providers. Because the rate structures and type of service of these energy providers vary, an "effective rate" is calculated for the purposes of comparison. This rate illustrates what customers will pay per MWh for heating. Based on the recommended rate increase of 3.2%, the proposed 2026 effective rate for the NEU is $141 per MWh. This effective rate assumes an average residential customer would consume 109 kilowatt hours per square metre of floor area annually, regardless of what energy provider they use.

On a 3-year rolling average, the NEU effective rate is 4.5% higher than BC Hydro. The NEU effective rate continues to be within the target maximum 10% premium over BC Hydro.

TABLE 2. COMPARISON OF 2026 EFFECTIVE RATES, NEU WITH OTHER PROVIDERS

Energy Provider	GHG Emissions Intensity (kg CO_2/ MWh)	Estimated Effective Rate [1] ($/MWh)	Notes
NEU Standard Green Heat (Hot Water)	**70**	**$141**	NEU Standard Green Heat is based on a target of generating 70% renewable energy, primarily through sewage heat recovery, with the balance supplied by natural gas boilers. Enhanced Green Heat and 100% Renewable Energy service classes are achieved by offsetting some or all natural gas use with RNG, thereby reducing GHG emissions intensity for EGH Program subscribers. **The NEU bills strata corporations, not individual suites; any incremental strata sub-metering costs incurred by NEU consumers are not included here.**
NEU Enhanced Green Heat (Hot Water)	30	$147	
NEU 100% RE (Hot Water)	~5	$151	
BC Hydro (Electricity)	9.9	$134	BC Hydro effective rate calculation is based on 50% of consumption at BC Hydro's Tiered Residential Step 1 Rate and 50% at Step 2 and includes a basic charge.
UBC Neighbourhood DES (Hot Water)	220	$144[2]	UBC Neighbourhood DES operations began in 2015, using temporary natural gas boilers, and plans to use waste heat from the Triumf particle accelerator facility once the customer base is sufficiently established.
SFU UniverCity Energy (Hot Water)	44	$220[3]	SFU UniverCity Energy operations began 2012, using temporary natural gas boilers. The utility commissioned a biomass facility for low carbon energy supply in late 2021**.**
River District Energy (Hot Water)	220	$148[2]	River District Energy operations began in 2012, using a temporary natural gas boiler, and has an agreement in place to switch to waste heat from Metro Vancouver once it is available.
Richmond Oval Village District Energy (Hot Water)	220	$130[3]	Oval Village District Energy has operated since 2015, and is currently served by three interim natural gas boiler plant, with a fourth to be completed in 2025. A permanent sewer heat recovery plant, planned for 2028, will replace the boilers and supply low carbon energy using heat from the Gilbert Trunk Sewer Main.

Energy Provider	GHG Emissions Intensity (kg CO_2/ MWh)	Estimated Effective Rate [1] ($/MWh)	Notes
Surrey City Energy (Hot Water)	220	$135	Surrey City Energy operations began in 2015, using temporary natural gas boilers and plans to use Sewer Heat Recovery once customer base is sufficiently established. The system also uses renewable natural gas from Surrey's Biofuel Facility.
Shannon Estates Utility Ltd.	61	$203	The Shannon Estates Thermal Energy System began operations in 2016, using a combination of natural gas boilers, solar panels, and heat recovery from waste sewage and cooling systems.
Oakridge Energy Limited Partnership (Heating & Cooling, rate reference for heating only)	70[2]	$216	The Oakridge Energy DES began operations in 2024 and utilizes a combination of closed-loop geo-exchange field, a waste heat recovery system, electric boilers, electric chillers, and natural gas boilers to provide low carbon heating and cooling services to the Oakridge Centre Redevelopment. 2026 Energy Charges based on 2025 rate with an assumed 2.0% discretionary inflation adjustment.

NOTES TO TABLE

1. Effective rate estimates are based on a reference building with an annual energy demand of 109 kWh/m². A higher effective rate does not necessarily mean higher total heating costs, as actual energy use varies by building efficiency. Estimates reflect 2026 rates approved by the applicable regulatory authority (Municipal Council or BC Utilities Commission), unless otherwise noted.
2. Data sourced from BC Utilities Commission filings, including proposed rates for 2026, are pending regulatory approvals and thereby subject to change.
3. 2026 rate forecast unavailable at time of report. Estimated effective rate is based on 2025 rates, with an assumed 2.0% discretionary inflation adjustment.

APPENDIX C

FALSE CREEK NEIGHBOURHOOD ENERGY UTILITY OWNERSHIP MODEL, GOVERNANCE AND RATE-SETTING PRINCIPLES, AND INVESTMENT DECISION FRAMEWORK FOR NEU EXPANSION

Approved Ownership and Operating Model

On December 14, 2006, Council assessed various ownership and operating options for the NEU, and approved the continued ownership and operation of the NEU by the City, with the following conditions:

- That the NEU be integrated into the Engineering Services Department.
- That the ongoing governance, operational and financial responsibilities related to the NEU be shared by the General Manager of Engineering Services and the Director of Finance.
- That the merits of continued ownership be reviewed before any significant expansion of the NEU, and, in any event, within three years of the commencement of commercial operations.

Approved Governance Principles

At that same time, Council approved the following governance principles for the NEU:

1. That the NEU will seek to minimise greenhouse gas emissions, consistent with the directions established in the Community Climate Change Action Plan.
2. That the NEU will be operated to ensure long-term financial viability based on a commercial model.
3. That the NEU will strive to establish and maintain customer rates that are competitive with the long-term capital and operating costs of other heating options available to customers.
4. That the City, where feasible, will support the development and demonstration of flexible, innovative and local technologies through the NEU.
5. That the City will consider and evaluate the potential to expand the NEU to other neighbourhoods and developments, with the merits and feasibility of each expansion phase to be determined separately.

Approved Rate-Setting Principles

Council also adopted the following eight principles, to be applied to setting rates and terms of service for NEU customers:

1. That NEU rates are structured so as to recover the following costs incurred by the City, based on forecasted costs:
    i. all direct operating costs associated with the NEU,
    ii. all debt service and repayment costs associated with the NEU,
    iii. the share of City administrative overheads that are attributable to the NEU,
    iv. property taxes and/or payments-in-lieu of property taxes, as appropriate,

v. a reserve fund for NEU rate stabilization,

vi. an appropriate level of compensation for the risks and liabilities assumed by the City associated with the ownership and operation of the NEU, and

vii. credits for any benefits provided by the NEU to City taxpayers (e.g., contribution to corporate greenhouse gas (GHG) reductions goals), as determined by Council.

2. That NEU rates fairly apportion the aforementioned costs among customers of the NEU.
3. That NEU rates be understandable to customers, practical and cost-effective to implement.
4. That at least two separate rate classes (commercial and residential) be established to distinguish different types of NEU customers, with rates reflecting each class's proportional contribution to total costs.
5. That, where feasible, NEU rates provide price signals that encourage energy conservation by NEU customers.
6. That the methodology for calculating NEU rates provide year-to-year rate stability for NEU customers to the greatest extent possible.
7. That the methodology for calculating NEU rates provide year-to-year revenue stability for the City to the greatest extent possible, and include the use of a rate stabilization reserve similar to that used by the City for other utility operations.
8. That rates be updated by Council annually based on forecasted costs and adjusted to reflect any deviation from target levels of reserves, with annual rate changes requiring review and approval by Council followed by enactment of the necessary amendments to the NEU by-law.

Guiding Principles for NEU Expansions

In 2018 Council approved the NEU Expansion Investment Decisions Framework. Expansion of the NEU incorporates the following guiding principles, which are generally aligned with the original NEU governance principles that Council approved in 2006.

- **Renewable Energy**: the NEU will be used to accelerate 100% renewable energy outcomes for connected buildings, maximizing use of local resources like waste heat
- **Long-term Financial Viability**: expansions of the NEU must be financially viable, earning a return on investment commensurate with a commercial utility model
- **Customer Cost**: the NEU will provide a service that is cost competitive with other low carbon heating options available to customers
- **Resiliency**: the NEU will utilize a design approach that maximizes the reliability of the service and maintains the long-term flexibility to adapt to future technologies
- **Business Model**: to maintain control over GHG outcomes, the City will own the distribution system, with flexibility for private sector to own, operate and finance new energy centres

NEU Expansion Investment Decision Framework

Table 1 below summarizes the analyses staff will undertake to guide major capital investment decisions.

TABLE 1. INVESTMENT DECISION FRAMEWORK

Aspect of Evaluation	Analysis Required
1. Options Analysis	• Update evaluation of NEU alongside alternative options to achieve desired GHG outcomes
2. Financial Analysis	• Evaluate financial implications (fiscal capacity, NEU financial KPIs etc.) of continued operations and expansion
3. Ownership Analysis	• Evaluate City role with respect to ownership and operations of all or a portion of NEU infrastructure, including both existing infrastructure and future energy centres
4. Risk Assessment	• Update evaluation of risks using the City's standard risk assessment framework

October 24, 2025

Mayor and Council
City of Vancouver
453 W. 12th Ave.
Vancouver, B.C. V5Y 1V4

RE: False Creek Neighbourhood Energy Utility ("NEU") 2026 Customer Rates

Dear Mayor Sim and Councilors:

The purpose of this letter is to advise City Council as to the opinion of the independent Neighbourhood Energy Utility Expert Panel ("Panel") on the rates proposed to be charged by the NEU to its customers for the 2026 calendar year.

The Panel first met with City staff and representatives of Reshape Strategies ("Reshape") via teleconference on June 11, 2025 to consider the proposed NEU enhanced green heat rate service options and to review the operations of the NEU over the previous year, in terms of its financial performance, achievement of environmental goals, customer growth and future expansion plans, as well as the proposed rates for 2026. A follow-up meeting with the same parties present was convened on July 31, 2025 to enable due consideration of the increased business complexity associated with the introduction of the new service classes. The Panel and City staff exchanged numerous information requests and replies over the summer focusing on the 2026 rate increases, development of the new service classes as well as the longer-term planning and modeling issues. These in-depth exchanges with City staff have given the Panel the confidence to endorse the 2026 draft Report to Council ("draft Report"), as discussed below.

The Panel's mandate is to provide independent expert advice on the rates and rate structures proposed for the NEU, taking into consideration established rate-setting principles and viewed in the context of certain parameters or targets, specific to the NEU, known as key performance indicators ("KPIs"). These KPIs are intended to ensure that the NEU can remain financially viable, recovering its total costs from its customers over a reasonable period of time. Special attention this year was devoted to the work and recommendations of Reshape regarding the creation of two new service classes offering higher blends of renewable energy.

<u>Updated Customer Levies and Charges</u>
Based on the information provided in the draft Report and discussions with City staff, the Panel endorses a rate increase of 3.2% across all customer rate classes. Further, the Panel continues to support the per annum increase over a three year period in the Connection Levy which was approved last year to reach parity with actual connection costs.

The Panel notes that there are three separate customer rate classes and two deferral accounts, based on the recommendations flowing from the 2023 Comprehensive Rate Review. These modifications to the rate structure and KPIs allow the NEU to continue to grow while ensuring that customer rates remain fair and reasonable and consistent with inter-generational equity principles. The proposed additional opt-in service classes for enhanced green energy are addressed below under a separate heading.

As in prior years, the rate increase includes an inflationary increase of 2% and a temporary escalation factor of 1.2% above 2025 rates. The intent of the temporary escalation factor is to allow the NEU to collect additional monies, beyond inflationary increases, in the early years to ensure that the NEU can recover its operating costs and its capital investment over the life of the utility, without putting unfair cost pressure on early users, when there is a smaller customer base. The temporary escalation factor is eliminated once annual revenues exceed annual costs on an ongoing basis.

With respect to the inflationary increase of 2%, the Panel notes that this increase is now in sync with the current rate of inflation. It is also consistent in large measure with the long-term target rate of the Bank of Canada. Maintaining the long-term inflationary portion of the rate increase at 2% will serve to keep rates relatively stable and therefore predictable, in accordance with Council-approved rate-setting principles. Further, any under-recoveries can be managed by way of the existing deferral accounts for under-recovered costs. The Panel further finds that the 1.2% temporary escalation factor remains appropriate and is consistent with prior years. The duration of this temporary escalation factor is also tracked as one of the NEU's KPIs. It is currently due to be eliminated in 2033.

The rate increases will be applied equally to the fixed capacity levy and the variable energy use charge, which is consistent with the allocation made last year and accords with the recommendation contained in the 2023 Comprehensive Rate Review.

As noted in Appendix B to the draft Report, and as discussed in relation to the escalation factor above, the NEU uses a "levelized approach" such that rates are designed to under-recover costs in the early years of operation, when the customer base is smaller, and to over-recover in later years, ensuring that the NEU's total costs are recovered over a reasonable time period. In this regard, one of the NEU's KPIs allows a maximum 25 year period for recovery of the balance in a deferral account which is the account used to track and accumulate under-recovered costs. The Panel notes that the original deferral account is on track to be eliminated in 18 years (2027), which is ahead of its 25 year timeline (2034) and the second deferral account is due to be eliminated in 20 years (2039), also ahead of its 25 year timeline (2044).

The other KPI sets a limit on the quantum of unrecovered costs in the deferral accounts. This KPI is entitled "Maximum Balance of Under-Recovered Costs" and set at $15.0M. The Panel is pleased to see that the current maximum balance forecast of $11.3 M is a significant improvement from last year's forecast. The main reason for this reduction is the elimination of carbon tax in April 2025, which brought down the cost of natural gas and renewable natural gas ("RNG") thereby reducing operating costs. Delays in some capital projects to align with development timing also helped reduce the maximum balance.

Enhanced Green Heat Program

The Panel has reviewed the draft Final Report by Reshape dated October 10, 2025, entitled "False Creek NEU Enhanced Green Heat and 100% Renewable Energy Products". As described on the first page of this letter, the Panel was deeply engaged with Reshape and City staff over the summer in various information exchanges. This work resulted in the proposed two new service classes for increased use of renewables and establishment of the associated rate riders. Consideration of a segregated service class for 100% green energy customers was also an initiative the Panel recommended for 2026. Numerous considerations discussed included: quality of green supply, alignment with rate-setting principles, offering low carbon service tiers vs. flexible allocation, managing uncertainty of future RNG prices, integration of other potential future energy sources, etc.

Accordingly, the Panel is pleased to endorse the proposed Enhanced Green Heat Program ("EGH Program") which introduces tiered, opt-in service classes offering higher renewable energy blends. This approach allows customers to select their thermal energy subscriptions to align with their needs, while maintaining fairness by assigning costs to those who benefit. The 100% Renewable Energy class is designed for customers seeking to voluntarily fully decarbonize whereas the 88% EGH class is designed for new buildings opting to use the EGH Program to be compliant with GHG intensity limits under the Vancouver Building Bylaw as of 2025. The Panel supports the use of incremental rate riders over the standard rates during the introductory phase of this program as it gives customers a clear visual image vis-a-vis the standard rate. As the program matures this rate design should be revisited. Furthermore, the Panel fully supports setting rates based on the interim strategy of replacing natural gas with RNG because the NEU is facing a very complicated energy landscape with significant changes taking place over the past. This strategy not only allows the NEU to leverage the benefits of RNG but also provides time to find the best solution going forward to deliver the enhanced green heat offerings.

The Panel notes that there is considerable uncertainty regarding the future of RNG prices over which the NEU likely has very limited control. The rate rider reflects the incremental cost of RNG relative to natural gas under FortisBC Energy Inc.'s current RNG pricing which benefits from significant subsidization. Therefore, with future uncertainty over the "subsidization", the Panel urges the NEU to focus on integration of other potential future energy sources, such as waste heat, whether from industry,

municipal operations/infrastructure or planned data centers. The next phase could also include heat pump based sources.

Finally, the Panel has considered Reshape's analysis of the estimated developer cost savings to achieve emissions intensity targets that will be realized by connecting to the NEU. Given that this sensitivity analysis involves a multitude of assumptions, the Panel therefore concurs with the City staff proposal that "developer cost savings and EGH Program capital requirements will be monitored to inform fair and proportional cost allocation as the program evolves".

Comparison of NEU Rates to Other Energy Providers

The Panel has reviewed the information provided on the rates charged by other neighbourhood energy systems in the Lower Mainland, as well as those charged by BC Hydro. The Panel finds that the rates proposed to be charged by the NEU for 2026 are not inconsistent with those charged by other comparable utilities and remain within the target maximum of a 10% premium over those charged by BC Hydro.

As the NEU operations continue to expand and mature while facing the emergence of new customers seeking enhanced green energy service, City staff and the Panel need to consider new planning and modeling requirements on a go-forward basis. In that regard, the Panel is pleased to report that significant idea exchanges took place over the last summer between City staff and the Panel regarding introduction of a more formalized Asset Management Plan. This work will continue in 2026.

In closing, the Panel would also like to take this opportunity to thank City staff for its analysis, proactiveness, succinct presentation of complex information and cooperation throughout the review process.

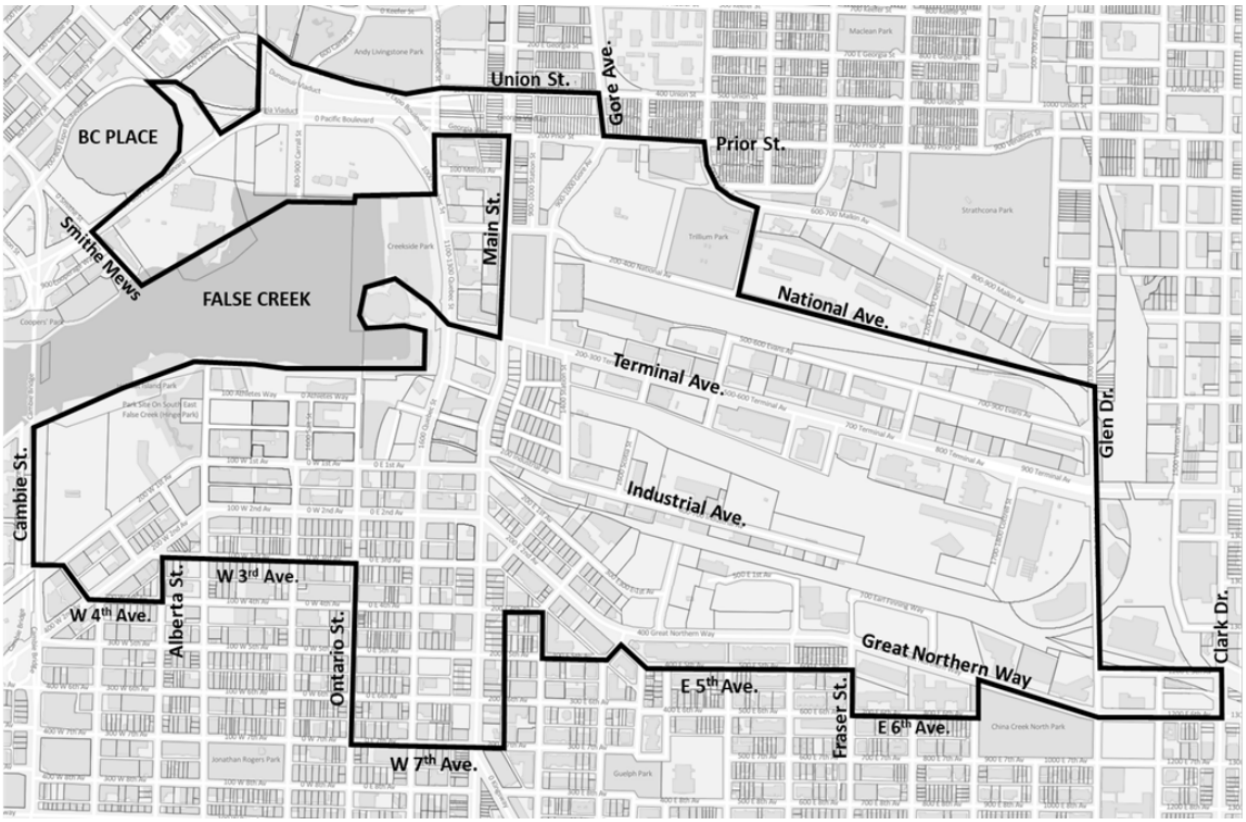
Yours sincerely,

Liisa O'Hara

Liisa O'Hara
Chair, NEU Expert Panel

APPENDIX E

FALSE CREEK NEIGHBOURHOOD ENERGY UTILITY
BOUNDARIES OF SERVICE AREA



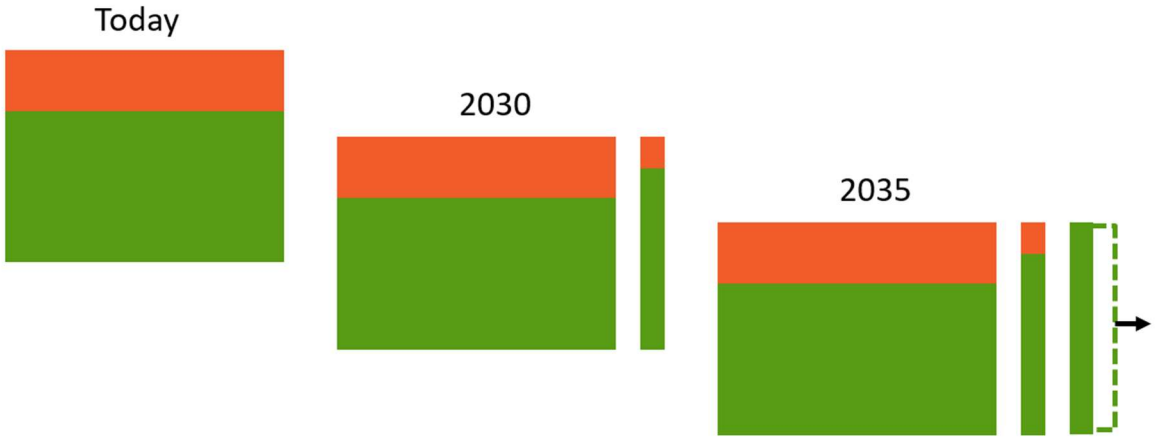
FALSE CREEK NEU ENHANCED GREEN HEAT AND 100% RENEWABLE ENERGY PRODUCTS

DRAFT FINAL REPORT

Prepared by Reshape Infrastructure Strategies

For the City of Vancouver

October 10, 2025



RESHAPE STRATEGIES

Statement of Limitations

This report has been prepared by Reshape Infrastructure Strategies ("Reshape") and its partners for the exclusive use and benefit of the City of Vancouver ("Client"). This document represents the best professional judgment of Reshape and our partners, based on the information available at the time of its completion and as appropriate for the scope of work. Services were performed according to normal professional standards in a similar context and for a similar scope of work.

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EXECUTIVE SUMMARY

When the False Creek Neighbourhood Energy Utility (NEU) began operating in 2010, heat from the NEU had much lower greenhouse gas emissions than typical building heating systems, giving the NEU's customers a level of environmental performance that significantly exceeded what was required under building codes.

Fast forward to 2025 and building codes have caught up. New buildings in Vancouver must have heating systems with extremely low GHG emissions, and new customers require lower GHG heat than has been offered by the NEU.

The City's preferred solution to this challenge is to offer distinct lower-GHG heat products to those customers who need lower-GHG heat to meet their regulatory requirements. This approach is increasingly common throughout the utility sector, with electricity, gas, and district heating utilities all offering separate products with reduced GHG emissions.

This report summarizes analysis of two new "greener heat" products to be offered by the NEU, including information on their associated emissions factors and costs. With this change, NEU will offer three distinct products:

- Standard Green Heat, with an emissions factor of approximately 70 kg CO2e per MWh
- Enhanced Green Heat, with an emissions factor of 30 kg per MWh
- 100% Renewable Energy, with an emissions factor of 5 kg per MWh or less.

In the near term, only the Enhanced Green Heat product is expected to be required by new customers to meet regulatory requirements, but some customers may voluntarily elect to reduce their emissions even further by purchasing 100% Renewable Energy.

NEU will incur additional costs to offer these two new products, and this report includes analysis of the rate riders needed to ensure customers purchasing these new products pay the associated incremental costs.

This report also summarizes analysis of the capital costs saved by developers when their buildings connect to the NEU. Based on a typical new building archetype, NEU connection allows developers to save ~$11 per square foot, because NEU connection eliminates the need to install an on-site low-carbon heating plant. This $11 per sq ft savings is after accounting for the NEU's existing connection charge, which is typically <$2 per sq ft. This suggests there is an opportunity to further increase the NEU's connection charge while continuing to make NEU connection win-win for developers and customers.

ACKNOWLEDGEMENTS

Reshape would like to thank the following for their contributions to this work:

- Emily Codlin, City of Vancouver
- Derek Pope, City of Vancouver
- Alex Blue, Evoke Buildings
- Jakub Policht, Footprint Energy
- Kevin Leung, Introba
- Sam Lane, Entuitive

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1 INTRODUCTION

1.1 Why Is This Necessary?

When the False Creek Neighbourhood Energy Utility (NEU) was established in 2010, most new buildings in Vancouver were heated exclusively with natural gas. The NEU's use of a sewer heat pump for baseload plus natural gas for peaking offered much better greenhouse gas (GHG) emission performance than was typical at the time.

In 2016, the City of Vancouver passed the Zero Emissions Building Plan. Under this plan, the Vancouver Building Bylaw (VBBL) will include increasingly stringent limits on GHG emissions for new construction. Initially, these emission limits were high enough that new buildings could easily comply with the requirement by connecting to the NEU. As of 2025, greenhouse gas emission limits for new residential buildings have been reduced to a level where it would be difficult for new buildings receiving NEU service to comply with the VBBL.[1] Additionally, the NEU has received inquiries from some customers about purchasing 100% renewable energy.

In response to these developments, the NEU's preferred approach is to develop new, lower-GHG heating offerings that can be provided to new customers to meet their regulatory requirements, as well as to other customers who may wish to voluntarily purchase lower-carbon heat.[2] Until existing customers are required by City policy to purchase lower-carbon heat, they would continue to be able to access heat with the same environmental performance as was targeted when the NEU was established in 2010.

Our team was engaged by the NEU to assist in developing the details of these offerings and this report summarizes our team's work.

1.2 Key Features of Proposed Program

Based on our team's analysis and in consultation with NEU staff, we have developed a proposed set of products and associated rates. Our approach has two key features:

1. Offer distinct products with defined emissions factors, and
2. Charge customers volume-based riders which capture all incremental costs.

Distinct Products with Defined Emissions Factors. NEU would offer three distinct thermal energy products, each with a defined GHG emissions factor per MWh of heat. These three thermal energy products are:

- **Standard Green Heat**. This is the product currently provided to NEU customers, defined as having a GHG emissions factor of 70 kg CO2e per MWh. Approximate renewable energy share: 70%.

[1] These VBBL limits are expressed as kg of CO2e per m^2 per year and are referred to as greenhouse gas intensity limits or GHGi. As of 2025, the City has reduced the GHGi for new residential multi-unit buildings from 6 kg per m^2 per year to 3 kg per m^2 per year, triggering the need for lower-carbon offerings from the NEU.

[2] This approach has generically been referred to as a "green heat" program, though for the NEU it may be better thought of as a "greener heat" program, since the NEU's standard service is already largely low carbon.

- **Enhanced Green Heat (EGH)**, with an emissions factor of 30 kg CO2e per MWh. As of 2025, most new buildings in the NEU's service area will need to purchase this product to be compliant with GHG intensity limits under the Vancouver Building Bylaw. Approximate renewable energy share: 88%.

- **100% Renewable Energy (100% RE)**. In alignment with the province's Zero Carbon Step Code, buildings may eventually require 100% renewable energy, generated without the use of natural gas. There may also be NEU customers who want to purchase 100% renewable energy to meet their own emission reduction goals. Because electricity has a non-zero emissions factor, an emissions factor of zero for heat from NEU is not possible; we suggest 5 kg CO2e per MWh as a reasonable target emissions factor for this product. Renewable energy share: 100%.

Offering thermal energy products with defined emissions factors directly links NEU's service offerings to compliance with GHG regulations. It also provides clear targets for NEU operations, since the utility's overall emissions must align with the emissions factors that NEU has committed to achieve for its customers.

Each customer would be designated as purchasing one of these products. We do not propose giving customers the option to blend or combine products. Some other utilities' low-carbon energy offerings include the ability to blend products. Given the fact that NEU's standard offering is already relatively low carbon, we expect that the three options shown above will offer sufficient flexibility to NEU customers, while limiting the administrative and operational burden on the NEU.

Use Volume-Based Riders Which Reflect Incremental Costs. Our recommendation is that at this time, purchasers of the Enhanced Green Heat and 100% Renewable Energy products be charged using volume-based (i.e. per MWh) rate riders. These riders would be in addition to existing NEU rates. The riders will reflect all incremental costs associated with the Enhanced Green Heat and 100% Renewable Energy products, respectively.

The use of volume-based riders is preferable in part because of the planned use of RNG. Until at least 2030, NEU staff expect that the additional low-carbon energy for the EGH and 100% RE products will be generated using RNG. Because RNG can be acquired as needed, without additional capital investments by the NEU, it is not necessary to have a capacity charge or similar fixed charge for the EGH and 100% RE services. In the future, if the NEU invests in additional low-carbon capacity (such as a new heat pump plant) to meet the needs of EGH and 100% RE customers, this approach may need to be revised.

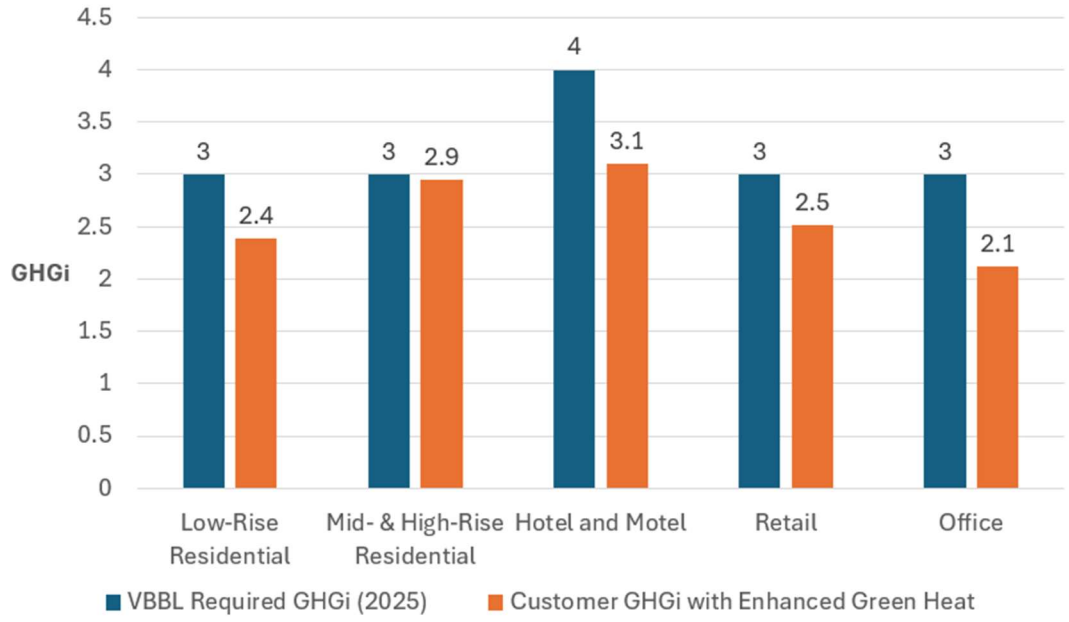
A further benefit of using a volume-based rider that recovers all incremental costs is that NEU can avoid having to establish deferral accounts for the EGH or 100% RE products.

2 ENHANCED GREEN HEAT PRODUCT

2.1 Setting the Emissions Factor for the Enhanced Green Heat Product

In consultation with industry experts and NEU staff, we determined that an Enhanced Green Heat product with a GHG emissions factor of **30 kg CO2e per MWh of heat** would enable new customers to comply with 2025 VBBL GHGi limits. VBBL limits vary by building typology; as is shown in Figure 1, with an emissions factor of 30 kg per MWh, all building types can meet their GHGi limits. Most new NEU customers will be mid- and high-rise residential buildings.

Figure 1: VBBL Required GHGi vs Achieved GHGi with Enhanced Green Heat



More detail on the determination of an appropriate emissions factor for the EGH product, including our team's consultation with industry experts, is provided in Appendix 1.

2.2 Calculation of Rate Rider for Enhanced Green Heat Product

Calculating the Enhanced Green Heat rate rider requires determining the incremental volume of RNG which must be purchased for an EGH customer, and the associated incremental cost. The calculation of these values is illustrated below in Table 1 and Table 2 using two hypothetical customers, each purchasing 1,000 MWh of heat. The customer in Table 1 is purchasing 1,000 MWh of the standard NEU product, and the Table 2 customer is purchasing 1,000 MWh of the Enhanced Green Heat product.

NEU currently offers one product which we refer to in this report as Standard Green Heat. This product has and will continue to have a target emissions factor of 70 kg per MWh. Table 1 provides fuel consumption and emissions for a customer receiving 1,000 MWh, with total emissions of 70 tonnes, equivalent to 70 kg per MWh. Further notes:

- FortisBC has used the term "designated RNG blend" to refer to the 3% blend of RNG which is provided to all customers as of July 2025. Customers can voluntarily designate additional amounts of RNG. This complicates the terminology somewhat, since FortisBC's standard product is now a mix of conventional natural gas and RNG. In this report, we have used the term "Standard Gas Product" to refer to this mix of conventional gas and RNG, and "RNG" to refer to a volume of "pure" RNG voluntarily purchased by NEU, incremental to and separate from the designated RNG blend in FortisBC's Standard Gas Product. The analysis below uses an emissions factor for the Standard Gas Product which accounts for the designated RNG blend received by all customers.

- NEU's average distribution system losses are 3.5%, so for a customer purchasing 1,000 MWh of thermal energy, the plant must produce 1,035 MWh.

Table 1: Fuel consumption and emissions for Standard Green Heat customer receiving 1,000 MWh

Resource	NEU Plant Output MWh	Efficiency	Fuel Input MWh	Fuel Emissions Factor, kg / MWh[3]	Emissions, tonnes CO2e
Heat Pump	707	308%	229	9.9	2
Standard Gas Product	328	85%	386	175.4	68
Additional RNG	-	85%	-	1.0	-
Total	1,035		615		70

Table 2: Fuel Consumption and Emissions for Enhanced Green Heat Customer Receiving 1,000 MWh

Resource	NEU Plant Output MWh	Efficiency	Fuel Input MWh	Fuel Emissions Factor, kg / MWh	Emissions, tonnes CO2e
Heat Pump	707	308%	229	9.9	2
Standard Gas Product	133	85%	157	175.4	28
Additional RNG	195	85%	229	1.0	0.2
Total	1035		615		30[4]

The resource mix in Table 2 results in GHG emissions of 30 tonnes to provide 1,000 MWh of thermal energy, equivalent to a GHG emissions factor of 30 kg per MWh.

The Enhanced Green Heat rate rider should be set at a level that recovers the incremental cost of this 229 MWh of RNG, relative to the 229 MWh of Standard Gas which it has replaced. Continuing with the example above, Table 3 calculates the rider required to pay for this 229 MWh of RNG. This rider is an additional charge

[3] BC Hydro emissions factor based on Climate Action Secretariat Emission Factor Catalogue for 2024 Reporting Year. Standard Gas Product emissions factor based on blend of 97% conventional natural gas at 181 kg per MWh and 3% RNG at 1 kg per MWh, both values from CAS EF Catalogue 2024.

[4] Values do not add due to rounding.

applicable to EGH customers. These customers would also pay all other NEU rates and charges associated with the Standard Green Heat product.

Table 3: Cost of Incremental RNG for Enhanced Green Heat

	Current Voluntary RNG Program Price	Full Cost of FEI's RNG Portfolio (2025)
Price of RNG per GJ (Commodity Only)	$9.23	$22.33
Price of Standard Gas per GJ (Commodity Only)	$2.23	$2.23
RNG Premium per GJ	$7.00	$20.10
RNG Premium per MWh	$25.20	$72.36
Incremental RNG MWh	229	229
Incremental Cost	$5,780	$16,600
Heat to NEU Customer	1,000 MWh	1,000 MWh
Incremental Cost of RNG per MWh Heat to NEU Customer	$5.78	$16.60

Table 3 shows two different RNG price scenarios: the price under FortisBC's current approved RNG program, and a price based on the actual cost of FortisBC's RNG portfolio. The prices are different because under the current RNG program, when FortisBC customers voluntarily purchase RNG (above and beyond the designated RNG blend received by all customers), they are charged a price that is less than FortisBC's cost to acquire RNG. FortisBC does not lose money on this transaction; the shortfall is instead paid by all FortisBC customers (not just customers who have voluntarily purchased additional RNG). The price of voluntary RNG is less than cost, because voluntary RNG is cross subsidized by other FortisBC customers.

We have shown these two scenarios for the cost of this incremental RNG (and the corresponding EGH rate rider) for two reasons:

- Utilities and their regulators generally try to avoid overt cross subsidies between customer groups. There is no guarantee that this pricing will persist indefinitely, and one day voluntary RNG customers may be required to pay the full cost of this resource.

- When comparing resource options, utilities often use a range of cost-effectiveness tests, some of which only reflect costs directly incurred by the utility, and some of which take a wider lens and incorporate costs and benefits which occur elsewhere in society. While this report is not a planning exercise and we have not conducted a full societal benefits cost test, the full cost of RNG must be paid by someone and the City may wish to include that information when communicating about this program internally as well as to the NEU's customers.

Other notes and comments on this analysis:

- Price of Standard FEI Gas per GJ is based on FortisBC's approved commodity charge as of Sept 2025.
- The analysis excludes delivery, midstream, and other non-commodity charges as they are equal for RNG and standard gas.
- Carbon tax is not included in these calculations as it was eliminated in April 2025.
- The Current Voluntary RNG Program Price is set as a fixed premium over the commodity cost of natural gas. As proposed by FortisBC and approved by BCUC, this premium is always $7 per GJ, so if (for example) the commodity cost for standard gas increases to $3 per GJ, then the price of RNG would increase to $10 per GJ. FortisBC's use of this mechanism makes it relatively straightforward for the NEU to price EGH, since the riders for this product will not have to be adjusted in response to changes in the cost of standard gas. Because sales of EGH will result in the NEU "swapping out" standard gas for RNG, all incremental costs associated with these purchases can be recovered via a rider set per the above methodology.
- Once more information is available from operations, NEU staff may wish to adjust the rider slightly upwards to account for EGH administration costs. Administration costs are difficult to estimate at this time, and we recommend beginning with a rider set to capture incremental RNG costs only.
- The Price of RNG per GJ in the "Full Cost of FEI's RNG Portfolio" scenario is set at $22.33 to align with the weighted average RNG portfolio cost reported by FEI in a summer 2025 gas cost report.[5]
- In the future, if the NEU invests in new low-carbon capacity such as a new heat pump plant to meet the needs of EGH and 100% RE customers, these riders will likely need to be adjusted, and a rate rider on the capacity levy may be required.

3 100% RENEWABLE ENERGY PRODUCT

For 100% Renewable Energy customers, all the standard gas purchased for Standard Green Heat customers must be replaced with RNG. Table 4 shows the fuel inputs to provide 1,000 MWh of 100% Renewable Energy. Replacing all standard gas with RNG results in an overall emissions factor of 2.7 tonnes for 1,000 MWh, or 2.7 kg per MWh using current emissions factors. The precise emissions factor of the 100% Renewable Energy product will be largely dependent on the emissions factors for BC Hydro and for RNG, both of which are outside the NEU's control. For this reason, we suggest that the NEU commit to a more lenient emissions factor for this product – e.g. 5 kg per MWh – or simply commit to purchasing 100% renewable energy and report the emissions factor as needed.

[5] See "Application to Set the Renewable Natural Gas (RNG) Blend Percent, Storage & Transportation (S&T) RNG Rider, and RNG Charges, Effective July 1, 2025", dated June 10, 2025, page 7, para. 2.

Table 4: Fuel Consumption and Emissions for 100% Renewable Energy Customer Receiving 1,000 MWh

Resource	NEU Plant Output MWh	Efficiency	Fuel Input MWh	Fuel Emissions Factor, kg / MWh	Emissions, tonnes CO2e
Heat Pump	707	308%	229	9.9	2.3
Standard Gas Product	-	85%	-	175.4	-
Additional RNG	328	85%	386	1.0	0.4
Total	1,035		608		2.7

Table 5 calculates two different cost scenarios for the rate rider required for the 100% RE product. Like the EGH rider, this rider would be in addition to all other NEU rates and charges (though 100% RE customers would not be required to pay the EGH rider, only the 100% RE rider). Please see the Enhanced Green Heat section of this report for further notes on the two different price scenarios used below.

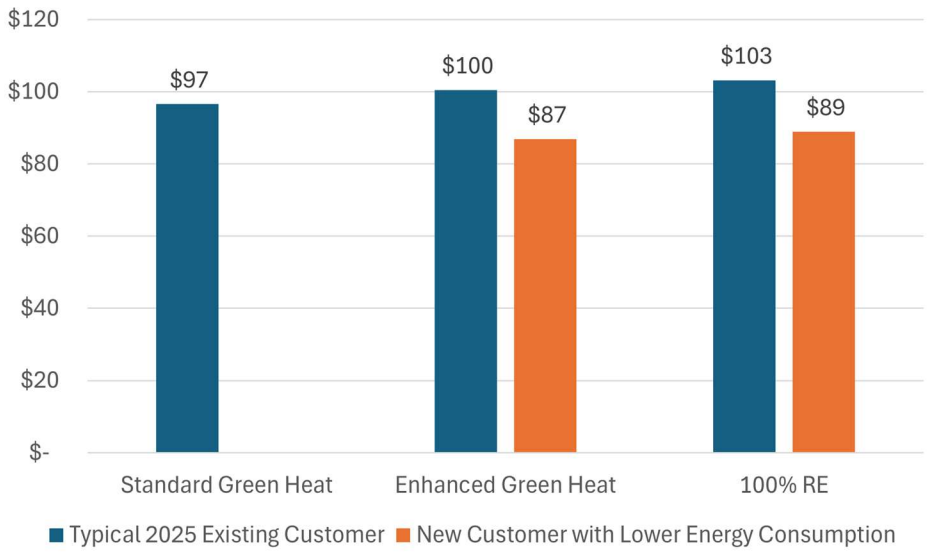
Table 5: Cost of Incremental RNG for 100% Renewable Energy

	Current Voluntary RNG Program Price	Full Cost of FEI's RNG Portfolio (2025)
Price of RNG per GJ (Commodity Only)	$9.23	$22.33
Price of Standard Gas per GJ (Commodity Only)	$2.23	$2.23
RNG Premium per GJ	$7.00	$20.10
RNG Premium per MWh	$25.20	$72.36
Incremental RNG MWh	386	386
Incremental Cost	$9,730	$27,940
Heat to NEU Customer	1,000 MWh	1,000 MWh
Incremental Cost of RNG per MWh Heat to NEU Customer	$9.73	$27.94

4 BILL IMPACTS

Figure 2 shows 2026 monthly per-suite bills for current customers, and customers receiving EGH and 100% RE, based on setting the riders in line with the current RNG price, not the full cost of FortisBC's RNG portfolio.

Figure 2: Projected 2026 monthly per-suite costs using current RNG program price



- All values shown are average monthly costs per residential suite based on projected NEU rates for 2026 (the first year in which the EGH and 100% RE products will be available to customers), plus the EGH and 100% RE riders, as applicable. The chart shows costs per suite for two types of customers: a typical existing NEU customer, and a new customer. New customers are expected to have lower thermal energy consumption due to more stringent building codes, reducing their monthly bills.

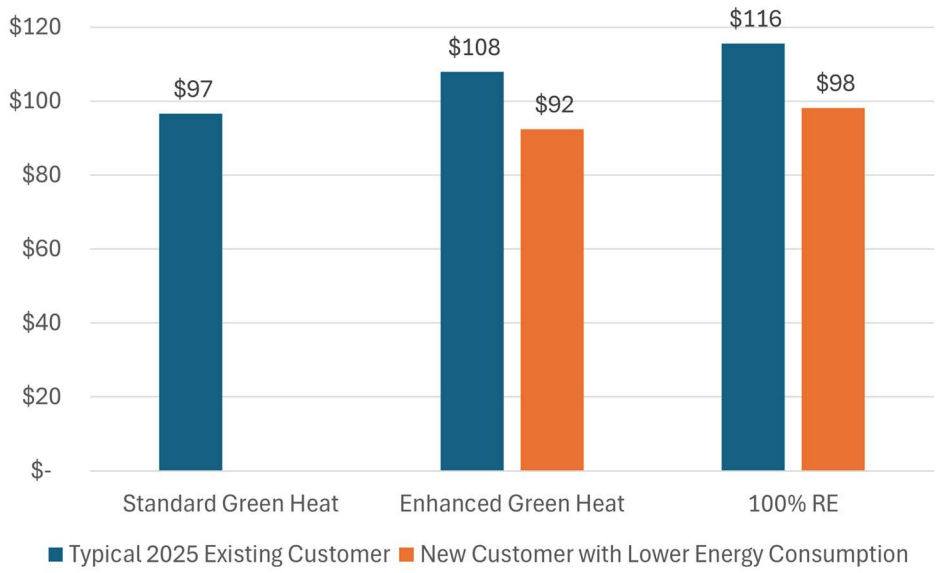
- The average existing NEU customer values in the chart are based on an 800 sq ft (75 m^2) suite with an energy use intensity of 109 kWh per m^2 per year, which aligns with the average consumption by existing NEU buildings, grossed-up by 10% to account for each suite's share of common space-related heating costs. This results in total per-suite thermal energy consumption of 8.2 MWh per year.

- The new NEU customer values are also based on an 800 sq ft (75 m^2) suite. Energy use intensity is assumed to be 74 kWh per m^2 per year, which is based on the modeled energy performance of new buildings (40 kWh space heat + 30 kWh domestic hot water), plus a 10% increase in space heat consumption to account for the gap between modeled and actual performance. Including the same 10% gross-up for common space costs give total per-suite thermal energy consumption of 6.1 MWh per year.

Despite the additional cost of the EGH rider, new customers will still have lower total bills than existing customers due to their buildings' lower energy consumption. The chart also illustrates that existing customers' costs would increase if they opt-in to the EGH or 100% RE programs.

Figure 3 provides the same information but with the EGH and 100% RE riders set based on the full cost of FortisBC's RNG portfolio. It is notable that even with this higher rider cost, the monthly per-suite cost for new buildings receiving EGH is still lower than for the typical existing customer receiving Standard Green Heat.

Figure 3: Projected 2026 monthly per-suite costs using full cost of FortisBC RNG portfolio



5 NEAR-TERM OUTLOOK FOR EGH AND 100% RE

Future NEU customers which would need to purchase Enhanced Green Heat for code compliance are currently in the planning and design stages. NEU's current forecast is that the first buildings required to purchase EGH would come online in 2028.

It is not clear when new customers will require the 100% RE product for building code compliance. For the purposes of this report, it has been assumed to be 2033 or later, based on the next step of the Energy and Carbon Step Code being effective for building permits from 2030.

Table 6 provides projected EGH and 100% RE sales and revenues through 2030, based only on forecast sales to customers who require these products for compliance purposes. Voluntary purchases – for example, by existing NEU customers electing to purchase EGH – would increase these numbers. Revenue values are based on setting the rider to align with the current RNG program price.

Table 6: EGH Sales and Revenues, 2026-2030

	2026	2027	2028	2029	2030
EGH Sales, MWh	-	-	1,100	4,200	19,600
100% RE Sales, MWh	-	-	-	-	-
Revenues from EGH Rider	-	-	$6,400	$24,300	$113,300
Revenues from 100% RE Rider	-	-	-	-	-

6 OTHER CONSIDERATIONS

6.1 Operational Issues

Key operational and implementation issues identified by our team are discussed below.

6.1.1 Fine-tuning RNG purchases

Adopting emissions factors for all NEU products will result in an overall emissions limit for NEU operations. An example using sample values: if the utility sells 100 MWh of heat with an emissions factor of 2 kg per MWh, and another 50 MWh of heat with an emissions factor of 1 kg per MWh, then total emissions from utility operations can be no greater than 250 kg.

Over the course of each year, NEU staff will have to monitor sales, heat pump output, and RNG purchases to ensure the utility is on track to keep total emissions within the applicable limit. This will be an iterative process. NEU staff already have experience managing this issue as the system has purchased specific RNG in prior years to achieve an overall 70% share of renewable energy. FortisBC has permitted the NEU to fine-tune RNG purchases in the later months of the year so if, for example, it is clear by October that based on year-to-date sales, heat pump output, and RNG purchases, the NEU will have GHG emissions slightly in excess of the system limit, then NEU staff can contact FortisBC and adjust the proportion of RNG which the NEU purchases for November. Another adjustment can be made for December if needed. By carefully monitoring sales and energy production, NEU staff will be able to achieve GHG emissions within the applicable overall limit.

6.1.2 Restrictions on Opting-Out and Opting-In

New buildings which are required to meet the 2025 GHGi limit cannot be permitted to initially sign up for EGH, then switch later to the Standard Green Heat product to avoid the cost of the EGH rider. The intent of GHGi limits is for buildings to have lower GHG emissions for the life of the building and the NEU service offering must meet that intent. One possible approach is that revisions to the NEU bylaw to offer the Enhanced Green Heat service include restrictions on some customers' ability to switch to the Standard Green Heat product. For example, buildings which received a building permit after a particular date (making them subject to the 2025 VBBL regulations) may be prohibited from purchasing Standard Green Heat. However, this approach would require legal review and approval.

A separate but related matter is that customers should be permitted to opt-in to purchasing a lower-GHG product. The NEU's existing customers should be permitted to opt-in to EGH, or to 100% RE if they choose. Likewise, customers required to purchase EGH should be allowed to opt-in to 100% RE.

One challenge the opt-in mechanism may pose is that frequent switching by customers between product types will make it more challenging for NEU staff to plan the system's resource mix. As part of updates to the NEU bylaw, the City may consider placing restrictions on how frequently or with what notice period customers are allowed to switch their type of service (to the extent they are permitted to do so). This issue balances providing stability to NEU operations, with providing flexibility to customers. Our team does not have a strong view on how best to balance these factors. One example approach to this issue is provided by Creative Energy's application to the BCUC for approval of an RNG-based green heat program. Creative Energy proposes that customers sign up for a minimum of one year, and program enrollment would be in calendar year increments (i.e. a customer wishing to sign up mid-year would begin service on January 1 of the following year).[6] An alternative approach would be to specify a notice period, for example 2 months' notice, before a customer can adjust the type of service they receive.

6.1.3 Providing Guidance to Developers and Customers

As part of offering these additional products, NEU staff will likely need to provide a detailed guidance document for building developers and energy modelers. This document will need to address how NEU calculates and ensures the GHG intensity of its products, in a manner that is consistent with how energy modelers use emissions factors to demonstrate compliance with VBBL. The document will also need to provide information on the NEU's overall efficiency or coefficient of performance (COP).

6.2 Longer-Term and Planning Issues

Longer-term and planning issues we have identified include the availability of sufficient RNG, future changes in how RNG is priced, and future investments by the NEU in additional low-carbon capacity.

6.2.1 Availability of RNG

In past years, FortisBC has not had sufficient RNG supply to meet demand from customers and has had to close the RNG program to new purchasers. As of 2025, FortisBC has managed to procure significant additional volumes of RNG, and customers are not restricted from purchasing RNG. For the 12-month period beginning July 1 2025, FortisBC projects that it will have sufficient RNG supply to sell 1,700 TJ of RNG to voluntary customers and also blend 5,200 TJ into all FortisBC customers' gas (the "designated RNG blend").[7] Given that contracted RNG supply is 4x voluntary customer demand, and FortisBC generally gives priority to voluntary customers, it appears that access to RNG should not be an issue for the near term.

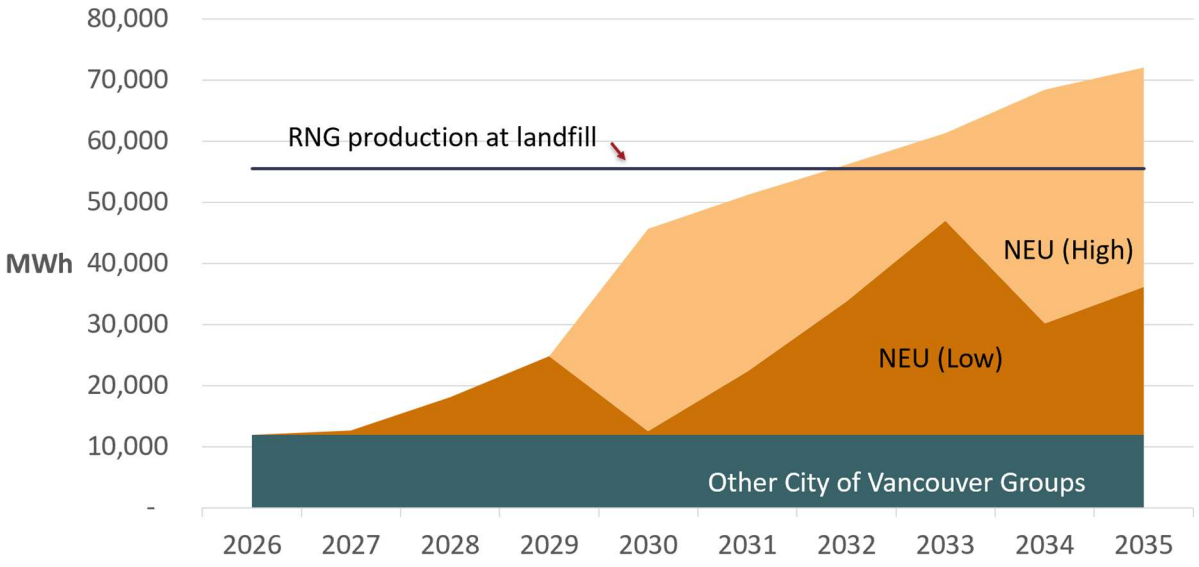
Another City of Vancouver project can provide additional assurance to the NEU that RNG supply will be available. Under a contract with FortisBC, landfill gas from the Vancouver Landfill is upgraded to RNG and sold

[6] See "Creative Energy Core TES RNG Bridging Fuel Rate" proceeding at bcuc.com. As of the time of writing, the BCUC has not provided a decision in this proceeding.

[7] See "FortisBC Application to Set the Renewable Natural Gas (RNG) Blend Percent, Storage & Transportation (S&T) RNG Rider, and RNG Charges, Effective July 1, 2025 (Application)" dated June 10, 2025 at bcuc.com, p 2.

to FortisBC. The contract includes a provision giving the City of Vancouver the right of first refusal to access RNG produced from the landfill. Annual production from the landfill is expected to be ~55,000 MWh of RNG. Figure 4 shows how this volume (the solid line) compares against possible future consumption by the NEU and other City of Vancouver groups. The "NEU (Low)" scenario is the amount of RNG that NEU would require, given projected customer growth and assuming that a new low-carbon resource is added in 2030 and expanded in 2034. The "NEU (High)" scenario is the volume that would be required if policymakers require the NEU to provide 100% renewable energy to all customers by 2030. The landfill project alone will provide sufficient RNG supply for all City of Vancouver needs until at least 2032.

Figure 4: Vancouver Landfill RNG Production and City of Vancouver Demand



6.2.2 Changes in RNG Pricing

As was noted previously, utility regulators generally prefer to avoid significant cross-subsidies between customer groups. It is possible that NEU prices the EGH and 100% RE products based on the existing cross-subsidized RNG price, and at some future date the price of RNG is increased, requiring the NEU to respond with higher prices for the EGH and 100% RE products.

Utilities always face the possibility of changes in input costs, and they generally respond by making corresponding changes in their prices. The same dynamic applies to the EGH and 100% RE products. The risk to the NEU is that such a change happens very quickly, requiring a fast response from the NEU to ensure that the NEU isn't spending more on RNG than it collects in revenues.

The good news from the perspective of the NEU is that any change in RNG pricing is unlikely to happen overnight. It will involve a BCUC proceeding – likely a lengthy one – and the process will provide time for NEU staff to prepare for the change. The most recent BCUC proceeding to review and modify FortisBC's RNG

program took five years and only concluded in 2024, so both FortisBC and the BCUC may not have the appetite to reconsider RNG pricing for several years.

6.2.3 Additional NEU Low-Carbon Resources

NEU staff do not intend to rely only on RNG for additional low-carbon energy supply. Staff are currently evaluating different opportunities to support the ongoing expansion and decarbonization of the NEU. This could include the introduction of new heat pumps for recovering waste heat, and/or electric boilers for peaking.

Because new low-carbon resources could have significant fixed capital costs as well as variable operating costs, and some share of that capacity would be dedicated to meeting the additional GHG performance associated with sales to the EGH and 100% RE customers, the NEU would consider at that time how to adjust pricing for EGH and 100% RE. The purely variable-rate riders described in this report may need to be replaced with a combination of variable and fixed riders, to more appropriately match rates to the cost of delivering the EGH and 100% RE products. To introduce this idea to customers, NEU could include placeholder capacity levy riders for the EGH and 100% RE products, set at $0 per kW.

7 DEVELOPER AVOIDED COSTS AND NEU CONNECTION CHARGE

When new buildings connect to the NEU, the developer avoids the cost of installing on-site heat generation equipment. Our team was tasked with answering the question: how much capital cost savings does a typical new building developer achieve by connecting to the NEU?

We worked with AME and BTY to develop an archetypal building and three appropriate heating and cooling system configurations:

- A building connected to NEU for space heating and domestic hot water, with a building-scale cooling plant.
- A non-NEU connected building with air-source heat pumps (ASHPs), and a combination of gas boilers and electric boilers for peak heating. This is a typical design for a building that must comply with a GHGi of 3.0 kg per m^2 per year.
- A non-NEU connected, fully-electric building with ASHPs and electric boilers for peak heating. This is expected to be a typical design for buildings which need to comply with future near-zero GHG requirements.

All three cases are based on the same building type: a two tower, 20-story multi-unit residential development on a shared podium, with a total area of 32,500 m^2 (350,000 sq ft), and centralized heating and cooling.

AME produced a mechanical brief describing each of these options in more detail. BTY produced cost estimates for each of the three options based on AME's mechanical brief. For the "NEU Connected" option, we have added the cost to the developer of the NEU's connection charge.

Table 7: Summary of Developer Capital Cost Estimate plus NEU Connection Charge

Resource	Case 1: NEU Connection + Air Cooled Chillers	Case 2: Air-Source Heat Pumps + E-Boiler and Gas Boiler	Case 3: Air-Source Heat Pumps + E-Boiler (no gas)
BTY Estimate, Incl. General Requirements, Fees, 25% Contingency	$5,903,900	$10,084,300	$9,995,400
NEU Connection Charge (by Reshape)	$365,500	-	-
Total	$6,269,400	$10,084,300	$9,995,400
Cost Increase from Case 1	-	$3,814,900	$3,726,000

Table 7 summarizes the results of this analysis. Compared to both Case 2 and Case 3, NEU connection would save the developer of this building $3.7 to $3.8 million, after accounting for the need to pay the current NEU connection charge. This analysis suggests that developers are achieving significant benefits from NEU connection and that there is room to increase the NEU connection charge. Greater NEU connection charges will reduce NEU rates (or, alternatively, accelerate the paydown of the deferral account), providing benefits to customers. A larger connection charge could still be win-win, allowing developers to retain a share of the benefits of NEU connection while increasing benefits to NEU customers.

We note the following:

- The building is assumed to be built to the 2025-era Vancouver Building Bylaw, which requires reduced space heating demand (TEDI of 40 kWh per m^2 per year). In all three cases, the building is assumed to have a four-pipe hydronic heating and cooling system to provide space heating and cooling.
- All capital costs are 2025$. The estimated NEU connection charge is based on the connection charges in place as of 2025.
- Costs which are downstream of the heating and cooling generation equipment and common to all options, such as the four pipe distribution system within the building, are excluded from the cost estimate.
- Electrical equipment falls outside of AME's area of practice, so their mechanical brief does not provide any information on differences in electrical equipment for each option. Based on BTY's experience with similar projects, BTY has included in Case 2 and Case 3 the incremental cost of upsized switchgears and transformers, relative to what would be required for the same building with NEU service[8]. BTY also included allowances for the cost of space required to house this additional equipment.

[8] The NEU-connected building is assumed to require an electrical connection of ~1.0 MW. BTY's estimate assumes a total of 2.5 MW is required for Case 1 (an increase of 1.5 MW), and 3.0 MW is required for Case 3 (an increase of 2.0 MW).

- Electrical utility connection costs and gas utility connection costs are not included in any cases.
- The NEU connection charge is partly a function of the amount of capacity requested by new buildings connecting to the NEU. This value is based on the NEU's current assumption that post-ZEB buildings will request capacity equivalent to 59 W / m2. This value is informed by NEU staff's prior experience and includes a 30% redundancy factor typically requested by building design teams.

  The analysis is not particularly sensitive to this number; for example, a 50% increase in the customer's requested capacity from the NEU would increase the connection charge by $125,000, reducing the savings from NEU connection by $125,000 or 3%.
- Additional information is provided in the AME mechanical brief (Appendix 2) and BTY cost estimate (Appendix 3).

8 REPORT SUBMISSION

RESHAPE INFRASTRUCTURE STRATEGIES

Prepared By:

Will Cleveland, Principal

LIST OF APPENDICES

Appendix 1	Reshape memo dated August 19, 2025 re: Summary of Findings from Engagement with Energy Modeling Industry
Appendix 2	AME mechanical brief dated September 12, 2025: Reshape, City of Vancouver – NEU Advisory
Appendix 3	BTY report dated September 19, 2025: CoV NEU Feasibility Study Class D Estimate

August 19th, 2025

Derek Pope, MSc, P.Eng.
Associate Director
Neighbourhood Energy, City of Vancouver

Re: Summary of Findings from Engagement with Energy Modelling Industry
Reshape Project P857 - NEU Green Heat Rate

The NEU is seeking to understand what level of emissions performance is required for a new 'Enhanced Green Heat' product to allow future customers to achieve compliance with the updated GHGi threshold within the latest version of the Vancouver Building By-law (VBBL).

Reshape engaged with a group of energy modelling professionals in the Lower Mainland to solicit feedback regarding the emissions factor of a "greener" heat offering from the NEU. This memo documents the findings from this engagement task.

We understand that NEU staff are currently considering offering a 100% low-carbon heat offering, as well as an intermediate offering between 100% low-carbon and the NEU's "standard" offering of 70% low-carbon. The intermediate offering should be aligned to satisfy compliance with the latest version of the VBBL for new construction effective 2025.

For this work, we spoke with the following firms and professionals:

- Evoke Buildings Engineering (Alex Blue, P. Eng., Principal)
- Footprint Energy (Jakub Policht, Project Manager)
- Introba (Kevin Leung, P.Eng., Principal)
- Entuitive (Sam Lane, P.Eng., Discipline Lead – Sustainability + Performance)

1. VBBL Requirements

The Vancouver Building By-Law outlines energy performance and emissions requirements for new buildings within Vancouver, by occupancy type (see Figure 1). The latest revision of the VBBL has decreased the GHGi limit for multi-unit residential buildings[1] (MURB's) from 6 $kgCO_2e/m^2$ to 3 $kgCO_2e/m^2$. This new GHGi limit will apply to new MURBs that apply for building permit starting in 2025 and going forward.

[1] GHGi requirements for Hotels and Motels have also been decreased from 8 $kgCO_2e/m^2$ to 4 $kgCO_2e/m^2$ in the latest revisions (however this is a less significant customer base for the NEU).

NEU Connected buildings[2] can pursue a separate compliance path that grants higher thresholds for Thermal Energy Demand Intensity (TEDI) and Total Energy Use Intensity (TEUI), relative to the standard compliance requirements for new construction.

Table 10.2.2.5.C
Maximum Energy Use and Emissions Intensities
Forming part of Sentence 10.2.2.5.(5)

Occupancy Classification	Total Energy Use Intensity ($kWh/m^2 \cdot a$)	Thermal Energy Demand Intensity ($kWh/m^2 a$)	Greenhouse Gas Intensity ($kgCO_2e/m^2 a$)
Group C *occupancies* in *buildings* up to 6 *Storeys*, except Hotel and Motel	110	25	3.0
Group C *occupancies* in *buildings* over 6 *Storeys*, except Hotel and Motel	130	40	3.0
Hotel and Motel *occupancies*	170	30	4.0
Business and Personal Services or Mercantile *occupancies*, except Office	170	30	3.0
Office *occupancies*	130	30	3.0

Figure 1: Energy and Emissions limits by occupancy, 2025 VBBL

Table 1: Changes to VBBL GHGi limits, by occupancy type, from 2023 to 2025
(changes highlighted in red)

	2023 $kgCO_2/m^2/yr$	2025 $kgCO_2/m^2/yr$
Low-Rise Residential (up to 6 storeys)	3	3
Mid- & High-Rise Residential (over 6 storeys)	6	3
Hotel and Motel	8	4
Retail	3	3
Office	3	3

2. 'Enhanced Green Heat' GHG Emissions Factor

New buildings within the NEU service area must connect to the NEU and meet all[3] of their space heating and domestic hot water loads from the NEU service

Reshape has developed a calculator, based on VBBL energy use requirements, to determine the resultant GHGi for a building for a given NEU emissions factor[4]. The

[2] Along with buildings connected to any other city-recognized Low-Carbon Energy System
[3] Apart from permitted heat recovery applications within the building and other minor heat loads
[4] The methodology for this calculator was developed in consultation with the energy modellers mentioned above.

calculator assumes that the modelled performance of a new building will 'max out' the energy use intensity that is granted under the VBBL framework (i.e. a MURB will have a TEDI of 40 kWh/m^2/yr and TEUI of 130 kWh/m^2/yr). Beyond this, some assumptions must be made, notably the amount of heating demand for domestic hot water use. We have carried a value of 30 kWh/m^2/yr for residential occupancy types, and 5 kWh/m^2/yr for non-residential. These assumptions were reviewed and corroborated by the energy modelling experts.

Using these inputs, we find that an emissions factor of 30 kWh/MWh[5] for heat from supplied by the NEU would allow compliance with the VBBL GHGi requirements for all occupancy types. See Table 2 for a detailed breakdown of this calculation for all occupancy types.

We note that the calculated emissions intensity is based on modelled energy use, which will likely underestimate actual energy use within new buildings. This is appropriate for this exercise, as VBBL compliance is based on modelled energy performance.

[5] Emissions factor is based on emissions of delivered heat to the customer ie. inclusive of distribution losses

RESHAPE STRATEGIES

Table 2: Summary of Calculated Emissions Intensity by Occupancy, for NEU Emissions Factor of **30kgCO2/MWh**

			Group C Occupancy up to 6 Storeys	Group C Occupancy Over 6 Storeys	Hotel and Motel	Business, Personal Services, Mercantile Occupancies (except office)	Office Occupancies
VBBL Requirements (2025)	TEUI	kWh/m^2/yr	110	130	170	170	130
	TEDI	kWh/m^2/yr	25	40	30	30	30
	VBBL GHGi (2025)	kgCO$_2$/m^2/yr	3	3	4	3	3
Estimated Building Energy Use Intensity	Space Heating and Ventilation	kWh/m^2/yr	25	40	30	30	30
	DHW	kWh/m^2/yr	30	30	30	5	5
	Total Heat from NEU	kWh/m^2/yr	55	70	60	35	35
	Electricity	kWh/m^2/yr	76	87	133	149	109
Calculated Emissions Intensity	Electricity GHGi	kgCO$_2$/m^2/yr	0.8	0.9	1.4	1.6	1.2
	Heating GHGi	kgCO$_2$/m^2/yr	1.7	2.1	1.8	1.1	1.1
	Total GHGi	**kgCO$_2$/m^2/yr**	**2.5**	**3.0**	**3.2**	**2.6**	**2.2**

RESHAPE STRATEGIES

3. Potential Impacts on Envelope Costs

City staff were interested to understand whether there may be any implications for developer envelope costs with the updated VBBL requirements. We posed this question to the energy modelling community and we heard that there were no significant envelope cost implications *if the NEU offered a lower emissions heat product* (eg. the Enhanced Green Heat product discussed here).

Currently, new buildings would have to be designed with an extremely low TEDI in order to comply with a GHGi of 3 $kgCO_2/m^2/yr$, based on the existing NEU emissions factor of ~$71kgCO_2/MWh$. However, with the lower emissions factor of the Enhanced Green Heat product, developers will be able to design a building with a TEDI approaching 40 $kWh/m^2/yr$ and still comply with the lower GHGi threshold. We heard that if a developer needs to tweak their TEDI performance slightly, there are many other low-cost strategies to do so (ie. low-flow fixtures, higher HRV efficiency) that would be employed before any envelope design changes are required.

Conclusion

This memo is intended to document our findings with respect to the required emissions performance of an 'Enhanced Green Heat' product to allow new NEU customers to comply with the updated GHGi requirements within the VBBL. We find that an Emissions Factor of 30 $kgCO_2e/MWh$ would be sufficient under almost all circumstances for new customers to meet their compliance requirements.

We hope this memo along with the accompanying excel calculator can serve as a resource for City staff to make the final determination on the target emissions factor.

Sincerely,

Connor Reed, P.Eng.
Associate, Reshape Infrastructure Strategies Ltd.

RESHAPE, CITY OF VANCOUVER – NEU ADVISORY

Project No.: 626b-001-25

Mechanical Brief

September 12, 2025

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TABLE OF CONTENTS

1. INTRODUCTION

AME has been engaged by Reshape Strategies to provide insight and provide high-level conceptual designs for a building-scale mechanical system reference case to be used in a larger neighbourhood energy utility (NEU) study for the City of Vancouver. This memo will identify three (3) reference building systems for a single building concept and will provide information on overall system capacities and spatial considerations.

2. PROJECT INFORMATION

The building that will be explored as a part of this reference case will be two (2) towers, 20-storey multi-residential development on a shared podium, that consists of total area of 32,500sq.m. (349,827sq.ft.).

A demand forecast was provided to AME by Reshape, which provided heating, cooling and domestic hot water demands (annual and peak), which was used to develop the references cases here within. A summary of the demand forecast used for this brief is as follows:

DEMAND FORECAST SUMMARY	
Space Heating (Annual)	1,300 MWh/yr
Space Heating (Peak)	1,115 kW
Domestic Hot Water (Annual)	975 MWh/yr
Domestic Hot Water (Peak)	600kW
Heating (Annual)	2,275 MWh/yr
Heating (Peak)	1,715 kW
Cooling (Annual)	780 MWh/yr
Cooling (Peak)	885 kW

3. REFERENCE CASES

As a part of this analysis, three (3) reference cases were evaluated that touch on both NEU and Non-NEU connected systems. The Non-NEU systems have been reviewed and designed to meet the 2025 City of Vancouver Building By-Law (VBBL) Greenhouse Gas (GHG) emission limits of 3kg/CO_2e/m^2, see the list of reference cases below:

- Reference Case 1 – NEU Connected Option
- Reference Case 2 – Non-NEU Connected Option (Gas-peaking)
- Reference Case 3 – Non-NEU Connected Option (100% Electric)

These systems were selected as they represent a typical building system typology, utilizing 4-pipe fancoil units and central heating and cooling systems most commonly seen and evaluated on high-performing mixed-use developments. There are benefits and drawbacks of each systems – while these will not be outlined in-depth the following will be covered within the report; maintenance, energy and spatial

requirements. Costing evaluation will be completed and supported through a separate report, provided by BTY.

3.1 Reference Case 1 (RC1) – NEU Connected Option

This system will consist of a traditional mechanical water (hydronic) based heating and cooling system, that will transport heating and cooling through a 4-pipe distribution piping system. This system will consist of a centralized cooling plant that will utilize air-cool chillers (ACCH's) for providing primarily cooling to the building. Both heating and domestic hot water will be provided by the NEU.

This system works by operating with two (2) dedicated hydronic loops (supply and return pipes) for both heating and cooling. When the building is in a net cooling condition, the system will rejected heat into the atmosphere through the ACCH, and when in a net heating condition, the building will be utilizing heat from the NEU through the building-level energy transfer station (ETS).

For this reference case, a 4-pipe fancoil will be the terminal units serving the residential and commercial spaces. For the purpose of this report, the fancoils will be horizontal style, and located in the ceilings of the residential suites. The ACCH in this option, has been sized for covering the peak cooling load.

The central plant serving this building will consist of two (2) 142-ton (nominal) ACCH's and one (1) ETS with two (2) separate heat exchangers (HX) and control valves for the DHW and space heating systems. In addition to the centralized equipment, depending on the overall height of the building, considerations may be required to accommodate dedicated pressure zones. These dedicated pressure zones would be supplied with 6kW (30MBH) DHW heat exchangers (DHW-HX), that will provide top-up heat for the zone which will be fed off the building's central DHW system fed from the ETS HX (DHW). These pressure zone considerations typically are required every seven (7) to nine (9) floors for high-rise towers. The ACCH and the heating water ETS will provide heating and chilled water that will be circulated throughout the building and will serve the distributed 4-pipe fancoils in the residential, commercial and amenity areas. These systems will provide heating water at temperatures between 38-49°C (100-120°F), and between 7-13°C (45-55°F) in cooling. The major equipment noted above has been summarized into the table below for clarity.

EQUIPMENT SUMMARY		
Description	**Capacity**	**Location**
ACCH (qty.2)	142-tons	Roof (Outdoors)
ETS HX (Heating)	1,115kW	Parkade Mech Space
ETS HX (DHW)	675kW	Parkade Mech Space
DHW-HX (x2)	6kW	L5 & L12

3.2 Reference Case 2 (RC2) – Non-NEU Connected Option (Gas-peaking)

This system will consist of the same 4-pipe based heating and cooling system as RC1, however this case will showcase a standalone option utilizing gas for peak heating conditions. This system will consist of a central plant that will utilize air-source heat pumps (ASHPs), and both electric and gas boilers for providing the heating and cooling to the building. The inclusion of both electric and gas boilers is to meet the City of Vancouver's GHG limits. To address the requirements of the building's domestic hot water (DHW) system, a separate DHW electric boiler will be provided.

This system works by operating with two (2) dedicated hydronic loops (supply and return pipes) for heating and cooling. When the building is in a net cooling condition, the heat will be rejecting heat into the atmosphere through the ASHP, and when in a net heating condition, it will be absorbing heat from the atmosphere through the ASHP, and supplemented with the electric and gas boilers. When the building is in a simultaneous heating and cooling condition, the ASHP is able to operate in a 'heat recovery' mode, which prioritizes utilizing the heat generated from cooling for heating instead of rejecting this to the atmosphere. In this heat recovery mode, the heat would be used for domestic hot water preheating.

For this concept, a 4-pipe fancoil will be the terminal units serving the residential and commercial spaces. For the purpose of this report, the fancoils will be horizontal style, and located in the ceilings of the residential suites. Refer to Image 2 below for a generalized schematic of the system which identifies some of the major system components, not shown in the rooftop adjacent mechanical room are electric boilers, central domestic hot water system, buffer tanks and distribution pumps that would be required for this system. The graphic below is not to scale, nor indicative of spatial requirements for this reference case. For details on spatial requirements, refer to the table located in **Section 4 – Spatial Considerations**.

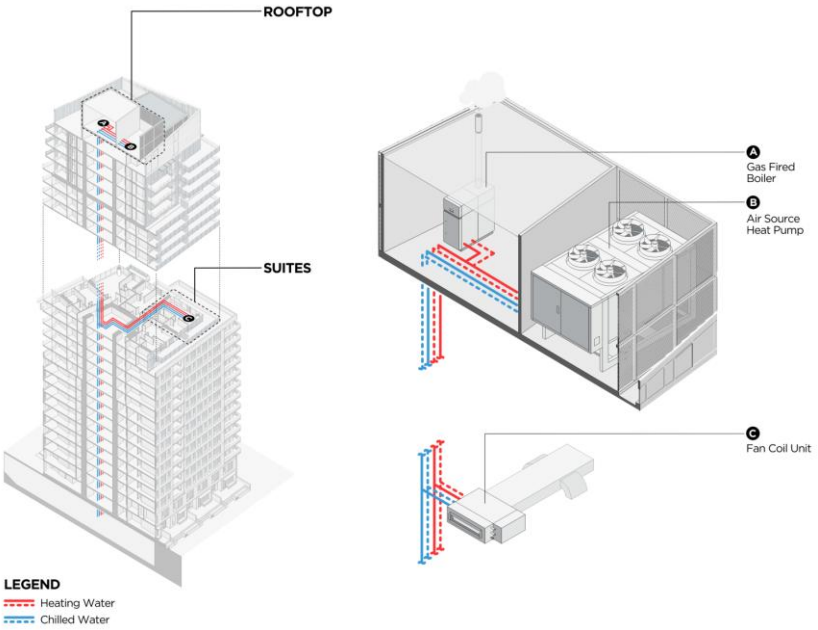

Image 1: RC2 System Schematic
*(*Electric Boiler not shown)*

The ASHP in this option has been sized for covering the peak cooling load, which subsequently can provide approximately 60% of the peak heating capacity in Vancouver's winter ambient design conditions. While the ASHP is able to provide approximately 60% of the peak heating capacity, the electric and gas boilers have been sized to cover the total peak heating in the event of an ASHP failure. In all operational instances, the ASHP will be intended as the primary heat source, with the electric and the gas-fired boilers being secondary and tertiary in peak conditions.

To determine the sizing for the gas-fired heating water boilers, we have conducted some high-level, generalized calculations to determine the maximum annual gas usage for this building. We determined the maximum annual gas-usage by estimating the total allowable annual emissions, assuming the heating and domestic hot water would have a emission budget of 2kgCO_2e/m^2/yr with the remaining (1kgCO_2e/m^2/yr) going to miscellaneous loads (i.e. plug loads, pump and fans etc.). Based on calculations, we anticipate that at most 5% of the annual demand can be gas generated (~114MWh/yr). We used this to guide the selection for the boiler size, however, this maximum annual gas-usage is not directly correlated with the equipment sizing.

The central plant serving this building will consist of two (2) 135-ton (nominal) ASHP's, three (3) 360kW (1,228MBH) electric boilers and two (2) 220kW (750MBH) condensing gas-fired boilers. To address the requirements of the building's domestic hot water (DHW) system, a dedicated system will be provided that will include five (5) 135kW (460MBH) DHW electric resistance type boilers/heaters with integral storage. This centralized DHW system will provide the building with hot water and will incorporate a recirculation system. In addition to the centralized equipment, depending on the overall height of the building, considerations may be required to accommodate dedicated pressure zones. These dedicated pressure zones would be supplied with small 6kW (20MBH) DHW heaters, that will provide top-up heat for the zone. These pressure zone considerations typically are required every seven (7) to nine (9) floors for high-rise towers. The central and DHW plants will be located in a mechanical room on the roof of the building, and will house pumps, heat exchangers, buffer tanks and other auxiliary equipment. The ASHP and boilers will provide heating and chilled water that will be circulated throughout the building and will serve the distributed 4-pipe fancoils in the residential, commercial and amenity areas. This system would provide heating water at temperatures between 38-49°C (100-120°F), and between 7-13°C (45-55°F) in cooling. The major equipment noted above has been summarized into the table below for clarity.

It should be noted that for this reference case that because there are three (3) means of heat generation (ASHP, Electric and Gas boilers), that this option has more complexity from a controls and overall operational standpoint.

EQUIPMENT SUMMARY		
Description	**Capacity**	**Location**
ASHP (qty.2)	135-tons	Roof (Outdoors)
Electric Boilers (qty.3)	360kW	Roof (Indoor) Mechanical Space
Gas Boilers (qty.2)	220kW	Roof (Indoor) Mechanical Space
Central Electric DHW Tank (qty.5)	135kW	Roof (Indoor) Mechanical Space
Electric DHW Tank (x2)	6kW	L5 & L12

3.3 Reference Case 3 (RC3) – Non-NEU Connected Option (All Electric)

This refence case is the same as Reference Case 2 (RC2), with the exception that this solution looks at all electric heating and domestic hot water systems. Refer to Image 3 below for a generalized schematic of the system which identifies some of the major system components, not shown in the rooftop adjacent mechanical room are the central domestic hot water system, buffer tanks and distribution pumps that would be required for this system.

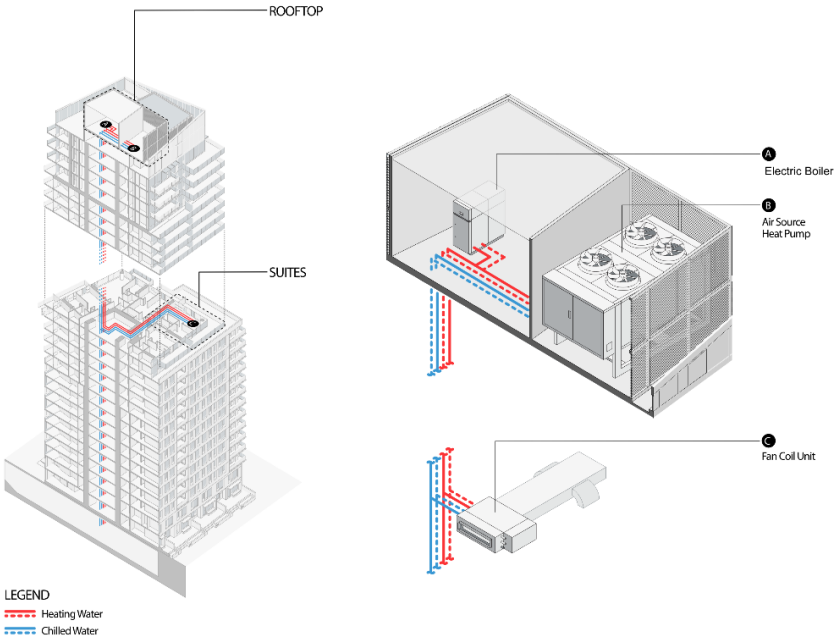

Image 2: RC3 System Schematic

The ASHP in this option has been sized for covering the peak cooling load, which subsequently can provide approximately 60% of the peak heating capacity in Vancouver's winter ambient design conditions.

While the ASHP is able to provide approximately 60% of the peak heating capacity, the electric boilers have been sized to cover the total peak heating in the event of an ASHP failure. In all operational instances, the ASHP will be intended as the primary heat source, with the electric boiler being used as the secondary in peak conditions.

The central plant serving this building will consist of two (2) 135-ton (nominal) ASHP's, and four (4) 360kW (1,228MBH) electric boilers. To address the requirements of the building's domestic hot water (DHW) system, a dedicated system will be provided that will include five (5) 135kW (460MBH) DHW electric resistance type boilers/heaters with integral storage. This centralized DHW system will provide the building with hot water and will incorporate a recirculation system. In addition to the centralized equipment, depending on the overall height of the building, considerations may be required to accommodate dedicated pressure zones. These dedicated pressure zones would be supplied with small 6kW (20MBH) DHW heaters, that will provide top-up heat for the zone. These pressure zone considerations, typically are required every seven (7) to nine (9) floors for high-rise towers.

The central heating, cooling and DHW plants will be located in a mechanical room on the roof of the building, and will house pumps, heat exchangers, buffer tanks and other auxiliary equipment. The ASHP and boilers will provide heating and chilled water that will be circulated throughout the building and will serve the distributed 4-pipe fancoils in the residential, commercial and amenity areas. This system would provide heating water at temperatures between 38-49°C (100-120°F), and between 7-13°C (45-55°F) in cooling. The major equipment noted above has been summarized into the table below for clarity.

EQUIPMENT SUMMARY		
Description	**Capacity**	**Location**
ASHP (qty.2)	135-tons	Roof (Outdoors)
Electric Boilers (qty.4)	360kW	Roof (Indoor) Mechanical Space
Central Electric DHW Tank (qty.5)	135kW	Roof (Indoor) Mechanical Space
Electric DHW Tank (x2)	6kW	L5 & L12

3.4 Equipment Comparison Summary

For convenience purposes, the table below summarizes the three (3) reference cases to showcase the difference in equipment requirements.

EQUIPMENT SUMMARY			
Equipment	**RC1**	**RC2**	**RC3**
ACCH	2@ 142-tons	-	-
ASHP	-	2@ 135-tons	2@ 135-tons
ETS HX (Heating)	1,115kW	-	-
ETS HX (DHW)	675kW	-	-
Electric Boilers	-	3@ 360kW	4@ 360kW
Gas Boilers	-	2@ 220kW	-
Central Electric DHW Tank	-	5@ 135kW	5@ 135kW
Electric DHW Tanks	-	2@ 6kW	2@ 6kW
DHW-HX	2@ 6kW	-	-
Peak Electrical Impact (approx.)	1.0MW	2.5MW	3.0MW

4. SPATIAL CONSIDERATIONS

The systems previously outlined will require varying mechanical space sizes and space allocations on the roof. Below is a summary of the spaces required for the mechanical systems, for interior mechanical space requirements, it has been assumed a clear height of 4m. (13ft.) is being maintained:

SPATIAL REQUIREMENTS				
System Option	**Parkade Mech Space**	**Roof (Indoor) Mech Space**	**Roof (Outdoor) Space**	**Total Mech Space**
RC1	24m^2 (260ft^2)	9m^2 (100ft^2)	71m^2 (765ft^2)	105m^2 (1,125ft^2)
RC2	0m^2 (0ft^2)	84m^2 (900ft^2)	83m^2 (890ft^2)	166m^2 (1,790ft^2)
RC3	0m^2 (0ft^2)	79m^2 (850ft^2)	83m^2 (890ft^2)	162m^2 (1,740ft^2)

Mechanical space in the parkade that would be assigned for a water entry room has been excluded from the above table, as that space would be common and typical for all reference cases regardless of what heating/cooling systems are explored.

5. EQUIPMENT SERVICE LIFE

Equipment service life provides another insight and consideration into the Building Concepts. The table below provides a summary of typical equipment life expectancies, based on ASHRAE recommendations.

While these recommendations are conservative in nature, actual service life can be extended through optimal operations, reduced runtime/operation, and proactive maintenance.

ANTICIPATED SERVICE LIFE	
	Life Expectancy
Boiler (Gas or Elec.)	25-years
ASHP	15-years
ACCH	15-years
DHW Boilers/Heaters	20-years
Heat Exchangers	25-years
Pumps	18-years
In-suite Fancoils	20-years

END OF REPORT

COST MANAGEMENT REPORT

CoV NEU Feasibility Study
Vancouver, BC
Class D Estimate

REPORT NUMBER 1.1

SEPTEMBER 19, 2025

PREPARED FOR:
Reshape Strategies

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1.0 Construction Cost Summary

The estimated construction cost of the project may be summerized as follows:

Description	RC1 NEU Connected Option $	RC2 Non-NEU Connected Option (Gas-peaking) $	RC3 Non-NEU Connected Option (All Electric) $
A. Structural	154,200	356,000	341,900
B. Architectural	468,600	547,800	547,800
C. Mechanical	2,987,400	4,733,800	4,595,400
D. Electrical	184,200	843,400	938,900
E. Cash allowance for connection charge to NEU	EXCLUDED	N/A	N/A
F. Premium for after-hours work	EXCLUDED	EXCLUDED	EXCLUDED
G. Hazardours material abatement	EXCLUDED	EXCLUDED	EXCLUDED
F1 General Requirements	683,000	1,166,600	1,156,300
F2 Fees	189,700	324,100	321,200
SUB-TOTAL CONSTRUCTION COST	**$4,667,100**	**$7,971,700**	**$7,901,500**
Contingencies			
Design Contingency 15%	700,100	1,195,800	1,185,200
Construction Contingency 10%	536,700	916,800	908,700
Government Sales Tax, GST	EXCLUDED	EXCLUDED	EXCLUDED
TOTAL CONSTRUCTION COST	**$5,903,900**	**$10,084,300**	**$9,995,400**

2.0 Basis & Assumptions

The construction estimate is based on the following list of assumptions:

1. 5% General contractor's fee/profit
2. All work will be performed during normal working hours
3. A design contingency of Fifteen Percent (15%) has been included in the estimate to cover modifications to the program, drawings and specifications during the design.
4. An allowance of Ten Percent (10%) has been included in the estimate for changes occurring during the construction period of the project. This amount may be expended due to site conditions or if there are modifications to the drawings and specifications.
5. The allowance for the CHWS/R piping length is based on two (2) towers, 20-storey height multi-residential development
6. All costs associated with the base building are excluded from the overall cost unless noted otherwise. The base building cost includes architectural, structural, mechanical systems for the base building, as well as incoming water and drainage. The incoming power, emergency power, and the base building electrical system.
7. Building distribution piping to the 4-pipe fan-coils by the base building (others).
8. 4-pipe fan-coils provided by the base building (others).
9. The allowance for the CHWS/R or HWS/R piping to the building piping distribution is capped within the Mechanical room only.
10. Allowance for capacity upsize for larger indoor switchgear, an indoor dry type transformer, and feeder in the reference case 2 (RC2) and reference case 3 (RC3) has been included in this estimation.
11. Allowance of $50,000 for gas services in the reference case 2 (RC2) has been included in this estimation.
12. A cash allowance of $100,000 for additional electrical space has been included in this estimation for each of the reference cases 2 (RC2) and 3 (RC3).
13. Assumptions have been made regarding more details and others. Please refer to Appendix I for details

Please note that BTY is not qualified to act as a design consultant. The assumptions in our estimate should be reviewed and corrected by the design team.

3.0 Exclusions

The construction estimate includes all direct and indirect construction costs derived from the drawings and other information provided by the Consultants, except for the following:

1. Land costs
2. Professional fees and disbursements
3. Planning, administrative and financing costs
4. Legal fees and agreement costs / conditions
5. Building permits and development cost charges
6. Temporary facilities for user groups during construction
7. Removal of hazardous materials from existing site
8. Loose furnishings and equipment
9. Preloading
10. Unforeseen ground conditions and associated extras
11. Archaeology found on site and associated extras
12. Environmental and archaeology monitoring
13. Environmental remediation outside building footprint
14. Servicing outside the project site boundary (Main hydro service), unless it was specifically shown in the costs
15. Off-site works and existing utility services relocation
16. General contractor bonding
17. Phasing of the works and accelerated schedule
18. Decanting & moving
19. Project Soft Costs
20. Costs associated with "LEED" certification
21. Project commissioning
22. Erratic market conditions, such as lack of bidders, proprietary specifications
23. Cost escalation past September 2025

4.0 Documents Reviewed

The list below confirms the information reviewed in preparing our report:

	Description	Revised Date
Reports		
	626b-001-25 RPT-001 City of Vancouver, NEU Mechanical Design Brief - AME Group (10 sheets)	July 7, 2025
	626b-001-25 RPT-001 City of Vancouver, NEU Mechanical Design Brief - AME Group (10 sheets)	Aug 1, 2025
	626b-001-25 RPT-001 City of Vancouver, NEU Mechanical Design Brief - AME Group (10 sheets)	Sept 12, 2025
Equipment List		
	626b-001-25 Preliminary Equipment List - AME Group (1 sheet)	July 1, 2025
	626b-001-25 Preliminary Equipment List - AME Group (1 sheet)	July 25, 2025

APPENDIX I

Cost Plan for Cov NEU Feasibility Study - RC 1, 2, and 3

12 page(s)

Reference Case 1 (RC1) - NEU Connected Option

Description	Quantity	Unit	Rate	Amount
STRUCTURAL				
The mechanical room w/ finished and door - Parkade	24	m²	2,291.67	55,000
The mechanical room w/ finished and door - Roof	9	m²	3,911.11	35,200
Allowance for concrete pad for mechanical equipment	1	sum	64,000.00	64,000

Notes:
i. Coring through to the slab, wall, and fire stop provided by the base building
ii. Mechanical shaft for piping provided by the base building

Total Structural	***$154,200***

ARCHITECTURAL				
Exterior enclosure				
50% free area screen around outdoor equipment c/w supporting steel structure (assume 3m height)	1	sum	468,600.00	468,600

Note:
i. The 50% free area screen above did not include acoustic provisions

Total Architectural	***$468,600***

Reference Case 1 (RC1) - NEU Connected Option

Description	Quantity	Unit	Rate	Amount
MECHANICAL				
Plumbing and Drainage				
By based building				
Fire Protection				
By based building				
HVAC				
HVAC equipment - allowance				
Air-cooled chiller, ACCH-1 & -2, 142 tons each - 2nos.	1	sum	1,044,000.00	1,044,000
CHWS/R and HWS/R pump	1	sum	100,000.00	100,000
DHW brazed plate heat exchanger, 6kW - 2nos.	1	sum	21,900.00	21,900
DHW circl. pump		incl.		
Allowance for hoisting and rigging	1	sum	60,000.00	60,000
Allowance for the ventilation system in the mechanical rooms - Parkade and Roof	1	sum	19,800.00	19,800
ETS system (Heating), 1115kW - EXCLUDED		by CoV		
ETS system (DHW), 675kW - EXCLUDED		by CoV		
Piping - allowance				
Mechanical room, Main piping headers	1	sum	30,000.00	30,000
Mechanical room, Branch and minor piping to equipment (Total max. 100m length)	1	sum	165,000.00	165,000
2x CWS/R and 2 xHWS/R pipe, 100mm (assume black steel sch. 40) - to serve each tower after the tee	540	m	1,300.00	702,000
2x CWS/R and 2 xHWS/R pipe, 150mm (assume black steel sch. 40) to serve both towers	100	m	1,450.00	145,000
2 xHWS/R pipe, 150mm (assume black steel sch. 40) - Level 1 to Parkade mech. Room	120	m	1,450.00	174,000
c/w insulation, jacketing, and support		incl.		
Valves, strainers, and connections	1	sum	66,000.00	66,000
Make-up water assembly	1	sum	5,000.00	5,000
Valves and connection to the incoming district heating	1	sum	60,000.00	60,000
Heat trace for exposed piping - allowance	1	sum	15,000.00	15,000
Building piping distribution - by others		excl.		
Allowance for testing, balancing, recommissioning, drawings, vibration isolation, and documentation	1	sum	62,500.00	62,500

Reference Case 1 (RC1) - NEU Connected Option

Description	Quantity	Unit	Rate	Amount
MECHANICAL (cont.)				
Controls				
Instrumentation/Controls	1	sum	293,700.00	293,700
PLC, sensors, control wiring, instruments, actuators		incl.		
Refrigerant monitoring system		incl.		
Revenue grade meter - EXCLUDED		by CoV		
Drawings and documentation		incl.		
Testing, integration, programming, & commissioning	1	sum	23,500.00	23,500
Total Mechanical				***$2,987,400***

Reference Case 1 (RC1) - NEU Connected Option

Description	Quantity	Unit	Rate	Amount
ELECTRICAL				
Service & Distribution				
Plant Electrical				
Additional MCCs, breakers, wiring, cable trays, and conduits	1	sum	160,200.00	160,200
Include power supply and motor controls for chillers, DHWTs, and pumps		incl		
Testing, verification, labelling, & commissioning	1	sum	24,000.00	24,000
Note:				
Assume no upsize of the indoor switchgear, additional transformer and larger feeder required				
Lighting, Devices & Heating				
By based building				
Systems & Ancillaries				
By based building				
Total Electrical				***$184,200***

Reference Case 2 (RC2) - Non-NEU Connected Option (Gas-peaking)

Description	Quantity	Unit	Rate	Amount
STRUCTURAL				
The mechanical room w/ finished and door - Roof	84	m²	1,917.14	161,000
Allowance for concrete pad for mechanical equipment	1	sum	95,000.00	95,000
Cash allowance for additional electrical room space	1	sum	100,000.00	100,000

Notes:
i. Coring through to the slab, wall, and fire stop provided by the base building
ii. Mechanical shaft for piping provided by the base building

Total Structural	***$356,000***

ARCHITECTURAL

Exterior enclosure

50% free area screen around outdoor equipment c/w supporting steel structure (assume 3m height)	1	sum	547,800.00	547,800

Note:
i. The 50% free area screen above did not include acoustic provisions

Total Architectural	***$547,800***

Reference Case 2 (RC2) - Non-NEU Connected Option (Gas-peaking)

Description	Quantity	Unit	Rate	Amount
MECHANICAL				
Plumbing and Drainage				
By based building				
Gas services only				
Allowance for gas piping c/w gas meter	1	sum	50,000.00	50,000
Connection to gas-fired boilers with testing, commissioning and certification		incl.		
Fire Protection				
By based building				
HVAC				
HVAC equipment - allowance				
Air-source heat pump w/ heat recovery, ASHP-1 & 2, 135 tons each - 2nos.	1	sum	1,377,500.00	1,377,500
CHWS/R and HWS/R pump	1	sum	100,000.00	100,000
Electric resistance boiler, EB-1 to 3, 360kW each	1	sum	258,800.00	258,800
Condensing gas-fired boiler, GB-1 to 2, 220kW each	1	sum	174,000.00	174,000
Boiler pump	1	sum	39,500.00	39,500
Electric resistance DHWT, EDHWT-1 to -5, 135kW	1	sum	272,600.00	272,600
Electric resistance DHWT, EDHWT-6 & -7, 6kW	1	sum	2,700.00	2,700
Domestic HW circl. pumps	1	sum	10,000.00	10,000
Buffer tank - 1no.	1	sum	230,000.00	230,000
Hydraullic separator - 1no.		incl.		
Double wall heat exchanger for DHW preheat - 1no.		incl.		
Allowance for hoisting and rigging	1	sum	75,000.00	75,000
Allowance for the ventilation system in the mechanical rooms - Parkade and Roof	1	sum	33,600.00	33,600
Gas boiler vent flue	1	sum	30,000.00	30,000
Piping - allowance				
Mechanical room, Main piping headers	1	sum	30,000.00	30,000
Mechanical room, Branch and minor piping to equipment (Total max. 200m length)	1	sum	315,000.00	315,000
2x CWS/R and 2 xHWS/R pipe, 200mm (assume black steel sch. 40) - Roof to Level 1	640	m	1,650.00	1,056,000
c/w insulation, jacketing, and support		incl.		
Valves, strainers, and connections	1	sum	93,000.00	93,000
Allowance for make-up water assembly	1	sum	5,000.00	5,000
Heat trace for exposed piping - allowance	1	sum	15,000.00	15,000

Reference Case 2 (RC2) - Non-NEU Connected Option (Gas-peaking)

Description	Quantity	Unit	Rate	Amount
MECHANICAL (cont.)				
Piping - allowance				
Building piping distribution - by others		excl.		
Allowance for testing, balancing, recommissioning, drawings, vibration isolation, and documentation	1	sum	109,600.00	109,600
Controls				
Instrumentation/Controls	1	sum	422,700.00	422,700
PLC, sensors, control wiring, instruments, actuators		incl.		
Refrigerant monitoring system		incl.		
Drawings and documentation		incl.		
Testing, integration, programming, & commissioning	1	sum	33,800.00	33,800
Total Mechanical				***$4,733,800***

Reference Case 2 (RC2) - Non-NEU Connected Option (Gas-peaking)

Description	Quantity	Unit	Rate	Amount
ELECTRICAL				
Service & Distribution				
Plant Electrical				
Additional for capacity upsize for larger indoor switchgears - 2.5MW	1	sum	492,800.00	492,800
Additional for an indoor dry-type transformer, and feeder - 2.5MW		incl.		
Sub distribution panel c/w MCCs, breakers, wiring, panel, cable trays, grounding, and conduits	1	sum	284,000.00	284,000
Include power supply and motor controls for ASHPs, boilers, DHWTs, and pumps		incl		
Testing, verification, labelling, & commissioning	1	sum	46,600.00	46,600
Extra over for pull box	1	no	20,000.00	20,000
Lighting, Devices & Heating				
By based building				
Systems & Ancillaries				
By based building				
Total Electrical				***$843,400***

Reference Case 3 (RC3) - Non-NEU Connected Option (All Electric)

Description	Quantity	Unit	Rate	Amount
STRUCTURAL				
The mechanical room w/ finished and door - Roof	79	m²	1,922.91	151,900
Allowance for concrete pad for mechanical equipment	1	sum	90,000.00	90,000
Cash allowance for additional electrical room space	1	sum	100,000.00	100,000

Notes:
i. Coring through to the slab, wall, and fire stop provided by the base building
ii. Mechanical shaft for piping provided by the base building

Total Structural	***$341,900***

ARCHITECTURAL

<u>Exterior enclosure</u>				
50% free area screen around outdoor equipment c/w supporting steel structure (assume 3m height)	1	sum	547,800.00	547,800

Note:
i. The 50% free area screen above did not include acoustic provisions

Total Architectural	***$547,800***

Reference Case 3 (RC3) - Non-NEU Connected Option (All Electric)

Description	Quantity	Unit	Rate	Amount
MECHANICAL				
Plumbing and Drainage				
By based building				
Fire Protection				
By based building				
HVAC				
HVAC equipment - allowance				
Air-source heat pump w/ heat recovery, ASHP-1 & 2, 135 tons each - 2nos.	1	sum	1,377,500.00	1,377,500
CHWS/R and HWS/R pump	1	sum	100,000.00	100,000
Electric resistance boiler, EB-1 to 4, 360kW each	1	sum	345,100.00	345,100
Boiler pump	1	sum	34,000.00	34,000
Electric resistance DHWT, EDHWT-1 to -5, 135kW	1	sum	272,600.00	272,600
Electric resistance DHWT, EDHWT-6 & -7, 6kW	1	sum	2,700.00	2,700
Domestic HW circl. pumps	1	sum	10,000.00	10,000
Buffer tank - 1no.	1	sum	250,000.00	250,000
Hydraullic separator - 1no.		incl.		
Double wall heat exchanger for DHW preheat - 1no.		incl.		
Allowance for hoisting and rigging	1	sum	70,000.00	70,000
Allowance for the ventilation system in the mechanical rooms - Parkade and Roof	1	sum	31,600.00	31,600
Piping - allowance				
Mechanical room, Main piping headers	1	sum	30,000.00	30,000
Mechanical room, Branch and minor piping to equipment (Total max. 200m length)	1	sum	315,000.00	315,000
2x CWS/R and 2 xHWS/R pipe, 200mm (assume black steel sch. 40) - Roof to Level 1	640	m	1,650.00	1,056,000
c/w insulation, jacketing, and support		incl.		
Valves, strainers, and connections	1	sum	88,000.00	88,000
Allowance for make-up water assembly	1	sum	5,000.00	5,000
Heat trace for exposed piping - allowance	1	sum	15,000.00	15,000
Building piping distribution - by others		excl.		
Allowance for testing, balancing, recommissioning, drawings, vibration isolation, and documentation	1	sum	105,000.00	105,000

Reference Case 3 (RC3) - Non-NEU Connected Option (All Electric)

Description	Quantity	Unit	Rate	Amount
MECHANICAL (cont.)				
Control				
Instrumentation/Controls	1	sum	451,800.00	451,800
PLC, sensors, control wiring, instruments, actuators		incl.		
Refrigerant monitoring system		incl.		
Drawings and documentation		incl.		
Testing, integration, programming, & commissioning	1	sum	36,100.00	36,100
Total Mechanical				***$4,595,400***

Reference Case 3 (RC3) - Non-NEU Connected Option (All Electric)

Description	Quantity	Unit	Rate	Amount
ELECTRICAL				
Service & Distribution				
Plant Electrical - allowance				
Additional for capacity upsize for larger indoor switchgears - 3.0MW	1	sum	591,200.00	591,200
Additional for an indoor dry-type transformer, and feeder - 3.0MW		incl.		
Sub distribution panel c/w MCCs, breakers, wiring, panel, cable trays, grounding, and conduits	1	sum	275,700.00	275,700
Include power supply and motor controls for ASHP and pumps		incl		
Testing, verification, labelling, & commissioning	1	sum	52,000.00	52,000
Extra over for pull box	1	no	20,000.00	20,000
Lighting, Devices & Heating				
By based building				
Systems & Ancillaries				
By based building				
Total Electrical				***$938,900***