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Oakridge Energy Limited Partnership

Application for a Certificate of Public Convenience and Necessity for a District Energy System

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Decision
and Order C-2-22

February 15, 2022

Before:
R. I. Mason, Panel Chair
E. B. Lockhart, Commissioner
T. A. Loski, Commissioner

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Executive summary

On June 1, 2021, Oakridge Energy Limited Partnership (Oakridge Energy) submitted an application to the British Columbia Utilities Commission (BCUC) pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA) seeking a Certificate of Public Convenience and Necessity (CPCN) to construct and operate a district energy system (Oakridge DES) for the provision of thermal energy service to the Oakridge Centre property redevelopment (Oakridge Centre Redevelopment) in Vancouver, B.C. (Application).[1] The Oakridge Centre Redevelopment is a joint venture project between Westbank Holdings (Westbank) and QuadReal Property Group (QuadReal) (collectively, the Developers). Oakridge Energy is a limited partnership of entities within the Corix Group of Companies and the Creative Energy group (Limited Partners).[2]

The proposed Oakridge DES provides thermal energy through a combination of multiple heating and cooling energy sources, including a closed loop geothermal exchange (geo-exchange) field, a waste heat recovery system, electric boilers, electric chillers, and natural gas boilers. The proposed Oakridge DES has been designed to qualify as a Low-Carbon Energy System, as classified by the City of Vancouver (City), and to ensure compliance with the City's Green Buildings Policy.[3]

The capital cost estimate to construct the proposed Oakridge DES is $108.41 million in 2020 dollars, before the inclusion of an allowance for funds used during construction.[4]

During the proceeding, Oakridge Energy amended the approvals sought in the Application whereby the Developers would proceed to construct the first phase of the geo-exchange field and associated assets (Phase 1 Geo-exchange Assets) at their own cost and risk, and Oakridge Energy would acquire the Phase 1 Geo-exchange Assets at net book value, subject to receiving BCUC approval.[5]

By Order G-194-21 dated June 24, 2021, the BCUC established a regulatory timetable for the review of the Application. The review of the Application proceeded by way of filing of further information, two rounds of information requests and final and reply arguments. BC Sustainable Energy Association is the only registered intervener in this proceeding.

The Panel finds that Oakridge Energy's plan to acquire the Phase 1 Geo-exchange Assets from the Developers is reasonable. However, the Panel is concerned that there is no purchase agreement between Oakridge Energy and the Developers, without which the Panel cannot determine whether the acquisition terms are reasonable. Therefore, the Panel determines that a term of the CPCN for the acquisition of the Phase 1 Geo-exchange Assets is that Oakridge Energy submits to the BCUC a satisfactory purchase agreement between it and the Developers for the acquisition of the Phase 1 Geo-exchange Assets by June 30, 2022.

[1] Exhibit B-1, p. 1.
[2] Exhibit B-1, p. 5.
[3] Ibid.
[4] Ibid., p. 2.
[5] Exhibit B-10, p. 2.

Accordingly, and for the reasons set out in this Decision, the Panel grants a CPCN to Oakridge Energy authorizing:

1. The construction and operation of a district energy system to provide space heating, space cooling and domestic hot water to the Oakridge Centre Redevelopment.
2. The purchase of the Phase 1 Geo-exchange Assets from the Developers at a cost not to exceed their net book value at the time of acquisition, subject to the term that Oakridge Energy submits to the BCUC a satisfactory purchase agreement between it and the Developers for the acquisition of the Phase 1 Geo-exchange Assets by June 30, 2022.

Additionally, the Panel directed various reporting requirements, which are set out in the Decision.

1.0 Introduction

1.1 Background

On June 1, 2021, Oakridge Energy Limited Partnership (Oakridge Energy) submitted an application to the British Columbia Utilities Commission (BCUC) pursuant to sections 45 and 46 of the *Utilities Commission Act* (UCA) seeking a Certificate of Public Convenience and Necessity (CPCN) to construct and operate a district energy system (Oakridge DES) for the provision of thermal energy service to the Oakridge Centre property redevelopment (Oakridge Centre Redevelopment) in Vancouver, B.C. (Application).[6]

The Oakridge Centre Redevelopment is a joint venture project between Westbank Holdings (Westbank) and QuadReal Property Group (QuadReal) (collectively, the Developers). The Oakridge Centre Redevelopment project will transform the existing Oakridge Centre and surrounding area into a new, sustainable, mixed-use neighbourhood hub with residential towers, office space and retail space that will all require heating and cooling thermal energy service. Oakridge Energy states that the Oakridge Centre Redevelopment project is currently underway, with the first building requiring thermal energy service in 2024 and full build-out scheduled to occur in 2027. Oakridge Energy states that at full build out, thermal energy service will be required for 486,259 square metres of floor space.[7]

The project involves the construction of a DES to serve the Oakridge Centre Redevelopment (Project). The proposed Oakridge DES has been designed as a low-carbon energy system that provides thermal energy through a combination of multiple heating and cooling energy sources, including a closed loop geothermal exchange (geo-exchange) field, a waste heat recovery system, electric boilers, electric chillers, and natural gas boilers. The proposed Oakridge DES has been designed to qualify as a Low-Carbon Energy System, as classified by the City of Vancouver (City), and to ensure compliance with the City's Green Buildings Policy.[8]

The capital cost estimate to construct the proposed Oakridge DES is $108.41 million in 2020 dollars, before the inclusion of an allowance for funds used during construction.[9]

1.2 Approvals Sought

In the Application, Oakridge Energy seeks a CPCN pursuant to sections 45 and 46 of the UCA, authorizing Oakridge Energy to construct and operate the Oakridge DES for the provision of thermal energy service to the Oakridge Centre Redevelopment.[10]

During the proceeding, Oakridge Energy filed a submission with the BCUC, which included an amendment to approvals sought in the Application based on recent developments regarding the geo-exchange field, which is an element of the proposed Oakridge DES. Oakridge Energy stated that due to scheduling constraints, the Developers would proceed to construct the first phase of the geo-exchange field at their own cost and risk, and

[6] Exhibit B-1, p. 1.
[7] Ibid.
[8] Ibid.
[9] Ibid., p. 2.
[10] Ibid., p. 1.

Oakridge Energy would acquire the associated assets at net book value, subject to receiving BCUC approval. Oakridge Energy, therefore, amended its approvals sought in the Application to include approval to purchase the Phase 1 geo-exchange field and associated assets (Phase 1 Geo-exchange Assets) at a cost not to exceed the net book value at the time of acquisition.[11]

Oakridge Energy is therefore seeking a CPCN pursuant to sections 45 and 46 of the UCA, authorizing Oakridge Energy to construct and operate the Oakridge DES for the provision of thermal energy service to the Oakridge Centre Redevelopment, which includes approval to purchase the Phase 1 Geo-exchange Assets at a cost not to exceed the net book value at the time of acquisition.[12]

Oakridge Energy requests approval of the Application no later than January 31, 2022 to ensure that the Oakridge Centre Redevelopment project remains on schedule.[13]

1.3 Legal and Regulatory Framework

1.3.1 *Utilities Commission Act*

Section 45(1) of the UCA provides that except as otherwise provided, after September 11, 1980, a person must not begin the construction or operation of a public utility plant or system, or an extension of either, without first obtaining from the BCUC a certificate that public convenience and necessity require, or will require, the construction or operation of the plant or system.[14]

Section 46(3.1) of the UCA provides that in deciding whether to issue a CPCN applied for by a public utility other than the authority (as defined in the UCA), the BCUC must consider:[15]

a) the applicable of British Columbia's energy objectives;

b) the most recent long-term resource plan filed by the public utility under section 44.1, if any; and

c) the extent to which the application for the certificate is consistent with the applicable requirements under sections 6 and 19 of the *Clean Energy Act* (CEA).[16]

1.3.2 *Clean Energy Act*

British Columbia's energy objectives are defined in section 2 of the CEA.[17]

Section 6 of the CEA pertains to electricity self sufficiency. Section 19 of the CEA pertains to clean or renewable resources, and is only applicable to British Columbia Hydro and Power Authority (BC Hydro) and a prescribed public utility, if any, and a public utility in a class of prescribed public utilities, if any.[18]

[11] Exhibit B-10, p. 2.
[12] Ibid.
[13] Oakridge Energy Reply Argument, p. 2
[14] *Utilities Commission Act*, RSBC 1996, c. 473, section 45(1).
[15] UCA, section 46(3.1).
[16] Sections 6 and 19 of the CEA do not apply to Oakridge Energy.
[17] CEA, section 2.
[18] CEA, sections 6 and 19.

1.3.3 TES Guidelines

On August 28, 2014, the BCUC issued Order G-127-14 approving the Thermal Energy Systems Regulatory Framework Guidelines (TES Guidelines). Revisions to the TES Guidelines were approved by Order G-27-15.

The TES Guidelines state that a thermal energy system (TES) that does not meet the requirements of a Micro TES or a Strata Corporation TES and does not meet the Stream A characteristics as described in section 2.3.1 of the TES Guidelines, is by default considered to be a Stream B TES. In such cases, a CPCN application is to be submitted to the BCUC. CPCN applications for Stream B TES are generally expected to be prepared in accordance with the BCUC's 2015 Certificate of Public Convenience and Necessity Application Guidelines (CPCN Guidelines) as well as section 2.4.2 of the TES Guidelines, which outlines additional filing requirements for Stream B TES.[19]

1.3.4 CPCN Guidelines

The BCUC's CPCN Guidelines provide general guidance regarding the BCUC's expectation of the information that should be included in a CPCN application while providing the flexibility for an application to reflect the specific circumstances of the applicant, the size and nature of the project and the issues raised by the application.[20]

The BCUC's CPCN Guidelines state that a CPCN application submitted under sections 45 and 46 of the UCA should contain information on the following:[21]

- Applicant;
- Project Need;
- Alternatives and Justification;
- Consultation;
- Project Description;
- Project Cost Estimate;
- Provincial Government Energy Objectives and Policy Considerations; and
- New Service Areas.

1.4 Regulatory Process

By Order G-194-21 dated June 24, 2021, the BCUC established a regulatory timetable for the review of the Application, which included Oakridge Energy filing of further information, public notification, intervener registration, one round of BCUC and intervener information requests (IRs) and Oakridge Energy responses to IR No. 1.

[19] TES Guidelines, pp. 18–20.
[20] Appendix A to Order G-20-15, BCUC 2015 Certificate of Public Convenience and Necessity Guidelines (CPCN Guidelines), p. 1.
[21] Ibid.

The BCUC subsequently amended the regulatory timetable at the request of Oakridge Energy to allow additional time for the filing of further information and following a further request of Oakridge Energy to allow additional timing for the filing of IR No. 1 responses.[22]

By Order G-300-21 dated October 20, 2021, the BCUC established a further regulatory timetable which included BCUC and intervener IR No. 2, Oakridge Energy responses to IR No. 2, and final and reply arguments.

By Order G-308-21 dated October 29, 2021, the BCUC amended the regulatory timetable in response to a submission from Oakridge Energy, which included an amendment to approvals sought in the Application based on recent developments regarding the geo-exchange field.[23] The amended regulatory timetable included a requirement that Oakridge Energy file a revised application and/or addenda, BCUC and intervener IR No. 2, Oakridge Energy responses to IR No. 2.

On November 4, 2021, Oakridge Energy filed a submission with the BCUC, which stated that Oakridge Energy does not have a construction and purchase agreement to acquire the Phase 1 Geo-exchange Assets from the Developers and that no further updates to the Application were required.[24] The BCUC subsequently amended the regulatory timetable, which included BCUC and intervener IR No. 2, Oakridge Energy responses to IR No. 2, and final and reply arguments.[25]

BC Sustainable Energy Association (BCSEA) is the only registered intervener in this proceeding. The City of Abbotsford, FVB Energy Inc. (FVB) and Mr. E. Fandrich registered as interested parties. The BCUC did not receive any letters of comment.

1.5 Decision Framework

The structure of this Decision largely follows that of the CPCN Application and the BCUC's CPCN Guidelines:

- Section 2 addresses the applicant, Oakridge Energy;
- Section 3 addresses the need for the Project;
- Section 4 addresses the alternatives to the Project;
- Section 5 addresses the Project description;
- Section 6 addresses the cost of the Project and rate impact;
- Section 7 addresses consultation for the Project;
- Section 8 addresses the Project's consistency with BC's Energy Objectives;
- Section 9 contains the overall CPCN determination; and
- Section 10 contains reporting requirements associated with the CPCN.

[22] G-206-21 dated July 7, 2021; G-272-21, dated September 16, 2021.
[23] Exhibit B-10.
[24] Exhibit B-11.
[25] G-328-21, dated November 10, 2021.

2.0 Applicant

Oakridge Energy is a limited partnership of entities within the Corix Group of Companies and the Creative Energy group, established to meet the thermal energy needs of the Oakridge Centre Redevelopment.[26]

Specifically, The Oakridge Energy Limited Partnership is a 50%/50% partnership of:[27]

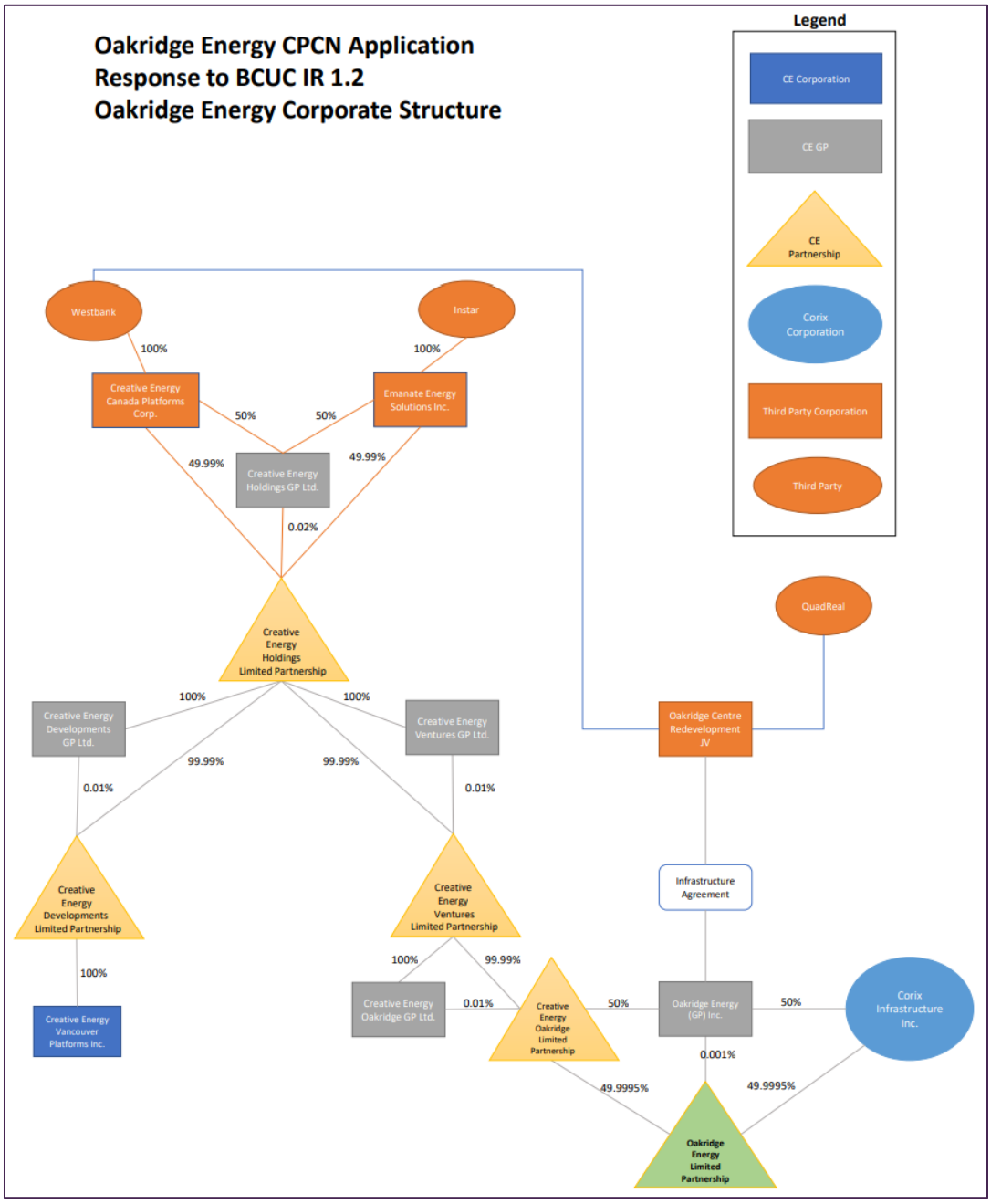
(i) Corix Infrastructure Inc.; and

(ii) Creative Energy Ventures Limited Partnership.
(together the Limited Partners)

Oakridge Energy's corporate structure, including its relationship with the Developers, is provided in Figure 1, below.

[26] Exhibit B-1, p. 5.
[27] Exhibit B-7, BCUC IR 1.1.

Figure 1: Oakridge Energy Corporate Structure[28]



Oakridge Energy states that through Corix and the Creative Energy group, it has access to an abundance of technical expert resources, which have been developed through decades of experience designing, building, financing, and managing utility infrastructure systems.[29] Oakridge Energy identifies that both its project team and its operational team will include staff employed by both Corix Infrastructure Inc. and Creative Energy Vancouver Platforms Inc.[30]

[28] Exhibit B-7, Attachment 1.2. Reformatted by the BCUC.
[29] Exhibit B-1, p. 6.
[30] Exhibit B-1, pp. 8-9; Exhibit B-7, BCUC IR 2.4, 2.6.

Oakridge Energy considers the combined financial capacity of Corix and Creative Energy will ensure that there is sufficient access to financing for Oakridge Energy.[31] Oakridge Energy states that Corix and Creative Energy are 50/50 LP partners and will provide all cash requirements to Oakridge Energy GP until such time Oakridge Energy GP has adequate self-produced cash flows and liquidity.[32]

Positions of the Parties

Oakridge Energy submits that it has the financial and technical capacity to execute the proposed Project "in a manner that is in the public interest and consistent with the regulatory requirements" for the Oakridge DES. Oakridge Energy explains that it is a limited partnership of entities within Corix and Creative Energy, both of which have extensive experience executing and operating district energy infrastructure projects, including several in BC regulated by the BCUC. Through its relationship with Corix and Creative Energy, Oakridge Energy submits it has significant in-house experience in the design, construction, finance and operations of district energy systems. [33]

Oakridge Energy further submits it has access to sufficient funding for the construction and operation of the Oakridge DES through the combined financial capacity of Corix and Creative Energy. [34]

BCSEA submits that Oakridge Energy has the capacity and experience to successfully execute the Project, and that Corix and Creative Energy have considerable experience constructing and operating energy utilities including district energy systems.[35]

Panel Discussion

The Panel finds that Oakridge Energy has sufficient financial and technical capacity to construct and operate the Oakridge DES.

The Panel accepts the evidence that the Limited Partners each have experience constructing and operating thermal energy utilities in BC, and are capable between them of providing the funding for Oakridge Energy until it becomes financially self-sufficient. Since the Limited Partners have an equal financial interest in Oakridge Energy, they are both incented to provide the technical and operational staff required to ensure its success.

3.0 Project Need and Justification

3.1 Overview

Oakridge Energy states that the Oakridge Centre Redevelopment project will transform the previous Oakridge Centre and surrounding area into a sustainable, mixed-use, transit-oriented neighbourhood hub. Upon completion of the Oakridge Centre Redevelopment project, Oakridge Energy states that approximately 486,000

[31] Ibid., p. 6.
[32] Exhibit B-7, BCUC IR 33.2.
[33] Oakridge Energy Final Argument, pp. 9-10.
[34] Ibid., p. 9.
[35] BCSEA Final Argument, p. 10.

square metres (or approximately 5.23 million sq. ft.) of floor area will require thermal energy services in the form of space heating, space cooling, and domestic hot water.[36] The Oakridge Centre Redevelopment will include, among other things:[37]

- 14 towers with 2,600 homes for residents;
- nearly half a million sq. ft. of office space;
- approximately 1 million sq. ft. of retail space;
- a city park covering nearly 10 acres;
- one of Vancouver's largest community centres and daycares;
- Vancouver's second-largest library;
- a performing arts academy; and
- a live music venue and numerous additional performance spaces within the shopping centre and the park.

Oakridge Energy states that the need for thermal energy for the entire Oakridge Centre Redevelopment has been identified by the Developers.[38] Oakridge Energy identifies that eight buildings and a portion of the new mall will require thermal energy service beginning in 2024 (Phase 1) and eight buildings and the remainder of the new mall will require thermal energy service starting in 2027 (Phase 2). The various buildings planned as part of the Oakridge Centre Redevelopment are either under construction (9 buildings), development permit pending (8 buildings), existing (1 building), or existing to be demolished and rebuilt (1 building).[39]

Oakridge Energy has entered into an infrastructure agreement with the Developers, which addresses the design, financing, construction, and ownership of the utility infrastructure, provides for permitting and land access, and sets out the design specifications and timelines (Infrastructure Agreement). The Infrastructure Agreement does not require approval of the BCUC.[40]

The Infrastructure Agreement commits the Developers to deal with Oakridge Energy exclusively, and states that "the powers and rights granted to Oakridge Energy under this [Infrastructure] Agreement are exclusive to Oakridge Energy and the Developer[s] will not itself install the Infrastructure or operate the DES or allow any other Person (except subcontractors and agents of Oakridge Energy) to do so."[41]

Oakridge Energy states that the City requires the Oakridge Centre Redevelopment project to incorporate a low-carbon energy system as part of its permitting process.[42] The City defines a low carbon energy system as a system that supplies heat energy primarily derived from highly efficient and renewable sources in order to provide space heating and conditioned ventilation air for buildings seeking to meet greenhouse gas (GHG)

[36] Exhibit B-1, pp. 15-16.
[37] Ibid., p. 15.
[38] Ibid., p. 12.
[39] Exhibit B-7, BCUC IR 24.1.
[40] Exhibit B-1, p. 16.
[41] Exhibit B-1, Appendix E, p. 8.
[42] Exhibit B-1, p. 16.

emission limits using the LCES pathway[43] (Low-Carbon Energy System, or LCES).[44] Oakridge Energy states that based on its understanding of the City's policy environment, the Developer's obligations could have been met through any of the defined LCES types[45] with the exception of connecting to a pre-existing thermal energy utility system. Oakridge Energy states that the Developers' decision to pursue a partnership with Oakridge Energy to deliver a DES sized for the development site was the result of much analysis and consideration of the most appropriate and beneficial solution for its customers and future rate payers.[46]

Oakridge Energy states that it considered an alternative to a DES, consisting of stand-alone building systems to provide thermal energy services. However, this alternative resulted in lower operating efficiencies, higher capital costs and higher aggregate operating costs, resulting in higher lifecycle costs while achieving similar GHG outcomes. Oakridge Energy states that the primary driver for a DES to be a more favourable outcome is that a DES offers economies of scale, reduced peak demand through load diversity and enhanced equipment performance as a result of the relatively steady load that results from load diversity.[47]

Oakridge Energy identifies that a portion of the existing development at the Oakridge Centre utilized an open-loop geothermal exchange in the overall cooling system. As a result, Oakridge Energy states that the Developers wanted to ensure that some form of geothermal energy would be included in the energy supply sources for its redevelopment project.[48]

Overall, Oakridge Energy states that feasibility studies, the Developers' obligation to the City regarding a low carbon energy system, and a commitment to some form of geothermal energy source resulted in a DES being the only viable option to meet the thermal energy requirements of the Oakridge Centre Redevelopment.[49]

3.2 Load Forecast

Oakridge Energy will provide space heating, domestic hot water, and space cooling service to customers of its proposed Oakridge DES. Table 8 of the Application provides the forecast annual energy demand and forecast undiversified peak loads for each building in the Oakridge Centre Redevelopment. Table 1 below summarizes these forecasts by building type and connection year.

[43] The City of Vancouver's Low-Carbon Energy System Policy states that developers of new rezoned buildings can choose one of two pathways for compliance with the City's GHG limits: (a) Envelope Pathway, which requires additional improvements in envelope and ventilation systems to further reduce heat loss and energy use; (b) Low Carbon Energy System (LCES Pathway), which in addition to the base envelope and ventilation system improvements, buildings are supplied with heat energy from a professionally operated and maintained district-scale or on-site low carbon energy system. The City of Vancouver's Low-Carbon Energy System Policy, Adopted by City of Vancouver Council on November 15, 2017. p. 1

[44] The City of Vancouver's Low-Carbon Energy System Policy, Adopted by City of Vancouver Council on November 15, 2017. p. 1.

[45] LCES types are defined by the City of Vancouver's Low-Carbon Energy System Policy, pp. 2-5.

[46] Exhibit B-7, BCUC IR 4.4.

[47] Ibid., BCUC IR 4.3, 4.3.1, 4.4.1.

[48] Exhibit B-1, p. 16.

[49] Ibid.

Table 1: Forecast Annual Energy Demand and Undiversified Peak Load[50]

Building Type	Connection Year	Floor Area (m2)	Annual Energy Demand (MWh)		Undiversified Peak Load (kW)		
			Heating	Cooling	Heating	DHW[51]	Cooling
Residential	2024	108,054	8,621	3,231	4,861	1,738	4,042
Office	2024	69,383	4,013	2,904	4,597	600	8,041
Retail	2024	57,195	2,966	2,565	7,874	695	8,289
Phase 1 Total	**2024**	**234,632**	**15,600**	**8,700**	**17,332**	**3,033**	**20,372**
Residential	2027	220,064	17,654	6,666	5,781	2,346	7,377
Office	2027	-	-	-	-	-	-
Retail	2027	31,562	1,646	1,434	3,542	358	4,326
Phase 2 Total	**2027**	**251,627**	**19,300**	**8,100**	**9,323**	**2,704**	**11,703**
Total Full Build Out	**2027**	**486,259**	**34,900**	**16,800**	**26,655**	**5,737**	**32,075**

Oakridge Energy states that the undiversified peak load forecasts were provided by its engineering consultant, FVB.[52] FVB developed these undiversified peak load forecasts based on a mechanical heat load analysis performed by a separate independent engineering firm, the Integral Group (Integral). Oakridge Energy states that Integral's analysis relied on detailed building envelope design data, floor area data, an hourly analysis program, outdoor design conditions for Vancouver, BC and the temperature and incidental solar loads on the buildings. Oakridge Energy states that the domestic hot water undiversified peak loads were developed based on the water usage type and requirements and appliance efficiencies. [53]

Oakridge Energy states that the annual energy demand as shown in Table 8 of the Application and as summarized above in Table 1 was forecast by Integral for each building by applying an energy use intensity (EUI) figure, measured in kWh per square meter, to the floor area for each building. Different EUIs were used for each building type (residential, retail, or office) and energy use type (space heating, domestic hot water, or space cooling based on existing projects' benchmarks).[54] Oakridge Energy provided the EUIs used to calculate the annual energy demand as follows:

Table 2: Annual Heating and Cooling Energy Use Intensities[55]

Building Type	Annual Heating EUI	Annual Cooling EUI
Office	58 kWh/m2	42 kWh/m2
Residential	80 kWh/m2	30 kWh/m2
Retail	52 kWh/m2	45 kWh/m2

[50] Table by the BCUC with data from Exhibit B-1, p. 43, Table 8.
[51] Domestic hot water.
[52] Exhibit B-1, p. 9.
[53] Exhibit B-7, BCUC IR 24.8.
[54] Ibid.
[55] Ibid., BCUC IR 24.3.

Oakridge Energy provided EUI comparators used or assumed in similar projects as follows:

- Heating Systems:[56]
    - FVB has stated that existing mixed-use DES with predominantly residential and some commercial space in the Metro Vancouver area have average building heating energy values in a range of 70-100 kWh/m^2. Oakridge Energy notes that as the range of uses for commercial entities can vary widely, it is difficult to find commercial EUIs that are an appropriate comparator.
    - Corix's Dockside Green Energy: 3-year historical average annual heating EUI for residential-only buildings and mixed-use buildings with predominantly residential floor space is 70 kWh/m^2. (2018-2020).
    - Corix's University of British Columbia (UBC) Neighbourhood DES: 3-year historical average annual heating EUI for residential-only buildings is 92 kWh/m^2. (2018-2020).
    - Corix Burnaby Mountain District Energy Utility (BMDEU) UniverCity: 3-year historical average annual heating EUI for residential-only buildings is 120 kWh/m^2. (2018-2020).
    - Creative Energy North-East False Creek (NEFC): Historical average annual heating EUI for 3 residential-only buildings and one mixed use hotel/casino building is 129kWh/m^2.
- Cooling Systems:[57]
    - Vancouver House Development: annual cooling demand of 23-30 kWh/m^2 for buildings B1 and B2, which are residential.
    - Vancouver House Development: annual cooling demand of 39-50 kWh/m^2 for buildings B3 and B4, which are commercial.
    - Mount Pleasant District Cooling System: annual cooling demand of 21 kWh/m^2 for building M5, which is residential.
    - Mount Pleasant District Cooling System: annual cooling demand of 41 kWh/m^2 for buildings M1, M2, M3, and M4, which are commercial.

Oakridge Energy utilizes a diversified peak load for system capacity planning and states that the diversified peak load represents the coincident peak load for the system, considering that the peak load of each individual end user on the system does not occur simultaneously.[58]

Oakridge Energy states that it worked closely with the base building design team and FVB to determine what level of diversity between customers should be assumed in sizing plant equipment, in order to ensure the system could, at all times, meet customer demand. Oakridge Energy states that the inputs to the decisions around diversity were the context around building occupancies for the various uses, the timing of the occupancies, advice from FVB from its district energy experience, and the recommendations of the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE), which Oakridge Energy states is the

[56] Exhibit B-9, BCSEA IR 2.3.
[57] Exhibit B-12, BCUC IR 48.15.2.
[58] Exhibit B-1, p. 44.

foremost technical society in the fields of heating, ventilation, air conditioning, and refrigeration.[59] Oakridge Energy notes that ASHRAE, in its handbook "HVAC Systems and Equipment" recommends a diversity factor of 70 percent.[60]

Oakridge Energy states that it has taken conservative assumptions to ensure that in Phase 1, there is "high certainty" that sufficient capacity has been installed. Oakridge Energy provides the following diversity factors: [61]

- The mall space heating and cooling loads were diversified separately at 85 percent.
- All space heating loads were diversified at 80 percent.
- Domestic hot water loads due to their very intermittent nature and the wide usage of storage configurations were diversified at 10 percent.
- Space cooling loads were diversified at 90 percent for Phase 1 and 85 percent for Phase 2.

Oakridge Energy notes that its system has a diverse mix of buildings including a large commercial mall, retail, office spaces, a community centre and residential towers with range of shapes and orientation (in respect of solar heat gain).[62] Oakridge Energy also states that diversity factors are different for cooling than they are for heating given cooling loads are more coincidental than heating loads.[63]

Table 3, below, provides the overall diversity factors and the diversified peak loads from Table 9 of the Application.

Table 3: Diversity Factors and Diversified Peak Loads[64]

Years	Heating		Cooling	
	Diversification Factor	Diversified Peak Load	Diversification Factor	Diversified Peak Load
2024-2026	69%	14.1 MW	90%	18.3 MW
2027 Onwards *(Full build-out)*	63%	20.4 MW	85%	27.2 MW

Positions of the Parties

Oakridge Energy submits that the need for the Oakridge DES has been identified by the Developers, who require thermal energy in the form of space heating, space cooling and domestic hot water to be delivered to the Oakridge Centre Redevelopment, and who wanted some form of geothermal energy to be included. Oakridge Energy adds that need for the Oakridge DES to be a low-carbon energy system is a requirement of the City.[65]

Oakridge Energy submits that the Oakridge Centre Redevelopment project is underway and that the first building will require thermal energy in 2024 with full build-out scheduled to occur in 2027. It adds that the fact

[59] Exhibit B-7, BCUC IR 13.9.
[60] Ibid.
[61] Ibid.
[62] Ibid.
[63] Ibid., BCUC IR 13.13.
[64] Exhibit B-1, p. 44, Table 9.
[65] Oakridge Energy Final Argument, p. 6.

that the Developers are willing to undertake the construction of the Phase 1 Geo-exchange Assets at their own cost prior to BCUC approval of the utility's acquisition of the Phase 1 Geo-exchange Assets demonstrates the Developers' commitment to completing the construction on schedule.[66]

Oakridge Energy submits that the need for the Oakridge DES to be one district energy system providing thermal energy to multiple buildings was driven by the opportunity for higher operating efficiencies and lower capital and operating costs. [67]

BCSEA submits that need for the Oakridge DES to provide thermal energy to the Oakridge Centre Redevelopment for space heating, space cooling and domestic hot water has been established, as evidenced by the Developers' Infrastructure Agreement with Oakridge Energy. BCSEA also submits that there is a need for the Oakridge DES to be designed as a Low-Carbon Energy System as this was a requirement imposed on the Developers as part of their redevelopment process.[68]

BCSEA submits it is satisfied with Oakridge Energy's estimation of the annual energy demand to be met by the Oakridge DES, and accepts the utility's explanation that the EUI figures used in its modeling are a function of building design and not a figure negotiated between the utility and the Developers. [69]

Oakridge Energy notes in reply BCSEA's support for the Oakridge Energy's position on the need for the Oakridge DES.[70]

Panel Discussion

The Panel finds that the need for a DES to deliver space heating, space cooling and domestic hot water to the Oakridge Centre Redevelopment has been established.

The Panel accepts the evidence from Oakridge Energy that a single DES, which provides thermal energy to all the buildings in the Oakridge Centre Redevelopment, is preferable to each building having individual sources of thermal energy. In particular, the Panel agrees that a single DES offers economies of scale, reduced peak demand through load diversity and enhanced equipment performance.

The need for the Oakridge DES is evidenced by the terms of the Infrastructure Agreement between Oakridge Energy and the Developers. In the Infrastructure Agreement, the Developers grant Oakridge Energy an exclusive right to install and operate the infrastructure required to deliver thermal energy to the Oakridge Centre Redevelopment project. The need for the Oakridge DES is further evidenced by the fact that phase 1 construction of the Oakridge Centre Redevelopment project is underway and scheduled for completion in 2024, and development permits are pending for the remaining phase which is scheduled for completion in 2027.

[66] Ibid., p. 7.
[67] Ibid., p. 6.
[68] BCSEA Final Argument, p. 6.
[69] Ibid., pp. 7-8.
[70] Oakridge Energy Reply, p. 2.

The Developers' commitment to the use of thermal energy for the Oakridge Centre Redevelopment project is further demonstrated by their construction of the Phase 1 Geo-exchange Assets at their own risk prior to the proposed acquisition of those assets by Oakridge Energy.

The Panel finds that the forecast annual energy demand of the Oakridge Centre Redevelopment provided by Oakridge Energy in Table 8 of the Application, and summarized in Table 1 above, is reasonable. The annual energy demand was forecast by a mechanical consultant, Integral, which provides a reasonable degree of assurance. Further, the forecast annual energy demand was calculated using EUIs which are comparable to other heating and cooling systems operated by Oakridge Energy's two limited partners, Corix and Creative Energy.

The Panel finds that the forecast diversified peak energy demand of the Oakridge Centre Redevelopment provided by Oakridge Energy in Table 9 of the Application, and reproduced in Table 3 above, is reasonable for the following reasons.

The peak energy demand for each building, the undiversified peak load, was forecast by Oakridge Energy's engineering consultant, FVB, using analysis performed by a mechanical consultant, Integral, which gives the Panel a reasonable degree of assurance.

The Panel is also satisfied with the diversity factors used by Oakridge Energy to calculate the diversified peak load for the system from the undiversified peak loads for each building: 80 percent for space heating; 10 percent for domestic hot water; 90 percent for space cooling in Phase 1 and 85 percent for space cooling in Phase 2; and 85 percent for mall space heating and space cooling. The diversity factors for space heating and space cooling are more conservative than the diversity factor of 70 percent which is recommended by ASHRAE. We accept that the overall diversification factor for heating of 69 percent in Phase 1 and 63 percent in Phase 2 are blended figures combining the undiversified peak loads for mall space heating (diversified at 85 percent), other building space heating (diversified at 80 percent) and domestic hot water (diversified at 10 percent).

The Panel discusses in section 5.1 below the degree to which the Project is at risk if the actual peak demand for heating or cooling is higher than forecast.

The Panel finds that there is a need for the Oakridge DES to be a Low-Carbon Energy System. This need arises from the requirement imposed by the City on the Developers as part of the permitting process.

4.0 Description and Evaluation of Alternatives

Oakridge Energy states that given the location and size of the Project site, several different low-carbon heating technologies combined with natural gas boilers could be considered in the design of a DES that satisfy the City's requirements for a Low-Carbon Energy System, which are described in section 5.3 below.[71] This section of the Decision summarizes the evaluation of alternatives undertaken by Oakridge Energy during the DES design process. The design process included the review of low-carbon heating technology alternatives, the

[71] Exhibit B-1, p. 16.

development of DES concept designs made up of various combinations of feasible low-carbon heating technologies and the selection of the preferred DES concept design.[72]

4.1 Low-Carbon Heating Technology Alternatives

The low-carbon technologies considered by Oakridge Energy include:[73]

- Biomass;
- Sewer heat recovery;
- De-watering heat recovery;
- Electric boilers;
- Geo-exchange;
- Waste heat recovery from cooling; and
- Air-source heat pump.

Oakridge Energy provides a qualitative and quantitative assessment of each low-carbon heating technology alternative.

Biomass

Oakridge Energy states that the capacity of a biomass heating alternative at the Oakridge DES site would be limited to 2.5 MW.[74] The biomass alternative technology capacity is limited by the size of the boilers that could be installed in the designated plant space.[75]

Oakridge Energy notes several challenges/risks with pursuing the biomass technology alternative, including:[76]

- The need for daily deliveries of biomass fuel in a congested area;
- Additional space for fuel storage space requirements;
- Plant noise due to exhaust filtration; and
- Possible negative public perception of the technology.

Sewer heat recovery

Oakridge Energy states that the capacity of a sewer heat recovery heating alternative would be limited to 1.0 MW based on the flow of the nearest sewer line.[77] Oakridge Energy identifies benefits of the sewer heat recovery technology alternative, such as for example, its relatively high efficiency and year-round consistent

[72] Ibid.
[73] Ibid., p. 17.
[74] Ibid., p. 20.
[75] Ibid., p. 18.
[76] Ibid., p. 18.
[77] Exhibit B-7, BCUC IR 6.4.

availability.[78] However, several challenges are also identified, including the risk of flooding and odour issues.[79] Ultimately, Oakridge Energy states that it did not consider the use of sewer heat recovery in any of its concept designs due to the identified challenges presented by the technology.[80]

De-watering heat recovery

This low-carbon heating technology is considered to be relatively simple and low-cost. However, Oakridge Energy notes the de-watering heat recovery technology offers only a small heat generating capacity, which is limited by the size of the ground water treatment system. The potential capacity this technology could contribute to a DES design is 0.25 MW.[81]

Electric boilers

Oakridge Energy notes several benefits of the electric boiler technology alternative, including its low capital cost and the ability to install multiple modules.[82] Several challenges/risks were also identified – including the high fuel costs relative to alternative technologies and the sensitivity to electricity rates. Oakridge Energy states that at the technology screening stage, the capacity potential for electric boilers was determined to be 2.5MW.[83]

In response to IRs, Oakridge Energy states that the electric boiler capacity potential is not limited by the electrical supply to the plant.[84] The electric boiler capacity was rather determined and optimized for the applicable GHG intensity target, which Oakridge Energy has committed to achieving.[85]

Geo-exchange

At the technology screening stage, Oakridge Energy states that the geo-exchange capacity potential was 4.0 MW, and that this capacity is limited by the area of the site available for drilling.[86] Oakridge Energy notes that the benefits offered by a geo-exchange system include the ability to provide significant low-carbon heating capacity year-round, as well as the provision of both heating and cooling capacity in a single technology. Noted challenges/risks include high capital costs and construction schedule constraints.[87]

Cooling heat recovery

Oakridge Energy states this is a simple and common technology alternative, but that the actual capacity of heat to the DES is limited by coincidental heating/cooling loads. The capacity potential of the cooling heat recovery opportunity is 2.0 MW.[88]

[78] Exhibit B-1, p. 18.
[79] Ibid.
[80] Ibid., p. 21.
[81] Ibid., p. 20.
[82] Ibid., p. 19.
[83] Ibid., p. 20.
[84] Exhibit B-7, BCUC IR 6.5.
[85] Ibid., BCUC IR 6.5.1.
[86] Exhibit B-1, p. 20.
[87] Ibid., p. 19.
[88] Ibid.

Air-source heat pumps

Oakridge Energy determined at the screening stage that the capacity potential of air-source heat pumps is 3.2 MW.[89] To meet this capacity, an additional 300 m^2 of space would be required both inside and outside of the plant to site equipment.[90] Oakridge Energy states there is limited space available outside of the plant, and for this reason the air-source heat pump technology was not pursued further during the concept design phase.[91]

4.2 Other Low-Carbon Heating Technology Alternatives

During the proceeding, the BCUC and BCSEA inquired about the consideration given by Oakridge Energy to other low-carbon heating technology alternatives not included in the analysis presented in the Application. These include solar thermal heat and renewable natural gas (RNG).

Oakridge Energy states that it did not consider solar thermal heat in detail.[92] Oakridge Energy states that based on experience with similar scale developments and utility systems in Metro Vancouver, solar thermal would provide a small fraction of the required energy for the Oakridge DES.[93] Oakridge Energy further states that the case for solar thermal is poor due to the challenge to find roof area for panel installation and that the small amount of energy contribution from the technology would be outweighed by the estimated cost of the infrastructure.[94]

Oakridge Energy considered the use of RNG at the outset of the Project. However, concerns regarding the availability of RNG supply led to the decision not to rely on this low-carbon solution to meet the Project's GHG emission objectives.[95] Oakridge Energy further states that RNG pricing could introduce further cost risk to the Project given the premium of RNG relative to conventional natural gas supplied by Fortis BC Energy Inc. (FEI).[96,97] Although not considered as a fuel source in any of its DES concept designs, Oakridge Energy is open to including RNG as a future source if the system expands or if low carbon requirements for the site change.[98]

4.3 District Energy System Concept Designs

Oakridge Energy developed four DES concept designs by using varying combinations of the low-carbon technologies it assessed. Sewer heat recovery and air-source heat pumps were excluded from the concept designs for the reasons mentioned above. The following four DES concepts were developed with the goal of achieving the established GHG intensity target for the Oakridge DES:[99]

- Concept 1: Large geo-exchange and cooling heat recovery;
- Concept 2: Biomass, electric boilers and cooling heat recovery;

[89] Ibid.
[90] Ibid., p. 21.
[91] Ibid.
[92] Exhibit B-7, BCUC IR 6.1.
[93] Ibid., BCUC IR 6.1.1.
[94] Exhibit B-12, BCUC IR 41.2.
[95] Exhibit B-7, BCUC IR 6.2.
[96] Ibid.
[97] Exhibit B-9, BCSEA IR 4.2.1.
[98] Exhibit B-7, BCUC IR 6.2.
[99] Exhibit B-1, p. 21.

- Concept 3: Electric boilers and cooling heat recovery; and
- Concept 4: Small geo-exchange, electric boilers and cooling heat recovery.

Oakridge Energy states that cooling heat recovery was added into each scenario as it is a readily available source of low-carbon heat due to the large retail cooling load located at this site. This was considered a baseload technology for all scenarios.[100]

Regarding biomass and geo-exchange, Oakridge Energy states these technologies were not combined in any scenarios as they are both high-cost technologies that require a large amount of infrastructure, and that both technologies can provide large low-carbon heating capacities.[101]

Oakridge Energy investigated two geo-exchange sizes ('small' and 'large') as it was not clear at the concept selection stage of the Project how much of the site could be used for a geo-exchange field. The size of the geo-exchange field is impacted by factors such as construction schedule, structural design, and geology.[102] The 'small' geo-exchange design in Concept 4 includes for 200 vertical boreholes to a depth of 152m (500').[103] The 'large' geo-exchange design in Concept 1 includes for 950 boreholes to a depth of 122m (400').[104]

Electric boilers were generally used as a top-up mechanism to reach peak heating loads.[105]

Concept 1 considered not feasible

Oakridge Energy determined that Concept 1, which included a large geo-exchange field, was not feasible for the following reasons:[106]

- The Project timeline and regulatory complications related to the drilling of a large geo-exchange field prior to energy requirements in 2024; and
- The large capital cost associated with drilling approximately 950 boreholes to a depth of 400 ft.

Concept 2 considered not feasible

Oakridge Energy determined that Concept 2, which included biomass boilers, was not feasible for the following reasons:[107]

- The air quality and noise concerns around biomass fuel trucking deliveries and combustion; and
- The availability of space for a biomass fuel bin in the designated plant area.

Both Concept 3 and Concept 4 were considered feasible, and Oakridge Energy assessed each in greater detail, as discussed below.

[100] Exhibit B-3, p. 7.
[101] Ibid.
[102] Ibid.
[103] Exhibit B-12, BCUC IR 44.4.
[104] Exhibit B-7, BCUC IR 7.3.
[105] Exhibit B-3, p. 7.
[106] Exhibit B-1, p. 22.
[107] Exhibit B-1, p. 22.

4.4 Preferred Alternative Justification

Oakridge Energy states it considered the following criteria in its assessment of Concepts 3 and 4:[108]

1. Ability to be classified as a Low-Carbon Energy System;
2. Diversity of energy supply;
3. Location and land use requirements;
4. System durability and reliability;
5. Competitive Customer Rates; and
6. Flexibility and Efficiency.

Association of Advancement of Cost Engineering International (AACE) Class 4 estimates were prepared for both Concept 3 and Concept 4 to determine effective heating and cooling end-user rates and to support net present value (NPV) analysis. The capital cost estimate for Concept 3 was $52.7 million.[109] The capital cost estimate for Concept 4 was $61.8 million.[110] Oakridge Energy confirms that the difference in cost between the two concepts is due to the inclusion of a geo-exchange system in Concept 4.[111] Based on the Class 4 estimates, Oakridge Energy provides the following indicative rates and NPV analysis:[112]

Table 4: Comparison of Effective Rates of Concept 3 and Concept 4[113]

	Concept 3	Concept 4
Inception Heating Rate ($/MWh)	$177/MWh	$197/MWh
Inception Cooling Rate ($/MWh)	$253/MWh	$244/MWh
NPV Heating – 15 Years ($/MWh)	$214/MWh	$231/MWh
NPV Heating – 15 Years ($/MWh)	$237/MWh	$230/MWh

Both Concept 3 and Concept 4 satisfied each assessment criterion listed above.[114] Oakridge Energy states that adequate consideration of the criteria did not require a quantitative weighting approach be utilized and that its assessment was based on considering the concepts relative to each other rather than to a theoretical ideal or specific threshold.[115,116]

[108] Ibid., p. 27.
[109] Exhibit B-7, BCUC IR 8.1.
[110] Ibid.
[111] Exhibit B-12, BCUC IR 44.3.
[112] Exhibit B-1, p. 23, Table 5.
[113] Ibid.
[114] Exhibit B-1, p. 23.
[115] Exhibit B-7, BCUC IR 5.1.
[116] Exhibit B-12, BCUC IR 40.1.

Oakridge Energy states that although Concept 3 offers lower capital cost and indicative heating rates, Concept 4 was selected as the preferred alternative for the following reasons:[117]

- Concept 4 has a higher level of energy supply diversity when compared to Concept 3. The additional heating source results in a more robust DES less susceptible to failures in any one energy supply source.
- The existence of geo-exchange in Concept 4 reduces risk exposure to electricity price increases when compared to Concept 3. This occurs through the reduction of electric boiler usage accompanied by the increase in coefficient of performance due to the presence of the geo-exchange source.
- The higher number of heating energy sources allows for diversity and additional flexibility during system design and optimization. This will also lead to improved operating benefits as the geo-exchange provides flexibility for both the overall heating and cooling functionality of the Oakridge DES.

Oakridge Energy states that it cannot determine a customer rate or capital cost threshold wherein the identified benefits of Concept 4 no longer outweigh the increase in costs relative to Concept 3.[118] Such a threshold could not be determined to any useful or reliable accuracy as it is dependent on economic factors specific to the future customers of Oakridge Energy, such as, for example, customer income or customer preference for low-carbon energy.[119]

Positions of the Parties

Oakridge Energy submits that the proposed DES was determined through appropriate consideration of the possible alternatives. The utility explains that while Concept 3 has modestly lower forecast costs, Concept 4 has a higher degree of diversity of energy supply, and increased system durability, reliability, flexibility and efficiency. Oakridge Energy adds that Concept 4 incorporates geothermal energy, a need expressed by the Developers.[120]

Oakridge Energy adds that feasibility studies, the Developers' commitment to using a Low-Carbon Energy System and to use some form of geothermal energy led to a DES being the only viable alternative for the Project.[121]

BCSEA submits that the proposed DES is the preferred option in comparison to feasible alternatives. BCSEA notes that Oakridge Energy has provided evidence that the alternatives have been appropriately considered.[122]

Panel Discussion

The Panel finds that Oakridge Energy's proposed alternative for the Oakridge DES, Concept 4, is reasonable.

The Panel is satisfied that Oakridge Energy rejected sewer heat recovery, air-source heat pumps and solar thermal energy as low-carbon heating technology alternatives. Sewer heat recovery would have provided little heating capacity and risked flooding and odour issues, air-source heat pumps would have required more than

[117] Exhibit B-1, p. 24.
[118] Exhibit B-12, BCUC IR 40.4.
[119] Ibid.
[120] Oakridge Energy Final Argument, p. 17.
[121] Ibid., p. 7.
[122] BCSEA Final Argument, pp. 5-6.

the limited space available in the plant, and solar thermal energy would have provided little heating capacity given the amount of roof space available for its installation.

The Panel is satisfied that Concept 1 is not feasible due to the time required to drill a large geo-exchange field prior to the thermal energy being needed in 2024. The Panel agrees that Concept 2 is less attractive than Concept 3 and Concept 4 due to the requirement for biomass fuel trucking deliveries and the availability of space for biomass fuel storage.

In the Panel's view, both Concept 3 and Concept 4 would meet the need for thermal energy for the Oakridge Centre Redevelopment. Further, the Panel does not consider that the differences between the indicative rates for Concept 3 and Concept 4 are sufficiently different to be determinative in choosing between them. The 15-year NPV heating rate is higher for Concept 4 than for Concept 3 ($231/MWh versus $214/MWh), but the 15-year NPV cooling rate for Concept 4 is lower ($230/MWh versus $237/MWh).

The Panel is satisfied that Concept 4 provides sufficient non-quantified benefits over Concept 3 to justify its selection. The inclusion of geothermal energy in Concept 4 provides an additional source of energy supply that results in a system less susceptible to the failure of any one energy source. Further, the use of geothermal energy reduces the system's reliance on the electric boilers, leading to reduced exposure to possible electricity price increases.

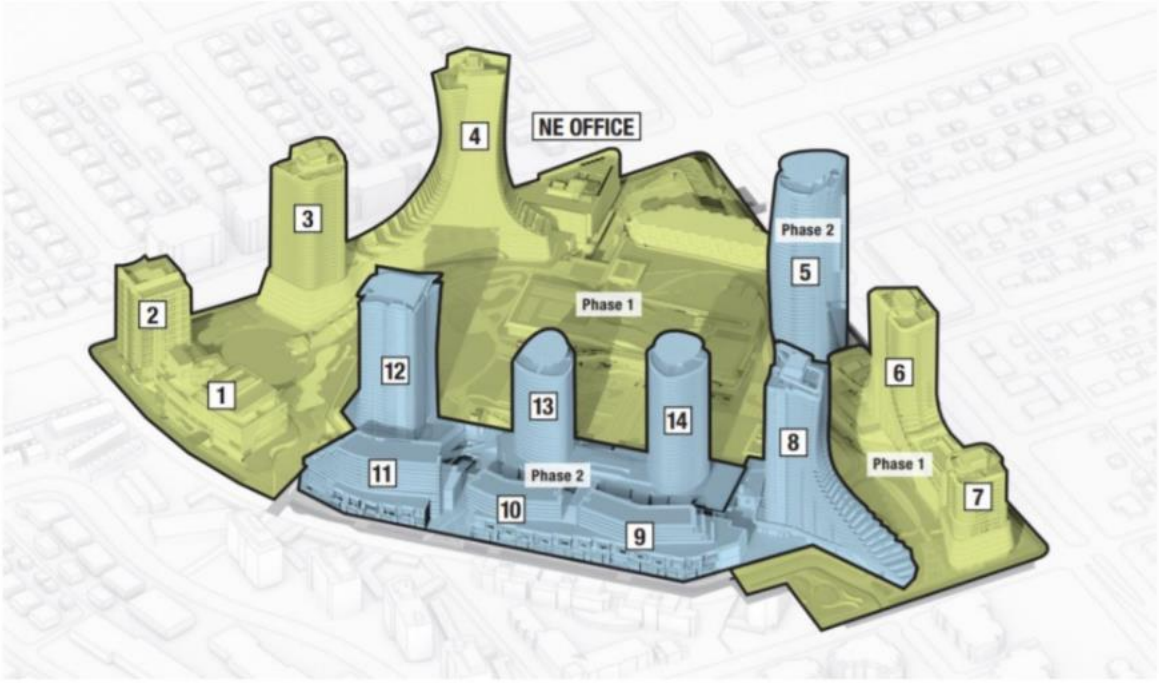
5.0 Project Description

The Project involves the construction of a DES to serve the Oakridge Centre Redevelopment. The proposed Oakridge DES has been designed as a Low-Carbon Energy System that provides thermal energy through a combination of multiple heating and cooling energy sources including a closed loop geo-exchange field, a waste heat recovery system, electric boilers, electric chillers, and natural gas boilers. The proposed Oakridge DES has been designed to qualify as a Low-Carbon Energy System, as classified by the City, and to ensure compliance with the City's Green Buildings Policy.[123] Infrastructure consisting of a central energy plant, distribution piping system (DPS) and energy transfer stations (ETS) will be constructed and operated to meet the energy needs of the site.[124] Oakridge Energy will provide space heating, domestic hot water and space cooling service to its customers.[125]

The Oakridge Centre Redevelopment project work will be phased, with Phase 1 buildings requiring service in 2024 and Phase 2 buildings requiring service in 2027. Oakridge Energy proposes to construct the Oakridge DES in two phases to meet these needs, according to the following figure:

[123] Exhibit B-1, p. 1.
[124] Ibid., p. 29.
[125] Ibid., p. 42.

Figure 2: Oakridge Centre Redevelopment Construction Phasing[126]



Upon completing the buildings for Phase 1, in 2024, Oakridge Energy will provide service to 234,632 square metres of floor space. This figure will increase to 486,259 square metres of floor space by full build-out at the end of Phase 2 in 2027.[127]

5.1 System Design

5.1.1 System Components

The central energy plant will be located underneath Building 1 on the P2/P3 level of the parking garage. By full build-out in 2027, the central energy plant will consist of:

- Seven chillers (five x 1,400 tonnes; one x 700 tonnes; and one x 300 tonnes);
- Four natural gas boilers (5 MW each);
- Two electric boilers (1.75 MW each);
- Two heat pumps for the geo-exchange field and heat recovery system (1.2 MW each);
- One high-temperature heat pump for the geo-exchange field and heat recovery system (2.6 MW);
- One heat exchanger for dewatering heat recovery (250 kW); and
- Two geo-exchange manifold rooms.[128]

Test holes were drilled in 2020, which resulted in amendments to the design of the geo-exchange field in order to minimize costs and risks. Oakridge Energy explains: “Further analysis of soil conditions revealed that the

[126] Ibid., p. 31, Figure 6.
[127] Exhibit B-10, p. 42.
[128] Exhibit B-1, pp. 32-33.

depth of the geo-exchange boreholes could be optimized at 250 ft. instead of the previous target depth of 400 ft. contemplated during concept design. This shallower depth would result in time and cost savings associated with the drilling schedule by avoiding drilling in the more challenging geotechnical conditions found at deeper depths."[129] The geo-exchange field for the site will be a closed-loop system of 837 boreholes, each to a depth of 250 feet.[130]

A water treatment plant will be located north of the central energy plant on the P3 level and will contain one 250 kW heat exchanger for heat recovery from the de-watering system. Piping will connect this heat exchanger back to the central energy plant.[131]

The roof of Building 2 has been designed to contain: [132]

- Eight cooling towers (four x 1,300 tonnes and four x 700 tonnes);
- One electrical room; and
- One mechanical shed.

Thermal energy produced at the central energy plant is distributed to customer buildings using a treated water thermal transfer medium routed through the DPS. The main distribution piping will run throughout the common parking garage that spans the entire Oakridge Centre Redevelopment site, with takeoffs to the ETS rooms for each of the customer buildings.[133]

The building ETS is the interface between the DES distribution loop and the buildings' heating ventilation and air conditions (HVAC) systems. The building HVAC systems are physically separated from the DES as each ETS transfers thermal energy to the customer's HVAC system through a heat exchanger.[134]

The geo-exchange field is to be constructed in two phases, in 2022 and 2025.[135] This approach was chosen to allow access to the site during construction. The initial phase 1 geo-exchange field will meet the demands of Phase 1 of the Oakridge Centre Redevelopment, with further expansion of the geo-exchange field in Phase 2 to align with full build-out of the site.[136] Within the central energy plant, the fourth natural gas boiler, second electric boiler, and one of the cooling towers would be installed by 2026 to complete commissioning ahead of service provision to new Phase 2 customers in 2027.[137]

[129] Ibid., p. 24. Exhibit B-7, BCUC IR 9.1, 9.2.
[130] Ibid., p. 33.
[131] Ibid.
[132] Ibid.
[133] Ibid.
[134] Ibid., p. 35.
[135] Ibid., p. 37; Appendix G.
[136] Exhibit B-7, Attachment 23.1B, p. 2.
[137] Exhibit B-1, p. 37.

5.1.2 Sizing of the System

Heating

Oakridge Energy states the total heating capacity is designed to be 18.55 MW at the completion of Phase 1 and 26.1 MW at the completion of Phase 2 (the full build-out). Oakridge Energy summarizes the total heating capacity for the DES as follows:[138]

Table 5: Total Heating Capacity[139]

Component	Total Capacity	Description
Phase 1		
Base Heating Plant		
Cooling Heat Recovery	0.95 MW	Heat Exchanger for HR from cooling
Geo-Exchange	0.60 MW	517 boreholes @ 250 ft. (Shallow)
Electric Boilers	1.75 MW	one x 1.75 MW Electric Boiler
Dewatering HR	0.25 MW	
Peaking Plant		
Natural Gas Boilers	15 MW	three x 5 MW Natural Gas Boilers
Total Heating Capacity		
Phase 1	**18.55 MW**	
Phase 2		
Base Heating Plant		
Cooling Heat Recovery	0.65 MW	Heat Exchanger for HR from cooling
Geo-Exchange	0.15 MW	320 boreholes @ 250 ft. (Shallow)
Electric Boilers	1.75 MW	one x 1.75 MW Electric Boiler
Dewatering HR	--	
Peaking Plant		
Natural Gas Boilers	5 MW	one x 5 MW Natural Gas Boiler
Total Heating Capacity		
Phase 2	**7.55 MW**	
Total Heating Capacity		
Installed at Full Build-out	**26.1 MW**	

The system is designed to meet the forecast diversified peak heating load and provide a level of N-1 redundancy as follows:

[138] Ibid., pp. 44-45.
[139] Ibid., pp, 44-45, Table 10.

Table 6: Year-end Diversified Peak Heating Load versus Installed Capacity[140]

	2024	2025	2026	2027	2028
Cumulative Peak, Heating (MW)	20.4	20.4	20.4	32.4	32.4
Diversified Cumulative Peak, Heating (MW)	**14.1**	**14.1**	**14.1**	**20.4**	**20.4**
Heating Installed Capacity (MW)	**18.55**	**18.55**	**18.55**	**26.1**	**26.1**

Cooling

Oakridge Energy states the total cooling capacity is designed to be 18.3 MW at the completion of Phase 1 and 28.1 MW at the completion of Phase 2.[141] Oakridge Energy provides the following table showing the total cooling capacity:[142]

Table 7: Total Cooling Capacity[143]

Component	Phase	Quantity	Total Capacity (Tonnes)	Total Capacity (MW)
Chillers	1	5	5,200	18.3
Chillers	2	2	2,800	9.8
		Total Full Build-out	**8,000**	**28.1**

The system is designed to meet the forecast diversified peak cooling load as follows:[144]

Table 8: Forecast Diversified Peak Cooling Load versus Installed Capacity[145]

	2024	2025	2026	2027	2028
Cumulative Peak, Cooling (MW)	20.4	20.4	20.4	32.1	32.1
Diversified Cumulative Peak, Cooling (MW)	**18.3**	**18.3**	**18.3**	**27.2**	**27.2**
Cooling Installed Capacity (MW)	**18.3**	**18.3**	**18.3**	**28.1**	**28.1**

Future expansion

Oakridge Energy states it could add a fifth 5 MW natural gas boiler and / or an additional electric boiler within the existing plant footprint to support additional load in future.[146] Also, Oakridge Energy states it can add additional chillers and cooling towers if the system requires future expansion.[147]

[140] Exhibit B-1, p. 45, Table 11.
[141] Ibid., p. 46.
[142] Ibid., p.46, Table 12.
[143] Ibid.
[144] Ibid., p. 47.
[145] Ibid., p. 47, Table 13.
[146] Exhibit B-7, BCUC IR 18.1.
[147] Ibid., BCUC IR 18.2.

Panel Discussion

The Panel finds that the proposed Oakridge DES has sufficient capacity to meet the needs of the Oakridge Centre Redevelopment.

The installed heating and cooling capacity meets or exceeds the forecast of the diversified cumulative peak energy requirements every year from 2024, the first year of operation, through 2027 when construction of the Oakridge Centre Redevelopment is completed, and beyond. The planned heating capacity of 26.1 MW from 2027 onwards exceeds the forecast diversified peak heating demand of 20.4 MW by 28 percent, which allows for a considerable margin of error between the forecast and actual diversified peak demand for heating. The planned cooling capacity of 28.1 MW from 2027 onwards likewise exceeds the forecast diversified peak cooling demand of 27.2 MW by 3.3 percent; while this allows for a relatively small margin of error in the event that Oakridge Energy has underestimated the peak cooling demand, the Panel considers that the utility will gain experience of the cooling needs of the Oakridge Centre Redevelopment during Phase 1 and will be able to adjust the size of the additions to cooling capacity being made for Phase 2 if required.

The Panel considers in section 5.2 below whether the proposed Oakridge DES has been designed with sufficient redundancy or whether the capacity of the proposed system is larger than required for the Oakridge Centre Redevelopment after allowing for an appropriate level of redundancy.

5.2 Redundancy

Oakridge Energy states that the central energy plant has been designed for an N-1 redundancy level of 75 percent of the diversified peak heating load, which means that the Oakridge DES will serve 75 percent of its total diversified peak heating load if the most significant piece of equipment were to be out of service.[148] Oakridge Energy explains this is the same standard achieved by the City with the South East False Creek Neighbourhood Energy Utility, which is of a similar scale and customer profile to the Oakridge development.[149]

Oakridge Energy states it is not required to provide N-1 redundancy for its heating or cooling systems. The decision to implement a degree of redundancy comes from the technical knowledge and experience both Corix and Creative Energy have with designing, building, owning and operating thermal energy systems located in the same geographic region as the proposed Oakridge DES.[150]

Oakridge Energy states that most of the time, the failure of a piece of major equipment would have no impact to customers as the load can be fully served by the remaining equipment. If a failure did occur during peak periods, but only for a short time, customers may not notice before the equipment is put back into service. If Oakridge Energy was forced to shed load, it would prioritize residential customers during a reduction in heating capacity.[151]

[148] Exhibit B-1, p. 36.
[149] Exhibit B-7, BCUC IR 13.6
[150] Ibid., BCUC IR 13.2.
[151] Ibid., BCUC IR 13.5.

Oakridge Energy provides the following examples of other TES providing heating service that incorporate a degree of redundancy:[152]

- Corix's Burnaby Mountain system has an N-1 redundancy level of 75 percent;
- Corix's system at UBC has an N-1 redundancy level of 70 percent; and
- Corix's Dockside Green system has an N-1 redundancy level of 70 percent.

Redundancy of the heating system

Oakridge Energy has designed the system to be able to produce 75 percent of the diversified peak load for heating in the event that the largest piece of heat-generating equipment, a 5 MW gas boiler, is offline, or if there is a loss of electricity. Oakridge Energy states that this level of redundancy is "similar to current DES heating applications when considering the nature of the end-uses and the type of customers being served (residential, office, and mall)".[153]

For Phase 1, the effect of the loss of the largest piece of heat-generating equipment is calculated as follows:

Table 9: Phase 1 Heating Capacity with the Largest Piece of Equipment Offline[154]

Phase 1 Heating Capacity (largest piece of equipment offline)			
Components	**Total Capacity**	**N-1 Capacity**	**Component Offline**
Cooling Heat Recovery	0.95 MW	0.95 MW	
Geo-Exchange	0.60 MW	0.60 MW	
Electric Boilers	1.75 MW	1.75 MW	
Dewatering HR	0.25 MW	0.25 MW	
Natural Gas Boilers	15 MW	10 MW	One (1) x 5 MW Nat. Gas Boiler
Total	**18.55 MW**	**13.55 MW**	

In this scenario, the system can produce 13.55 MW of heat generating capacity, which is 96 percent of the peak of 14.1 MW in Phase 1. However, this peak capacity assumes that the geo-exchange field, cooling heat recovery, and de-watering heat recovery systems are working at full capacity, which is not always the case. The heating capacity of the electric boilers and the natural gas boilers with one 5 MW gas boiler unavailable is 11.75 MW, which is 83 percent of the diversified peak load.[155]

For Phase 1, in the event of an electrical outage, the gas boilers provide 15 MW of heating capacity, which is 106 percent of the diversified peak load of 14.1 MW.[156] In the event of a loss of the gas supply, Oakridge Energy states that the geo-exchange system, heat recovery system, and electric boilers will continue to provide thermal energy service.[157]

[152] Exhibit B-7, BCUC IR 13.3.
[153] Ibid., BCUC IR 13.6, 13.7. Exhibit B-1, p. 36.
[154] Ibid., BCUC IR 13.6, 13.7.
[155] Ibid., BCUC IR 13.7.
[156] Ibid.
[157] Exhibit B-1, p. 36.

For Phase 2, the calculation is as follows:

Table 10: Full Build-out Heating Capacity with the Largest Piece of Equipment Offline[158]

Full Build-out Heating Capacity (largest piece of equipment offline)			
Components	**Total Capacity**	**N-1 Capacity**	**Component Offline**
Cooling Heat Recovery	1.6 MW	1.6 MW	
Geo-Exchange	0.75 MW	0.75 MW	
Electric Boilers	3.5 MW	3.5 MW	
Dewatering HR	0.25 MW	0.25 MW	
Natural Gas Boilers	20 MW	15 MW	One (1) x 5 MW Nat. Gas Boiler
Total	**26.1 MW**	**21.1 MW**	

In this scenario, the system can produce 21.1 MW, which is 103 percent of the diversified peak load of 20.4 MW. Considering only the capacity of the electric boilers and the natural gas boilers with one 5 MW gas boiler unavailable, the total generating heat capacity minimum is 18.5 MW, which is 91 percent of the diversified peak load.[159]

For Phase 2, in the event of an electrical outage, the gas boilers provide 20 MW of heating capacity, which is 98 percent of the diversified peak load of 20.4 MW.[160]

Oakridge Energy notes that the redundancy levels for Phase 1 and Phase 2 are greater than 75 percent, but states that any further reductions in the redundancy level would result in fewer and / or larger pieces of equipment, which would "generate challenges to headroom in the plant."[161] Further, Oakridge Energy stated it considered reducing the size of natural gas boilers, but there was no strong benefit to this decision. A reduction in size of the boilers would reduce plant capacity but not provide a significant reduction in footprint or cost.[162] Oakridge Energy explains that to meet the LCES GHG intensity targets the low carbon sources of heat must be kept constant. Therefore, any reduction in total installed capacity for the Oakridge DES would have to come from the natural gas boilers. If one 5 MW natural gas boiler was to be removed from the plant, the total installed heating capacity would decline such that the loss of a single component under an N-1 scenario would be below the 75 percent minimum threshold. As a result, the plant configuration was kept as designed.[163]

Redundancy of the cooling system

Oakridge Energy states that if one of the largest chiller units fails, the cooling capacity decreases to 23.2 MW, which satisfies 85 percent of the diversified peak cooling load.[164]

[158] Exhibit B-7, BCUC IR 13.8.
[159] Ibid.
[160] Ibid.
[161] Ibid., BCUCIR 13.7, 13.7.1.
[162] Ibid., BCUC IR 13.7.1.
[163] Ibid.
[164] Ibid., BCUC IR 13.17.

Panel Discussion

The Panel finds that the proposed Oakridge DES has an appropriate level of redundancy in the event of component failure or loss of electricity supply to the heating system.

Oakridge Energy states its proposed system is designed to have an N-1 redundancy of 75 percent. That is, in the event the largest single component were to be unavailable, the remaining components would provide at least 75 percent of the forecast peak demand on the system. The Panel considers this to be reasonable, noting the evidence from Oakridge Energy that this is the same standard adopted by the City with the South East False Creek Neighbourhood Energy Utility which is of a similar scale and customer profile to the Project.

The capacity of the heating system in the event of the failure of its largest single component, a single natural gas boiler, is 96 percent of the peak demand of 14.1 MW in Phase 1, and 103 percent of the peak demand of 20.4 MW in Phase 2. If the geothermal energy and the energy from the cooling heat recovery and dewatering heat recovery systems were excluded, the remaining electric boilers and natural gas boilers would be able to provide 83 percent of the peak demand in phase 1, and 91 percent of the peak demand in Phase 2. Therefore, the heating system design exceeds the N-1 planning criterion of 75 percent.

In the event of loss of the electrical system, the gas boilers would provide 15 MW of heating capacity in Phase 1, which is 106 percent of the peak demand, and 20 MW of heating capacity in Phase 2, which is 98 percent of the peak demand.

The capacity of the cooling system in the event of the failure of its largest single component, one of the largest chillers, would in Phase 2 be reduced by 4.9 MW from 28.1 MW to 23.2 MW, which is 85 percent of the peak demand of 27.2 MW, thus exceeding the N-1 planning criterion of 75 percent.

Oakridge Energy does not provide the calculation in the event the largest single chiller were to fail in Phase 1. Using the same information Oakridge Energy provided with respect to Phase 2, the capacity in Phase 1 would be reduced from 18.3 MW to 13.4 MW[165] in the event of the failure of a single chiller, or 73.2 percent of the peak demand of 18.3 MW. The Panel is satisfied this is sufficiently close to the design specification of 75 percent.

It does not appear to the Panel that Oakridge Energy has designed the Oakridge DES to operate at 75 percent or better of peak cooling capacity in the event of a loss of the electricity supply. However, Westbank, one of the Developers of the Oakridge Centre Redevelopment which will be relying on the cooling service, is also ultimately one of the Limited Partners of Oakridge Energy. The Panel concludes that the Developers are aware that the Oakridge DES is not designed to operate at 75 percent of peak cooling capacity in the event of a loss of the electricity supply and are satisfied with this level of service.

The Panel further finds that the proposed system does not exceed the needs of the Oakridge Centre Redevelopment by an unreasonable amount. As noted above, the proposed system exceeds the capacity required to achieve the N-1 redundancy level of 75 precent in almost all circumstances. For example, the heating system in Phase 2 has 91 percent of its capacity in the event of the loss of the single largest component. Oakridge Energy states that any reduction in heating capacity would have to come from the natural gas boilers

[165] 18.3 MW – 4.9 MW = 13.4 MW.

in order to continue to achieve the City's Low-Carbon Energy System standard. Reducing the number of natural gas boilers by one would reduce the redundancy of the system to 60 percent, which is below the design threshold. Alternatively, reducing the size of the natural gas boilers from 5 MW to 4 MW would provide no significant reduction in cost. The Panel accepts this analysis.

5.3 City of Vancouver Low-Carbon Energy System Requirement

Oakridge Energy states that the Developer is bound as a condition of development to provide an overall low-carbon energy system solution that meets the City's mandate.[166] The City's Green Buildings Policy mandates values for the Thermal Energy Demand Intensity (TEDI), Total Energy Use Intensity (TEUI), and Greenhouse Gas Intensity (GHGI) of the Oakridge Centre Redevelopment as a whole.[167]

The Developers agreed with the City to adopt the "Low Emissions Green Buildings Performance Limits – Buildings Connected to a City-recognized Low Carbon Energy System (LCES)" for all buildings included in the Oakridge Centre Redevelopment.[168]

Oakridge Energy states that the City has conditionally approved the Oakridge DES to qualify as a Low-Carbon Energy System, subject to the utility receiving a CPCN from the BCUC.[169] Oakridge Energy provides the following evidence to indicate the City's conditional approval:

Figure 3: City of Vancouver LCES Conditional Approval[170]

--- Perform NEU review --- Accepted at May 14, 2021 16:25:17

[May 14, 2021 16:25:17] - Conditional Approval Note by Patrick Enright:
> This NEU review is being completed by Sustainability under the Low Carbon Energy Systems Policy (LCES Policy). For the system type included in this application (Type 2b), the LCES Policy requires:
>
> (a) Feasibility study - accepted
> (b) BCUC application - underway, as per correspondence from applicant. While the LCES Policy requires BCUC approval, given that this development voluntarily opted-in to the policy, and that the development is entirely reliant on the system for heat, we consider BCUC application to be acceptable in this case.
> (c) Long-term system connection - confirmed, as per correspondence from applicant
> (d) Energy reporting agreement - complete, as per legal agreement prior to enactment.
>
> Based on the above criteria, this review is conditionally approved.

Oakridge Energy states that the City's Low-Carbon Energy System policy applies to the system as a whole, which is not complete until full buildout.[171]

Oakridge Energy states that it will be required to report to the City on an annual basis, which will include information on the mix of energy sources utilized, their respective carbon intensities, and the energy sold to

[166] Exhibit B-1, p. 12.
[167] Exhibit B-7, BCUC IR 19.4.
[168] Exhibit B-3, p. 2.
[169] Ibid., p. 4.
[170] Exhibit B-7, BCUC IR 4.7.
[171] Ibid., BCUC IR 19.1.

customers. The basis of the report is to confirm the carbon intensity of the energy delivered to customers, on a kg/MWh basis. Oakridge Energy states that the City has given it a draft energy reporting agreement that lays out the anticipated reporting requirements of an Low-Carbon Energy System, and while the agreement is still being finalized, it contains the following annual reporting requirements:[172]

- Total monthly energy consumption of each building from each utility (electricity, gas, steam, solar, etc.);
- Total monthly energy input by utility (electricity, natural gas, hot water, steam, etc.);
- Total monthly thermal output by end use (heating, cooling, domestic hot water);
- Average annual carbon intensity of the energy inputs; and
- Average annual coefficients of performance of heating, cooling, and domestic hot water production.

Positions of the Parties

Oakridge Energy submits that it has received conditional approval from the City that its proposed DES qualifies as a Low-Carbon Energy System, pending the BCUC's approval of the Application.[173]

BCSEA submits that the fact the proposed DES is designed to meet the City's Low-Carbon Energy System standard is a substantial factor supporting a conclusion that the Oakridge DES is in the public interest.[174]

Panel Discussion

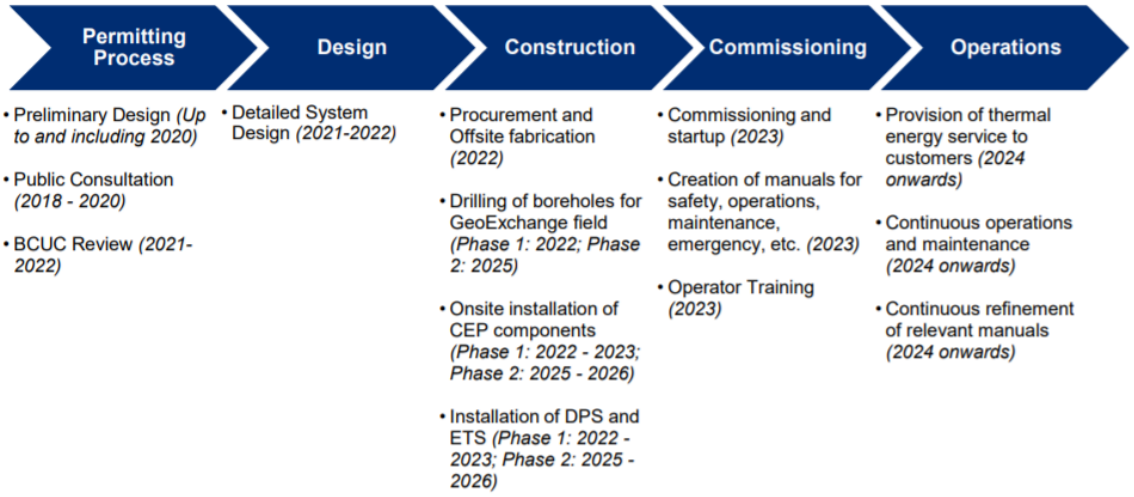
The Panel finds that the proposed Oakridge DES meets the need for the system to be a Low-Carbon Energy System. The City has provided conditional approval that Oakridge Energy's proposed DES qualifies as a Low-Carbon Energy System subject only to BCUC approval of the Application. Once the BCUC has granted the CPCN for the Project, the Oakridge DES will fully satisfy the City's requirements for it to be a Low-Carbon Energy System.

5.4 Schedule

Oakridge Energy states its implementation plan for the Oakridge DES is integrated with the Developers' schedule for build-out of the site, stating there is a high level of coordination between the parties. The construction of the Oakridge DES and capital expenditure will be phased with the Oakridge Centre Redevelopment project's thermal energy service timing requirements.[175] Oakridge Energy provides the following Project schedule:

[172] Ibid., BCUC IR 19.2.
[173] Oakridge Energy Final Argument, p. 9.
[174] BCSEA Final Argument, p. 9.
[175] Exhibit B-1, p. 36.

Figure 4: Oakridge Energy DES Implementation Schedule[176]



5.5 Risks

Oakridge Energy states it drew on the experience of Corix and the Creative Energy group in developing, financing, constructing, owning, and operating district energy systems to identify the following project risks:

- Development delay risk;
- Construction cost risk, to portions of the construction project and equipment costs;
- Public acceptance;
- Permitting; and
- Energy cost and availability risk.[177]

Of these identified risks, all were evaluated to be 'low' risk with the exception of construction cost risk, which was ranked 'low-medium' and development delay risk, which was ranked 'medium.'[178]

The future rate impacts of development delays were analysed in various scenarios presented by Oakridge Energy. Oakridge Energy states it mitigates the risk of rate impacts due to development delays by completing the Project in a phased manner, such that a delay in the construction of the building would have a similar delay to the capital expenditures necessary to connect the building to the DES.[179]

Oakridge Energy states it cannot mitigate the risks from development delays further as the Developers will be managing the construction of the Oakridge Centre Redevelopment.[180] Additionally, the Developers are now undertaking construction of the geo-exchange field to prevent development delays, which is discussed in detail in section 5.6 below.

[176] Exhibit B-1, p. 36, Figure 9.
[177] Ibid., p.65.
[178] Ibid., pp. 65-67.
[179] Ibid., pp.65; 68-75. Exhibit B-7, IR 36.3, 36.4, 36.5.
[180] Exhibit B-7, IR 36.1, 36.2.

5.6 Developer Constructing Geo-exchange Field

On October 21, 2021, Oakridge Energy filed an update to its requests for approvals with the BCUC.[181] Oakridge Energy explained that it had recently been informed by the Developers that construction of the geo-exchange field was required to be expedited for the Oakridge Centre Redevelopment project to remain on schedule, and must begin in November 2021. Oakridge Energy explains that the accelerated timeline is the result of external market factors as a result of the COVID-19 pandemic.[182]

To avoid the consequences of not proceeding on the new schedule, the Developers will construct the Phase 1 geo-exchange field at their own cost and risk and Oakridge Energy proposes to acquire the Phase 1 Geo-exchange Assets after construction at net book value after receiving BCUC approval.[183]

Oakridge Energy has informed the Developers that, if the BCUC does not grant a CPCN for the Project, the Developers will bear the cost of the Phase 1 geo-exchange field and neither Oakridge Energy nor any ratepayer of a Creative Energy or Corix utility will bear any portion of this cost, expected to be $8.386 million.[184] Oakridge Energy states this approach to the construction of the Phase 1 geo-exchange field does not preclude any future BCUC panel reviewing the Phase 1 Geo-exchange Assets acquired and their acquisition costs.[185]

Oakridge Energy states it does not have an agreement in place with the Developers to purchase the Phase 1 Geo-exchange Assets. Oakridge Energy expects that the purchase will occur in the first quarter of 2022 and an executed agreement could be filed with the BCUC no later than 2 months following the purchase date.[186] Oakridge Energy anticipates that the purchase agreement will have conditions including warranty provisions, design and specification provisions, and deficiency provisions.[187]

Oakridge Energy identifies that while it will not have the same degree of direct oversight of the geo-exchange field installer, the Developers are fully capable of delivering the geo-exchange field, including any reasonable additions or alterations that might arise throughout the course of construction.[188] Oakridge Energy adds that it will direct its prime consulting engineer to take all necessary steps to ensure that the Phase 1 Geo-exchange Assets are constructed to the standard that would have been expected of Oakridge Energy, and prudently constructed at a reasonable cost.[189]

The rationale for setting the purchase price of the Phase 1 Geo-exchange Assets as the net book value is to align with the treatment of the asset cost Oakridge Energy would incur if Oakridge Energy constructed the asset itself. A price cap has not been considered to date as the ultimate cost of constructing the asset should follow the same treatment and practices of prudent utility practice standards.[190]

[181] Exhibit B-10.
[182] Ibid., p. 2.
[183] Ibid.
[184] Ibid.
[185] Ibid., p. 3.
[186] Exhibit B-12; IR 53.5
[187] Exhibit B-12, BCUC IR 53.8, 53.9.
[188] Ibid., BCUC IR 53.7.2.
[189] Exhibit B-10, p. 2.
[190] Exhibit B-12, BCUC IR 53.10

Positions of the Parties

Regarding the Developers constructing the geo-exchange field, Oakridge Energy believes that this is an appropriate solution that includes strategies to mitigate the identified technical risks. The approach allows for the Oakridge Centre Redevelopment project to remain on schedule despite unforeseen market impacts that would have otherwise resulted in costly delays, while allowing for a thorough regulatory review process to be completed within a reasonable timeline. As the Developers will be using the same process that Oakridge Energy would use, a competitive tender process, to select a contractor, there is no reason to believe the capital costs would differ from what Oakridge Energy would incur.[191]

BCSEA agrees with Oakridge Energy that the changes to the construction of the Phase 1 geo-exchange field, whereby it will be built by the Developers and transferred to Oakridge Energy, do not impact the Oakridge DES design or forecast costs.[192]

Panel Determination

The Panel finds that Oakridge Energy's plan to acquire the Phase 1 Geo-exchange Assets from the Developers is reasonable.

The Panel found in section 4 above that Concept 4 including the geo-exchange field is the most appropriate alternative to meet the thermal energy needs of the Oakridge Centre Redevelopment. Oakridge Energy's modified request to acquire the Phase 1 Geo-exchange Assets from the Developers rather than build them itself is not a change to the proposed solution but rather a change to the implementation approach.

The Panel accepts that there are dependencies between the construction of the geo-exchange field and the overall construction activities of the Oakridge Centre Redevelopment project, and that external factors have necessitated an earlier than anticipated start to construction of the geo-exchange field for the Oakridge Centre Redevelopment project to remain on schedule. The Panel further accepts that these are sufficient reasons to justify Oakridge Energy's proposed change in approach to implementing the geo-exchange field.

While Oakridge Energy will not be involved in the physical construction or project management of the geo-exchange field, the Panel is satisfied that Oakridge Energy will have sufficient influence over the construction through the oversight of its prime consulting engineer.

The Panel also accepts that the net book valuation for the planned acquisition of the Phase 1 Geo-exchange Assets by Oakridge Energy from the Developers is appropriate. This net book valuation is analogous to the situation if Oakridge Energy had retained direct control over the construction of the geo-exchange field; that is, Oakridge Energy would value the Phase 1 Geo-exchange Assets at their actual construction costs, which must be determined by the BCUC to be prudent before they can be recovered from ratepayers. The BCUC's determination of prudency occurs when Oakridge Energy applies in a revenue requirement application to start recovering the cost of its assets from ratepayers whether the assets were built by Oakridge Energy or whether

[191] Oakridge Energy Final Argument, para 79, p. 19.
[192] BCSEA Final Argument, para 45, p. 11.

they were acquired by Oakridge Energy. Further, if a utility were to acquire assets for a price greater than their net book value, the BCUC would likely not approve the utility to recover the excess from ratepayers.

While the Panel accepts the reasons for Oakridge Energy's proposed acquisition of the Phase 1 Geo-exchange Assets, the Panel is concerned that there is no purchase agreement between Oakridge Energy and the Developers. In the absence of such a purchase agreement, the Panel cannot determine whether the acquisition terms are reasonable. For these reasons, **the Panel determines that a term of the CPCN for the acquisition of the Phase 1 Geo-exchange Assets is that Oakridge Energy submits to the BCUC a satisfactory purchase agreement between it and the Developers for the acquisition of the Phase 1 Geo-exchange Assets by June 30, 2022**.

6.0 Project Cost and Rate Impact

Oakridge Energy's capital cost estimate for the construction of the proposed Oakridge DES is $108.41 million in 2020 dollars, which includes Project development and start-up costs, but excludes an allowance for funds used during construction and annual sustaining capital expenditures.[193] This capital cost estimate has been prepared to an AACE Class 3 degree of accuracy of -10 to -20% and +10% to +30%,[194] consistent with the requirements outlined in BCUC's CPCN Guidelines[195].

An initial cost estimate was prepared by Turner and Townsend (T&T), a professional Quantity Surveyor, using industry standards and cost estimating practices and based on "the most up-to-date design drawings reflecting the latest version of the DES design at the time of costing". The initial cost estimate was reduced by 1.7 percent following a subsequent review.[196] The T&T initial cost estimate excludes construction soft costs[197], contingency, engineering costs[198] and Project development costs[199]. Oakridge Energy estimated these costs, and states that this is typical for project cost estimates where the owner has a good understanding of how the project will be executed and the associated risks.[200]

FVB reviewed the costing prepared by T&T to ensure all required scope was addressed and the current design intent was captured.[201] The table below presents the capital cost estimate in 2020 dollars for the Oakridge DES broken down by project phase.[202]

[193] Exhibit B-1, p. 52.
[194] Ibid., p. 47.
[195] Appendix A to Order G-20-15, CPCN Guidelines.
[196] Exhibit B-1, p. 47; Exhibit B-7, BCUC IR 25.1.2; Exhibit B-12, BCUC IR 48.5.
[197] Includes, general contractor fees, construction management, bonding permitting, insurance, provincial sales tax, contractor testing and commissioning (Exhibit B-1, pp. 48-49).
[198] Includes cost forecast to be incurred for detailed engineering design, which follows the approval of the CPCN application (Exhibit B-1, pp. 48-49).
[199] Include feasibility studies, test drilling, legal costs, regulatory costs associated with public consultations internal project, engineering and construction management costs, and third-party engineering costs (Exhibit B-1, pp. 48-49).
[200] Exhibit B-7, BCUC IR 25.1.1.
[201] Exhibit B-12, BCUC IR 48.5.
[202] Exhibit B-1, p, 48, Table 14.

Table 11: Total Project Capital Costs, Excluding AFUDC (in 2020 dollars)[203]

Project Capital Costs	Phase 1 ($000's)	Phase 2 ($000's)	Total Project ($000's)
Cooling HR	2,269	--	2,269
Electric Boilers	308	308	616
Geo-Exchange	8,386	5,591	13,977
Heating Plant (1)	18,160	1,425	19,585
Cooling Plant (2)	26,519	4,402	30,921
DPS - Heating	4,003	2,993	6,996
DPS - Cooling	9,658	6,369	16,027
ETS - Heating	3,583	3,255	6,838
ETS - Cooling	3,583	3,255	6,838
Subtotal	**76,469**	**27,598**	**104,067**
Project Development & Start-up (3)	4,339	--	4,339
Total Capital Costs	**80,808**	**27,598**	**108,406**

1) Heating Plant includes natural gas boilers, hot water piping, tanks, ventilation and flues, controls and instrumentation, and a portion of the electrical equipment.
2) Cooling Plant includes electric chillers, cooling towers, chilled water piping, refrigerant, controls and instrumentation, and a portion of the electrical equipment.
3) See Table 15 for a breakdown of Project Development & Start-Up costs.

The capital cost estimate includes a 20 percent global contingency, which Oakridge Energy states is consistent with the BCUC's CPCN Guidelines and industry best practice and is the same contingency both Corix and Creative Energy have used in similar types of filings.[204] To inform and support the calculation of the contingency an allocation project risk analysis was prepared by FVB.[205]

Oakridge Energy states that given it is a greenfield utility built from the ground up, there are currently no renewal and replacement plans. Oakridge Energy intends to prepare such a plan and seek the relevant approvals from the BCUC at a future date, once maintenance information from the plant and the original equipment manufacturers is available, and it has experience operating the system. Oakridge Energy adds that capital funding for the renewal and replacement of major assets, or any emergency repair funding, would be provided directly by Corix and Creative Energy.[206]

Oakridge Energy states that no adjustment has been made to the capital cost estimate for the impact associated with the COVID-19 pandemic noting that any adjustment could be considered to be speculative in nature given

[203] Ibid.
[204] Exhibit B-7, BCUC IR 27.1, 27.2, 27.2.2, 27.2.3.
[205] Ibid., BCUC IR 27.3.1; Exhibit B-12, BCUC IR 50.4.
[206] Exhibit B-1, p. 51.

the uncertainty and constantly changing COVID-19 situation.[207] However, Oakridge Energy adds that based on the experience of Corix and Creative Energy with other projects in development, delays in procuring equipment are expected in the coming months due to global shipping delays. At this point, Oakridge Energy has not identified an impact on the capital cost estimate, and states the risk relates to lead times only.[208] Oakridge Energy intends to mitigate schedule impacts and cost escalations by directly procuring major equipment for the site, including boilers, chillers and cooling tower, rather than using a contractor.[209]

Revenue requirements

Oakridge Energy provides in the Application the forecast annual operating costs used to calculate the indicative rates beginning in 2024, including the fixed operating costs, energy costs, and the general financing and tax assumptions.[210]

The fixed operating costs represent all non-fuel and consumables costs and include the following:

- Operating labour: Includes seven personnel, which Oakridge Energy state are to ensure that the Oakridge DES operates safely and reliably 24 hours per day, 365 days per year.[211] Oakridge Energy adds the operating labour costs are based on similar operating labour profiles and salaries from both Corix and Creative Energy in the lower mainland region.[212] Operating labour is the greatest fixed operating cost, which is forecast to range between 47 to 57 percent of the total annual fixed operating costs during the first five years of operations.[213]
- Rent: represents the cost for the use of floor space in the parking garage for the central energy plant and the rate was negotiated between the Developers and Oakridge Energy. Oakridge Energy states the annual rent costs account for between 14 to 23 percent of the total annual fixed operating costs during the first five years of operations.[214]
- Selling, general and administrative: includes general and administrative costs such as corporate finance, accounting, human resources, customer service and billing, information technology communications, regulatory, legal. Oakridge Energy forecast the costs based on a services agreement negotiated between Corix and Creative Energy. All charges are made without mark-up or margin and are reviewed and approved by the General Manager of Oakridge Energy with oversight by the Operating Committee. Oakridge Energy adds these costs are forecast to range between 14 to 17 percent of the total annual fixed operating costs during the first five years of operations.[215]
- Insurance: Oakridge Energy states insurance costs includes liability and property insurances and are forecast based on the latest utility insurance rate information and to range between 8 to 9.5 percent of the total annual fixed operating costs during the first five years of operations. [216]

[207] Exhibit B-12, BCUC IR 48.9.
[208] Ibid., BCUC IR 48.8.
[209] Ibid., BCUC IR 48.8.1.
[210] Exhibit B-1, p. 52.
[211] Ibid., p. 53.
[212] Exhibit B-7, BCUC IR 30.2.
[213] Exhibit B-1, p. 53.
[214] Ibid.; Exhibit B-12, BCUC IR 30.8, 30.9.
[215] Exhibit B-1, p. 54; Exhibit B-7, BCUC IR 30.11, 30.12.
[216] Ibid.

- Property Tax: Oakridge Energy states that it does not anticipate to directly pay property taxes as it does not own the land the Oakridge DES will occupy. However, it notes that given it is a utility, it may cause the property owner or Oakridge Energy itself to be assessed at a somewhat higher property tax rate than is otherwise levied against the property owner. Oakridge Energy estimated property taxes using a 1 percent of revenue factor noting that it is not uncommon in BC for municipalities to assess certain utilities on a percentage of revenues basis in lieu of assessing on the basis of the value of land, structures and fixtures. Oakridge Energy adds these costs are forecast to range between 3 to 5 percent of the total annual fixed operating costs during the first five years of operations. [217]

The remining fixed operating costs include maintenance and chemicals and supplies, which are forecast based on operating experience with similar utilities and together represent between 2 to 5 percent of the total annual fixed operating costs during the first five years of operations.[218]

Energy costs include the cost of electricity and the cost of natural gas required to produce thermal energy to provide service to customers. Oakridge Energy states that as these costs vary with market price and customer consumption and it is unable to control these costs, energy costs are forecast as a direct flow-through to customers.[219]

The table below provides the indicative, annual revenue requirements for the first five years of operation.

Table 12: Base Case Revenue Requirements Forecast[220]

(IN $000's)	2024	2025	2026	2027	2028
Fixed Operating Costs	1,985	2,113	2,227	2,321	2,694
Natural Gas	131	199	202	249	465
Electricity, Heating	604	936	955	1,209	2,286
Electricity, Cooling	221	335	341	403	686
Subtotal Energy Costs	956	1,470	1,498	1,861	3,437
Depreciation	1,264	2,528	2,528	2,942	3,357
Interest on Debt	1,072	2,118	2,096	2,457	2,819
Return on Equity	1,841	3,636	3,598	4,218	4,840
Income Tax	--	--	--	--	--
Subtotal Financing and Tax Costs	4,177	8,281	8,221	9,616	11,015
Total Revenue Requirements	**7,118**	**11,864**	**11,946**	**13,799**	**17,146**
Total Rev. Req. excluding Energy Costs	6,163	10,395	10,448	11,938	13,709

[217] Ibid; Exhibit B-7, BCUC IR 30.4.
[218] Ibid., pp. 53-54. The percentage of total annual fixed operating costs during the first five years of operations was estimated by BCUC staff based on the individual figures for each item as provided in the Application.
[219] Exhibit B-1, p. 55.
[220] Exhibit B-1, p. 59.

Indicative rates

Oakridge Energy used a levelized rate plan with an associated rate stabilization account (RSA) to develop the indicative rates. It states that this approach is typically employed for greenfield utilities requiring significant initial capital expenditure prior to establishing its full customer base. It adds that this rate design recognizes that the utility will not reasonably recover its entire annual revenue requirements in the early years of the project due to its limited, though growing, customer base. The initial rates for the first year of operations would be set at a reasonable level to allow for the recovery of a portion, but not the full annual revenue requirements. The annual deficit in the early years would be recorded in the RSA until revenues exceed the revenue requirements. The excess annual revenue in the later years of the rate levelization plan would then be used to recover the deficit balance in the rate stabilization account. Oakridge Energy states that the indicative rates lead to a maximum balance in the RSA of $4.8 million, and the utility would recover the RSA balance by 2030.[221]

Oakridge Energy provides the following estimated annual cost impact for a typical residential end-user and considers this to be is a useful indicator for the reasonableness of the annual cost of residential heating and cooling services.[222]

Table 13: Estimated Impact to Annual Costs Based on Indicative Cooling Rates (Base Case)[223]

COOLING	2024	2025	2026	2027	2028
Indicative Cooling Capacity Charge per month ($/kW)	18.34	18.71	19.08	19.47	19.86
Indicative Cooling Energy Charge ($/kWh)	0.038	0.038	0.039	0.040	0.041
Annual Change – Cooling Capacity Charge (%)	N/A	2%	2%	2%	2%
Annual Change – Cooling Energy Charge (%)	N/A	2%	2%	2%	2%
Cooling Service					
Residential Suite Size (m^2)	80	80	80	80	80
Annual Cooling Energy Consumption (kWh)	3,360	3,360	3,360	3,360	3,360
Estimated Annual Cooling Costs – Capacity Charge Portion ($)	665	678	692	706	720
Estimated Annual Cooling Costs – Energy Charge Portion ($)	127	129	132	134	137
Estimated Annual Cooling Costs ($)	**792**	**808**	**824**	**840**	**857**
Estimated Monthly Cooling Costs ($)	**66**	**67**	**69**	**70**	**71**
Annual Change (%)	**N/A**	**2%**	**2%**	**2%**	**2%**

[221] Ibid., pp. 61, 63.
[222] Ibid., pp. 63-64
[223] Exhibit B-1, p. 64, Table 27.

Table 14: Estimated Impact to Annual Costs Based on Indicative Heating Rates (Base Case)[224]

HEATING	2024	2025	2026	2027	2028
Indicative Heating Capacity Charge per month ($/kW)	17.17	17.52	17.87	18.22	18.59
Indicative Heating Energy Charge ($/kWh)	0.072	0.073	0.074	0.078	0.079
Annual Change – Heating Capacity Charge (%)	N/A	2%	2%	2%	2%
Annual Change – Heating Energy Charge (%)	N/A	1%	2%	5%	1%
Heating Service					
Residential Suite Size (m^2)	80	80	80	80	80
Annual Heating Energy Consumption (kWh)	6,080	6,080	6,080	6,080	6,080
Estimated Annual Heating Costs – Capacity Charge Portion ($)	819	835	852	869	886
Estimated Annual Heating Costs – Energy Charge Portion ($)	436	442	451	473	479
Estimated Annual Heating Costs ($)	**1,255**	**1,278**	**1,303**	**1,342**	**1,366**
Estimated Monthly Heating Costs ($)	**105**	**106**	**109**	**112**	**114**
Annual Change (%)	N/A	1.82%	1.97%	3.02%	1.75%

Oakridge Energy compared its indicative rates to those of other heating and cooling TES, as provided in the following tables:

Table 15: Indicative Heating Rate Comparators[225]

Utility Rates (Heating)	2021	2022	2023	2024	2025	2026	2027
Oakridge Energy Indicative Heating Rates							
Indicative Heating Capacity Charge per month ($/kW)	N/A	N/A	N/A	17.17	17.52	17.87	18.22
Indicative Heating Energy Charge ($/kWh)	N/A	N/A	N/A	0.072	0.073	0.074	0.078
BMDEU – UniverCity (Approved Rates) - Heating							
Basic Charge ($ per sq. m. per month)	1.0482	1.1164	1.1889	N/A	N/A	N/A	N/A
Variable Energy Charge ($/kWh)	0.0301	TBD*	TBD*	N/A	N/A	N/A	N/A
Dockside Green Energy (Approved Rates) - Heating							
Basic Charge ($ per sq. m. per month)	0.391	0.403	0.415	N/A	N/A	N/A	N/A
Variable Energy Charge ($/kWh)	0.072	TBD*	TBD*	N/A	N/A	N/A	N/A

* TBD – To be determined as flow-through energy cost actuals will be used to determine Variable Energy Charges from 2022 onwards.

Table 16: Indicative Cooling Rate Comparators[226]

Utility Rates (Cooling)	2021	2022	2023	2024	2025	2026	2027
Oakridge Energy Indicative Cooling Rates							
Indicative Cooling Capacity Charge ($/kW/mo)	N/A	N/A	N/A	18.34	18.71	19.08	19.47
Indicative Cooling Energy Charge ($/kWh)	N/A	N/A	N/A	0.038	0.038	0.039	0.040
Main Alley Development - Cooling							
Capacity Charge per month ($/kW/mo)(indicative 2024-2027	31.28	31.91	32.54	33.20	33.86	34.54	35.23
Indicative Variable Energy Charge ($/kWh)(flow-through)	0.044	0.044	0.045	0.046	0.047	0.049	0.050

[224] Ibid., p. 64, Table 26.
[225] Exhibit B-12, BCUC IR 52.7.
[226] Ibid.

However, Oakridge Energy considers that the comparisons are not highly informative as no useful definitive conclusions can be drawn from the comparisons given the following:[227]

- There are different technologies leading to different capital costs and operational costs.
- There are different EUIs leading to different energy costs and energy charges.
- There exist long-term deferral accounts with rates escalating at various percentages which allow utilities to under-recover their cost of service to varying extents in early years.
- Oakridge Energy proposes Capacity Charges on a $/kW basis applied to each building's design peak load, whereas other DES systems charge Basic or Capacity Charges on a $/m2 basis applied to each building's floorspace.

Oakridge Energy states it is not requesting BCUC approval or acceptance of the indicative revenue requirements, rate design, or customer rates in this Application. Prior to the in-service date of the DES, Oakridge Energy will submit a revenue requirements and rates application to the BCUC for approval to be in effect as of the in-service date.[228]

Positions of the Parties

Oakridge Energy submits that the capital cost estimate of $108.41 million in 2020 dollars excluding allowance for funds used during construction has been prepared to an AACE Class 3 degree of accuracy.[229] Oakridge Energy further submits that the costs associated with the construction and operation of the proposed system can be fairly and reasonably recovered from ratepayers over time, and that the evidence demonstrates the financial viability of the utility.[230]

BCSEA submits that the indicative rates for the Oakridge DES are reasonable and indicate the financial viability of the utility, and support a conclusion that the Project is in the public interest. BCSEA supports the approach of using a rate stabilization account to levelize rates while the utility builds its full customer base.[231]

Panel Discussion

The Panel finds that the approach taken by Oakridge Energy to develop the capital cost estimate is reasonable. Oakridge Energy prepared its capital cost to an AACE Class 3 degree of accuracy, which is consistent with the BCUC's CPCN Guidelines. Portions of the initial capital cost were prepared by a professional quantity surveyor, with Oakridge Energy providing the construction soft costs, engineering costs, project development costs and project contingency. The cost estimate was reviewed by the utility's engineering consultant, FVB, to ensure that all required scope was addressed.

The Panel further finds that the indicative rates provided by Oakridge Energy are reasonable. The Panel agrees that a rate stabilization account is an appropriate assumption to use in calculating the indicative rates as if

[227] Ibid.
[228] Exhibit B-1, pp. 13-14.
[229] Oakridge Energy Final Argument, p. 2.
[230] Ibid., p. 11.
[231] BCSEA Final Argument, p. 10.

approved by the BCUC it would smooth the recovery costs while the utility builds its customer base, and considers a maximum balance of $4.8 million in the rate stabilization account which is fully recovered by 2030 to be reasonable.

7.0 Consultation

7.1 First Nations Consultation

Oakridge Energy states that it requires no First Nations consultation for the development of the proposed Oakridge DES because the utility does not and will not own any of the lands where the DES will be situated. Oakridge Energy adds that the Oakridge DES is situated on privately-owned land and therefore it is not required to engage First Nations as part of the application process.[232] It further adds that environmental permitting is not required for the geo-exchange system as any environmental permitting will be addressed as part of the Developers' site excavation permitting plan, and thus a duty to consult with First Nations is not triggered for that reason.[233]

Oakridge Energy states that while it has not engaged with First Nations regarding the Oakridge DES, the landowner engaged in consultation with the First Nations (Musqueam, Squamish and Tsleil-Waututh) as part of the overall Oakridge Centre Redevelopment project process for the site. Oakridge Energy identifies that the brownfield site redevelopment is presently used for commercial retail, office, and residential on privately owned land and as disturbed land with current present-day use, there is no impact on Aboriginal rights.[234]

7.2 Public Consultation

Oakridge Energy undertook public consultation efforts in both 2018 and 2020. In 2018, Oakridge Energy participated in two Oakridge Centre Redevelopment open houses, which Oakridge Energy states attracted considerable public interest and allowed for the sharing of information about the Oakridge Energy proposal and the ability to gather input from attendees who were mostly local residents and potential future end-users. Oakridge Energy states that approximately 750 people attended the two 2018 open houses, and that seven comment forms were completed with 100 percent of the completed comment forms considering low-carbon energy a priority for local energy generation or distribution.[235]

In 2020, Oakridge Energy continued its public consultation process by establishing a public engagement period from August 5, 2020, to August 31, 2020. The public engagement period included a virtual stakeholder meeting, two virtual public open houses, a Project website with discussion guide, and an online feedback form. Oakridge Energy states that in total, there was one attendee at the virtual stakeholder meeting, and five attendees total for the virtual public open houses. The topics raised in questions during the public engagement period included:[236]

[232] Exhibit B-1, p. 27; Exhibit B-7, BCUC IR 22.2.1.1.
[233] Exhibit B-7, BCUC IR 22.2, Exhibit B-1, p. 41.
[234] Exhibit B-1, p. 27, Appendix C p. 3.
[235] Ibid.
[236] Ibid., p. 28.

- Timeline and phasing of construction components;
- The technology and design of the DES, including questions on its capacity, the waste heat recovery process, and the extent of natural gas use in the system;
- GHG emissions reductions and compliance with climate targets;
- The scalability of the system, including to other neighbourhoods or developments;
- Rates for future customers; and
- The regulatory process.

Oakridge Energy states that all respondents using the online feedback form consider low-carbon energy a priority for local energy utilities and that questions generally sought a greater understanding of the Project, focusing on the DES technology, GHG emissions reductions, and the scalability of the Project. Oakridge Energy states that no submission or feedback from stakeholders or the public opposed the Project.[237]

Oakridge Energy considers that there has been sufficient public consultation prior to filing this CPCN Application.[238]

Positions of the Parties

Oakridge Energy submits that its consultation demonstrates that the Oakridge DES is in the public interest. The utility explains that it received no feedback opposed to the DES, and that all respondents in the public consultation sessions considered low-carbon energy a priority.[239]

Panel Discussion

The Panel finds that the consultation performed by Oakridge Energy is sufficient and supports the conclusion that the Oakridge DES is in the public interest.

The duty to consult with First Nations remains with the Crown.[240] There is no requirement for Oakridge Energy to consult with First Nations concerning the development of the Oakridge DES because the utility will operate entirely on privately-owned land, it is a brownfield development and because no environmental permit is required for the DES. Despite Oakridge Energy not being required to consult with First Nations, the Panel finds it sufficient that consultation with First Nations was undertaken by the landowner and that there is no evidence of any issues having been raised.

The Panel is satisfied that two open houses in 2018 and a public engagement period of almost a month in August 2020 were sufficient to engage interested parties. The topics raised in questions during the public engagement period, for example regarding the GHG emissions of the Project and customer rates, are evidence

[237] Ibid.
[238] Ibid.
[239] Oakridge Energy Final Argument, p. 10.
[240] Haida Nation v. British Columbia (Minister of Forests), 2004 SCC 73.

of meaningful consultation. The lack of feedback opposed to the Oakridge DES supports the conclusion that it is in the public interest.

8.0 Provincial Government Energy Objectives

Oakridge Energy states that the proposed Oakridge DES aligns with several provincial government objectives under the: (i) *Clean Energy Act* (BC's Energy Objectives); and (ii) *Climate Change Accountability Act*.[241] Table 17 below provides Oakridge Energy's assessment on how the proposed DES supports provincial government objectives.

Table 17: Addressing BC Energy Objectives[242]

Objective	Oakridge Energy's Assessment of Project Alignment with Objective
(g) to reduce BC greenhouse gas emissions …. (iv) by 2050 and for each subsequent calendar year to at least 80% less than the level of those emissions in 2007, and (v) by such other amounts as determined under the Climate Change Accountability Act;[243]	The proposed DES would generate energy using clean/renewable technologies through a closed-loop geo-exchange system, waste heat recovery, electric chillers, and electric boilers. The source of electricity for the chillers and boilers will be BC Hydro, which has 96.3% clean electricity generation.[244] Compared to a conventional natural gas boiler solution, the proposed district energy system configuration will result in an estimated reduction in overall GHG emissions of: • 2,931 tonnes CO2e per year after full completion of Phase 1 (2025 and 2026); and • 6,513 tonnes CO2e per year after full build-out (2028 onwards). These figures represent a reduction of GHG emissions by approximately 72% when compared to a traditional natural gas boiler heating concept. The GHG emissions reductions are all attributable to the heating energy system design, and the recovery of heat from the cooling energy system.
(h) to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia.[245]	
2 (1) The following targets are established for the purpose of reducing BC greenhouse gas emissions: (a.1) by 2030 and for each subsequent calendar year, BC greenhouse gas emissions will be at least 40% less than the level of those emissions in 2007; (a.2) by 2040 and for each subsequent calendar year, BC greenhouse gas emissions will be at least 60% less than the level of those emissions in 2007.[246]	
(i) to encourage communities to reduce greenhouse gas emissions and use energy efficiently.[247]	The centralized DES operates with higher efficiencies compared to standalone building systems. This is achieved through load diversity requiring less infrastructure capacity and better utilization of the infrastructure resulting in higher operating efficiencies.

[241] Exhibit B-1, p. 25.
[242] Table by the BCUC with information from Exhibit B-1, Table 6, pp. 25-26 unless otherwise footnoted.
[243] *Clean Energy Act*, Section 2(g).
[244] Oakridge Energy references to BC Hydro 2019/20 Annual Service Plan Report, p. 6, p. 19.
[245] CEA, Section 2(h).
[246] *Climate Change Accountability Act*, Section 2(1).
[247] *C*EA, Section 2(i).

Objective	Oakridge Energy's Assessment of Project Alignment with Objective
(j) to reduce waste by encouraging the use of waste heat, biogas and biomass.[248]	The proposed DES contributes to the reduction of waste by incorporating the use of waste heat recovery from cooling.
(k) to encourage economic development and the creation and retention of jobs.[249]	The proposed DES would contribute to economic development through the creation of 7 local full-time jobs required to staff and operate the utility on an ongoing basis.

Positions of the Parties

Oakridge Energy submits that the proposed Project aligns with BC's Energy Objectives and the *Climate Change Accountability Act*, while taking energy costs into consideration. Oakridge Energy explains that the Oakridge DES design incorporates the use of a closed-loop geo-exchange system, waste heat recovery and electric boilers and chillers, which are all clean and renewable technologies, and that the source of the electricity will be BC Hydro which has 96.3 percent clean generation. [250]

Oakridge Energy submits that its design includes the use of natural gas boilers only when the combined heat pump and electric boiler capacity has been exceeded. Oakridge Energy adds that renewable natural gas could increase its percentage of low-carbon energy in future, but that its use at present is cost-prohibitive. [251]

BCSEA submits that the Oakridge DES aligns with BC's Energy Objectives "to reduce BC GHG emissions, to switch to lower-carbon fuels, to encourage communities to reduce GHG emissions and use energy efficiently, to utilize waste heat and to encourage economic development and job creation."[252]

Panel Discussion

The Panel finds that the Oakridge DES is consistent with most of BC's Energy objectives but conflicts with objective 2(g), which is to reduce GHG emissions.

The Panel finds that the applicable BC Energy objectives when considering the Application are:

> 2(d) to use and foster the development in British Columbia of innovative technologies that support energy conservation and efficiency and the use of clean or renewable resources
>
> 2(g) to reduce BC greenhouse gas emissions
>
> 2(i) to encourage communities to reduce greenhouse gas emissions and use energy efficiently
>
> 2(j) to reduce waste by encouraging the use of waste heat, biogas and biomass

[248] Ibid., Section 2(j).
[249] Ibid., Section 2(k).
[250] Oakridge Energy Final Argument, p. 8.
[251] Ibid.
[252] BCSEA Final Argument, p. 9.

2(k) to encourage economic development and the creation and retention of jobs

2(o) to achieve British Columbia's energy objectives without the use of nuclear power.

The Panel finds that the Oakridge DES is consistent with BC's Energy objective 2(d) because its design uses a geo-exchange system, waste heat recovery and electric boilers and chillers which are innovative technologies that use clean or renewable resources.

The Panel finds that the Oakridge DES is consistent with BC's Energy objective 2(i) because the centralized design operates more efficiently than stand-along systems in each building, enabling the communities living and working in the Oakridge Centre Redevelopment project to reduce GHG emissions and use energy efficiently.

The Panel finds that the Oakridge DES is consistent with BC's Energy objective 2(j) because it uses waste heat recovery from cooling.

The Panel finds that the Oakridge DES is consistent with BC's Energy objective 2(k) because it contributes to economic development by creating seven local, full-time jobs to operate the system.

The Panel finds that the Oakridge DES is consistent with BC's Energy objective 2(o) because it does not include the use of nuclear power.

The proposed system design uses less natural gas than if natural gas were the only source of heat for the Oakridge Centre Redevelopment project. However, the Panel does not consider that using natural gas for 31 percent of the heating system's annual demand[253] is consistent with BC's Energy objective 2(g), which is to reduce GHG emissions, when alternatives such as renewable natural gas and electric boilers are available.

9.0 CPCN Determination

The Panel finds that public convenience and necessity require the construction and operation of the Oakridge DES to provide space heating, space cooling and domestic hot water to the Oakridge Centre Redevelopment.

Accordingly, and for the reasons set out in this Decision, the Panel grants a CPCN to Oakridge Energy authorizing:

1. **The construction and operation of a district energy system to provide space heating, space cooling and domestic hot water to the Oakridge Centre Redevelopment.**
2. **The purchase of the Phase 1 Geo-exchange Assets from the Developers at a cost not to exceed their net book value at the time of acquisition, subject to the term that Oakridge Energy submits to the BCUC a satisfactory purchase agreement between it and the Developers for the acquisition of the Phase 1 Geo-exchange Assets by June 30, 2022.**

[253] Exhibit B-1, Table 7, p. 39.

10.0 Reporting

The Panel directs Oakridge Energy to provide regular reporting to the BCUC for the duration of the Project, as detailed below.

1. Semi-annual Progress Reports on the Project

Each report must include:

- **Summary of the status of implementation for each phase of the Project;**
- **Anticipated construction, commissioning and operations completion dates compared to the implementation schedule show in Figure 9 of the Application, with an explanation for any variance;**
- **For each building, the actual or anticipated in-service date compared to the anticipated connection year provided in Table 8 of the Application, with an explanation for any variance;**
- **For each building, the current forecast energy demand and forecast undiversified peak load compared to the forecast energy demand and forecast undiversified peak load shown in Table 8 of the Application, with an explanation for any variance;**
- **Actual costs incurred to date compared to the estimate provided in Table 14 of the Application highlighting variances with an explanation of significant variances;**
- **Updated forecast of costs, highlighting the reasons for significant changes in Project costs anticipated to be incurred; and**
- **The status of Project risks, highlighting the status of identified risks, changes in and additions to risks, the options available to address the risks, the actions that Oakridge Energy is taking to mitigate the risks and the likely impact on the Project's schedule and cost.**

Oakridge Energy must file semi-annual progress reports within 30 days of the end of each semi-annual reporting period, with the first report covering the period ending June 30, 2022.

2. Material Change Report

A material change (Material Change) is a change in Oakridge Energy's plan for the Project that would reasonably be expected to have a significant impact on the schedule, cost or scope, such that:

- **There is a schedule delay of greater than six months compared to the CPCN schedule provided in Figure 9 of the Application;**
- **The total Project cost exceeds 10 percent of the estimated Project cost provided in Table 14 of the Application; or**
- **There is a change to the Project scope provided in section 7 of the Application.**

In the event of a Material Change, Oakridge Energy must file a Material Change report with the BCUC explaining the reasons for the Material Change, Oakridge Energy's consideration of the Project risk and the options available, and actions Oakridge Energy is taking to address the Material Change. Oakridge Energy

must file the Material Change report as soon as practicable and in any event within 30 days of the date on which the Material Change occurs.

3. Final Report

A Final Report within three months of substantial completion of the Project. The report is to include:

- **The final cost of the Project, including a breakdown of the final costs; and**
- **A comparison of these costs to the estimates provided in Table 14 of the Application and an explanation of all material cost variances for any of the cost items provided in Table 14 that exceed 10 percent.**

In addition to reporting to the BCUC for the duration of the Project as described above, the Panel directs Oakridge Energy to include in its Oakridge DES annual report:

- **A copy of Oakridge Energy's Low-Carbon Energy System annual report that it submits to the City, as described in Section 5.3 of this Decision.**
- **Peak Demand and Diversity information as follows:**
    a. **The heating and cooling peak demand for each building served by the Oakridge DES;**
    b. **The heating and cooling diversified peak demand of the Oakridge DES; and**
    c. **The heating and cooling diversity factors for the Oakridge DES, including any data and assumptions used to determine the diversity factor.**

DATED at the City of Vancouver, in the Province of British Columbia, this 15th day of February 2022.

Original signed by:

R. I. Mason
Panel Chair / Commissioner

Original signed by:

E. B. Lockhart
Commissioner

Original signed by:

T. A. Loski
Commissioner

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ORDER NUMBER
C-2-22

IN THE MATTER OF
the *Utilities Commission Act*, RSBC 1996, Chapter 473

and

Oakridge Energy Limited Partnership
Application for a Certificate of Public Convenience and Necessity for a District Energy System

BEFORE:
R. I. Mason, Panel Chair
E. B. Lockhart, Commissioner
T. A. Loski, Commissioner

on February 15, 2022

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

WHEREAS:

A. On June 1, 2021, Oakridge Energy Limited Partnership (Oakridge Energy) submitted an application to the British Columbia Utilities Commission (BCUC) pursuant to sections 45 and 46 of the *Utilities Commission Act* seeking a Certificate of Public Convenience and Necessity (CPCN) to construct and operate a district energy system (Oakridge DES) for the provision of thermal energy service to the Oakridge Centre property redevelopment (Oakridge Centre Redevelopment) in Vancouver, B.C. (Application);

B. The Oakridge Centre Redevelopment is a joint venture project between Westbank Holdings and QuadReal Property Group (collectively, the Developers);

C. Oakridge Energy is a limited partnership of entities within the Corix Group of Companies and the Creative Energy group, established to meet the thermal energy needs of the Oakridge Centre Redevelopment;

D. The project involves the construction of a DES to serve the Oakridge Centre Redevelopment (Project). The proposed Oakridge DES has been designed as a low-carbon energy system that provides thermal energy through a combination of multiple heating and cooling energy sources, including a closed loop geo-exchange field, a waste heat recovery system, electric boilers, electric chillers, and natural gas boilers;

E. By Orders G-194-21, G-206-21 and G-272-21 dated June 24, 2021, July 7, 2021 and September 16, 2021, respectively, the BCUC established and amended a regulatory timetable for the review of the Application, which included Oakridge Energy filing of further information, public notification, intervener registration, one round of BCUC and intervener information requests (IRs) and Oakridge Energy responses to IRs No. 1;

F. By Orders G-300-21, G-308-21 and G-328-21 dated October 20, 2021, October 29, 2021 and November 10, 2021, respectively, the BCUC established and amended a further regulatory timetable, which included BCUC and intervener IRs No. 2, Oakridge Energy responses to IRs No. 2, and final and reply arguments;

G. On October 21, 2021, Oakridge Energy filed a submission with the BCUC, which included an amendment to approvals sought in the Application based on recent developments regarding the geo-exchange field. Oakridge Energy stated that due to scheduling constraints, the Developers would proceed to construct the first phase of the geo-exchange field at their own cost and risk, and Oakridge Energy would acquire the associated assets at net book value, subject to receiving BCUC approval. Oakridge Energy, therefore, amended its approvals sought in the Application to include approval to purchase the phase 1 geo-exchange field and associated assets (Phase 1 Geo-exchange Assets) at a cost not to exceed the net book value at the time of acquisition;

H. BC Sustainable Energy Association registered as a sole intervener in the proceeding; and

I. The BCUC has considered the Application, evidence and submissions from all parties and finds that public convenience and necessity require that the Project proceed and the following determinations to be warranted.

NOW THEREFORE pursuant to sections 45 to 46 of the *Utilities Commission Act* and for the reasons set out in the Decision issued concurrently with this order, the BCUC orders as follows:

1. A CPCN is granted to Oakridge Energy authorizing:
    a. The construction and operation of a district energy system to provide space heating, space cooling and domestic hot water to the Oakridge Centre Redevelopment.

    b. The purchase of the Phase 1 Geo-exchange Assets from the Developers at a cost not to exceed their net book value at the time of acquisition, subject to the term that Oakridge Energy submits to the BCUC a satisfactory purchase agreement between it and the Developers for the acquisition of the Phase 1 Geo-exchange Assets by June 30, 2022.

2. Oakridge Energy is directed to comply with all the directives outlined in the Decision issued concurrently with this order.

DATED at the City of Vancouver, in the Province of British Columbia, this 15th day of February 2022.

BY ORDER

Original signed by:

R. I. Mason
Commissioner

Oakridge Energy Limited Partnership
Application for a Certificate of Public Convenience and Necessity
for a District Energy System

GLOSSARY AND ACRONYMS

ACRONYM / GLOSSARY	DESCRIPTION
AACE	Association of Advancement of Cost Engineering International
Application	Application seeking a Certificate of Public Convenience and Necessity to construct and operate a district energy system (Oakridge DES) for the provision of thermal energy service to the Oakridge Centre property redevelopment (Oakridge Centre Redevelopment) in Vancouver, B.C.
ASHRAE	American Society of Heating Refrigeration and Air Conditioning Engineers
BC Hydro	British Hydro and Power Authority
BCSEA	BC Sustainable Energy Association
BCUC	British Columbia Utilities Commission
BMDEU	Burnaby Mountain District Energy Utility
CEA	*Clean Energy Act*
City	City of Vancouver
CPCN	Certificate of Public Convenience and Necessity
CPCN Guidelines	BCUC's 2015 Certificate of Public Convenience and Necessity Application Guidelines
Developers	Westbank and QuadReal
DPS	Distribution Piping System
ETS	Energy Transfer Stations
EUI	Energy Use Intensity
FVB	FVB Energy Inc.
GHG	Greenhouse Gas
GHGI	Greenhouse Gas Intensity
HVAC	Heating Ventilation and Air Conditions

ACRONYM / GLOSSARY	DESCRIPTION
Infrastructure Agreement	The agreement with the Developers, which addresses the design, financing, construction, and ownership of the utility infrastructure, provides for permitting and land access, and sets out the design specifications and timelines
Integral	Integral Group
IRs	Information Requests
LCES	Low Carbon Energy System
Limited Partners	Corix Infrastructure Inc. and Creative Energy Ventures Limited Partnership
NEFC	North-East False Creek
NPV	Net Present Value
Oakridge Energy	Oakridge Energy Limited Partnership
Project	The construction of a DES to serve the Oakridge Centre Redevelopment
QuadReal	QuadReal Property Group
RNG	Renewable Natural Gas
RSA	Rate Stabilization Account
T&T	Turner and Townsend
TEDI	Thermal Energy Demand Intensity
TES	Thermal Energy System
TES Guidelines	Thermal Energy Systems Regulatory Framework Guidelines
TEUI	Total Energy Use Intensity
UBC	University of British Columbia
UCA	*Utilities Commission Act*
Westbank	Westbank Holdings

Oakridge Energy Limited Partnership
Application for a Certificate of Public Convenience and Necessity
for a District Energy System

EXHIBIT LIST

Exhibit No.	Description
COMMISSION DOCUMENTS	
A-1	Letter dated June 17, 2021 – Appointing the Panel for the review of the Oakridge Energy LP/GP Inc. Application for a Certificate of Public Convenience and Necessity for a District Energy System dated June 1, 2021
A-2	Letter dated June 24, 2021 – BCUC Order G-194-21 establishing a regulatory timetable, requesting further information and public notice
A-3	Letter dated July 7, 2021 – BCUC Order G-206-21 amending the regulatory timetable
A-4	Letter dated July 12, 2021 – BCUC Response to Oakridge Energy regarding its June 29, 2021 submission in response to Order G-194-21
A-5	Letter dated August 12, 2021 – BCUC Information Request No. 1 to Oakridge Energy
A-6	**CONFIDENTIAL** Letter dated August 12, 2021 – BCUC Confidential Information Request No. 1 to Oakridge Energy
A-7	Letter dated September 16, 2021 – BCUC Order G-272-21 amending the regulatory timetable
A-8	Letter dated October 20, 2021 – BCUC Order G-300-21 establishing a further regulatory timetable
A-9	Letter dated October 29, 2021 – BCUC Order G-308-21 amending the timetable and requesting a revised application
A-10	Letter dated November 10, 2021 – BCUC Order G-328-21 amending the timetable
A-11	Letter dated November 26, 2021 – BCUC Information Request No. 2 to Oakridge Energy
APPLICANT DOCUMENTS	
B-1	**OAKRIDGE ENERGY LP/GP INC. (OAKRIDGE ENERGY)** – Application for a Certificate of Public Convenience and Necessity (CPCN) for a District Energy System (DES) dated June 1, 2021
B-1-1	**CONFIDENTIAL** – Letter dated June 1, 2021 - Oakridge Energy submitting Application for a DES CPCN Confidential Infrastructure Agreement

B-2	Letter dated June 29, 2021 - Oakridge Energy submitting Extension Request to file additional documents
B-3	Letter dated July 20, 2021 – Oakridge Energy submitting Additional Information as requested
B-3-1	**CONFIDENTIAL** – Letter dated June 25, 2021 - Oakridge Energy submitting Confidential Feasibility Study
B-3-2	**CONFIDENTIAL** – Letter dated May 26, 2021 - Oakridge Energy submitting Confidential Fully Executed Infrastructure Agreement
B-4	Letter dated July 30, 2021 – Oakridge Energy submitting clarifications of additional information that was submitted July 20, 2021
B-5	**CONFIDENTIAL** – Letter dated August 12, 2021 – Oakridge Energy submitting Confidential Model
B-6	Letter dated September 15, 2021 – Oakridge Energy submitting extension request to file Information
B-7	Letter dated September 30, 2021 – Oakridge Energy submitting responses to BCUC Information Request No. 1
B-7-1	**CONFIDENTIAL** – Letter dated September 30, 2021 – Oakridge Energy submitting confidential attachments relating to BCUC public Information Request No. 1
B-8	**CONFIDENTIAL** – Letter dated September 30, 2021 – Oakridge Energy submitting responses to confidential BCUC Information Request No. 1
B-9	Letter dated September 30, 2021 – Oakridge Energy submitting responses to BCSEA Information Request No. 1
B-10	Letter dated October 21, 2021 – Oakridge Energy submitting updated to Approvals Sought
B-11	Letter dated November 4, 2021 – Oakridge Energy submitting response regarding Agreement and Application updates
B-12	Letter dated December 9, 2021 – Oakridge Energy submitting responses to BCUC Information Request No. 2
B-12-1	**CONFIDENTIAL** – Letter dated December 9, 2021 – Oakridge Energy submitting responses to BCUC Information Request No. 2 confidential attachment
B-13	Letter dated December 9, 2021 – Oakridge Energy submitting responses to BCSEA Information Request No. 2

INTERVENER DOCUMENTS

C1-1	**BC SUSTAINABLE ENERGY ASSOCIATION (BCSEA)** - Letter dated August 5, 2021 Request to Intervene by T. Hackney
C1-2	Letter dated August 19, 2021 – BCSEA Information Request No. 1 to Oakridge Energy
C1-3	Letter dated November 26, 2021 – BCSEA Information Request No. 2 to Oakridge Energy
C1-4	Letter dated December 16, 2021 – BCSEA confirming intention to file Final Argument

INTERESTED PARTY DOCUMENTS

D-1	The City of Abbotsford (Abbotsford) - Submission dated July 19, 2021 – Request for Interested Party status by Aniz Alani
D-2	FVB Energy Inc. (FVB) - Submission dated October 6, 2021 – Request for Interested Party status by David Trigg
D-3	Fandrich, E. (Fandrich) - Submission dated November 22, 2021 – Request for Interested Party status