



REPORT

Report Date: November 5, 2020
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Meeting Date: December 1, 2020

[Submit comments to Council](#)

TO: Vancouver City Council

FROM: General Manager of Engineering Services

SUBJECT: 2021 False Creek Neighbourhood Energy Utility ("NEU") Customer Rates

RECOMMENDATION

- A. THAT Council approve, in principle, the proposed amendments to the Energy Utility System By-law (the "By-law"), generally as set out in Appendix A, including:
- i) the 2021 customer rates and fees, with a 3.2% increase over 2020 customer rates. In accordance with Council Policy to improve the energy conservation price signal, this 3.2% increase is to be achieved by increasing the Fixed Capacity Levy by 2.6% and the Variable Energy Charge by 4.0%; and
 - ii) the initial connection levy, with a 2% increase over 2020 rates to provide for construction cost escalation.
- B. THAT Council instruct the Director of Legal Services to bring forward for enactment the By-law amendments, generally as set out in Appendix A.

REPORT SUMMARY

This report seeks Council approval of the recommended 2021 NEU customer rates, which incorporates a 3.2% net increase over 2020. This increase enables the NEU to recover its long-term costs under the commercial utility rate model, while providing stable and competitive energy rates for customers. This will result in a cost increase of ~\$30 per year (from \$961 to \$991 per year) for the occupants living in an average 75 square metre (800 square feet) suite. This rate increase has been endorsed by the Neighbourhood Energy Expert Panel, which provides the City with independent, expert advice on NEU rate setting.

In accordance with Council policy to improve the energy conservation price signal, this 3.2% net increase is to be achieved through a 2.6% increase to the Fixed Capacity Levy and a 4.0% increase to the Variable Energy Charge components of the NEU rate structure.

The proposed By-law amendments also include an updated Table of Contents and the correction of minor cross-referencing errors.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

In December 2006, Council approved a set of governance and rate-setting principles for the NEU (Appendix C).

In March 2009, Council instructed staff to report back to Council annually on adjustments to the NEU rates, and to bring a comprehensive rate review to Council every five years.

In July 2010, Council approved the establishment of an independent Neighbourhood Energy Expert Panel (referred to as the "Expert Panel" in this report) to advise staff and Council on future NEU rate adjustments. At this time, Council also approved the establishment of separate customer rate classes and rate formulas for residential and mixed-use residential buildings located outside SEFC, and for non-residential buildings both within and outside SEFC.

In October 2012, Council approved the Vancouver Neighbourhood Energy Strategy and Energy Centre Guidelines, to address the Greenest City 2020 Action Plan objective of reducing 120,000 tonnes carbon dioxide per year through the conversion of existing steam heat systems to low carbon energy sources and the deployment of sustainable energy systems for high-density neighbourhoods.

In April 2014, Council approved a transition strategy to adjust the NEU rate structure to strengthen the energy conservation price signal while maintaining energy rates at the same level as projected under the commercial utility rate model.

In July 2015, based on the result of the comprehensive review of the NEU after five years of operation, Council adopted key performance indicators and targets to guide NEU rate setting under the commercial utility rate model.

In February 2018, Council adopted the NEU investment decision framework to guide NEU expansion into parts of Mount Pleasant, Northeast False Creek and the False Creek Flats. Further to this, in April 2018, Council enacted an amendment to the Energy Utility System Bylaw to include these service areas (see Figure 1).

In December 2018, Council approved updated KPI's to accommodate the NEU service area expansion. Council also approved the addition of an Initial Connection Levy for new buildings connecting to the system. Similar to connection fees used for water and sewer utilities, this levy recovers the cost of connecting new buildings to the NEU distribution network.

In November 2020, Council approved the Climate Emergency Action Plan. This plan included adoption of a target to convert the NEU to 100% renewable energy by 2030, subject to evaluation and competitiveness with other low carbon energy options for buildings. By 2023, staff will make recommendations to Council on a roadmap to convert the City-owned NEU to 100% renewable energy for all connected buildings by or before 2030.

REPORT

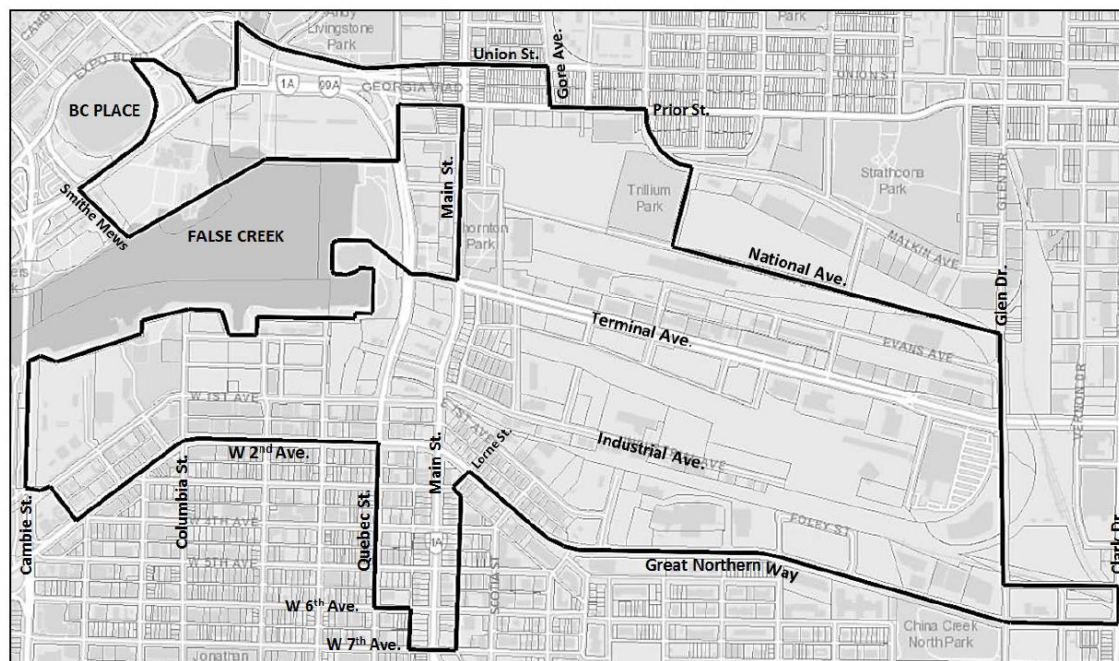
Background/Context

The fundamental goal of the NEU is to minimize greenhouse gas (GHG) emissions via a financially self-sustaining, commercially operated utility that delivers competitively priced thermal energy services. The NEU currently targets to produce 70% of its energy from renewable sources, such as sewage waste heat and renewable natural gas. This results in substantial GHG emission reductions compared to traditional methods of providing heat and hot water to buildings. While non-NEU approaches to achieve low-carbon building outcomes do not require any direct City investment, the NEU offers the following unique benefits:

- it provides the City with direct long-term control to secure 100% renewable energy target for connected buildings;
- it increases the local supply of renewable energy and reduces reliance on new renewable energy from more remote locations;
- it provides long-term flexibility to adapt to new low-carbon technologies; and
- it provides a cost-effective opportunity to retrofit existing gas-heated buildings with renewable energy.

The NEU began operation in January 2010, and since then has rapidly expanded to serve 584,000 square metres (6,290,000 square feet) of residential, commercial and institutional floor area. In accordance with the 2018 NEU expansion plan, over time, the NEU will continue to be extended to serve new developments in Southeast False Creek, Mount Pleasant, the False Creek Flats and Northeast False Creek (See Figure 1). The total build-out is currently forecast at 2,100,000 square metres (22,600,000 square feet) of floor area – approximately 3.4 times greater than projected in the original business case)

As part of the City's Climate Emergency Action Plan, staff have been tasked with evaluating options to transition the NEU's energy supply from its current target of 70% to a new target of 100% renewable energy sources by 2030. Note that all forecast costs and rate assumptions provided in this report are based on the current target of 70% renewable energy.

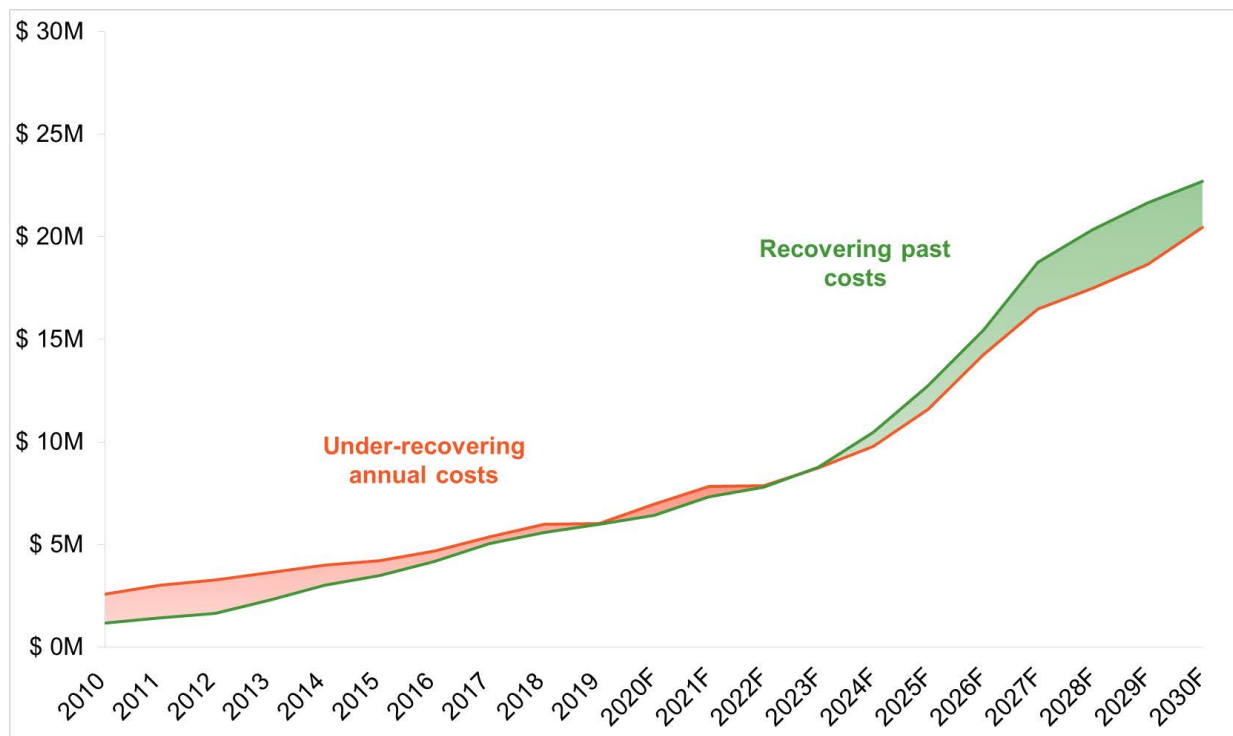
FIGURE 1. MAP OF NEU SERVICE AREA

Appendices B and C provide additional details on the NEU's services, technology, and its ownership, operating and governance model.

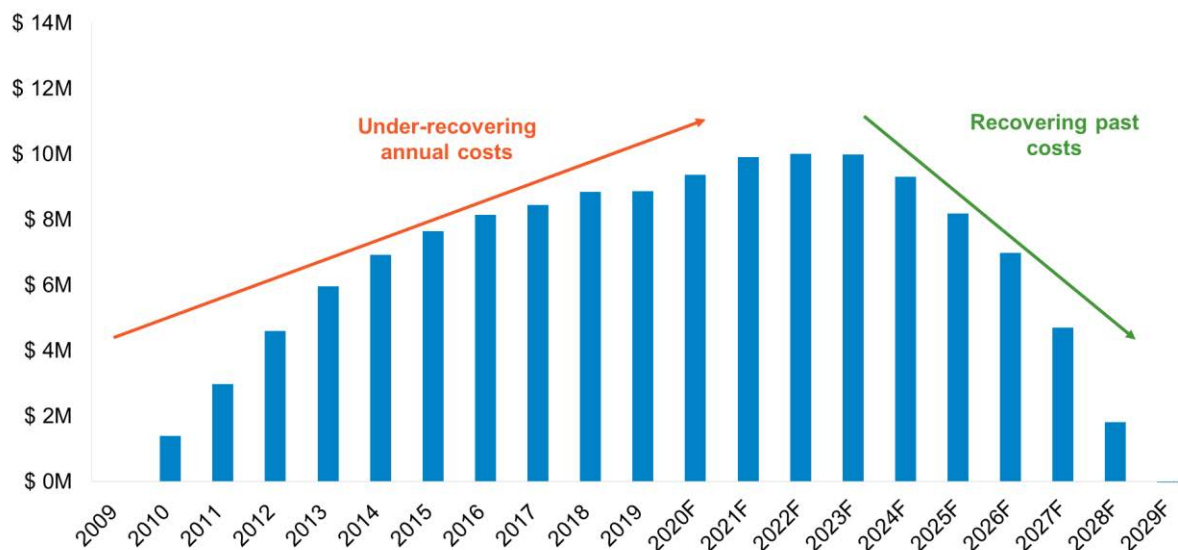
Levelized Rate Structure

NEU customer rates are comprised of two components: a Fixed Capacity Levy (related to the fixed capital and operating costs associated with the NEU) and a Variable Energy Use Charge (related to customers' actual energy consumption). To ensure fair and appropriate rates, all annual rate changes are reviewed by the independent Expert Panel.

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 and a modest return on investment 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. If the levelized rate approach were not taken, customer rates would have to be set much higher in the early years of operation. 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 without impacting the affordability of customer rates, 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 inflation, 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

Strategic Analysis

The NEU recovers its costs using three different rate classes: (1) Residential and Mixed Use Residential Buildings within the Southeast False Creek ("SEFC") Official Development Plan area; (2) Residential and Mixed Use Residential buildings Outside of SEFC; and (3) Non-Residential Buildings. These separate rate classes were established to ensure that NEU costs are equitably distributed among different customers, based on a cost of service model.

Staff recommends that NEU customer rates for all three rate classes be increased by 3.2% over 2020 rates, as shown in Table 1. Consistent with Council policy to improve the energy conservation price signal, staff recommend that this 3.2% increase be achieved through a 2.6% increase to the Fixed Capacity Levy and a 4.0% increase to the Variable Energy Charge. This allocation is supported by the Expert Panel, and will improve the conservation price signal while maintaining energy rates at the same level as projected under the commercial utility rate model.

A 3.2% increase is equivalent to a 1.2% real rate increase to customers above the systems long-term inflation forecast of 2%. This 1.2% above inflation value is the Rate Escalation Factor, which enables the NEU to maintain rates that are predictable and affordable, while keeping the NEU on track to recover its costs in accordance with the commercial utility rate model.

Applied as recommended by staff, this 3.2% increase will result in a cost increase of ~\$30 per year (from \$961 to \$991 per year) for a resident living in an average 75 square metre (800 square feet) suite with an average energy demand of 8.2 megawatt hours per year.

TABLE 1. NEU 2020 AND RECOMMENDED 2021 CUSTOMER RATES¹

	2020	2021 PROPOSED	% CHANGE
<u>Class 1 (Residential and Mixed Use Residential within SEFC)</u>			
Fixed Capacity Levy	\$0.583 per m ² per month	\$0.598 per m² per month	2.6%
Variable Energy Use Charge	\$53.111 per MW.hr	\$55.236 per MW.hr	4.0%
Net Effective Rate²	\$117.0 per MW.hr	\$120.8 per MW.hr	3.2%
<u>Class 2 (Residential and Mixed Use Residential Outside SEFC) and Class 3 (Non-Residential)</u>			
Fixed Capacity Levy	\$8.764 per KW peak demand per month	\$8.992 per KW peak demand per month	2.6%
Variable Energy Use Charge	\$53.111 per MW.hr	\$55.236 per MW.hr	4.0%

NOTES TO TABLE

- For the purposes of classifying buildings to apply these rate classes, the following definitions apply:
 - Residential: Residential uses comprise 100% of building net floor area.
 - Mixed-Use Residential: Residential uses comprise less than 100% and greater than or equal to 50% of net floor area.
 - Non-Residential: Building use is industrial, commercial or institutional, and, if residential uses are included, residential uses comprise less than 50% of the net floor areas.
- 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 for customers will vary due to differences in energy performance from building to building.

NEU EXPERT PANEL INPUT

The Expert Panel established by Council provides staff with invaluable advice on many elements of the business of the NEU. In their annual letter to Council, as attached in Appendix D, the Panel has endorsed the 2021 rate increase of 3.2%.

Staff would like to acknowledge the contributions of the Expert Panel. Their advice helps to ensure that the rate increases recommended in this report reflect an appropriate balance between the need to recover the City's costs for operating the NEU and the customer's need to receive fair and competitive rates for energy services delivered.

FINANCIAL PERFORMANCE UPDATE

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 key financial performance indicators ("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. These KPI targets were updated in December 2018, to reflect the expansion of the NEU to parts of Mount Pleasant, the False Creek Flats and Northeast False Creek. Table 2 below compares the KPIs associated with the levelized rate approach under the original forecast included in the 2010 rate report, the last forecast, and the current forecast. The NEU remains on target for all KPIs.

TABLE 2: NEU KPIs

	Original Forecast Feb '09	Last Forecast Nov '19³	Current Forecast³
Maximum Balance of Under-Recovered Costs <i>Target: not to exceed \$15.0 M</i>	\$ 7.3 M	\$ 11.8 M	\$ 9.9 M
Recovery Timeline for Under-Recovered Costs <i>Target: not to exceed 25 years</i>	22 years (2031)	21 years (2030)	20 years (2029)
Escalated Rate Increases¹ <i>Target: Rate Escalation Factor to be eliminated when annual revenues exceed annual costs</i>	3.2% thru 2035 ²	3.2% thru 2023	3.2% thru 2022

Notes to table

1. Includes mid-term average inflation of 2%
2. Original forecast maintained escalated rate increase over entire timeline, until 2035
3. Includes expansion areas added in February 2018 that were not factored into original forecast

Actual vs. Budgeted 2020 Costs and Revenues

Table 3 compares 2020 revenues and expenses as forecast at the end of August for the 2020 Operating and Capital Budgets under the commercial utility model. The main causes for the difference between 2020 budget and the 2020 actuals projected to year-end are as follows:

1. **October 28, 2018 Flooding Event at the False Creek Energy Centre:** Flooding caused by a 1-in-25 year rainfall event has resulted in a prolonged outage of the sewage heat recovery system. The sewage heat recovery system was repaired in Q1 2020 and has been fully operational in Q2 and Q3 2020. At the time of this report, 2020 flood-related expenses are expected to total \$1.4M; the majority of these costs will be recovered by insurance.
2. **Fixed Price Contract for Natural Gas:** The October 2018 Enbridge pipeline explosion led to a spike in natural gas prices the following winter. To hedge against a similar spike while pipeline integrity testing continued, the NEU entered into a fixed price contract to purchase 9,000 GJ a month at \$5.36/GJ for the first four months of 2020. This price was higher than the originally forecast price of \$3.56/GJ, resulting in an extra \$65k of conventional natural gas costs.
3. **August 1, 2019 Curtailment of Renewable Natural Gas (RNG):** In 2018, the NEU entered into a long term RNG supply agreement with FortisBC. In August 2019, the NEU received notice that the supply of RNG would be halted for the remainder of the year due to a temporary RNG production shortfall. The curtailment of RNG continued in 2020. Replacing the RNG with less expensive conventional natural gas translated into \$284k in savings on natural gas costs.
4. **Lower Heat Pump Maintenance Costs:** As a result of extensive repairs of the sewage heat recovery system (due to the flooding event) and a consequent pause in the maintenance contract, system operating costs are \$0.2M lower than budgeted. The sewage heat recovery system was repaired in Q1 2020 and has been fully operational in Q2 and Q3 2020.
5. **Lower than Anticipated Capital Costs and Financing Rates:** Procurement of the sewage heat recovery project was delayed in 2020 while the City waited to receive news on a grant application made to the BC Clean Communities Fund to contribute up to \$10.2M towards the capital expansion. A formal announcement was expected in early 2020; however, it was delayed until September 1, 2020. This delays the 2020 capital spending,

combined with lower than anticipated financing rates, has resulted in financing costs that are \$0.5M lower than budgeted.

In all, the utility is forecasted to have an operating shortfall of \$0.5M, \$0.4M lower than budgeted.

TABLE 3. 2020 NEU REVENUES AND EXPENSES, BUDGET COMPARED TO YEAR-END FORECAST BASED ON THE COMMERCIAL UTILITY RATE MODEL (\$ MILLIONS)

	2020 Budget	2020 Forecast	\$ Variance	% Variance	2021 Proposed
Revenues and Recoveries					
Capacity Levies	\$ 3.6	\$ 3.6	\$ (0.0)		\$ 4.1
Energy Use Charges	2.8	2.8	(0.0)		3.2
Total Revenues	\$ 6.4	\$ 6.4	\$ (0.0)	-1%	\$ 7.3
Insurance Proceeds	-	1.0	1.0		
Total Revenues	\$ 6.4	\$ 7.4	\$ 1.0	15%	\$ 7.3
Operating Expenses					
Natural Gas & Electricity ¹	\$ 2.3	\$ 2.2	\$ (0.1)		\$ 2.6
Staff, Maintenance, Overhead & Other ²	1.2	1.0	(0.2)		1.4
Total Non Flood-Related	\$ 3.5	\$ 3.2	\$ (0.3)	-7%	\$ 4.0
Flood-Related	-	1.4	1.4		-
Total Operating Expenses	\$ 3.5	\$ 4.6	\$ 1.1	32%	\$ 4.0
Financing Expenses²					
Interest Expense	\$ 1.0	\$ 0.9	\$ (0.1)		\$ 1.0
Return on Equity	1.6	1.4	(0.2)		1.6
Depreciation	1.2	1.0	(0.2)		1.2
Total Financing Expense	\$ 3.8	\$ 3.3	\$ (0.5)	-14%	\$ 3.8
Total Expenses	\$ 7.3	\$ 7.9	\$ 0.6	8%	\$ 7.8
Operating Shortfall	\$ 0.9	\$ 0.5	\$ (0.4)	-41%	\$ 0.5
System Expansion Costs	\$ 21.6	\$ 10.3	\$ (11.3)	-52%	\$ 11.7

¹ Other than flood-related

² Reflects costs under the commercial utility model

Table may not sum due to rounding.

COVID-19 Customer Response

In response to the COVID-19 crisis and the state of emergency declared by the Province, the NEU put measures in place to support customers. Further to consultation with the NEU Executive Steering Committee, a letter was sent to all NEU customers in May 2020 advising of the following:

1. Extension of the bill payment period from 30 to 60 days;
2. Ensuring customers that they will not be disconnected for non-payment of bills during the crisis;
3. Advising that the NEU will work with customers experiencing hardship to find a payment solution; and
4. Advising customers experiencing hardship to contact 311 and relevant cases will be referred to the NEU team.

In addition, measures were put in place to allow customers using significantly less energy (minimum 20% less than in previous years) to apply for a temporary reduction in peak demand, which results in a lower capacity charge each month. Two customers applied for this temporary reduction. Relative to their energy use, these two customers saved \$815 and \$3,500 per month (32% and 81% savings respectively). A total of \$16,000 in capacity charge reduction was applied in 2020.

No customers contacted NEU staff advising of hardship or inability to pay bills. While many customers are taking advantage of the additional bill payment period, customers are paying their energy bills.

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."*

To assess the competitiveness of the NEU, staff examined what a typical NEU customer would pay compared with other energy providers. Table 4 includes comparisons with BC Hydro, FortisBC natural gas, and a range of district 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 megawatt-hour for heating. Based on the recommended rate increase of 3.2%, the proposed 2021 effective rate for the NEU is \$121 per MW.h. 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.

The NEU effective rate continues to be well within the target maximum 10% premium over electricity. The proposed 2021 NEU rate is 7% lower than the forecast 2020 BC Hydro effective rate.

The proposed 2021 NEU effective rate will be 32% higher than the cost of using high efficiency natural gas boilers. This is based on the current natural gas commodity price which is at a near historical low and is subject to significant change from year to year. The NEU offers more stable and predictable rates compared to natural gas, and much lower GHG emissions.

TABLE 4. COMPARISON OF 2021 EFFECTIVE RATES, NEU WITH OTHER PROVIDERS

Energy Provider	GHG Emission Intensity (kg CO ₂ /MW.h)	Estimated Effective Rate ¹ (\$/MW.h)	Notes
NEU (Hot Water)	70	\$121	The NEU bills strata corporations, not individual suites; any incremental strata sub-metering costs incurred by NEU consumers are not included here.
BC Hydro ² (Electricity)	24	\$130	BC Hydro effective rate calculation is based on 50% of consumption at BC Hydro's Residential Step 1 Rate and 50% at Step 2, and includes a rate rider and basic charge.

Energy Provider	GHG Emission Intensity (kg CO ₂ /MW.h)	Estimated Effective Rate ¹ (\$/MW.h)	Notes
FortisBC ³ (Natural Gas)	220	\$92	Fuel costs, based on FortisBC Lower Mainland Rate 3, with high efficiency boiler and factoring in conversion losses = \$42 per MW.h. Installation and replacement of boiler equipment plus maintenance = \$50 per MW.h. Total effective cost = \$92 per MW.h
Creative Energy Ltd. (Steam)	268	\$61 ⁴	Actual effective rate for this Downtown steam system varies depending on size of building and building efficiency of converting steam to energy. Rates fluctuate with the commodity price of natural gas.
UBC Neighbourhood DEU (Hot Water)	220	\$109 ⁵	UBC Neighbourhood DEU operations began in 2015, using temporary natural gas boilers, and plans to use waste heat from the Triumph particle accelerator facility once the customer base is sufficiently established (forecast 2024).
SFU UniverCity Energy (Hot Water)	43	\$144 ⁵	SFU UniverCity Energy operations began 2012, using temporary natural gas boilers. This system has received regulatory approval to transition to a biomass facility for low carbon energy supply; construction of the new facility is scheduled to be complete by late 2020. Estimated effective rate assumes new facility has been commissioned and is based on proposed rates subject to BCUC approval.
River District Energy (Hot Water)	220	\$103 ⁵	River District Energy operations began in 2012, using a temporary natural gas boiler, and plans to switch to a low carbon energy supply once the customer base is sufficiently established.
Richmond Oval Village District Energy (Hot Water)	220	\$104	Oval Village District energy operations began 2015, using a natural gas boiler, and plans to use Sewer Heat Recovery once customer base is sufficiently established (forecast 2025).
Surrey City Energy (Hot Water)	148	\$120	Surrey City Energy operations began in 2015, using temporary natural gas boilers and plans to implement a wood waste fuelled energy centre in 2024. The system is currently achieving emission reductions with the use of renewable natural gas.
PCI Marine Gateway (Heating & Cooling)	58	\$125 ⁵	The PCI Marine Gateway development utilizes a geo-exchange heating and cooling system provided by FortisBC Alternative Energy Services.

NOTES TO TABLE

1. Effective rate estimates are based on a reference building with an annual energy demand of 109 KW.hr per m² of floor area. Actual effective rates for customers will vary due to differences in energy performance from building to building. Effective rate estimates may be based on proposed 2021 rates that are pending regulatory or Council approvals and are thereby subject to change.
2. Although B.C. Hydro's electricity is on-average a low carbon energy source, new electricity demand is largely served by sources that have a much higher production cost than BC Hydro's retail customer rates. In addition, as demonstrated by a recent BC Auditor General's Report, BC Hydro's current rates are not sufficiently high enough to recover BC Hydro's operating costs, and the electric utility's deferral account debt is significant. Also, electric baseboard heat is often used in conjunction with natural gas for ventilation air and hot water, and that natural gas may supply more than 50% of the building heat demand.
3. FortisBC rates (and rates of other providers listed that rely on natural gas supply) are largely dependent on the commodity cost of natural gas and are subject to commodity price volatility. The GHG emission intensity as

reported in Table 4 reflects provincial standard methods for calculating GHG emissions, and does not include upstream emissions associated with the extraction and transportation of natural gas.

4. Effective rate provided by Creative Energy accounts for losses upstream of the steam meter (entry point into the building), but does not account for the efficiency of the building side systems and equipment.
5. Estimated effective rates sourced from BC Utilities Commission rate filings, which are based on modeled energy performance of buildings served by the reference systems. A high estimated effective rate does not necessarily imply that the customer's total cost of heating will be high, because some new developments consume significantly less energy than others.

Initial Connection Levy for New Service Connections to the NEU

In December 2018, Council approved the adoption of an Initial Connection Levy to recover the cost of connecting new buildings to the NEU. This is similar to the use of connection fees for waterworks and sewer utilities, and is also a standard practice in the energy utility sector. Connecting to the NEU provides developers with a cost-effective means to achieve the Zero Emissions Building Plan GHG limits, as it results in mechanical system and building envelope cost savings for new developments. The Initial Connection Levy helps to distribute this cost savings between the building developer and the end-user, who ultimately pays for NEU infrastructure costs via NEU rates.

TABLE 5. NEU CONENCTION LEVY STRUCTURE

COMPONENT	AMOUNT	RATIONALE
Fixed Portion	\$86,700	Recovers cost of the connection pipe, which is largely influenced by factors other than peak energy demand (e.g. distance from NEU distribution pipe, road type, etc.)
Variable Portion	\$102/kW of peak energy demand required for a building	Recovers cost of the energy transfer interface, which is directly impacted by the amount of peak energy demand required for a building

Staff recommended a 2% increase to the Initial Connection Levy to provide for construction cost escalation.

Implications/Related Issues/Risk

Financial

The recommended rate increase is in accordance with the Council approved rate setting framework established in July 2015, and is also consistent with the rate forecasts from previous years.

There were two main changes in 2020 that impact the NEU financials:

1. An expansion to provide service to two new sites within the NEU mandatory connection area (1890 Foley and 701 Great Northern Way) was incorporated into projections following evaluation under the existing NEU expansion decision framework.
2. On September 1, 2020 successful projects under the BC Clean Communities Fund (CCF) were announced. The NEU was successful in securing up to \$10.2 M (~73% of eligible capital costs) in grant funding towards the expansion of the sewage heat recovery system. This has two impacts on the NEU energy generation costs:

- a. Reduced capital expenditure due to the grant funding;
- b. A delay in project schedule, and capital spending, due to the later than expected announcement of the grant award.

Sensitivity Analysis on Key Variables in the NEU Business Case

Table 7 below summarizes the potential capital requirements for the distribution system and energy centres for the expanded NEU service area, and the forecast levelized cost of service to end users under three scenarios – base case, high cost and low cost.

TABLE 7. SCENARIO ANALYSIS – CAPITAL INVESTMENT FOR NEU EXPANSION & LEVELIZED COSTS

Scenario	Total Remaining Capital Requirements to 2038, in 2019 \$*	Levelized Cost of Service to End User (30 year project life)
Forecast “Base Case” Scenario	\$41M – Distribution \$54M – Generation \$95M - Total	\$136 per MW.hr
High Cost Scenario (30% increase in capital costs, a 3 year delay in customer development, and a 6% borrowing rate)	\$52M – Distribution \$68M – Generation \$120M - Total	\$161 per MW.hr
Low Cost Scenario (Additional \$10M grant, and a 4% borrowing rate)	\$36M – Distribution \$49M – Generation \$85M - Total	\$127 per MW.hr

**Note: New generation facilities can potentially be supplied by the private sector, reducing the direct debt funding requirements associated with NEU infrastructure expansion. Scenario analysis was run using pro-forma which was built using 2019 dollar assumptions.*

To support the NEU expansion plan, over the next 18 years the distribution system requires a capital investment in the range of \$36 to \$52 million (2019\$), however, \$12.5 million is expected to be recovered from developers through the initial connection levy. New energy generation requires a capital investment in the range of \$49 to \$68 million (2019\$) bringing the total for expansion to \$85 to \$120 million (2019\$). \$26 million of this total is already included in the 2019-2022 Capital Plan, and the remainder will be subject to Council approval of future capital plans.

Under the NEU commercial utility rate model, the levelized cost of service to end users could range from \$127 to \$161 per MW.hr, in comparison to BC Hydro's cost of service for a residential building which could range from \$155 to \$190 per MW.hr depending on input assumptions.

The City's future investment will be determined through the 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 in future Capital Plans.

Environmental

In 2018, the NEU entered a supply agreement with FortisBC for the supply of renewable natural gas (RNG). The committed RNG quantities combined with the NEU sewage heat recovery

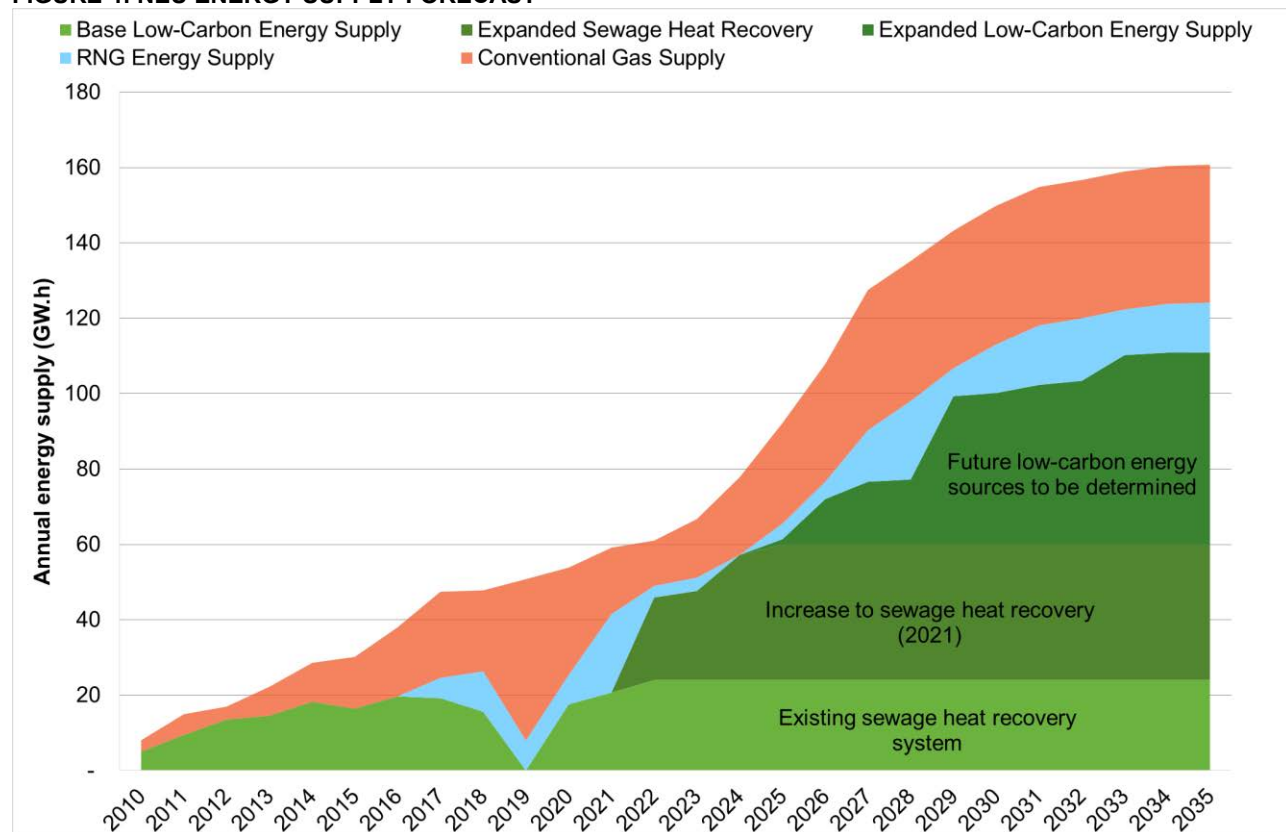
system would have resulted in a 72% renewable energy supply for 2020 (40% from sewage heat recovery and 32% from RNG). Two events resulted in a significant temporary reduction in NEU environmental performance:

1. On October 28, 2018, flooding triggered by a 1-in-25-year rainfall event caused a prolonged outage of the sewage heat recovery system at the False Creek Energy Centre. Although this event did not disrupt service to customers, it did cause the NEU's forecast renewable energy supply to drop to 33%. The sewage heat recovery system was repaired in Q1 2020 and has been fully operational in Q2 and Q3 2020.
2. On August 1, 2019, the City received notice from FortisBC that the supply of renewable natural gas would be halted for the remainder of the year because of production shortages. RNG supply in 2020 will be limited to 40% of the volume of the supply agreement. Fortis is forecasting RNG supply in 2021 can be increased to 85% of the supply agreement volume.

With the heat pump down for Q1 2020 and RNG supply curtailed to 40% of supply agreement volume, the renewable energy supply is expected to be 45% by the end of 2020. This is an increase on the 2019 renewable energy supply of 15%.

In 2020, the NEU successfully implemented its first application of heat recovery from a building. The NEU recovered 423 MW.h (forecast to end of 2020) from a commercial customer which accounts for 1% of total energy.

Expansion of the sewage heat recovery system secured up to \$10.2 million in grant funding and is now at Detailed Engineering stage. This project will add 6.9MW of renewable capacity and is targeted to be online by the end of 2021. This will enable the NEU to achieve its long-term GHG performance targets while reducing dependence on renewable natural gas ("RNG"). Figure 4 below illustrates the forecast sources of energy supplied to meet customer loads and the projected annual renewable energy performance.

FIGURE 4: NEU ENERGY SUPPLY FORECAST

At the time of build-out of the customer base, the NEU is forecast to provide low carbon heating and hot water to approximately 2,100,000 square metres (22,600,000 square feet) of mixed use floor area. GHG savings, at build-out, are forecast at approximately 14,000 tonnes of CO₂ per year, compared to buildings that would otherwise be constructed with no NEU and would need to comply with applicable green building rezoning policies. In a hypothetical case where buildings were simply constructed to comply with building code, the GHG benefit would increase to 24,000 tonnes CO₂ at build-out. These estimates are based on a 70% renewable energy target for the NEU and GHG emissions would be further lowered when transitioning to 100% renewable energy at a future date. As part of the City's Climate Emergency Action Plan, staff have been tasked with evaluating options to accelerate the transition of NEU's energy supply to 100% renewable before 2030.

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 recovery of waste heat from building air conditioning systems also provides an opportunity to reduce potable water consumption compared to conventional evaporative

cooling systems (e.g. the recovery of waste heat from the new Mountain Equipment Co-op store in Southeast False Creek will reduce potable water consumption by approximately 1 million litres annually);

- the NEU allows buildings to avoid 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; and
- 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.

CONCLUSION

This report recommends that NEU rates be increased by 3.2% in 2020. This proposed increase is consistent with Council's approved rate-setting principles and methodology, and enables the NEU to recover its long-term costs under the commercial utility rate model while providing stable and competitive energy rates for customers. This rate increase has been endorsed by the Neighbourhood Energy Expert Panel, which provides the City with independent, expert advice on NEU rate setting. This increase will be allocated to the Capacity Levy and the Energy Charge in a manner consistent with the conservation rate setting policy approved by Council in April 2014.

This report also recommends a 2% increase to the initial connection levy to provide for construction cost escalation.

The NEU continues to be an important contributor to the City's work in achieving Climate Emergency and Greenest City goals of transitioning Vancouver's buildings to zero emissions and securing a 100% renewable energy future.

* * * * *

ENERGY UTILITY SYSTEM BY-LAW DRAFT AMENDMENT

BY-LAW NO. _____

**A By-law to amend Energy Utility System By-law No. 9552
regarding 2021 Fees and Miscellaneous Amendments**

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 strikes the Table of Contents and replaces it with the "TABLE OF CONTENTS" attached to this By-law.
3. Council strikes section 4.4 and replaces it as follows:

"4.4 The location of each of the:

 - (a) energy transfer station, submitted under section 4.1(d);
 - (b) distribution system extension, submitted under section 4.1(e); and
 - (c) entry points, submitted under section 4.1(f);

is subject to approval by the Chief Building Official and City Engineer."
4. Council strikes "Schedule C", and substitutes the "Schedule C" attached to this By-law.
5. In "Schedule D", Council strikes "\$35.00" and replaces it with "\$36.00".
6. This By-law is to come into force and take effect on January 1, 2021.

ENACTED by Council this _____ day of _____, 2020

Mayor

Acting City Clerk

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ENERGY UTILITY SYSTEM BY-LAW

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“SCHEDULE C

LEVIES AND CHARGES

PART 1 – Connection levy

Fixed Portion	\$88,434
Variable Portion	\$104 per KW of the peak heat energy demand as approved under section 4.32

PART 2 – Monthly capacity levy

Class 1 - SEFC residential or mixed use residential building	\$0.598 per m ²
Class 2 - Residential or mixed use residential building located outside SEFC	\$8.992 per KW of peak heat energy demand
Class 3 - Non-residential building	\$8.992 per KW of peak heat energy demand

PART 3 – Monthly charge

Monthly charge	\$55.236 per MW per hour
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PART 4 – Credit

Credit for heat energy returned to energy transfer station	\$55.236 per each MW per hour multiplied by 50%
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”

OVERVIEW OF THE CITY OF VANCOUVER'S SOUTHEAST FALSE CREEK NEIGHBOURHOOD ENERGY UTILITY

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 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 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.

From the Energy Centre, a network of underground pipes delivers the heated water to SEFC buildings (termed the "Distribution Pipe System," or DPS). 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.

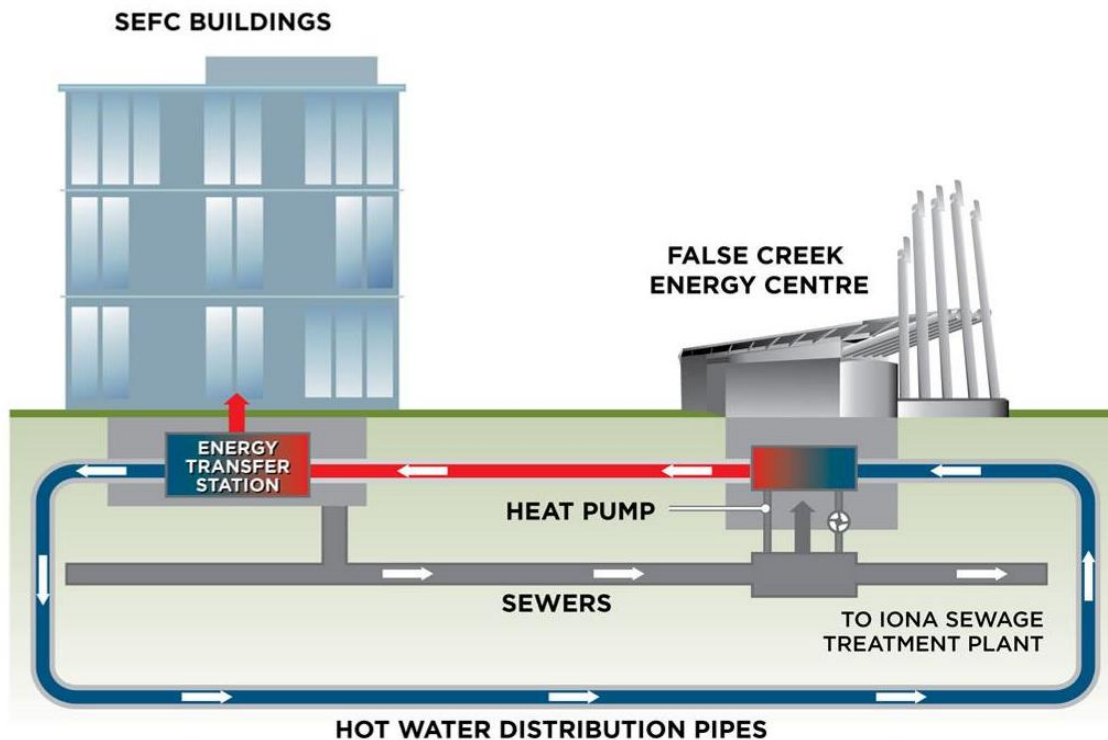
Metering is incorporated in the ETS's for energy measurement and billing purposes. Three of the ETS's also enable customer-generated solar thermal energy to be distributed to the wider neighbourhood.

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

- *False Creek Energy Centre*: 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"). Beyond basic provisions required to regulate energy services, the By-law makes connection to the NEU mandatory for all new buildings within the SEFC Official Development Plan area (which is generally bounded by Cambie Street, Main Street, 2nd Avenue and the False Creek waterfront). In June 2012 this service area was expanded to also include the Great Northern Way Campus and Adjacent Lands in the False Creek Flats South area.

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.

**SOUTHEAST FALSE CREEK NEIGHBOURHOOD ENERGY UTILITY
OWNERSHIP MODEL, GOVERNANCE AND RATE-SETTING PRINCIPLES
APPROVED BY CITY COUNCIL IN DECEMBER 2006**

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 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.

* * * * *

APPENDIX D
LETTER FROM THE CITY OF VANCOUVER NEIGHBOURHOOD ENERGY
EXPERT PANEL, REGARDING 2021 PROPOSED NEU RATES

November 02, 2020

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

RE: False Creek Neighbourhood Energy Utility (NEU) 2021 Customer Rates

Dear Mayor Stewart and Councilors:

The purpose of this letter is to advise City Council as to the opinion of the independent Neighbourhood Energy Utility Expert Panel (NEU Expert Panel, Panel) on the rates proposed to be charged by the NEU to its customers for the 2021 calendar year.

The Panel met with City staff by way of a Webex teleconference on September 28th, 2020. The purpose of the meeting was to review the operations of the NEU over the past year, in terms of its financial performance, environmental goals, expected customer growth and future expansion plans, as well as proposed rates for 2021. The Panel also reviewed a draft Administrative Report to Council, dated November, 2020.

The year 2020 has been and continues to be particularly challenging. The declaration of a global pandemic catapulted the world into a severe economic recession. The year 2020 has also been an extraordinary year for the utility, having suffered as well from a serious flood in late 2018, which significantly affected its operations. Consequently, the Panel paid particular attention to the costs and recoveries associated with the flood, as well as to the ability of the NEU to withstand providing utility services for a period of time without the requested rate increase.

As noted in previous years, the Panel's mandate is to provide independent expert advice on the NEU's proposed rates and rate structures, taking into consideration established rate-setting principles and viewed in the context of certain parameters or targets, specific to the operations of the NEU, known as "key performance indicators" (KPIs). These KPIs ensure that the NEU can remain viable, in terms of the extent of costs which are unrecovered during the early years, and the timeline for their recovery.

Based on the information provided in the draft Report and discussions with City staff, the Panel endorses the proposed customer rates for 2021.

As discussed in the draft Report, the rates proposed for 2021 reflect a total rate increase of 3.2% above 2020 rates, for all customer classes, as well as a 2% increase to the initial connection levy. These rate increases consist of an escalation factor of

1.2%, together with a 2% inflationary adjustment. The escalation factor allows the NEU to collect additional monies, beyond inflation, in the early years, to enable it to recover its operating costs as well as its capital investment over the life of the utility. The 2% inflationary adjustment is consistent with anticipated inflation, and is therefore also appropriate for the proposed increase to the initial connection levy. These rate increases are also consistent with those of prior years.

The Panel also endorses the proposed allocation of the rate increases between the fixed and variable components, with a greater proportion going to the variable component in order to continue to improve the conservation price signal.

As also discussed in the draft Report, the NEU uses a "levelized cost approach" which is common to utility rate setting. Under this approach, as noted above, rates are designed to under-recover costs in the early years of operation, when the customer base is small, and over recover in later years, to make up for the difference, ensuring that the total costs of the utility are recovered over a reasonable period of time. In that regard, the KPIs for the NEU are designed to keep the utility on track to recover its costs over a 25 year period, while charging rates which remain fair and reasonable, and not subject to undue variation from year to year.

The Panel notes that the proposed rates for 2021 will allow the NEU to continue to operate within the boundaries set by its KPIs. In particular, the Maximum Balance of Under-Recovered Costs, now forecast to reach \$9.9 Million, is slightly below that of last year, and well within the target maximum of \$15.0 Million, while the Recovery Timeline for Under-Recovered Costs is now forecast to be 20 years, also well within the 25 year target maximum. These KPIs are achieved by forecasting rate increases of 3.2%, (which include the 1.2% escalation factor) through 2022. At that point, annual revenues are forecast to exceed annual costs such that the rate escalation factor will no longer be required, and therefore eliminated.

The Panel has also reviewed the information provided as to the rates charged by other neighbourhood energy systems in the lower mainland as well as those charged by BC Hydro and FortisBC. The Panel finds that the NEU's rates for 2021 are not inconsistent with those charged by other comparable utilities, and remain below those charged by BC Hydro, which continue to represent a useful comparator.

In summary, the Panel finds that the proposed rate increases of 3.2%, including inflation, across all customer classes, together with the 2% increase in the connection levy, are reasonable. The Panel also finds that the rates themselves remain reasonable, relatively stable and predictable, and compare favourably with rates charged by other, similar neighbourhood energy systems. The Panel is also satisfied that the NEU is in a position to withstand some deviation from forecast in terms of expected insurance recoveries relating to the flood, and customer acceptance of the proposed rate increases.

The Panel would like to take this opportunity to thank City staff for its thorough preparation, analysis and cooperation throughout the review process.

Yours truly,

A handwritten signature in dark ink, appearing to read 'Alison Rhodes', with a large initial 'A' and several loops.

Alison Rhodes
Chair, NEU Expert Panel