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VIA EMAIL

August 29, 2014

BRITISH COLUMBIA UTILITIES COMMISSION
Sixth Floor, 900 Howe Street, Box 250
Vancouver, BC V6Z 2N3

Attention: Ms. Erica Hamilton, Commission Secretary

RE: **Corix Multi-Utility Services Inc. ("Corix") Application for a Certificate of Public Convenience and Necessity for Phase 1 of the Neighbourhood District Energy System ("NDES") at the University of British Columbia – Revised**

Attached is a revised CPCN application for Phase 1 of the NDES at the University of British Columbia.

Also attached is a draft copy of the Infrastructure Agreement (Appendix 10) between Corix and UBC. A final copy of this agreement will be filed with the Commission when completed.

Eight hard copies of these materials will be sent to your offices in the next few days.

If you have any questions, please contact me at (604) 697-6702 or Michelle McLarty at (604) 697-6782.

Sincerely yours,

Corix Multi-Utility Services Inc.

Ian Wigington
Director, Regulatory and Government

cc: Michelle McLarty
Director, Business Development

CPCN APPLICATION

FOR

THE UNIVERSITY OF BRITISH COLUMBIA

NEIGHBOURHOOD DISTRICT ENERGY SYSTEM PROJECT

Prepared by Corix Utilities Inc.

August 8, 2014

Building a World of
Sustainable Communities

CPCN APPLICATION

FOR

THE UNIVERSITY OF BRITISH COLUMBIA

NEIGHBOURHOOD DISTRICT ENERGY SYSTEM PROJECT

SUBMITTED TO:	**BRITISH COLUMBIA UTILITIES COMMISSION** SIXTH FLOOR, 900 HOWE STREET BOX 250 VANCOUVER, BC V6Z 2N3 ATTENTION: ERICA HAMILTON COMMISSION SECRETARY
SUBMITTED BY:	**CORIX MULTI-UTILITY SERVICES INC.** SUITE 1160, 1188 WEST GEORGIA STREET VANCOUVER, BC V6E 4A2 CONTACT: MICHELLE MCLARTY DIRECTOR, BUSINESS DEVELOPMENT PHONE: 604.697.6782 CELL: 604.999.1592 FAX: 604.697.6703 EMAIL: michelle.mclarty@corix.com CONTACT: IAN WIGINGTON DIRECTOR, REGULATORY AND GOVERNMENT PHONE: 604.697.6702 CELL: 604.240.6567 FAX: 604.697.6703 EMAIL: ian.wigington@corix.com
DATE:	AUGUST 8, 2014

Corix Utilities

Building a World of Sustainable Communities

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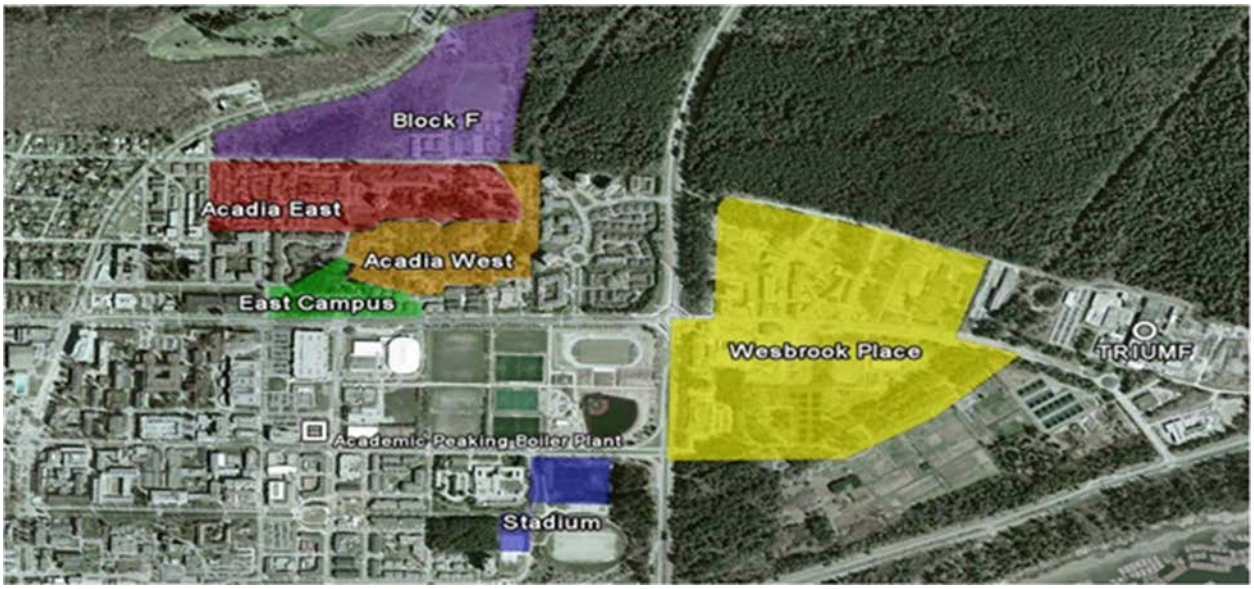
EXECUTIVE SUMMARY

Corix Multi-Utility Services Inc. ("CMUS") is seeking a Certificate of Public Convenience and Necessity ("CPCN") to construct and operate Phase 1 of the University of British Columbia ("UBC") Neighbourhood District Energy System ("NDES") to serve new developments at UBC. Hereafter, CMUS will be referred to as Corix. *Figure 1: Proposed NDES Service Area* depicts the proposed NDES service area.

To facilitate the start of initial construction of the NDES in early 2015, at this time Corix is requesting expedited Commission approval for Phase 1 (the first 10 years of the model) of the NDES as described in this application, including an indicative financial model showing current cost assumptions, revenue requirements, rate design and rates. Corix will be filing a revised financial model, revenue requirement and rate application in the spring of 2015. Corix is however seeking Commission approval in principle of the Carbon Emissions Rider and the Connection Credit and the Residential Deferral Account based on a levelized rate approach as described below and elsewhere in this application.

Project Plan

Figure 1: Proposed NDES Service Area



The purpose of the UBC NDES is to provide a thermal energy solution that supports UBC's institutional and neighbourhood GHG reduction targets, in addition to the community and provincial energy sustainability objectives for the new development areas. To achieve this, the project plan outlines how the NDES development is contemplated to be implemented in two phases with the goal to efficiently match capital investment with neighbourhood development. Phase 1, the project for this application, is approximately the first 10 years of operation and provides service for Wesbrook Place and initial loads in the Acadia East and Block F neighbourhoods.

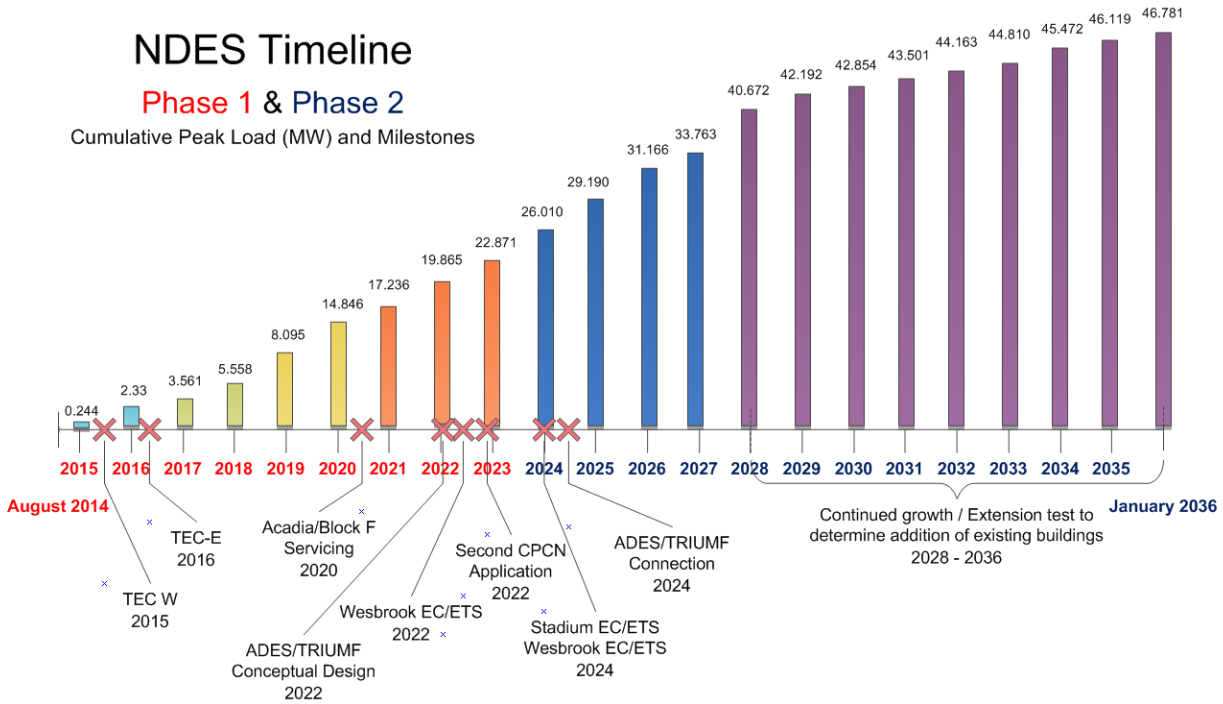
Phase 2 is currently contemplated to occur in 2024 when thermal load can support the installation of the alternate energy source, which is likely to be the utilization of waste heat from TRIUMF cooling towers. UBC has a Letter of Intent (LOI) with TRIUMF supporting the project.

The trigger to initiate Phase 2 of the NDES is either or both of the following events:

- the interconnection of the Wesbrook portion of the NDES and the ADES; and/or
- the connection of a permanent CEP to an Alternate Energy Source

Phase 2 of the NDES Project Plan outlines the interconnection of Wesbrook Place, Stadium Road, the ADES and Acadia/Block F with a main trunk supply-return pipeline. A permanent Central Energy Plant (CEP) will be constructed to the south of Wesbrook Place, as close as possible to the TRIUMF research facility. *Figure 2: NDES Project Plan* outlines the overall Project Plan.

Figure 2: NDES Project Plan



There are two unique features proposed for the NDES that provide long term benefits to NDES customers. The first is the Carbon Emissions Rider. It is proposed that during Phase 1, Corix will collect, in rates, a temporary rider called the Carbon Emissions Rider of $25 / tonne of GHG emissions. The rider is intended to ensure that initial customers served by temporary natural gas boilers contribute to the cost of future Alternate Energy Sources and to help mitigate potential changes in rates with the implementation of the Alternate Energy Sources. It is also intended to ensure that Corix has appropriate incentives to implement low carbon energy sources in the event natural gas prices stay low.

The second unique feature is the Connection Credit, which is proposed to ensure that early low-rise buildings in Wesbrook Place have the required hydronic systems to connect to the NDES. Securing these loads will result in lower rates for all customers, even after taking into account the Connection Credit. The Connection Credit is designed to reflect the incremental cost of in-suite hydronic heating systems, over electric baseboard heating, and decline over time, as it is expected that hydronic building systems will become standard as developers innovate and building codes evolve, thereby eliminating the premium. The Connection Credit is anticipated to be in place until 2021.

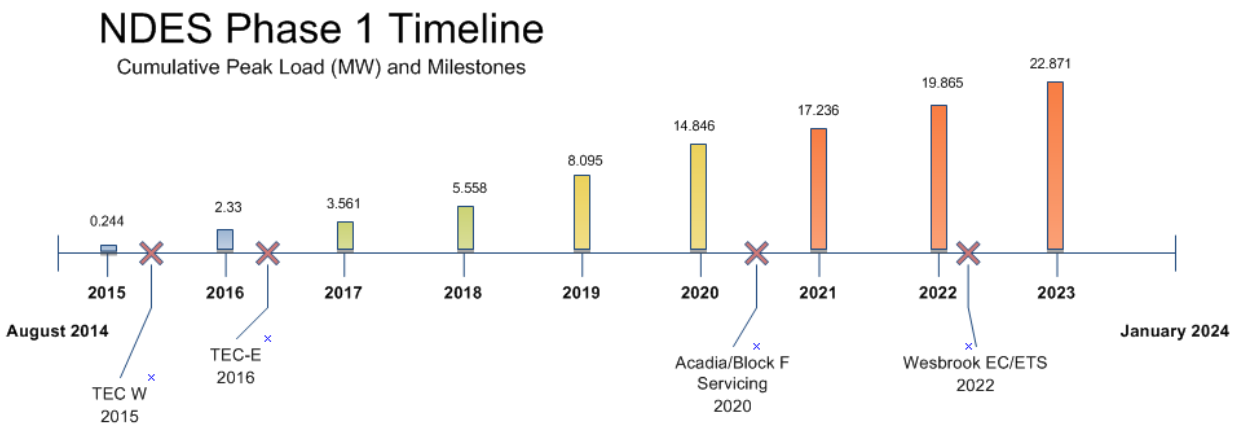
When the community is built out, the NDES is projected to reduce annual GHG emissions by approximately 64% and electricity by 40% relative to benchmark approaches to heating and domestic hot water production to multi-family residential buildings in Vancouver. The project aligns with UBC's Sustainability Initiative,

UTown@UBC Community Energy and Emissions Plan (CEEP) and the Provincial Government's green energy objectives under the *2007 BC Energy Plan* and the *Clean Energy Act*.

Phase 1- Current CPCN Application

Phase 1, the project outlined in this CPCN application, is approximately the first 10 years of operation and provides service for Wesbrook Place and initial loads in the Acadia East and Block F neighbourhoods. Corix is currently seeking a CPCN for the first 10 years of the project plan including indicative projected rate base, indicative revenue requirements, indicative rates, revenue deficiency deferral account (referred to as Residential Deferral Account in indicative model), connection credit and GHG emission rider associated with this phase. During Phase 1 two temporary energy centres (TECs), potentially a component of the nodal Wesbrook Energy Centre/ETS, distribution piping systems and energy transfer stations will be constructed to serve the initial development parcels in the Wesbrook Place neighbourhood. Natural gas will be the interim fuel source and the first building called Prodigy will require service in June of 2015. Acadia East and Block F will likely be served by purchased energy from the UBC Academic District Energy System. *Figure 3: NDES Phase 1 Project Plan* outlines the timeline for Phase 1.

Figure 3: NDES Phase 1 Project Plan



By submitting this application to the BCUC, Corix applies for:

1. A Certificate of Public Convenience and Necessity under Sections 45 of the Utilities Commission Act (the "Act") for the construction and operation for Phase 1 of the proposed community-based district energy system at UBC, Vancouver BC
2. Approval under section 45(vii) of the Infrastructure Agreement between Corix and UBC, including endorsement of the proposed project plan.
3. Approval under sections 45 (i),56, 60 and 61 of the Act of the revenue requirements, rate design and rates as described in the application (a revised financial model showing final revenue requirements, rate design and rates will be filed in the spring of 2015):
   a. The indicative rate base as provided in Section 2.7 of the Application.
   b. The indicative revenue requirement as provided in Section 2.9 and consistent with the recent Commission decision in the Phase 2 Generic Cost of Capital proceeding applicable to small thermal energy utilities:
      i. A deemed capital structure of 57.5% debt and 42.5% equity;
      ii. Long term debt financing costs estimated at 4.0%;
      iii. A return on equity (ROE) 9.5%, which is based on the current low risk benchmark equity return plus 75 basis points to account for the additional risk related to the development of the small scale alternative energy utility;

iv. Operating costs as provided in Section 2.6.2; and
v. The proposed 10-year levelized rate structure through which the company defers a portion of its annual revenue requirements in the early stages of development in order to provide affordable rates for customers.

c. Approval of the accounting treatment of the following:
i. A revenue deficiency deferral account which is used to record those portions of revenue requirements which are not recovered in the early stages of development, with the goal of complete recovery of the funds over the 20-year period; and
ii. The proposed Connection Credit for low rise buildings connected prior to 2021
iii. The Carbon Emission Rider; and
iv. The indicative rate design as provided in Section 2.10 of the Application

This application was developed in accordance with the *2010 CPCN Application Guidelines.* Corix would be the utility services provider responsible for system operations and maintenance, emergency response, and billing and customer care functions. The indicative rates were developed using a cost of service model and financial structure consistent with that implemented by other regulated utilities in British Columbia. Final rate design and rates will be submitted early in 2015 when construction for Prodigy service is completed. This will include the installation of the first temporary energy center, plus distribution piping and the ETS to serve the building.

Section 1 – "Project Introduction" provides information about Corix, its technical and financial capacity, the proposed project team and an overview of the regulatory process proposed for this project.

Section 2 – "Project Need, Alternatives and Justification" includes information about the project, its purpose, the feasibility study (including UBC's feasibility study evaluating thermal energy alternatives) and the results of the financial and technical analysis of the selected technical concept compared with business as usual.

Section 3 – "Consultation" focuses on the public consultation process conducted to date. Samples of related material developed for the consultation process are included in Appendices 3 and 4.

Section 4 – "Project Description" provides a detailed technical description of the project and an overview of the project implementation process.

Section 5 - "Project Costs" - in addition to the summary of the project costs provided in Section 3, this section includes a more detailed breakdown of the capital costs and an overview of the assumptions as developed during the feasibility assessment process.

Section 6 – "Provincial Government Energy Objectives and Policy Considerations" – addresses British Columbia's Energy Objectives and the project's impact on the environment.

Section 7 – "New Service Areas" includes information about the operations and maintenance, customer service and the proposed role of the new neighbourhood energy utility.

1 PROJECT INTRODUCTION

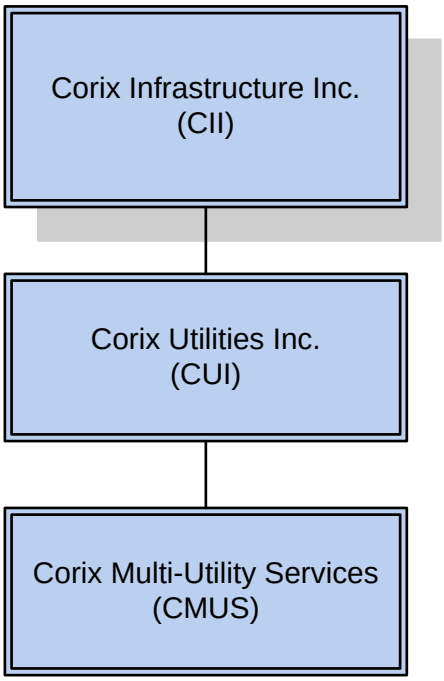
1.1 APPLICANT

1.1.1 Name, Address and Nature of Business

Corix Multi-Utility Services Inc. (CMUS), a subsidiary of Corix Inc., will develop, implement and own the Neighbourhood District Energy System (NDES) that will provide thermal energy to the University of British Columbia's new development areas at its Vancouver campus.

The ownership structure of Corix Multi-Utility Services with Corix is depicted in *Figure 4: Ownership Structure Organizational Chart*.

Figure 4: Ownership Structure Organizational Chart



Corix

Corix is a fully integrated, leading provider of utility infrastructure solutions, including energy, water and wastewater projects. The Corix team has extensive experience and expertise in the development of sustainable District Energy Utilities across North America and includes local experience at UniverCity in Burnaby, BC. Corix's portfolio includes system ownership, operations and management services, water product distribution and other utility services.

University of British Columbia

Established in 1908, the University of British Columbia (UBC) is one of Canada's leading research universities and is consistently ranked among the top 40 in the world. UBC is located on two campuses, an Okanagan campus in Kelowna, and a Vancouver Campus at Point Grey (referred to here as UBC's Vancouver campus, or the Campus).

UBC Properties Investments Ltd. (referred to here as UBC Properties Trust) was created in 1988 as a wholly owned subsidiary of UBC and the sole trustee of the UBC Properties Trust. The Trust's beneficiaries are UBC and the UBC Foundation. Its mission is to acquire, develop and manage real estate assets for the benefit of its beneficiaries. Over the years, the role of UBC Properties Trust has evolved to include management of many aspects of UBC's real estate assets, including servicing and marketing lands for residential development, and developing faculty and staff rental housing.

UBC's Vancouver campus is located within the boundaries of Metro Vancouver. However, its land use and planning regime is governed by Part 10 of the Municipalities Enabling and Validating Act (No. 3) [SBC 2001] Ch. 44 (MEVA), which provides for the Minister to adopt a Land Use Plan and that for so long as the Land Use Plan is in effect, the Metro Vancouver's land use bylaws (and in particular, zoning bylaws) do not apply to the Campus. Rather, UBC's Board of Governors must ensure that all:

(a) agreements entered into by the University,
(b) rules, resolutions or similar authorities issued or adopted by the Board of Governors,
(c) permits, licences or similar authorities issued or adopted by the University under an authority referred to in paragraph (b), and
(d) land development undertaken or authorized by the Board of Governors,

are consistent with the Land Use Plan.

The Land Use Plan is akin to an official community plan adopted by a local government pursuant to the Local Government Act. The Land Use Plan divides the Campus into "academic", "green academic" and "residential community" areas. Lands designated as "residential community" are to provide a range of rental and long-term lease housing to the broader community (non-institutional housing). The "residential community" areas are divided into Neighbourhood Housing Areas, which are reserved for the creation of a vibrant residential community with related retail and office areas.

The UBC Board of Governors applies the general land use policies of the Land Use Plan by adopting a Neighbourhood Plan for each Neighbourhood Housing Area.

Currently, the Land Use Plan designates seven Neighbourhood Housing Areas. Four have been built out (Hampton Place, Chancellor Place, Hawthorne Place and East Campus). Wesbrook Place is currently being developed. Stadium and Acadia East are reserved for future development.

When completed, Wesbrook Place will be the largest Neighbourhood on UBC's Vancouver Campus. Over 12,500 students, faculty, staff, parents, alumni and members of the general public will live here in a mix of townhouses and apartments. Neighbourhood plans will be prepared for the future Acadia East and Stadium Road Neighbourhoods. Within the Acadia East neighbourhood, there are two precincts: the Acadia West Precinct has been designated for University purposes, namely student family housing, and Acadia East precinct will be designated to provide housing to the broader community. In this document, the Wesbrook Place, Acadia East, East Campus and Stadium Road Neighbourhoods will be referred to collectively as the Development Areas.

The land within each Development Area is owned in fee simple by UBC. UBC Properties Trust administers the process of subdividing, servicing and marketing the lands to third party developers. UBC Properties Trust also develops and operates residential and commercial rental premises in the Development Areas.

Development sites are developed pursuant to the terms of a 99-year ground lease between UBC and the developer. The terms of the lease require that the developer construct the building in compliance with UBC's land use rules and governance requirements, which are municipal-like in structure and content (including requiring compliance with the B.C. Building Code). In addition, the lands on Campus are subject to property taxes at the rural tax rate. To ensure that there is no tax advantage to leasing land on Campus (compared to the City of Vancouver) and to provide funding for the municipal-like services provided in the Development Areas, the lease requires lessees to pay to UBC an additional amount, called the "services

levy". The amount of the services levy is such that a lessee on Campus will pay a comparable amount to what a person leasing land in the City of Vancouver would pay in property taxes.

UBC has an existing Academic District Energy System (ADES), which serves the academic section of Campus. UBC is completing a major conversion of its ADES from steam to hot water. UBC has added the Bioenergy Research and Demonstration Facility (BRDF) to the ADES and is now building a new gas-fired hot water plant.

Musqueam First Nations and Block F

The Musqueam First Nation is currently seeking to rezone Block F with the University Endowment Lands (UEL) for a mixed used development. The UEL is the administration set up to administer all lands generally described as being situate in the areas east of Wesbrook Mall and north of Agronomy Road. Block F is located immediately east of UBC's Acadia East Neighbourhood and is owned by the Musqueam First Nations. Block F was contemplated in the pre-feasibility study and is currently being considered as part of the project plan.

Neighbourhood District Energy System (NDES)

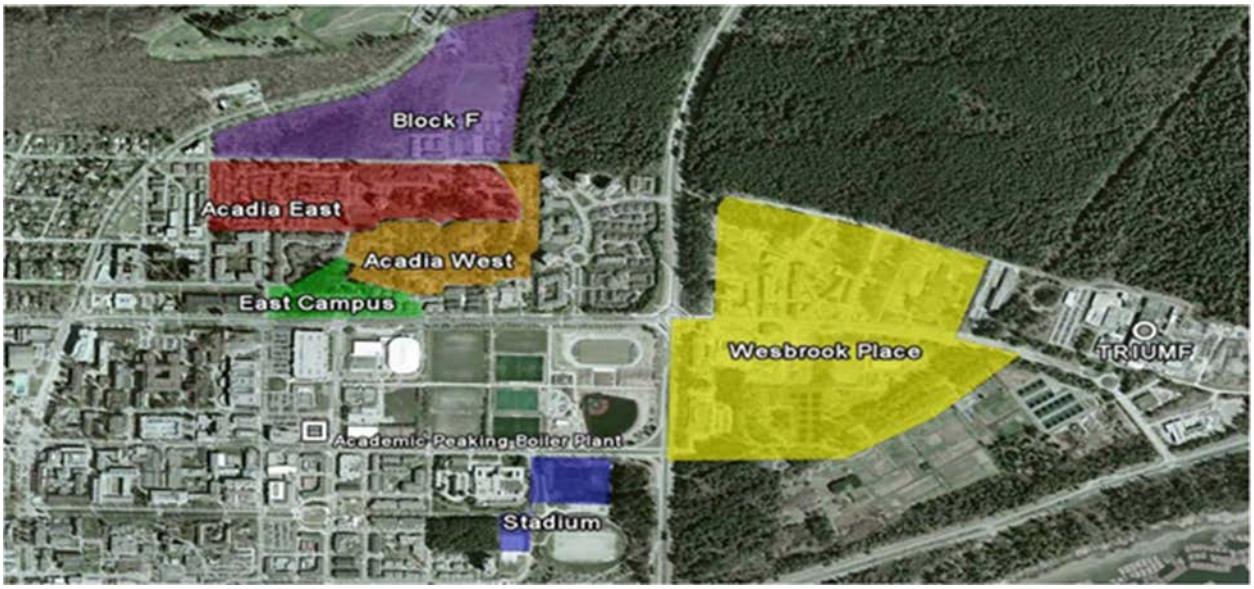
In 2011, UBC commissioned a pre-feasibility study of district energy as one tool for achieving its high environmental targets for development at Wesbrook Place. The pre-feasibility study found that a Neighbourhood District Energy System (NDES) using waste heat captured from TRIUMF cooling towers could be technically and economically viable, while providing large GHG reductions and other social and environmental benefits. TRIUMF is Canada's national laboratory for particle and nuclear physics and is owned and operated by a consortium of Canadian universities (including UBC). UBC subsequently commissioned a full feasibility study to assess the potential for a NDES serving the Development Areas and the Musqueam First Nations Block F lands. The full feasibility study considered an expanded scope (larger Development Area) and contains more detail than the pre-feasibility study.

After considering the results of the full feasibility study, UBC determined that a NDES utilizing waste heat from TRIUMF cooling towers (or comparable Alternate Energy Sources) would support its objectives for the target Development Areas as well as UBC's institutional GHG reduction targets. UBC sees considerable potential synergies between the NDES and ADES, along with other strategic benefits, including possible research and education opportunities, consistent with UBC's goal for the Campus as a Living Lab. After considering various ownership models, UBC opted to pursue a private sector partner to develop the core NDES infrastructure and deliver ongoing retail services to residents. This decision was made in part because of the commercial and regulated nature of district energy services to external residents and businesses, and in part because of UBC's capital constraints and other near-term capital priorities.

Based on the results of the full feasibility study on February 25, 2013, UBC issued a Request for Information (RFI) to identify a utility partner to complete due diligence on and to implement an NDES using Alternate (low-carbon) Energy Sources across the new Development Areas at UBC. Several respondents submitted responses to the RFI and based on its evaluation, on May 6, 2014 UBC issued a Supplementary Request for Information (SRFI) to the two leading respondents. Based on that competitive process, UBC awarded the project to Corix in August of 2013.

Corix completed final detailed due diligence and in March 2014 submitted the NDES Project Plan that proposes that the NDES approach be implemented in two phases, with Phase 1 being a temporary natural gas solution serving early loads and Phase 2 being the implementation of the Alternate Energy Source, which is currently contemplated to be waste heat recovery from TRIUMF. *Figure 5: Proposed NDES Service Area* outlines the overall project plan.

Figure 5: Proposed NDES Service Area



This CPCN application is for Phase 1. The Project Plan phases are generally described below:

- Phase 1 involves the construction of two separate district heating loops, one for Wesbrook Place and one for Acadia East and Block F, (with further extensions as required). The Wesbrook Place loop would be fed initially by two 6.0 MW temporary natural gas boiler plants, plus a portion of the Wesbrook EC/ETS (5MW Boiler) in 2022. The Acadia East/Block F would be fed from the ADES via an interconnection to the ADES peaking plant. Phase 1 includes each loop's energy supply capacity or connection, associated distribution piping and energy transfer stations;
- The trigger to initiate Phase 2 of the NDES is either or both of the following events:
    - the interconnection of the Wesbrook portion of the NDES and the ADES; and/or
    - the connection of a permanent Central Energy Plant (CEP) to an Alternate Energy Source

There are two unique features proposed for the NDES that provide long term benefits to NDES customers. The first is the Carbon Emissions Rider. It is proposed that during Phase 1, Corix will collect in rates a temporary rider called the Carbon Emissions Rider of $25 / tonne of GHG emissions. The rider is intended to ensure that initial customers served by temporary natural gas boilers contribute to the cost of future Alternate Energy Sources and to help mitigate potential changes in rates with the implementation of the Alternate Energy Sources. It is also intended to ensure that Corix has appropriate incentives to implement low carbon energy sources in the event natural gas prices stay low. The second unique feature is the Connection Credit, which is required to insure that early low-rise buildings in Wesbrook Place have the required hydronic systems to connect to the NDES. Securing these loads will result in lower rates for all customers, even after taking into account the Connection Credit. The Connection Credit is designed to reflect the incremental cost of in-suite hydronic heating systems, over electric baseboard heating, and decline over time, as it is expected that hydronic building systems will become standard as developers innovate and building codes evolve, thereby eliminating the premium. The Connection Credit will be in place until 2021.

The anticipated Alternate Energy Source is TRIUMF, which is located to the south of Wesbrook Place, in the South Campus. TRIUMF generates a substantial amount of waste heat for a very significant portion of the year from cooling requirements for their research equipment; currently, the waste heat is rejected to the atmosphere via cooling towers. TRIUMF waste heat recovery is anticipated to be implemented in 2024. UBC has been consulting with TRIUMF throughout the feasibility process and has a Letter of Intent (LOI) in place agreeing to jointly support the development, establishment and operation of a heat recovery and distribution system.

1.2 FINANCIAL AND TECHNICAL CAPACITY

1.2.1 Financial Capacity

Corix is a privately held Canadian corporation owned by the British Columbia Investment Management Corporation (bcIMC).

Based in Victoria, British Columbia, bcIMC is one of the largest institutional investors in Canada, with gross assets under management of more than $114.0 billion. In addition to core holdings such as Corix, bcIMC has an active direct infrastructure investment program including water utilities, electric and gas utilities, energy and power companies, liquids transportation pipelines, and rapid transit infrastructure. bcIMC is a corporation owned by the Province of British Columbia and is not rated by credit rating agencies.

The solid financial foundation provided by this large, stable and well-respected investment firm enables Corix to be a fully invested partner with our clients. Corix has a strong financial history of consistent growth, stable revenue generation and operating cash flow. Corix has experienced strong revenue growth over the past 5 years with an average annual increase of 11%. Over the same period, EBITDA has grown at an annual rate of 21%. Correspondingly, we have also increased our asset base through a number of key investments and our employee base has increased to provide appropriate support without adding undue costs to our operations. Corix currently has over 2,250 employees and in 2013 recorded revenues of $620.9 million and $1,486.6 million in assets. Corix has established term debt and a revolving loan facility with a syndicate of banks, led by TD Securities and HSBC Bank Canada.

Corix has borrowing capacity of $250 million through a $150 million revolving credit facility and a $100 million accordion to its credit facility. This capacity can be used to provide interim financing for projects. Additionally, Corix can also access interim financing from its shareholders and external partners. Corix's core businesses is the long-term investment of equity in capital infrastructure related businesses and projects and we have extensive experience in making equity investments.

1.2.2 Technical Capacity

Corix and its predecessor companies have over 70 years of combined experience designing, building, financing and managing utility infrastructure systems. Corix owns and operates district energy systems at UniverCity in Burnaby, BC and at Centretown Citizens Ottawa Corporation (CCOC) in Ottawa, Ontario. Corix is an investor and operator of Dockside Green biomass-based district energy system (DES) and community tertiary wastewater treatment plant in Victoria, the electric, gas and district energy systems at Fort Wainwright, Joint Base Elmendorf-Richardson and Fort Greely in Alaska, and multi-utility operations at Panorama, Sun Rivers, and Sonoma Pines. Other projects include a long-term contract to own and operate the GeoExchange community at Wills Creek in Surrey, BC and the Rise in Vernon, BC. In addition to these operations, Corix operates regulated and non-regulated utility systems throughout Western Canada, Ontario, and the US. Corix has significant in-house experience in the design, construction and operations of district energy systems.

Corix partnered with Kerr Wood Leidal throughout the competitive process and they are the lead technical consultant for the NDES project. Kerr Wood Leidal Associates (KWL) is a civil engineering firm specializing in infrastructure consulting services, including infrastructure planning, modelling, design, construction management, project management and survey services. Clients include all levels of government, heavy industry, utilities, mining, First Nations, and developers. KWL has completed a number of district energy projects including projects with UBC (steam to hot water conversion), the City of Surrey, City of New Westminster and the City of Vancouver. Other specialized firms will be retained as required through the project.

1.2.3 Name, Title and Address of Contact

All communications with respect to this application should be addressed to:

Michelle McLarty, Director Business Development
Suite 1160, 1188 West Georgia Street, Vancouver, BC V6E 4A2
Telephone: 604.697.6782
Mobile: 604.999.1592
Facsimile: 604.697.6703
Email: michelle.mclarty@corix.com

Alternate contact:

Ian Wigington, Director Regulatory and Government
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Telephone: 604.697.6702
Mobile: 604.240.6567
Facsimile: 604.697.6703
Email: ian.wigington@corix.com

1.2.4 Name and Address of Legal Counsel

Ann Tuck, Senior Legal Counsel
Suite 1160, 1188 West Georgia Street, Vancouver, BC V6E 4A2
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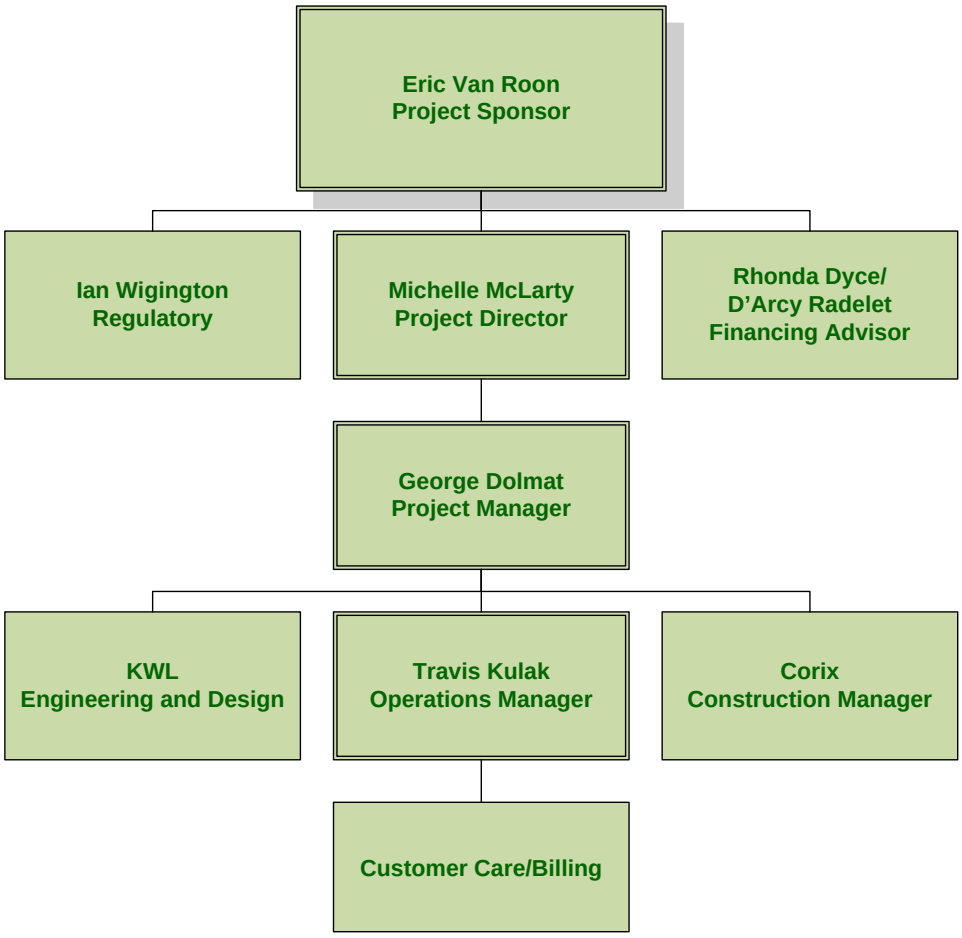
Email: ann.tuck@corix.com

David Bursey, Partner, Energy + Aboriginal Law
BULL HOUSSER, Suite 900 - 900 Howe Street, Vancouver, BC, V6Z 2M4
Telephone: 604.641.4969
Fax 604.646.2563
Email: dwb@bht.com

1.2.5 Project Team Organizational Chart

The project team comprises individuals within Corix who are experienced at successfully delivering projects of similar complexity as the proposed UBC NDES project and have extensive experience in designing and engineering district energy systems. Several team members have direct experience with the development of community based district energy systems in BC and Canada. The project team will also be supported by KWL Consulting Engineers who have experience in designing district energy heating and cooling systems in Canada and internationally. *Figure 6: Project Team Organizational Chart* outlines the project team.

Figure 6: Project Team Organizational Chart



1.3 REGULATORY PROCESS

In this Application, Corix is seeking approval of the indicative rate base, revenue requirements, rates and revenue deficiency deferral account (referred to as Residential Deferral Account in indicative model) associated with Phase 1 of the Project Plan, which is approximately the first 10 years of operation and includes the construction of distribution piping system (DPS) and energy transfer station (ETS) infrastructure, as well as two temporary energy centres and the nodal Wesbrook Energy Centre/ETS that will use natural gas as the interim fuel source to serve the initial development parcels in the Wesbrook Place neighbourhood. The long-term Project Plan, which includes the full expected DPS and ETS assets, boiler capacity, and the connection to TRIUMF for waste heat utilization, is presented as context for this Application, in particular as context for the proposed levelized rates, rate stabilization account and long-term benefits of the project. The Project Plan also forms part of the Infrastructure Agreement in Appendix 10 with UBC, which will guide the development of the NDES. The use of levelized rates is consistent with the approach used in other new district energy systems approved by the Commission including UniverCity, Dockside Green, and River District Energy. Corix intends to file a second CPCN Application for Phase 2 of the NDES development (currently forecasted to occur in 2024) when either or both of the following triggers occur:

- the interconnection of the Wesbrook portion of the NDES and the ADES; and/or
- and the connection of a permanent CEP to an Alternate Energy Source;

By submitting this application to the BCUC, Corix applies for:

1. A Certificate of Public Convenience and Necessity under Sections 45 of the Utilities Commission Act (the "Act") for the construction and operation for Phase 1 of the proposed community-based district energy system at UBC, Vancouver BC.
2. Approval under section 45(vii) of the Infrastructure Agreement between Corix and UBC, including endorsement of the proposed project plan.
3. Approval under sections 45 (i) 56, 60 and 61 of the Act of the indicative revenue requirements, indicative rate design and indicative rates as described in the application (a revised financial model showing final revenue requirements, rate design and rates will be filed in the spring of 2015):
    a. The rate base as provided in Section 2.7 of the Application.
    b. The indicative revenue requirement as provided in Section 2.9 and consistent with the recent Commission decision in the Phase 2 Generic Cost of Capital proceeding applicable to small thermal energy utilities:
        i. A deemed capital structure of 57.5% debt and 42.5% equity;
        ii. Long term debt financing costs estimated at 4.0%;
        iii. A return on equity (ROE) 9.5%, which is based on the current low risk benchmark equity return plus 75 basis points to account for the additional risk related to the development of the small scale alternative energy utility;
        iv. Operating costs as provided in Section 2.6.2; and
        v. The proposed 10-year levelized rate structure through which the company defers a portion of its annual revenue requirements in the early stages of development in order to provide affordable rates for customers.
    c. Approval of the accounting treatment of the following:
        i. A revenue deficiency deferral account which is used to record those portions of revenue requirements which are not recovered in the early stages of development, with the goal of complete recovery of the funds over the 20-year period; and
        ii. The proposed Connection Credit for low rise buildings connected prior to 2021;
        iii. The Carbon Emission Rider; and
        iv. The indicative rate design as provided in Section 2.10 of the Application

2 PROJECT NEED, ALTERNATIVES AND JUSTIFICATION

2.1 PROJECT HISTORY AND NEED

UBC's on-campus residential community currently houses approximately 8,500 residents in student accommodations and an additional 8,000 permanent community residents. UBC is targeting an additional 8,000+ student beds by 2030 in order to meet its goal for 50% of the full-time student enrolment. Meanwhile, neighbourhood build-out is projected to conclude by 2041 with a population of approximately 24,000 residents, requiring rapid building development. With these population targets and developments come increased sustainability challenges, such as increased greenhouse gas emissions on campus.

The Province of BC measures local governments' greenhouse gas (GHG) emissions in the Community Energy and Emissions Inventory (CEEI). Analysis determine that 51.5% of UBC's residential GHG emissions are due to building energy use, and almost entirely the result of fossil fuel use.

In 2011, UBC and the University Neighbourhoods Association (UNA) developed a Community Energy and Emissions Plan (CEEP) for UBC's residential community. The CEEP presents a comprehensive framework to achieve reductions in the use of energy, and to reduce GHG emissions within the community. In order to support its vision to advance a sustainable live-work-learn residential community, and to aid in achieving its greenhouse gas (GHG) emissions reduction targets of 18% by 2020 and 85% by 2050, UBC's CEEP recommends the implementation of a low carbon district energy (DE) system servicing all new buildings starting in 2015.

In June 2011, Stantec and Earth Voice Strategies completed a pre-feasibility study of a district energy system for Wesbrook Place for UBC with funding support from BC Hydro. Using preliminary, screening-level assumptions, the pre-feasibility study results suggested an NDES using waste heat capture from TRIUMF (Canada's national laboratory for particle and nuclear physics) was technically and potentially economically viable. Stantec recommended a full feasibility study be conducted.

In December 2011, UBC commissioned FVB and Compass Resource Management to prepare a full feasibility study to assess the potential for a NDES serving Wesbrook Place, as well as the Stadium Road, Acadia West, Acadia East, East Campus, and Block F (Musqueam) lands Development Areas. The study concluded that using waste heat from TRIUMF and/or biomass is technically feasible, with waste heat from TRIUMF being the preferred technology, and that on a lifecycle basis, customers' energy costs would be similar to current energy costs within the community.

Following the preliminary studies, in February 2013 UBC issued an RFI to identify a utility partner to complete due diligence for the potential implementation of a temporary district energy solution followed by the long term Alternate Energy Source solution to serve the neighbourhoods. Based on the RFI submissions, UBC released a Supplementary Request for Information (SRFI) and Corix responded with an initial due diligence report that analyzed the NDES alternatives for providing energy service to the UBC neighbourhood and confirming the viability of the NDES business case. Via this competitive bid process, Corix was named the lead proponent to finalize the due diligence and implement a BCUC regulated NDES. In January 2014, Corix completed a detailed technical and financial Due Diligence report that is the basis for this CPCN application.

In April 2014, Corix, along with a team representing the UBC Properties Trust, met with BCUC staff and presented an overview of the project scope of the new residential development underway at UBC and the proposed neighbourhood district energy system to serve that development.

2.2 SCREENING OF ALTERNATIVE TECHNOLOGIES

The UBC pre-feasibility study investigated a range of thermal energy sources with the following four energy supply alternatives being evaluated in more detail:

- Connection to the future medium temperature hot water system for the main Campus;
- Heat capture from the TRIUMF cooling facilities;
- Biomass combustion from a facility located on South Campus; and
- Sewer heat capture from South Campus sewer lines.

The pre-feasibility study results concluded that there are several technically feasible Alternate Energy Sources, that waste heat captured from TRIUMF and connection to the ADES are the preferred options, and the study recommended a full feasibility study to further refine the opportunity. In 2011, a full feasibility report was conducted by FVB Energy and Compass Resource Management, to develop the technical and business case for the NDES. The study generated the following conclusions:

- NDES serving UBC's Wesbrook, Stadium Road, Acadia East and potentially Block F Development Areas and using waste heat from TRIUMF and/or biomass is technically feasible. Waste heat could be captured from TRIUMF's cooling towers.
- The NDES would provide significant reductions in natural gas use and GHG emissions and moderate reductions in electricity use (at build out), both to the target Development Areas and to the Academic Campus. The NDES supports UBC's near-term GHG reduction targets. It also facilitates development of future Alternate Energy Sources to meet more aggressive significant long-term reduction targets. The system supports UBC's vision for a sustainable community with seamless integration to surrounding academic uses. There are also many teaching, research, and demonstration opportunities associated with the NDES (both in terms of technical and socio-economic aspects), which is consistent with UBC's vision of a living lab.
- Waste heat from TRIUMF is the preferable starting technology, but biomass offers an economically viable alternative to TRIUMF if agreements cannot be reached with TRIUMF to access waste heat and optimize system design. Biomass also offers a source of supplemental alternative energy in future phases of development.
- Under a set of conservative but realistic Reference Case assumptions and a variety of ownership scenarios, the NDES cost to residents would be equal to or lower than the benchmark cost based on 100% electric heat.

The full feasibility study uses the waste heat recovery from the TRIUMF cooling water system for the NDES Reference Case. Biomass combustion was considered as a supplemental source of alternative energy (for the NDES and the existing Academic District Energy System (ADES) in future phases if necessary, and also as an alternative to waste heat recovery from TRIUMF in sensitivity analyses. In all scenarios, peaking and back up for the NDES is provided by the ADES and/or dedicated gas-fired boilers.

2.3 THE SUSTAINABILITY OF WASTE HEAT FROM TRIUMF

The TRIUMF facility currently has two major cooling plants, with an additional plant expected to come online in 2014. An existing central cooling tower farm handles the cooling for the Accelerator Building and new Electron Hall, while an independent cooling tower serves the existing TRIUMF Isotope Separator and Accelerator (ISAC) facility, and a new cooling tower will serve The Advanced Rare Isotope Laboratory (ARIEL) facility, which is currently under construction. Stantec[1] prepared a Waste Energy Recovery Study that detailed the availability of waste heat and technical considerations for waste heat capture. The analysis conducted for Detailed Due Diligence is primarily based on that study and further analysis will be conducted

[1] TRIUMF – Waste Energy Recovery Study. Stantec, 2012.

as Phase 2 of the Project Plan is conceptually designed. At this time, Phase 2 of the Project Plan consists of the installation of a Permanent 10 MW CEP consisting of Four 2.5 MW heat pumps to feed Wesbrook Place, Stadium Road, Acadia East, East Campus (incl. Block F) and the ADES. Finally, the business case assumes that waste heat will be available from TRIUMF at no charge (beyond the costs of recovering this waste heat, which is currently vented to atmosphere). This is based on discussions between UBC and TRIUMF, supported by a Letter of Intent (LOI) between the two parties. Since the waste heat is currently released to the atmosphere, recovery by the NDES (at the NDES's cost) will lower operating costs for TRIUMF's existing cooling tower. TRIUMF will release heat to the NDES and therefore reduce the usage of its cooling towers. This will result in a reduction in operating costs: less power to operate the cooling towers pumps and fans; less wear and tear on the equipment. Moreover, making use of the waste heat recovery also represents an opportunity for TRIUMF to demonstrate goodwill towards the community within which it operates, and to contribute to its own sustainability performance.

2.4 PROJECT BUILD-OUT SCHEDULE, LOAD ANALYSIS AND ENERGY DEMAND FORECAST

The Corix team used development data provided by UBC Properties Trust, UBC and other sources to estimate thermal loads of the UBC NDES development. This information included the project build-out schedule, load analysis and energy demand forecast.

At build-out, the NDES will serve approximately 1,078,800 m^2 of built space, consisting of primarily residential units, with the possibility of having commercial and institutional customers in the Development Area.

The NDES will serve all new loads and district energy ready buildings (when existing systems reach the end of their current life) in the following neighbourhoods (collectively Development Areas):

- Wesbrook Place
- Stadium Road neighbourhood
- East Campus neighbourhood
- Acadia East neighbourhood
- Block F (potential)

Additional existing or new loads not in the current Project Plan may be added in future subject to a positive extension test.

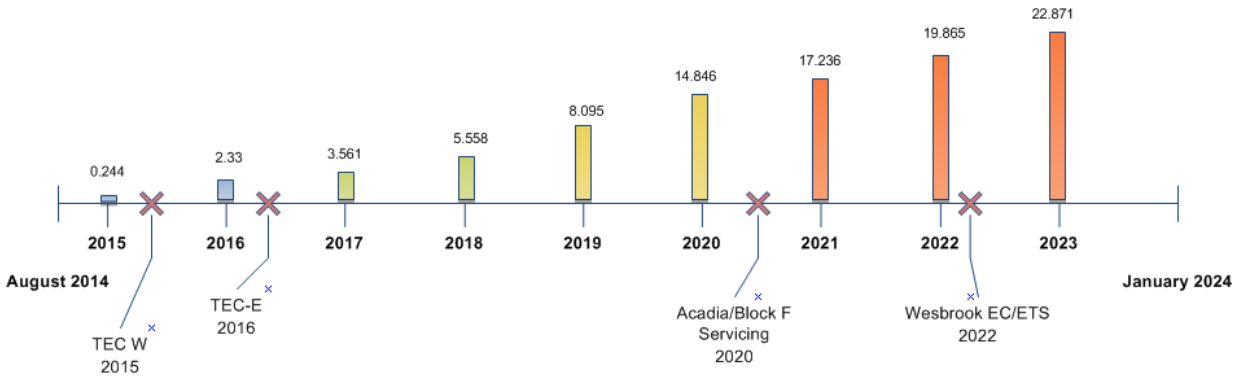
It is anticipated that there will be energy purchases from the Academic District Energy System (ADES) in Phases 1 and 2 to serve the Acadia East and Block F loads. Thermal energy sales from the NDES to the ADES are also contemplated in Phase 2 whereby the ADES may utilize surplus energy.

The Project Plan has been developed with the understanding that all new buildings constructed in the service area will connect to the NDES for all heating needs, including domestic hot water, ventilation air and space heating within suites. Under the Infrastructure Agreement, UBC has agreed to ensure that UBC Properties will require all developers who want to lease in the Development Areas to enter into a Community Energy Covenant with Corix. The Community Energy Covenants will require entry into an Energy Services Contract between developers and Corix, enforceable against future NDES customers. The Design Guide for Compatibility with District Energy, a set of guidelines for NDES-compliant design, will be attached as a schedule to each Energy Services Contract, enabling and ensuring Developer compliance with system design and connection requirements.

The current application for Phase 1 of the NDES Project Plan outlines how the NDES will provide thermal energy service to new buildings that are scheduled for completion between 2014 and 2023 in Wesbrook Place and between 2020 and 2023 in Acadia East and Block F. This comprises approximately 493,000 of floor area, or approximately half of projected load at build out.

A timeline of the anticipated Phase 1 developments is shown in *Figure 7: Anticipated Phase 1 Developments Timeline* with Cumulative Peak Load (MW) and milestones.

Figure 7: Anticipated Phase 1 Developments Timeline



2.4.1 Project Build-out Schedule

Development projections for the Wesbrook Place and Stadium Road neighbourhoods are based on information provided by UBC Properties Trust[2]. This information included projected occupancy dates and building floor area forecasts for planned developments by parcel. UBC Properties Trust did not provide floor area estimates for three lots (4/1, 3W and 11W) and two existing buildings (Sail and Academy) in Wesbrook Place, therefore the heated floor areas for these developments are based on the lot size and maximum Floor Area Ratio (FAR) allowed for in the Wesbrook Place Neighbourhood Plan. The floor areas of existing buildings were obtained from UBC Properties Trust's lists of properties published on their website, and complemented with as-built drawings and developer information (where available). *Table 1: Projected Building Gross Floor Area (m2) - Full Build Out* summarizes the expected gross heated floor areas in the four neighbourhoods. The load forecast for the Acadia East and Block F neighbourhoods is based on UBC's load analysis for NDES and cogeneration[3] and Block F's recent rezoning application package.

The load forecast for the Wesbrook Place and Stadium Road neighbourhoods is based on UBC's annual floor area projections for these neighbourhoods, updated as of May 2014[4]. In total, the Project Plan outlines that the new UBC development including Block F, will include approximately 1,078,800 m^2, and Phase 1 consists of approximately 493,000 m^2. *Table 1: Projected Building Gross Floor Area (m2) - Full Build Out* summarizes the projected building gross floor area. UBC's annual floor area projections for these neighbourhoods updated as of May 2014.

[2] Projected development map. Appendix One. June 2013.

[3] UBC NDES and Cogen schedules, received May, 2013

[4] Source Nick Maile, UBCPT email dated May 2nd, 2014.

Table 1: Projected Building Gross Floor Area (m^2) - Full Build Out

NEIGHBOURHOOD	HIGH RISE EXISTING BUILDINGS	HIGH RISE NEW BUILDINGS	LOW RISE EXISTING BUILDINGS	LOW RISE NEW BUILDINGS	COMMERCIAL EXISTING BUILDINGS	COMMERCIAL NEW BUILDINGS	TOTAL GROSS FLOOR AREA
Wesbrook Place	50,200	255,400	103,600	138,700	10,000	0	557,900
Stadium Road	0	0	0	75,900	0	0	75,900
Acadia East and East Campus	0	0	0	323,000	0	0	323,000
Block F	0	122,000	0	0	0	0	122,000
Total Gross Floor Area	50,200	377,400	103,600	537,600	10,000	0	1,078,800

2.4.2 Energy Use Intensity (EUI)

The EUIs summarized in *Table 2: EUI Summary* are based on the values used in the 2013 Feasibility Study[5] and projected EUIs provided from UBC, and validated by UBC in analyses of recently completed projects.[6]. The 2013 Feasibility Study applied a declining peak EUI over time, based on the assumption that energy efficiency requirements in the BC building code would result in lower peak energy consumption in the future. The peak demand EUIs applied in the Due Diligence Study are an area-weighted average of the declining EUI scheme. An annual EUI of 100 kWh/m^2 was applied to all buildings with full DES servicing; this is based on an annual Domestic Hot Water (DHW) EUI of 29 kWh/m^2 and a space heating EUI of 71 kWh/m^2. In buildings with partial hydronic servicing, the annual EUI is adjusted to account for reduced space heating provided through the DES. EUIs will be reviewed as buildings come online.

Table 2: EUI Summary

BUILDING TYPE	PEAK HEATING EUI (W/M^2)	ANNUAL SPACE HEATING EUI (KWH/M^2)	ANNUAL DHW EUI (KWH/M^2)	TOTAL ANNUAL EUI (KWH/M^2)
High Rise	47.5	71	29	100
Low Rise	46.5	71	29	100
High Rise – Partial Hydronic Service	15	37.5	29	66.5
Low Rise – Partial Hydronic Service	15	32.5	29	61.5
Commercial	29	34	13	47

The EUI assumptions are reasonably consistent with values used in other DES studies in the Lower Mainland. *Table 3: Energy Use Intensity Benchmark Data* shows a range of other published EUIs. As shown, the selected EUIs in this study are within the range of the published values.

[5] UBC NDES Technical Feasibility Study Report FVB Energy. March 20, 2013.

[6] Personal communication. Orion Henderson via email. December 5, 2013.

Table 3: Energy Use Intensity Benchmark Data

PARAMETER	VALUE	SOURCE
Wesbrook Place-UBC[7]	100-105 kwh/m^2	UBC Campus Sustainability
Southeast False Creek NEU[8]	109 kwh/ m^2	City of Vancouver
Annual Space Heating – New High-Rise Residential (> 5 stories)	84 kWh/m^2	City of Vancouver Sustainable Large Site Rezoning Guidelines
	60 kWh/m^2 to 140 kWh/m^2 (input basis)	"The Path toward Net-Zero High-Rise Residential Buildings: Lessons Learned from Current Practice"[9]
	73 kWh/m^2	River District Energy CPCN Application
Annual Space Heating – New Low-Rise Residential (5 stories or less)	67 kWh/m^2	City of Vancouver Sustainable Large Site Rezoning Guidelines
	62 kWh/m^2	River District Energy CPCN Application
Annual Domestic Hot Water – Residential	24 kWh/m^2	City of Vancouver Sustainable Large Site Rezoning Guidelines
	30 kWh/m^2	River District Energy CPCN Application
Total Heating – Residential	118 kWh/m^2 102 kWh/m^2	UBC REAP Gold minimum requirement (Version 3) UBC REAP Gold Plus (Version 3)
Space Heating – Retail	34 kWh/m^2	River District Energy CPCN Application

2.4.3 Load Analysis

The load forecast for Phase 1 of the NDES is illustrated on the following page in *Table 4: Expected Load Forecast Summary.* Details regarding the Energy Centres can be found in Section 4.3.1.

[7] Actual data for nine buildings based on BC Hydro and Fortis BC data

[8] Actual data

[9] Finch, Ricketts, Knowles. ASHRAE 2010.

Table 4: Expected Load Forecast Summary

Year	Cumulative Connected Floor Space (m^2)	Cumulative Peak Load - Undiversified (kW)	Cumulative Peak Load - 85% Diversified (kW)	Cumulative Annual Energy Consumption (MWh/yr)	Cumulative # ETS	# Temporary Energy Centres	# Permanent Energy Centres	Cumulative Energy Capacity (kW)	Energy Centre Description (AEC supplies peaking to NDES after 2020)
2015	16,295	244	208	1,002	1	1	0	5,858	W-TEC
2016	58,889	2,330	1,981	5,262	4	2	0	11,716	W-TEC, E-TEC
2017	84,916	3,561	3,027	7,864	7	2	0	11,716	W-TEC, E-TEC
2018	125,677	5,558	4,725	11,940	9	2	0	11,716	W-TEC, E-TEC
2019	179,197	8,095	6,881	17,292	12	2	0	11,716	W-TEC, E-TEC
2020	322,194	14,846	12,619	31,592	27	2	0	11,716	W-TEC, E-TEC
2021	372,209	17,236	14,651	36,594	31	2	0	11,716	W-TEC, E-TEC, Wesbrook EC/ETS
2022	426,662	19,865	16,885	42,039	34	2	1	16,716	W-TEC, E-TEC, Wesbrook EC/ETS
2023	493,050	22,871	19,440	48,678	38	2	1	16,716	W-TEC, E-TEC, Wesbrook EC/ETS

2.5 SUMMARY OF PREFERRED ALTERNATIVE

2.5.1 Phase 1: Project Plan and Description for Current CPCN Filing (2014-2024)

The NDES Project Plan proposes that the NDES approach be implemented in two phases. Phase 1 is contemplated as a natural gas solution serving early loads in Wesbrook Place, Acadia East and potentially Block F. Phase 2 is the implementation of the Alternate Energy Source, currently contemplated as waste heat recovery from TRIUMF, and/or the interconnection of the Wesbrook Place portion of the NDES and ADES, which is assumed to occur in 2024.

Corix is applying for Phase 1 of the NDES, which will provide service to new buildings in Wesbrook Place, Acadia East and Block F and is scheduled for completion between 2015 and 2023. Thermal energy for Wesbrook Place during Phase 1 will be provided by two natural gas temporary energy centres (TEC) located within Wesbrook Place, and potentially supplemented in 2022 by the installation of a section (one 5 MW natural gas boiler) of the nodal Energy Centre/ETS as described in section 4.3.4. Acadia East and Block F buildings will likely be fed from ADES through a direct connection to the ADES peaking plant. The installation of the Wesbrook EC/ETS and the supply of energy to Acadia East and Block F will not trigger another CPCN application, unless the triggers described in Section 2.5.2 occur.

Phase 1 includes each loop's energy supply capacity or connection, associated distribution piping and energy transfer stations. Drawing G002 in Appendix One depicts anticipated locations of the temporary and permanent energy centres as well as the interconnection to the ADES. Phase 1 is anticipated to be in place until 2024 based on the current Project Plan.

As the development of Wesbrook Place continues, there are two distinct areas to the far east and far west of Wesbrook Mall. The Project Plan anticipates that each area will initially be served independently, each by one temporary energy centre.

2.5.2 Phase 2: Long Term Project Plan

The trigger to initiate Phase 2 of the NDES is either or both of the following events:

- the interconnection of the Wesbrook portion of the NDES and the ADES; and/or
- the connection of a permanent CEP to an Alternate Energy Source

Phase 2 of the NDES Project Plan outlines the interconnection of Wesbrook Place, Stadium Road, the ADES and Acadia East/Block F with a main trunk supply-return pipeline. A permanent Central Energy Plant (CEP) will be constructed to the south of Wesbrook Place, as close as possible to the TRIUMF research facility. The Alternate Energy Source for the NDES will be provided by low-grade heat at 25ºC recovered from the TRIUMF cooling plant and upgraded by heat pumps in the CEP up to 80ºC. The heat pumps will be supplemented by natural gas boilers to raise the supply temperature to 90ºC during peak demand periods and to meet anticipated ADES temperatures. The supply temperature of the system will follow a reset strategy based on outside air temperature and whether heat is delivered to the ADES or not. Prior to the ADES connection, the NDES supply temperature will range from 65ºC for low demand periods in the summer to 90ºC for peak demand periods in the winter. After the ADES connection, the NDES supply temperature will be increased to 90ºC whenever heat can be sold to the ADES.

The long term servicing plan for Wesbrook Place, including the connection of existing buildings, is shown in the general arrangement Drawing G003, in Appendix One. Service to existing buildings will be provided by connecting the eastern and western branches at the northern end of the Wesbrook DPS, thus minimizing the required pipe sizes.

Alternate energy will be provided from the CEP to the ADES via the direct connection of the two district energy systems, the ADES and NDES. However, the load on the ADES is fundamentally different to the load on the NDES due to the fact that the majority of the buildings served by the ADES were originally designed to be heated with steam and the supply temperature on the ADES ranges between 80ºC and 117ºC. Therefore, during periods of peak demand when the ADES supply temperature exceeds 90ºC, the CEP will not supply any heat to the ADES and all thermal energy produced at the CEP will be supplied to the NDES. If the CEP is not feeding the ADES, it should not be necessary to run the CEP boilers unless additional peak heating capacity is needed.

The ADES return temperature ranges from 60-75ºC, which is higher than the required return temperature for the heat pumps at the CEP; therefore the Wesbrook and Stadium Road heating loads will be cascaded off of the hot return from the ADES via neighbourhood nodal energy transfer stations (ETS).

Each nodal ETS will also include local peaking boilers (i.e. Wesbrook EC/ETS and Stadium EC/ETS); this approach will enable the NDES to meet the higher supply temperatures required during peak demand periods.

2.6 FINANCIAL MODELING AND INPUTS

The principal objective of the financial analysis is to:

- Determine the requirements for long-term economic feasibility and financial viability of the project;
- Define the variables which will affect the viability of establishing and operating a district energy system at UBC;
- Develop a financial model to evaluate and optimize the project variables following a cost of service approach;
- Calculate the indicative rates for residential customers during Phase 1 of the development and compare the rates to conventional energy sources that would be used were it not for the DES; and
- Present a base case scenario ("Base Case") and sensitivity analysis.

The Base Case assumes that the CEP will be constructed and in operation in year 2024, and before then all heat energy for Wesbrook Place will be provided to customers using the two temporary natural gas TECs and the Wesbrook EC/ETS until 2023. The Wesbrook EC/ETS will continue to be used for trimming the

hot water temperature once the permanent CEP is in operation. Loads in Acadia East and Block F in Phase 1 are contemplated to be served by the ADES. Phase 2 will involve interconnecting Wesbrook Place, Stadium, the ADES and Acadia East/Block F with a main trunk supply-return pipeline and additional peaking and boiler capacity in Wesbrook EC/ETS and Stadium EC/ETS.

As previous outlined, this application is for Phase 1 of the Project Plan, which is contemplated to be the first 10 years of the NDES. However, because the Base Case considers the full build-out of the UBC NDES project, all relevant capital costs, operating costs, and other facts and assumptions for the full 30-year project term will be presented where necessary in order to provide a complete picture of the long-term economic feasibility and financial viability of the project.

There are a number of assumptions regarding future prices and rates that have a global bearing on the results of the financial model. *Table 5: Escalation: Facts and Assumptions* below shows the commodity price and other cost escalation rates used in the model.

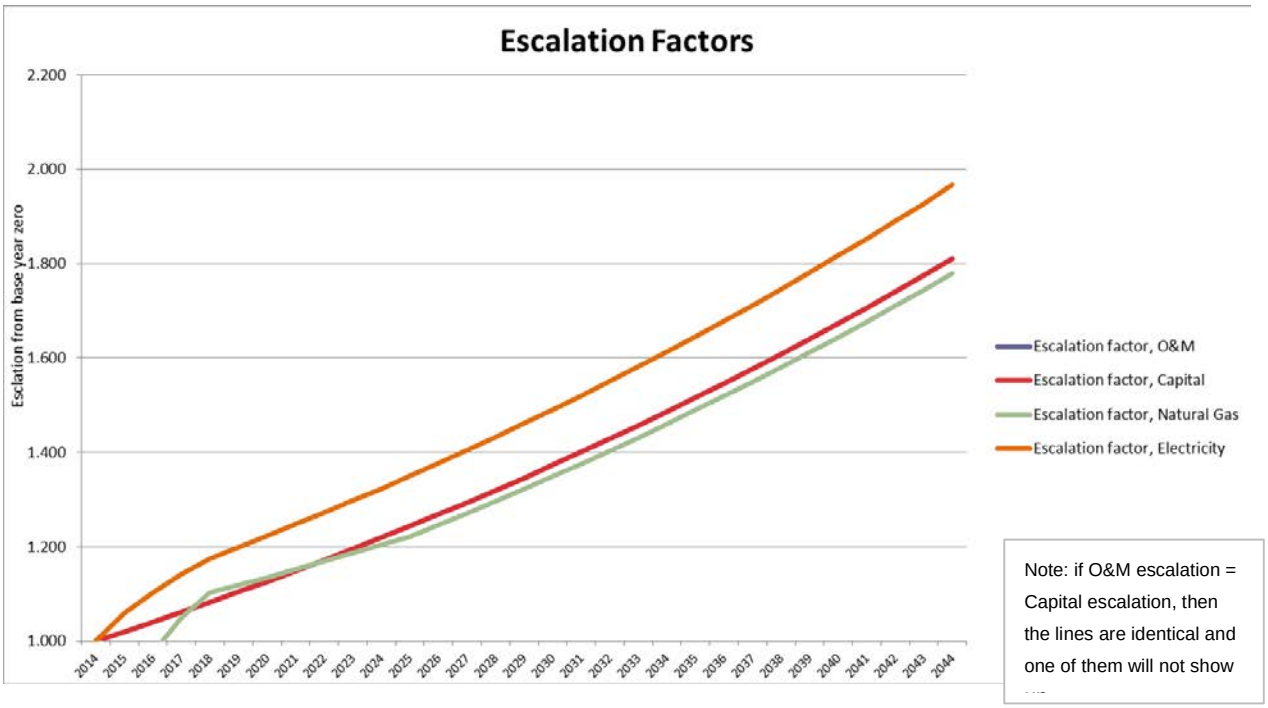
Table 5: Escalation: Facts and Assumptions

ESCALATION (NOMINAL)	
Base year	2014
Forecast CPI (for O&M)	2.0%
Capital costs	2.0%
Natural gas	Sproule
Electricity (2014 to 2023)	Hydro
Electricity (2024 onwards)	2.0%
Heat purchased from ADES	Sproule
Waste heat from TRIUMF	0.0%

Further information regarding the items in *Table 5* above:

- The base year for the model is 2014, although construction is not expected to commence until early 2015. The model also indicates a project year, with 2014 being year 0. No adjustment to the NPV calculations has been made for the short initial year because the costs incurred are proportionately small and no customer connections are made until the second quarter of 2015.
- Operating costs (non-fuel) and capital costs have been escalated at 2% per annum as an estimate of inflation. A sensitivity comparison for +/– 1% on this amount has been prepared and is shown in Section 2.10.3.
- The commodity cost of natural gas is assumed to escalate in proportion to the Sproule forecast for domestic natural gas at Huntington/Sumas. The commodity forecast used is as of June 30, 2014, and after two years of mild decline, followed by two years of increase moderately in excess of CPI, the forecast assumes 1.5% per annum escalation until 2024, which is the limit of the Sproule forecast. Thereafter, the financial model assumes that commodity cost of natural gas will escalate at 2% per annum, in line with the estimated CPI. Gas delivery and demand charges are assumed to escalate at CPI.
- The cost of electricity is assumed to escalate according to BC Hydro's most recent 10 year rate plan. The escalation factor used is moderately in excess of CPI until 2018, and thereafter is assumed to be 2% per annum, in line with the estimated CPI. *Figure 8: Escalation Factors* depicts all escalation factors.

Figure 8: Escalation Factors



2.6.1 Capital Costs

Detailed information about the compilation of capital costs and phasing of construction is found in Section 5.

For the purpose of the financial model, the capital costs are built up from a study of connected floor area and energy loads. *Table 6: Connected Floor Area* below shows the cumulative connected floor area during the first portion of Phase 1, as well as year 2024 when the CEP is expected to be constructed, and finally at year 2044, the completion of the 30 project life and forecast period.

Table 6: Connected Floor Area

Connected floor area, MWh's load, DPS length	At build-out	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
		1	2	3	4	5	6	7	8	10	30
Connected floor area, cumulative, square metres	1,078,680	16,295	58,889	84,916	125,677	179,197	322,194	372,209	426,662	561,943	1,078,680
Load, cumulative, MWh's	113,204	1,002	5,262	7,864	11,940	17,292	31,592	36,594	42,039	74,497	113,204
DPS length, cumulative, metres	7,685	144	907	1,276	1,319	1,433	3,499	3,738	3,756	6,523	7,685

Table 7: Incremental Capital Cost (thousands, 2014$) below shows the incremental capital costs during Phase 1, which includes the connection of Acadia East in 2020 and the construction of the Wesbrook EC/ETS in 2022, and at 2024 (the connection of the CEP to an Alternative Energy Source), and at 2044 (the end of the forecasted period). *Table 8: Cumulative Capital Costs (thousands, 2014$)* shows the cumulative capital costs. The capital costs in *Table 7: Incremental Capital Cost (thousands, 2014$)* and *Table 8: Cumulative Capital Costs (thousands, 2014$)* are in current year dollars (i.e., real dollars). *Figure 9: Incremental Capital Costs (2014$)* and *Figure 10: Cumulative Capital Costs (2014$)* show the annual incremental capital costs and cumulative capital costs, segregated by asset category, in nominal dollars.

Table 7: Incremental Capital Cost (thousands, 2014$)

Incremental capital costs (thousands, 2014$)	Cumulative	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
		1	2	3	4	5	6	7	8	10	30
Energy centre, site work & buildings, incremental	9,770	169	169	0	0	0	0	0	677	8,754	0
Energy centre, mechanical, incremental	11,398	812	812	0	0	0	0	0	868	8,615	0
Energy centre, heat pump, incremental	10,662	0	0	0	0	0	0	0	0	10,662	0
DPS, incremental	24,082	391	1,653	826	120	267	7,438	484	120	8,824	0
Energy transfer stations, incremental	12,083	110	331	331	221	331	1,657	442	331	773	0
Total, incremental	67,994	1,483	2,966	1,158	341	599	9,094	926	1,997	37,629	0

Figure 9: Incremental Capital Costs (2014$)

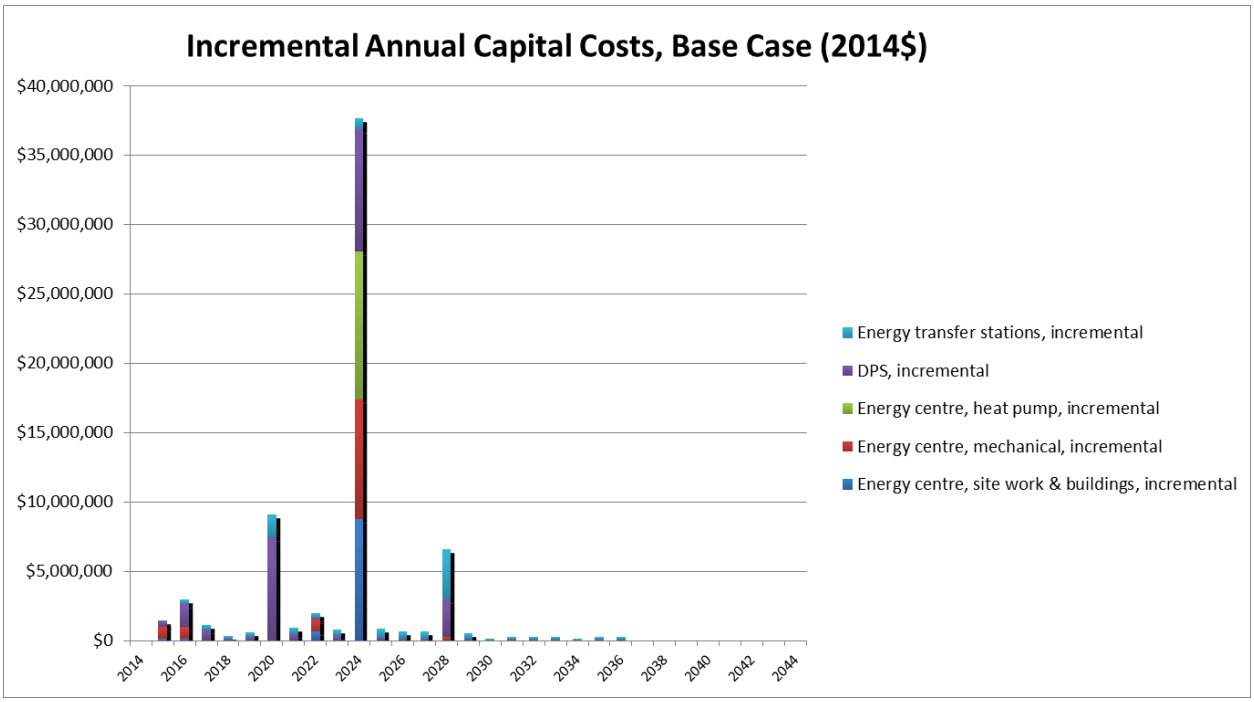
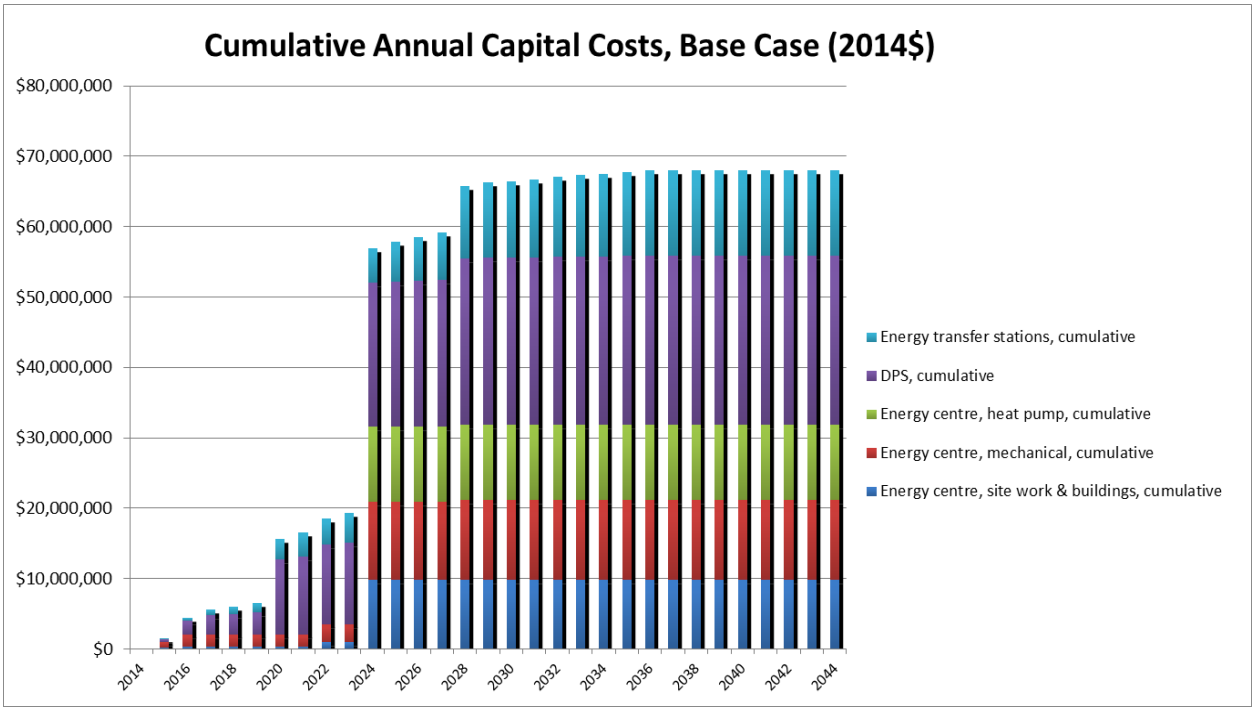


Table 8: Cumulative Capital Costs (thousands, 2014$)

Cumulative capital costs (thousands, 2014$)	Cumulative	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
		1	2	3	4	5	6	7	8	10	30
Energy centre, site work & buildings, cumulative	9,770	169	338	338	338	338	338	338	1,015	9,770	9,770
Energy centre, mechanical, cumulative	11,398	812	1,625	1,625	1,625	1,625	1,625	1,625	2,493	11,109	11,398
Energy centre, heat pump, cumulative	10,662	0	0	0	0	0	0	0	0	10,662	10,662
DPS, cumulative	24,082	391	2,044	2,871	2,991	3,258	10,696	11,180	11,300	20,465	24,082
Energy transfer stations, cumulative	12,083	110	442	773	994	1,325	2,982	3,424	3,755	4,970	12,083
Total, cumulative	67,994	1,483	4,449	5,607	5,948	6,547	15,641	16,567	18,564	56,975	67,994

Figure 10: Cumulative Capital Costs (2014$)



2.6.1.1 PST

Provincial sales tax of 7% has been added to the capital costs assuming a factor of approximately 45% hard-goods and 55% non-taxable labour.

2.6.1.2 Project Development Costs

UBC and Corix have developed an Infrastructure Agreement to define the roles and responsibilities of relevant parties. As a part of the financial submission, Corix and UBC will submit each of their project development costs. These include engineering, financial, legal, consultation and regulatory costs spent by both to move the project to the implementation and construction stage. These project development costs are approximately 1.5% of total project capital costs. The project development costs have been capitalized and amortized over 30 years, being the contract term to which they relate. Corix is applying to have these costs included in rates AFUDC.

2.6.1.3 AFDUC

Allowance for Funds Used During Construction is negligible in the current financial model, but will be calculated and added to the capital cost of the infrastructure once a specific construction timetable is available, and will reflect the same combined interest and return on equity cost as applied to the rate base amount at the particular time. Given small capital incremental capital expenditures in Phase 1, AFUDC is not expected to have a material impact on revenue requirement and rates.

2.6.1.4 Grants and CIAC

Although no grants or other contributions in aid of construction have been assumed in the Base Case, Corix and UBC will cooperate to seek all grant and other capital contribution opportunities in order to provide the greatest possible benefit to the DES customers. The implementation of an Alternate Energy Source solution contemplated for Phase 2 in 2024 should allow Corix to apply for special environmental programs, such as NRCan federal funding, and this will be investigated and pursued.

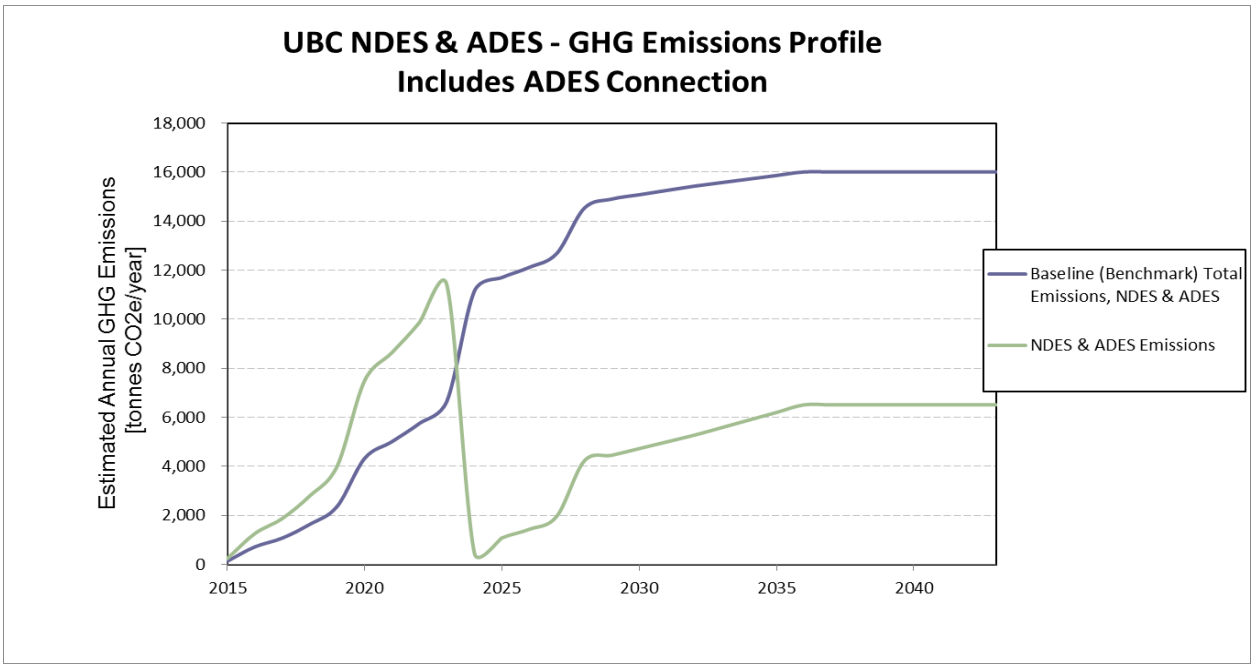
2.6.1.5 Salvage Value

It is expected that the two temporary energy centres will be removed once Phase 2 begins. Corix will attempt to sell or otherwise re-deploy for value the temporary boilers, to the benefit of ratepayers, but recent experience indicates that the expected salvage value is sufficiently indeterminable that no estimate has been included in the financial model.

2.6.1.6 Carbon Emissions Rider

Subject to BCUC approval, the Infrastructure Agreement provides that a temporary surcharge (the "Carbon Emissions Rider") will be applied to the monthly invoice for all NDES customers until the Alternate Energy Source is operational in 2024. The Carbon Emissions Rider will reflect a charge of $25 per tonne of carbon emissions resulting from the operation of natural gas boilers during Phase 1. The rider is intended to ensure that initial customers served by temporary natural gas boilers contribute to the cost of future Alternate Energy Sources and to help mitigate potential changes in rates with the implementation of the Alternate Energy Sources. It is also intended to ensure that Corix has appropriate incentives to implement low carbon energy sources in the event natural gas prices stay low. In the year that the Alternate Energy Source is utilized, the accumulated balance (with an interest amount in favour of the customers, reflecting Corix's after-tax weighted average cost of capital) of the Carbon Emissions Rider will be applied against the finished construction cost of the CEP in calculating the plant in service amount for rate-setting purposes. In the financial model, the accumulated balance of the Carbon Emissions Rider is expected to be about $0.9 million in 2024. It is intended that the revenues from the Carbon Emissions Rider will effectively be held in trust to be applied to a future low carbon energy source, or in the event a low carbon energy source is not available or feasible within the timeframe contemplated in the Project Plan, Corix may use the funds to acquire external offsets as necessary. *Figure 11* depicts the Carbon emissions profile.

Figure 11: Carbon (GHG) Emissions Profile



2.6.1.7 Connection Credit

Subject to BCUC approval, the Infrastructure Agreement requires Corix to offer a connection incentive (the "Connection Credit") to identified developers of new low-rise buildings in Wesbrook Place to offset the incremental cost of fully hydronic-capable buildings over the benchmark approach of using electric baseboards for in-suite heating. As shown in *Table 10: Connection Credit*, the incentive will be at a rate of

$4.50 per square foot of completed floor space through 2017, and then declining by $0.90 per square foot each year thereafter (i.e., $nil by 2022). The accumulated amount of the Connection Credit will be added to rate base to permit Corix to earn its allowed return, and the balance will be amortized over a period of no less than 10 years. In the Base Case, the aggregate Connection Credit is expected to be approximately $2.9 million, which will have only a modest impact on the balance of rate base. The Connection Credit will be in place only until 2021. It is expected that developer innovation will drive the hydronic premium to zero by 2021. Innovation will be supplemented by potential changes in the building code that will make hydronic systems standard.

The magnitude of the proposed Connection Credit is based on an analysis by UBC of the net incremental costs of hydronic heating for a recent low rise project, and is also consistent with information from industry participants. No premium was found in high rise construction. The declining credit is intended to reflect expected cost reductions from developer learning, experience and innovation, as well as the effects of changes in building code and certification requirements that are expected to increase the prevalence of hydronic heating and also the value of future low carbon energy from the NDES.

In the absence of a Connection Credit, UBC was considering an exemption to hydronic systems for low rise construction. UBC has provided an exemption for a hydronic system to one building and has paid directly for hydronic systems for two projects, which shows the relevance of the Connection Credit. The Connection Credit has a small impact on levelized costs per MWh, of about 4.5%. The loss of low-rise loads would have an even larger impact on remaining customers, increasing levelized costs significantly. *Table 9: Connection Credit Scenarios* outlines how the connection credit versus low rise building exclusion impacts rates. The Connection Credit is essential to building load and lowering rates for all NDES customers.

Table 9: Connection Credit Scenarios

Scenario	Levelized Cost
No Connection Credit	$130
With Connection Credit	$133
Exclude low-rise buildings (considered for connection credit)from NDES	$139

Table 10: Connection Credit

CONNECTION CREDIT		
Deferral a/c amortization, years		10
Connection Credit per sq. foot		
Year 2014 & 2015	$	4.50
Year 2016	$	4.50
Year 2017	$	4.50
Year 2018	$	3.60
Year 2019	$	2.70
Year 2020	$	1.80
Year 2021	$	0.90

2.6.1.8 Capital Cost Summary

Table 11: Plant in Service (thousands, nominal $) below shows the cumulative plant in service cost for each asset category, as well as the aggregate accumulated depreciation balance and the net book value of the Project Development Costs and the Connection Credit.

Table 11: Plant in Service (thousands, nominal $)

Plant in service (thousands, nominal $)	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
	1	2	3	4	5	6	7	8	10	30
Original cost										
Buildings	0	0	0	0	0	0	0	0	10,236	10,236
Renewable energy, plant	0	0	0	0	0	0	0	0	19,720	19,720
Non-renewable energy, plant	1,033	2,086	2,086	2,086	2,086	2,086	2,086	3,135	6,840	7,233
ADES distribution pipe	0	0	0	0	0	0	0	0	6,280	6,280
ADES mechanical equipment	0	0	0	0	0	0	0	0	0	0
NDES distribution pipe	412	2,186	3,090	3,225	3,529	12,169	12,743	12,887	18,117	23,068
NDES mechanical equipment	116	472	834	1,081	1,458	3,383	3,906	5,125	7,318	17,110
Total cost	1,560	4,743	6,010	6,392	7,073	17,638	18,735	21,148	68,510	83,647
Accumulated depreciation	0	(41)	(150)	(284)	(427)	(587)	(933)	(1,304)	(2,209)	(38,788)
Net book value, PP&E	1,560	4,703	5,860	6,107	6,646	17,051	17,801	19,844	66,301	44,859
Net book value, project development costs	880	851	821	792	763	733	704	675	616	29
Net book value, lowrise connection credit account	0	190	1,432	2,070	2,259	2,284	1,990	1,696	1,109	0
Total, plant in service, net book value	2,440	5,743	8,113	8,969	9,668	20,068	20,495	22,215	68,026	44,889

2.6.2 Operating Costs

NDES operating costs under the Base Case include all fuel, wages, maintenance, insurance, administration, land leases, water and sewer, UBC service levy, UBC franchise fee, property taxes and all other taxes, fees and levies. The temporary Carbon Emissions Rider charged to customers is added to the cost of fuel.

Table 12: Fuel Prices (nominal $) below shows the price for each category of fuel consumed.

Table 12: Fuel Prices (nominal $)

Fuel prices (nominal $)	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
	1	2	3	4	5	6	7	8	10	30
Renewable, waste heat (TRIUMF), $ / MWh	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heat purchased from UBC, $ / MWh	$ -	$ -	$ -	$ -	$ -	$ 47.80	$ 48.46	$ 49.13	$ 51.42	$ 71.54
Natural gas, commercial, fully-loaded cost + carbon tax, $ / GJ	$ 10.05	$ 9.80	$ 10.26	$ 10.61	$ 10.74	$ 10.89	$ 11.04	$ 11.19	$ 11.71	$ 16.30
Electricity, commercial, fully-loaded, $ / MWh	$ 78.33	$ 79.92	$ 82.80	$ 85.36	$ 87.11	$ 94.34	$ 95.28	$ 97.20	$ 102.49	$ 150.84

Further information about the items in *Table 12* above:

- Based on current LOI and subject to agreement with TRIUMF, it is assumed that there will be no cost associated with waste heat captured at the TRIUMF facility.
- The cost of heat purchased from UBC to satisfy periodic NDES load requirements will be a function of the cost of natural gas (but minus the carbon offset amount otherwise included in the cost), being the FortisBC Large Commercial Service rate (i.e., Rate Schedule 3, as of April 1, 2014) including commodity, delivery, basic charge, riders and carbon tax.
- In the ordinary course of operations, the NDES will purchase natural gas from FortisBC at the Large Commercial Service rate (i.e., Rate Schedule 3, as of April 1, 2014) including commodity, delivery, basic charge, riders and carbon tax.
- Electricity will be purchased from UBC or BC Hydro at the Medium General Service Rate or Large General Service Rate as applicable according to the demand of the DES system as it grows (i.e., Schedule 1500 and 1600 respectively, although in the initial years the demand may be below the applicable demand for Schedule 1500; any difference in cost is nominal, however). The BC Hydro 5% Schedule 1901 Deferral Account Rate Rider is added to the cost of electricity each year and is assumed to continue indefinitely. Electricity consumption is modest until 2024 when the CEP heat pump is operational.

Table 13: Fuel Consumption on the following page shows the forecast consumption for each category of fuel.

Table 13: Fuel Consumption

Fuel consumption	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
	1	2	3	4	5	6	7	8	10	30
Renewable, waste heat (TRIUMF), MWh's	-	-	-	-	-	-	-	-	52,459	54,731
Heat purchased from UBC, MWh's	-	-	-	-	-	11,211	12,502	13,793	-	6,367
Natural gas, GJ's	4,589	24,235	36,066	53,794	77,082	94,964	111,339	129,356	8,826	97,305
Electricity, large general, MWh's	94	126	124	122	121	171	187	186	24,335	25,336

Table 14: Fuel Costs (nominal $) shows the nominal dollar cost for each category of fuel on an annual and 30-year NPV basis. *Figure 12: Fuel Costs (nominal $)* also shows the fuel costs by category.

Table 14: Fuel Costs (nominal $)

Fuel costs (thousands, nominal $)	NPV, 30 yrs	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
		1	2	3	4	5	6	7	8	10	30
Renewable, waste heat (TRIUMF)	0	0	0	0	0	0	0	0	0	0	0
Heat purchased from UBC	2,779	0	0	0	0	0	536	606	678	0	456
Natural gas	11,763	46	238	370	571	828	1,034	1,229	1,448	103	1,586
Electricity	20,824	7	10	10	10	11	16	18	18	2,494	3,822
Carbon emissions rider	586	6	32	47	70	100	123	145	168	0	0
Total	35,366	59	279	427	651	939	1,710	1,997	2,312	2,598	5,863

Figure 12: Fuel Costs (nominal $)

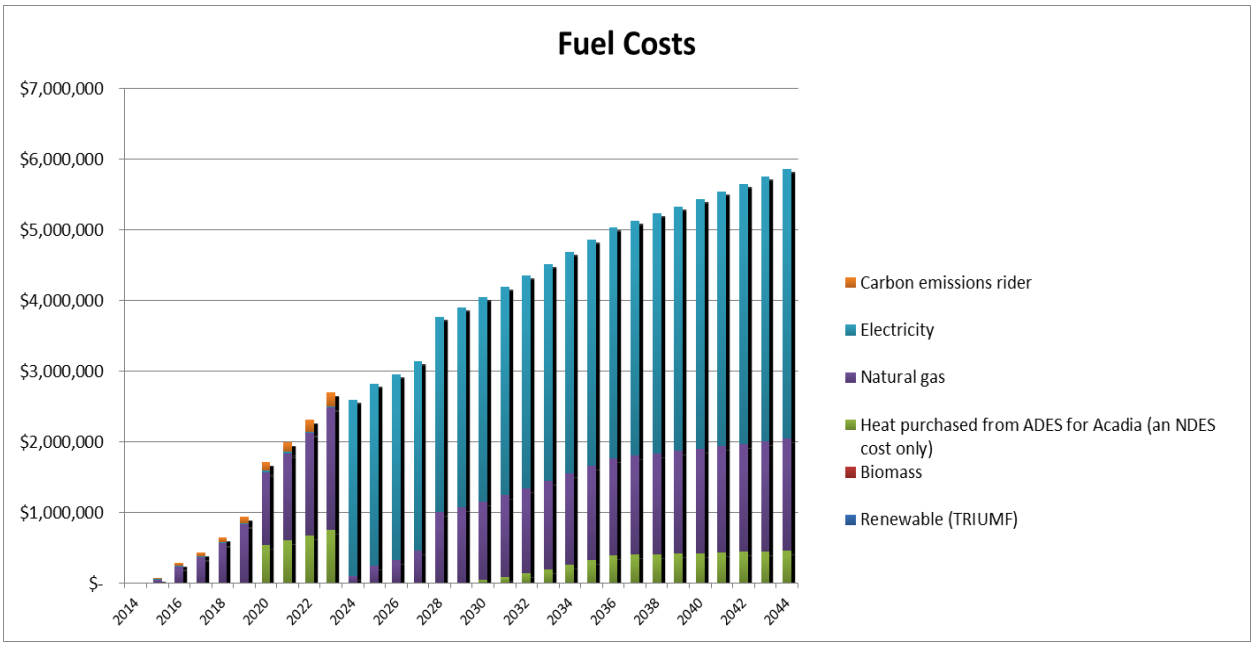


Table 15: Direct Operating Costs (nominal $) shows the operator cost and maintenance cost for the DES.

Table 15: Direct Operating Costs (nominal $)

Operator FTE's, operator cost, maintenance cost	At build-out	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
		1	2	3	4	5	6	7	8	10	30
Operator FTE's	4.9	0.1	0.5	0.6	0.7	0.9	1.6	2.8	2.8	4.9	4.9
Operator cost, thousands 2014$	490	10	45	60	70	85	160	280	280	490	490
Maintenance cost, thousands 2014$	444	0	8	20	24	25	28	55	58	71	444

Further information about the items in *Table 15*: Direct Operating Costs (nominal $):

- Operator FTE's have been determined by KWL and Corix, with input from UBC. The Base Case assumes that less than 1 FTE is required to operate the two temporary energy centres and 4.9 FTE's will be required to operate the CEP when it is connected to the Alternative Energy Source in 2024.
- Each qualified operator FTE is assumed to cost $100,000 per annum in year 2014 dollars.
- Annual maintenance costs for each category of equipment have been estimated by KWL and Corix, with input from UBC, and are calculated as follows:
  - Mechanical, non-renewable energy equipment – 0.75% of cumulative capital
  - Site work and structures (civil) – 0.25% of cumulative capital
  - Mechanical, renewable energy equipment – 2.0% of cumulative capital
  - Distribution pipe system – 0.25% of cumulative capital
  - Energy transfer station – 0.50% of cumulative capital

Table 16: Indirect Operating Costs (nominal $) below shows the indirect operating costs for the NDES. There are assumptions about the allocation of indirect costs between the NDES and the ADES. For example, fees paid to UBC will be charged only to NDES customers. The details of these apportionment calculations are included in the financial model but only have an impact beginning in 2024 when the CEP becomes operational and the ADES receives heat energy. The costs shown in *Table 16: Indirect Operating Costs (nominal $)* are aggregate amounts and have not been apportioned between the NDES and ADES.

Table 16: Indirect Operating Costs (nominal $)

Indirect operating costs (thousands, nominal $)	NPV, 30 yrs	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
		1	2	3	4	5	6	7	8	10	30
Insurance	985	2	5	9	12	14	17	34	37	45	132
Corix admin	2,385	143	146	149	152	155	158	161	164	171	254
Land leases	901	0	0	0	0	0	0	0	0	111	165
Water & sewer	443	27	27	28	28	29	29	30	30	32	47
UBC service levy	3,308	0	3	14	19	20	22	75	79	82	439
UBC franchise fee	1,705	0	0	0	0	0	0	0	0	0	434
Property tax on buildings, land and DPS	2,284	0	2	9	13	14	15	52	54	57	303
Total	12,011	171	182	208	224	231	240	352	365	497	1,774

Table 17: Indirect Costs: Facts and Assumptions

INDIRECT COSTS		
Portion of capital costs attracting PST		45.0%
Rural property tax paid to Province (Metro Van.)		2.13%
Land value for property tax ($ per sq. metre)	$	560.00
UBC service levy		3.09%
Insurance, owner ($ per $100 of nbv)	$	0.11
Insurance, general commercial liability (% of rev.)		0.25%
Water & Sewer ($ annual)	$	26,000
Corix admin (average year)	$	140,000
UBC franchise fee (% of PY NDES rev.)		3.0%
UBC franchise fee to begin in project year		16
UBC land lease rate per m2	$	50.00

Further information about the items in *Table 16: Indirect Operating Costs (nominal $)* and *Table 17: Indirect Costs: Facts and Assumptions*

- Insurance includes an amount for (a) commercial general liability, and (b) operational insurance on the value of the property, being the buildings, pipe and equipment. General commercial liability insurance is assumed to be 0.25% per dollar of revenue, subject to a $2000 per annum minimum. Operational (property) insurance is assumed to be $0.11 per $100 of value, being the net book

value of the buildings and equipment, plus an estimated 20% of the cost of the pipe system. These estimates are based on internally provided information from Corix's insurance administrator. Construction insurance during construction and wrap-up is already included in KWL's capital cost estimates.

- Corix administration and overhead charge is an internal estimate based on Corix's broad experience operating similar district energy systems. The bundled charge of $140,000 per annum (in 2014 dollars) is for an average year and includes separately determined estimates for legal, accounting, regulatory, administration, human resources, I/T support and maintenance, telephones, office supplies, and vehicle costs. Corix makes every effort to minimize its administrative and overhead costs, but it is reasonable to assume that costs in the early phase of a project will be higher, if viewed on a per megawatt hour basis, than in later years.
- The CEP will be situated on land leased from UBC. Final site determination and the lease agreement have not been concluded, but provisional discussion between Corix and UBC indicates that the lease rate will be a market rate of approximately $50 per square meter. KWL has estimated that the CEP will require 1820 square meters of land.
- Annual water and sewer charges from UBC have been estimated based on provisional discussions between Corix and UBC.
- A Service Levy, intended to emulate a municipal tax, is charged by UBC at a rate of 3.09% (2014 rate) of the value of leased land, buildings and pipes. Property owners on UBC's campus pay a Rural Property Tax to the Province of BC (i.e., 2.13%, 2014 rate for jurisdiction 739 Lower Mainland Rural) and the Services Levy to UBC. The two added together are substantially the same as the City of Vancouver municipal tax due on a property with the same assessed value. Although property assessment will be determined by the BC Assessment Authority, for purposes of the calculation, land value has been estimated at an indicative market rate of $560 per square meter based on input from UBC, buildings have been valued at net book value, and the pipes at 20% of their capital cost.
- A UBC Franchise Fee on revenues has been agreed to between Corix and UBC and is included in the Infrastructure Agreement. The rate is 3% of revenue, but will not begin until after the 15th year of operation.

2.7 DEBT AND EQUITY FINANCING

The Base Case balance sheet used to calculate annual revenue requirement is shown in *Table 18: Balance Sheet (thousands, nominal $)*. Total depreciated rate base assets for this purpose include the residential revenue deferral account balance (see Section 2.10 below), and is net of the Carbon Emissions Rider account balance (see Section 2.6.1.7 above) that benefits the NDES customers and is expected to be used to offset the capital cost of the CEP in year 2024.

Ownership and operation of the NDES exposes Corix to business and financial risks that may exceed those allowed for in the Commission's recent Generic Cost of Capital (GCOC) decision for small thermal energy utilities. Corix proposes to set initial rates consistent with the GCOC Stage 2 "Minimum Default Capital Structure and Equity Risk Premium" for similar small thermal utilities to that contemplated for Phase 1 of the proposed NDES.

As indicated on the following page in *Table 19: Financing, Depreciation and Tax Assumptions*, Corix proposes a deemed capital structure of 57.5% debt and 42.5% equity and an equity risk premium of 75 basis points over the benchmark low risk utility. The Base Case annual revenue requirement includes interest expense and return on equity (ROE) calculated on the mid-year debt and equity balances on a forward test year basis.

The interest rate on debt financing was determined using the credit spread between BBB and BBB (low) rated debt and the 10 year Government of Canada bond yield, consistent with approach outlined for

calculating a "default debt" rate for TES utilities from the Commission's GCOC Decision (Stage 1) and confirmed in the Commission's Stage 2 decision[10]. The financing and tax assumptions applied are summarized in *Table 19: Financing, Depreciation and Tax Assumptions* below.

Table 18: Balance Sheet (thousands, nominal $)

Balance sheet (thousands, nominal $)	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
	1	2	3	4	5	6	7	8	10	30
Plant in service	2,440	5,813	8,341	9,505	10,600	21,453	22,550	24,964	72,325	87,463
Accumulated depreciation	0	(70)	(228)	(536)	(932)	(1,385)	(2,055)	(2,749)	(4,299)	(42,574)
Carbon emissions rider account owing to NDES	(6)	(37)	(84)	(154)	(254)	(378)	(523)	(691)	0	0
Residental deferral account	220	549	1,090	1,722	2,234	2,422	3,096	3,503	3,160	0
Total assets	2,654	6,255	9,118	10,537	11,648	22,112	23,068	25,027	71,186	44,889
Debt	1,526	3,597	5,243	6,059	6,697	12,714	13,264	14,391	40,932	25,811
Equity	1,128	2,658	3,875	4,478	4,950	9,398	9,804	10,636	30,254	19,078
Total liabilities and equity	2,654	6,255	9,118	10,537	11,648	22,112	23,068	25,027	71,186	44,889
Debt, mid-year	763	2,561	4,420	5,651	6,378	9,706	12,989	13,827	27,681	26,370
Equity, mid-year	564	1,893	3,267	4,177	4,714	7,174	9,601	10,220	20,460	19,491
Total liabilities and equity, mid-year	1,327	4,455	7,687	9,828	11,092	16,880	22,590	24,048	48,141	45,861

Table 19: Financing, Depreciation and Tax Assumptions

FINANCING & TAX	
Debt ratio	57.5%
Equity ratio	42.5%
Debt rate	4.0%
Equity rate	9.5%
Tax rate	26.0%
Weighted after tax average cost of capital	5.7%
Pre tax WACC	6.3%
Depreciation - buildings	1.5%
Depreciation - plant	3.0%
Depreciation - distribution	1.5%
Depreciation - ETS and other	3.0%
CCA - buildings	4.0%
CCA - natural gas	8.0%
CCA - renewable energy (before 2020)	50.0%
CCA - renewable energy (after 2019)	30.0%

2.7.1 Depreciation and Amortization

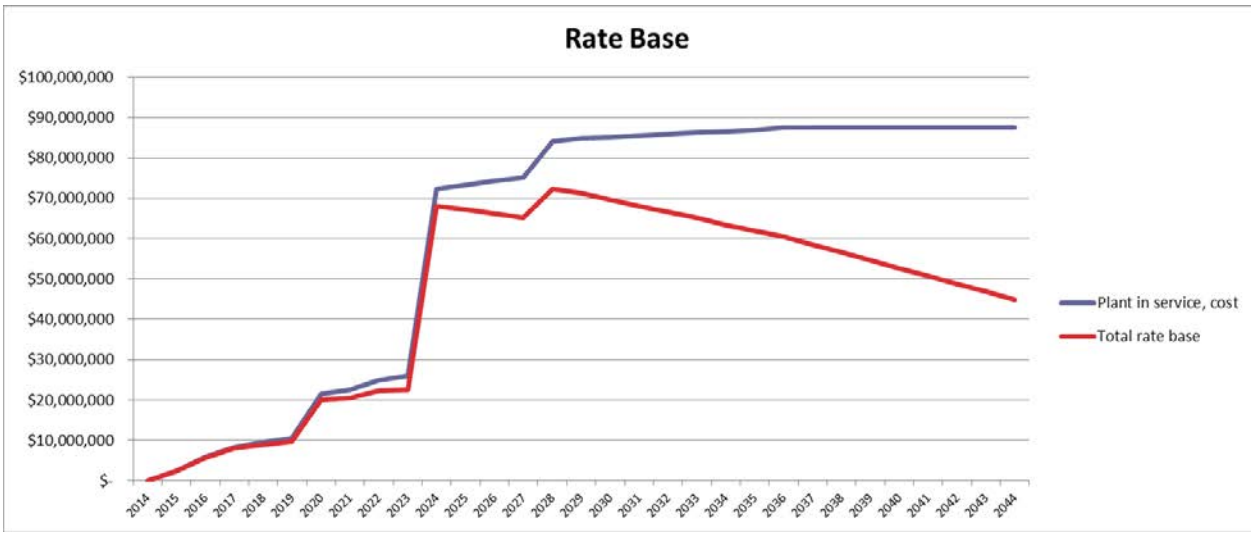
Depreciation charges are shown above in *Table 19: Financing, Depreciation and Tax Assumptions*. The charges reflect common DES utility accounting practice and estimated useful life of each asset group. The 30-year forecast period for the financial model is, on balance, in line with the end of the useful life of the plant and equipment, although it is reasonable that actual asset life will vary and replacement of plant and equipment might need to occur before the end of 30 years. (Also, the 30-year forecasted period was chosen because the terms of the Infrastructure Agreement allow UBC to purchase the NDES at that point.) Notwithstanding, the useful life assumptions for accounting depreciation, and the capital maintenance program is intended to allow plant, equipment and other infrastructure to meet or surpass the expected useful life.

Figure 13: Plant in Service Coast Compared to Rate Base (nominal $) below shows the depreciating balance of rate base over the 30-year forecast period compared to the original cost of the plant in service.

[10] BCUC Generic Cost of Capital Proceeding (Stage 2) Decision, March 25, 2014

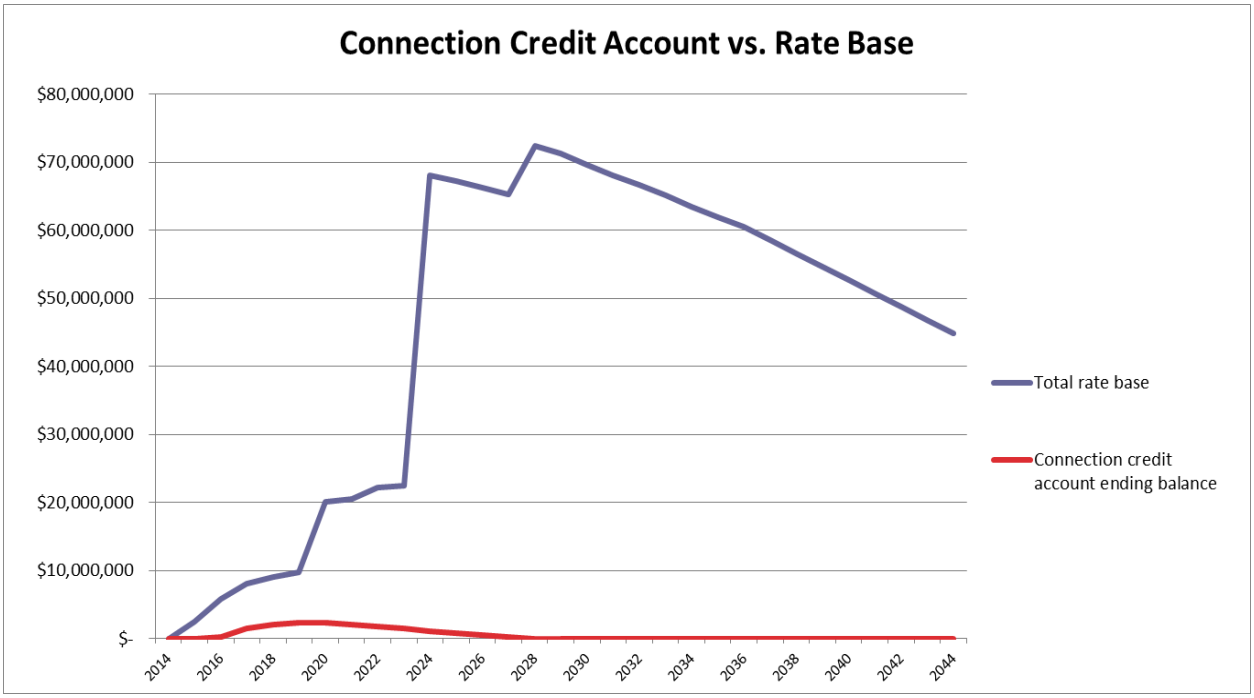
For this purpose, rate base excludes the residential Revenue Deferral Account and the Carbon Emissions Rider account.

Figure 13: Plant in Service Coast Compared to Rate Base (nominal $)



Subject to BCUC approval, the temporary Connection Credit account will be amortized over 10 years, which is considered a reasonable duration in order to smooth the impact on revenue requirement. The aggregate amount of the Connection Credit is forecast to be less than $3 million, as discussed above in Section 2.6.1.7. *Figure 14: Connection Credit Account Compared Rate Base (nominal $)* below shows the Connection Credit account balance in comparison to the depreciated rate base amount, which for this purpose excludes the residential Revenue Deferral Account and the Carbon Emissions Rider account.

Figure 14: Connection Credit Account Compared Rate Base (nominal $)



2.8 INCOME TAXES

Income tax assumptions are shown in *Table 19: Financing, Depreciation and Tax Assumptions*. The combined federal and provincial corporate tax rate on general income in British Columbia is 26%. The CEP is assumed to qualify for the UCC Class 43.1 renewable energy accelerated capital cost allowance rate of 30% (declining balance). In the Base Case, the CEP is not built until 2024, which is after the cut-off date for the enhanced UCC Class 43.2 50% CCA rate. Regardless, for purposes of calculating the Annual Revenue Requirement, the Base Case forecasts that tax will be not be payable in a material amount until year 2040. The Connection Credit and the Project Development Costs are each amortized for tax purposes as a Cumulative Eligible Capital amount (i.e., 75% of the incurred cost is added to the CEC account; 7% of CEC is annually deducted for tax).

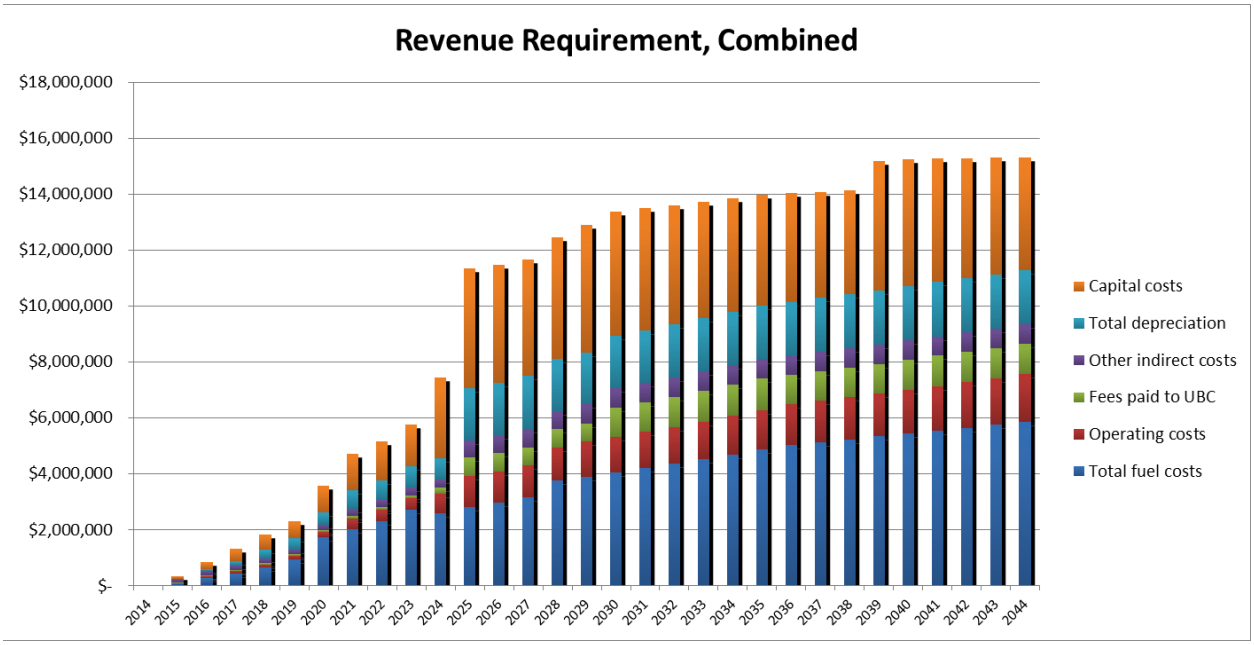
2.9 INDICATIVE REVENUE REQUIREMENTS

The forecasted annual revenue requirements until year 2022 (i.e., the year that the Wesbrook EC/ETS is in service), and thereafter as of 2024 (i.e., the year the CEP is constructed), and as of 2044 (i.e., the year in which UBC has an option to purchase the NDES from Corix under the terms of the Infrastructure Agreement), are shown below in *Table 20: Revenue Requirements (thousands, nominal $) and Figure 15: Revenue Requirement (nominal $)* on the following page.

Table 20: Revenue Requirements (thousands, nominal $)

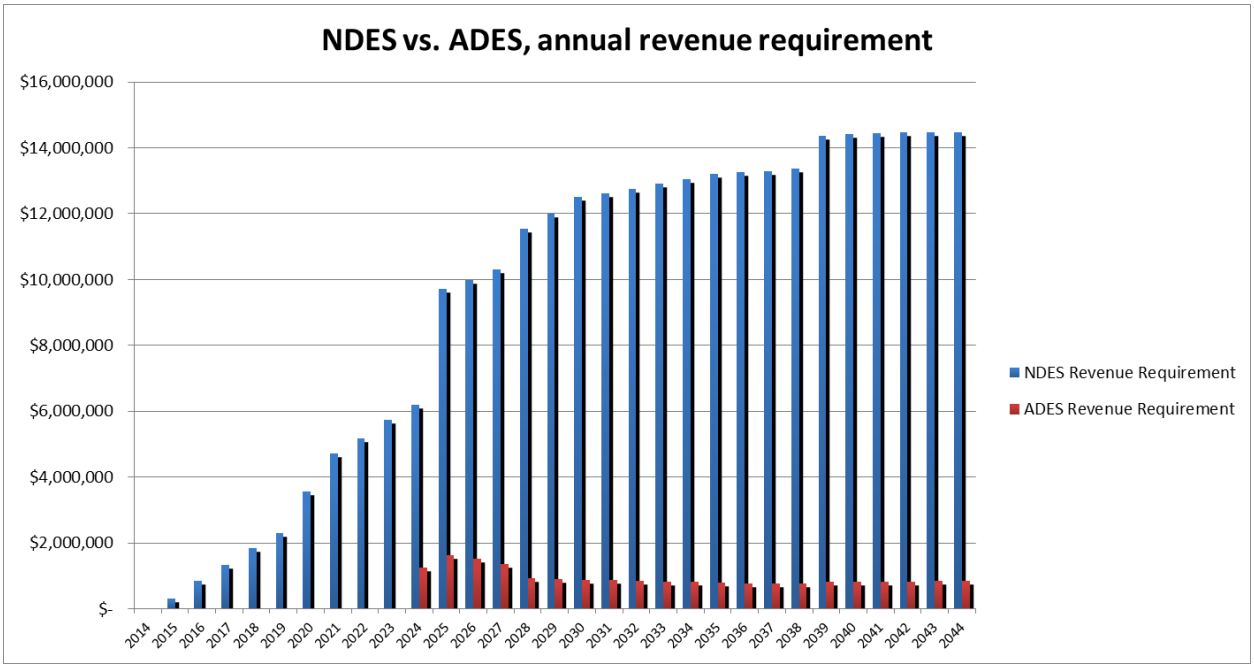
Revenue requirements, indicative (thousands, nominal $)	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
	1	2	3	4	5	6	7	8	10	30
Fuel costs										
Renewable, waste heat (TRIUMF)	0	0	0	0	0	0	0	0	0	0
Heat purchased from UBC	0	0	0	0	0	536	606	678	0	456
Natural gas	46	238	370	571	828	1,034	1,229	1,448	103	1,586
Electricity	7	10	10	10	11	16	18	18	2,494	3,822
Carbon emissions rider	6	32	47	70	100	123	145	168	0	0
Total fuel costs	59	279	427	651	939	1,710	1,997	2,312	2,598	5,863
Operating costs	0	0	0	0	0	0	0	0	0	0
Indirect costs	171	182	208	224	231	240	352	365	497	1,774
Depreciation & amortization	0	70	158	308	396	453	669	694	787	1,945
Income tax	0	0	0	0	9	10	27	41	0	1,135
Interest	28	94	159	196	214	342	466	491	1,040	1,055
Return on equity	49	165	280	345	376	600	819	862	1,826	1,852
Total revenue requirement, indicative	318	845	1,317	1,826	2,287	3,567	4,716	5,160	7,431	15,315

Figure 15: Revenue Requirement (nominal $)



Commencing in year 2024, it is assumed that UBC's Academic District Energy System (ADES) will begin to purchase energy that is produced by the CEP. At this point, certain capital and operating costs included in the annual revenue calculation will be allocated between the NDES and the ADES. Since this occurs after Phase 1, it does not directly impact the near-term NDES rate proposal expressed in this application, although it is discussed in general terms below and forms part of the long-term levelized cost comparisons. *Figure 16: NDES vs. ADES Annual Revenue Requirement (nominal $)* on the following page shows the allocated NDES and ADES annual revenue requirements.

Figure 16: NDES vs. ADES Annual Revenue Requirement (nominal $)



Apportionment of the annual revenue requirement between the NDES and the ADES for years 2024 and forward is based on a principled allocation of capital, fuel and operating costs. Costs that are solely attributable to the NDES are allocated solely to the NDES, while costs for shared plant (e.g., the TRIUMF waste heat recovery equipment and the ADES interconnection) are allocated based on relative use of energy between the NDES and ADES.

The apportionment of property, plant and equipment between the NDES and the ADES is shown in *Figure 17: Allocation of Property, Plant* and Equipment NBV between NDES and ADES below, and the apportionment of fuel costs based on annual relative energy load is shown in *Figure 18: NDES vs. ADES Share of Fuel Costs (%)* on the following page.

Figure 17: Allocation of Property, Plant and Equipment NBV between NDES and ADES

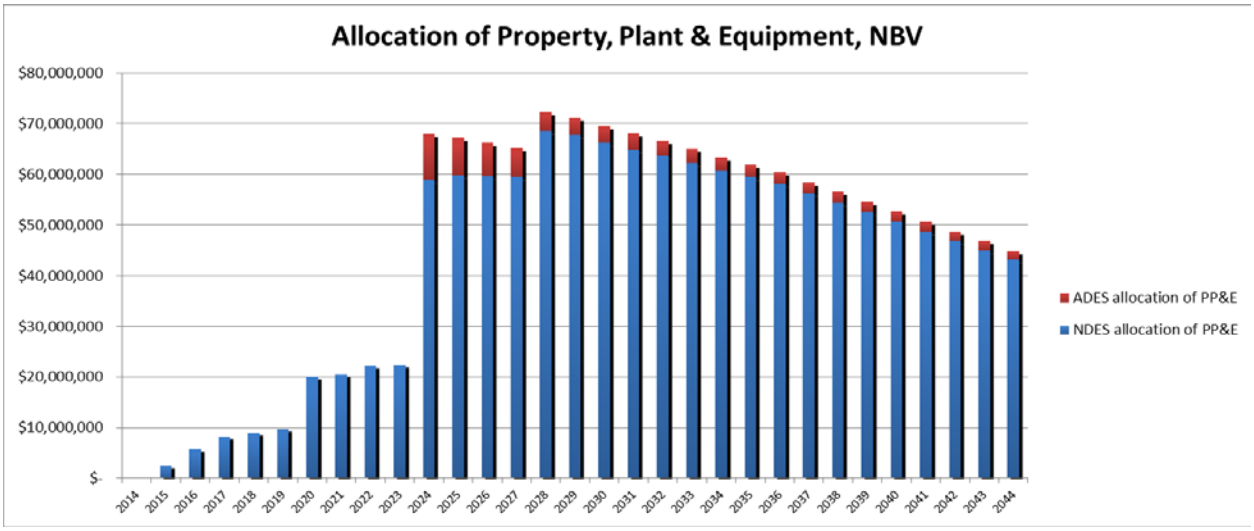
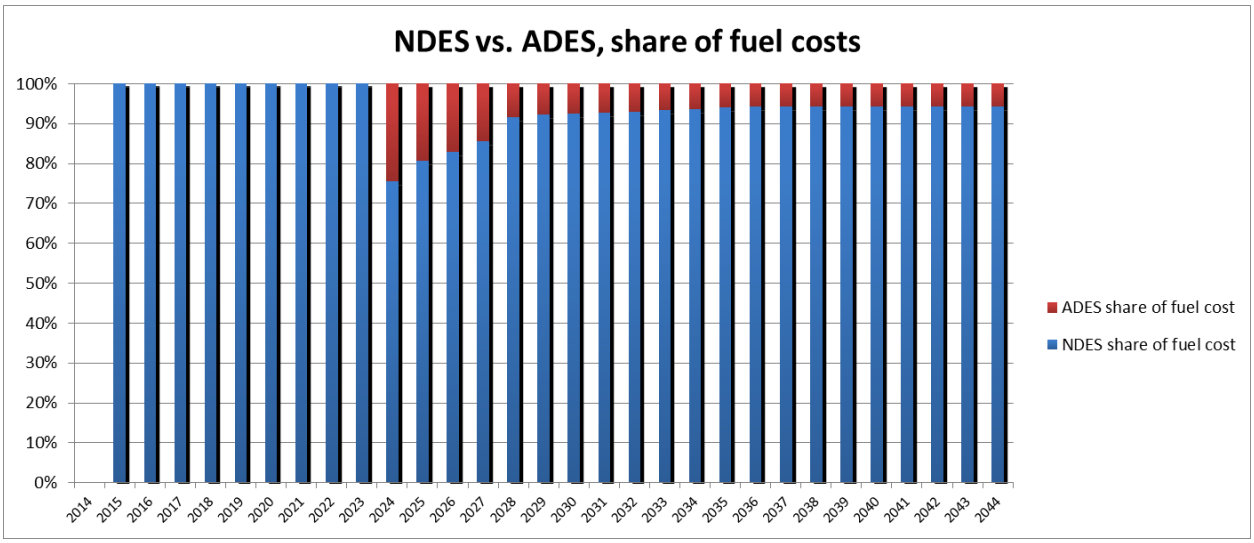


Figure 18: NDES vs. ADES Share of Fuel Costs (%)



2.10 LEVELIZED RATE PROPOSAL

The maximum sustained annual energy load occurs in project year 22 of the development (i.e., year 2036) at 102,835 MWh per annum. This is the result of 108 connections and 1,078,000 square meters of connected floor space. As shown previously in *Figure 9: Incremental Capital Costs (2014$)* and *Figure 10: Cumulative Capital Costs (2014$)* there is a very large, sudden increase in capital expenditures in project year 10 (i.e., year 2024) as a consequence of the CEP construction. To a lesser extent, because of a large increase in connected floor space in project year 6 that will result in a significant expansion of distribution piping, and the subsequent construction of the Wesbrook EC/ETS in project year 8, there is also a significant step-up in revenue requirement in project year 6 and then again in project year 10. As shown in *Figure 19: Annual Consumption (MWh)* the forecasted annual energy load in the Base Case lags these step changes in revenue requirement. The result is that annual revenue requirement per MWh of energy load increases suddenly in a manner that would be onerous to NDES customers, as shown in *Figure 20: NDES Annual Revenue Requirement per MWH (nominal $)*.

Figure 19: Annual Consumption (MWh)

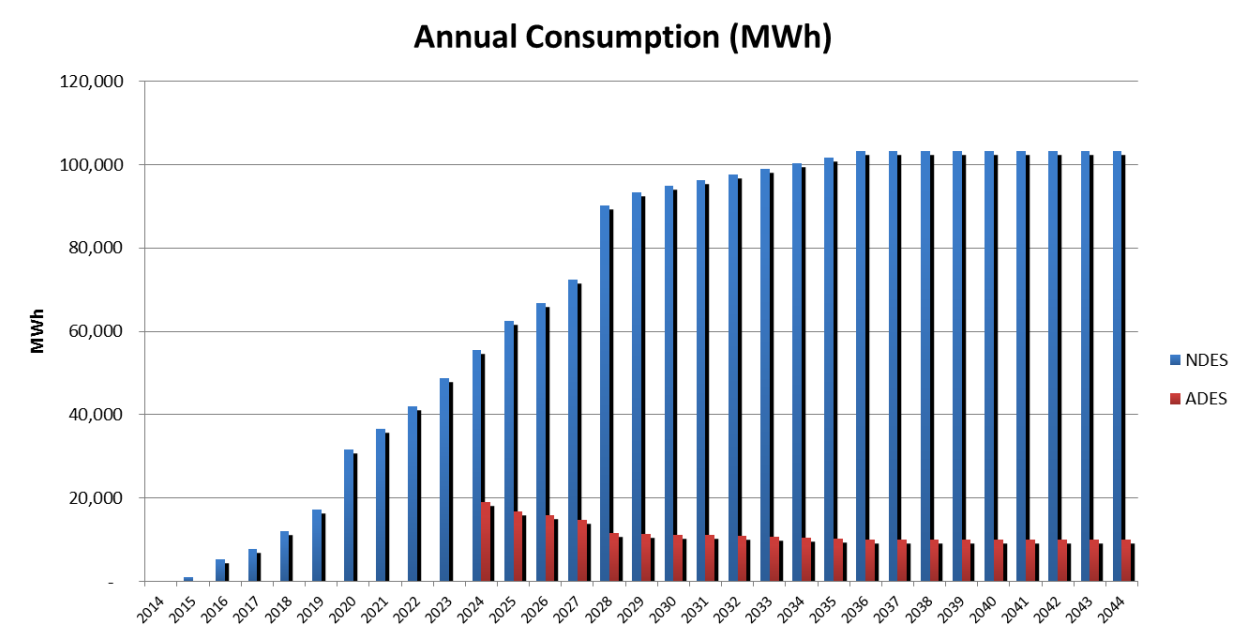
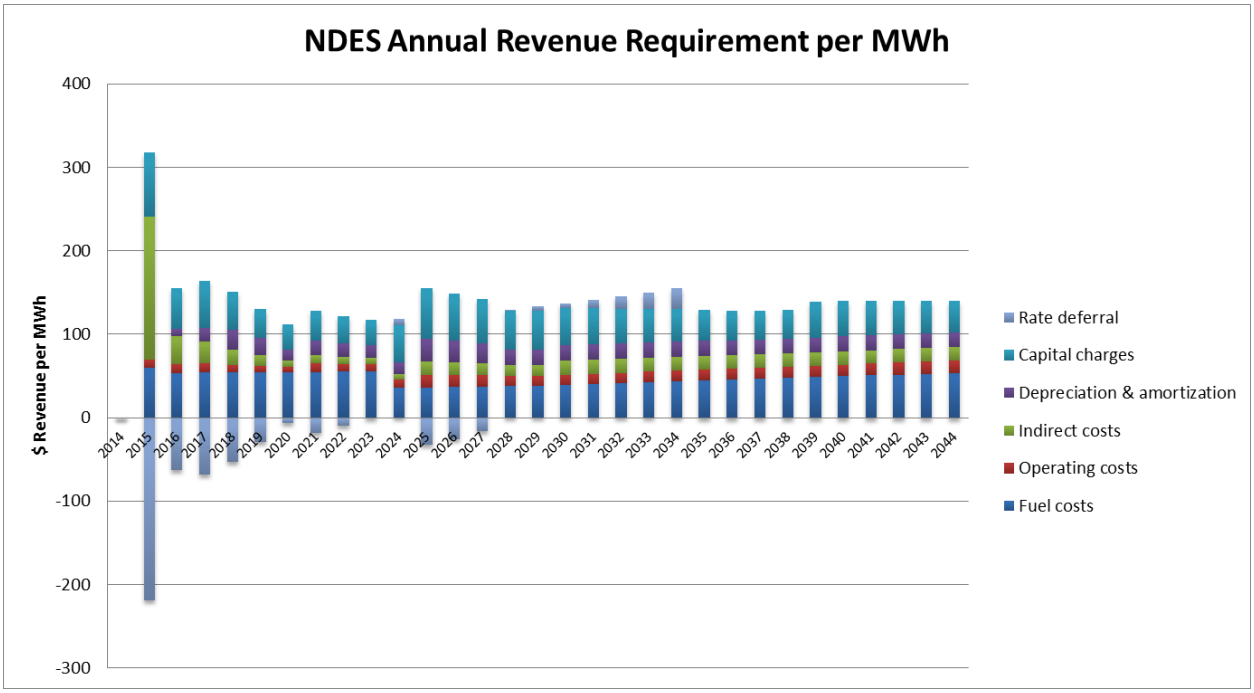


Figure 20: NDES Annual Revenue Requirement per MWH (nominal $)



Corix is proposing a levelized rate for the NDES, beginning upon initial energy load delivery and continuing until year 20, to allow recovery of accumulated deferred revenues without escalating annual rates much above CPI, and in line with other energy costs such as residential electricity. In the Base Case, the initial rate per MWh (i.e., including proportionally both fixed and variable components of annual revenue requirement) is $98.23 per MWh, escalating at 2.5% per annum. Including the remaining 10 years of the project term, the levelized cost on an NPV basis over 30 years is $133.28 per MWh. (For this purpose,

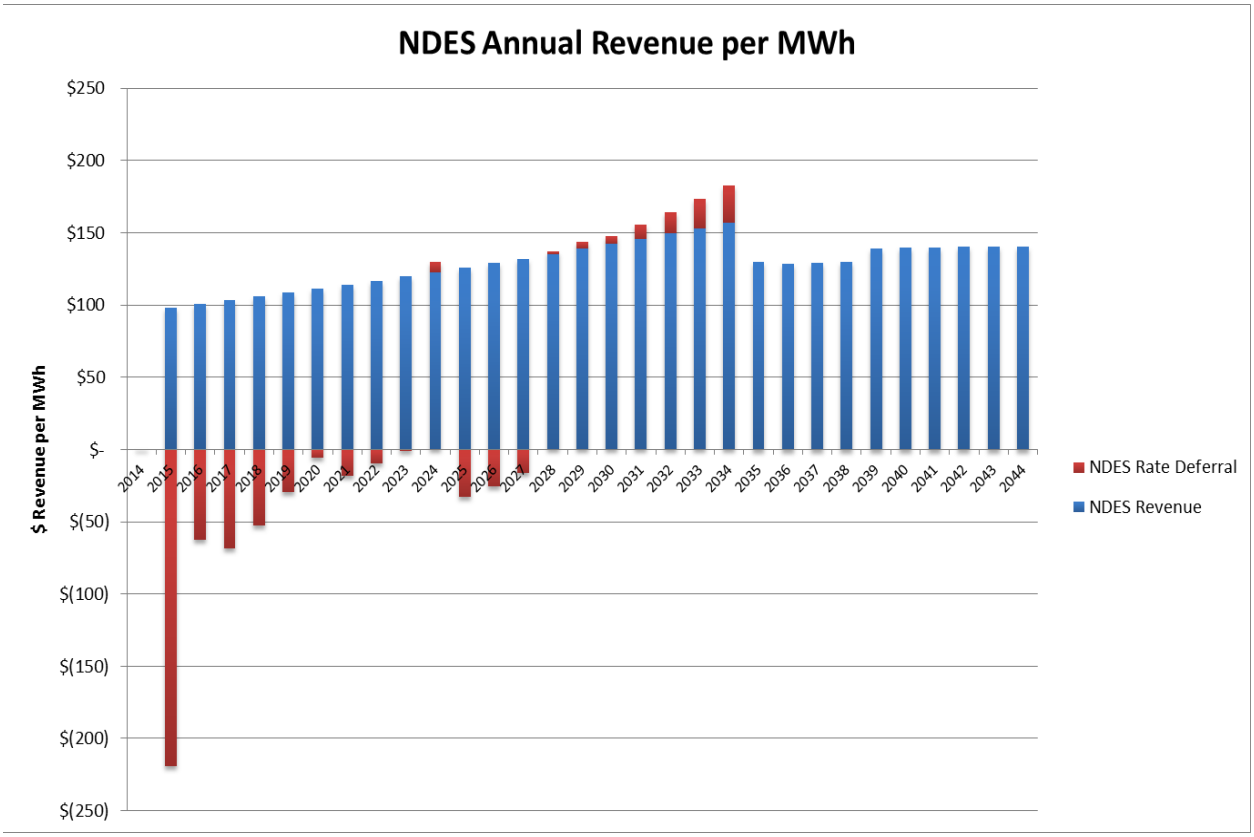
NPV is calculated using the after-tax WACC shown in *Table 19: Financing, Depreciation and Tax Assumptions)*. By comparison to a competitive carbon-neutral benchmark scenario assuming 100% residential electricity, the NDES levelized rate is about 10% lower and the initial rate is about equal, as shown below in *Table 21: NDES Rate Design*. Electricity is commonly cited by real estate developers as being a preferred heating alternative owing to the low cost of installing baseboard heaters.

Table 21: NDES Rate Design

NDES rate design, indicative		2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
		1	2	3	4	5	6	7	8	10	30
NDES	Levelized										
Utility revenue (thousands, nominal $)		98	530	812	1,263	1,875	3,511	4,169	4,909	6,817	14,478
Utility revenue per MWh ($)	$ 133.28	$ 98.23	$ 100.68	$ 103.20	$ 105.78	$ 108.43	$ 111.14	$ 113.91	$ 116.76	$ 122.67	$ 140.32
Escalation			2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	0.06%
Square metres		16,295	58,889	84,916	125,677	179,197	322,194	372,209	426,662	561,943	1,078,680
Annual basic charge per sq metre ($)		$ 4.002	$ 5.960	$ 6.332	$ 6.659	$ 6.932	$ 7.220	$ 7.420	$ 7.622	$ 8.037	$ 8.893
Monthly basic charge per sq metre ($)		$ 0.667	$ 0.497	$ 0.528	$ 0.555	$ 0.578	$ 0.602	$ 0.618	$ 0.635	$ 0.670	$ 0.741
Commodity charge per kWh ($)		$ 0.033	$ 0.034	$ 0.035	$ 0.036	$ 0.037	$ 0.038	$ 0.038	$ 0.039	$ 0.041	$ 0.047
Carbon Neutral Benchmark, NDES	Levelized										
Status quo electricity cost (thousands, nominal $)		99	550	855	1,344	2,005	3,736	4,414	5,172	7,112	19,624
Status quo electric rates per MWh ($)	$ 147.69	$ 98.65	$ 104.57	$ 108.75	$ 112.56	$ 115.93	$ 118.25	$ 120.62	$ 123.03	$ 128.00	$ 190.20
Escalation			6.00%	4.00%	3.50%	3.00%	2.00%	2.00%	2.00%	2.00%	2.00%

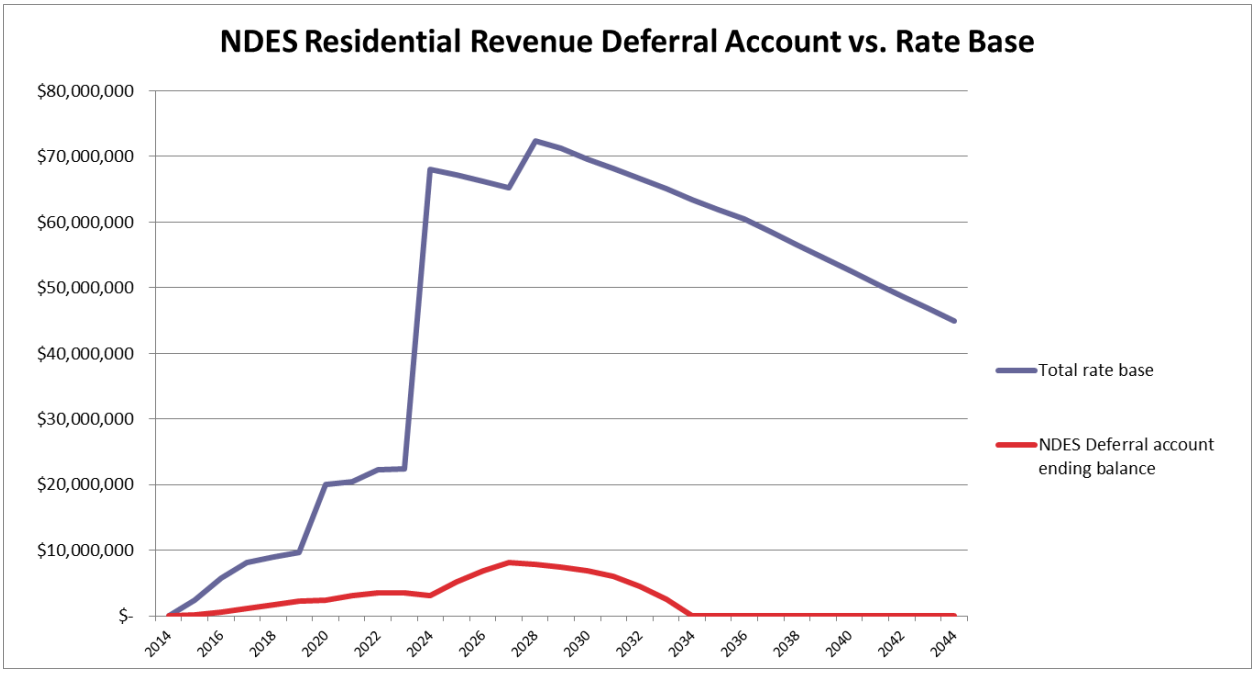
The levelized NDES rate is shown *in Figure 21: NDES Annual Rate per MWh (nominal $)* below, and the annual over or under recovery is shown as well. Note that the revenue deferral is bi-modal, with rates that under-recover annual revenue requirement in project years 1 to 5 and 11 to 13, while over-recovering in all other years up to project year 20.

Figure 21: NDES Annual Rate per MWh (nominal $)



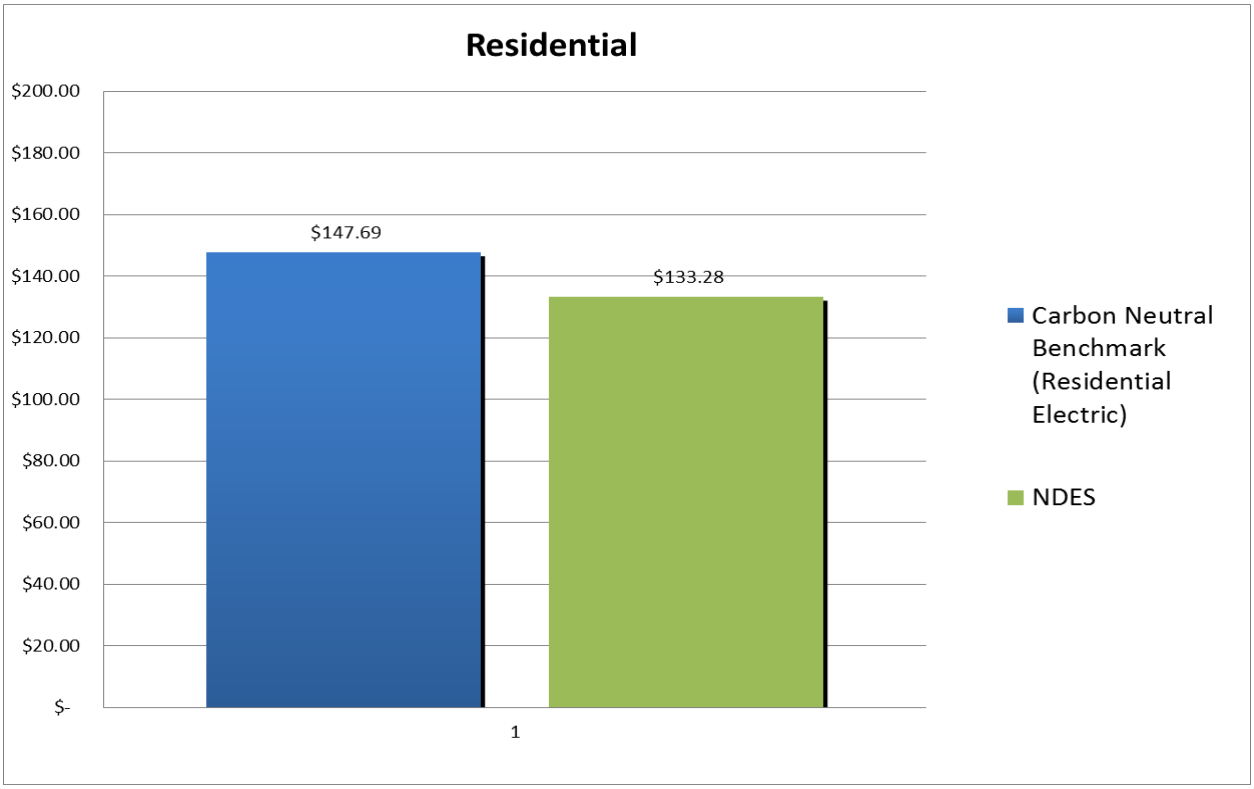
Corix proposes to accumulate the annual over or under recovery of revenue requirements in a Residential Revenue Deferral Account to be included in annual rate base, earning a return at the after-tax weighted average cost of capital. The Base Case intends that the Residential Revenue Deferral Account will be reduced to $nil by the end of 2034 (year 20), as shown in *Figure 22: NDES Residential Deferral Account Compared to Rate Base (nominal $) to Rate Base (nominal $)* below.

Figure 22: NDES Residential Deferral Account Compared to Rate Base (nominal $) to Rate Base (nominal $)



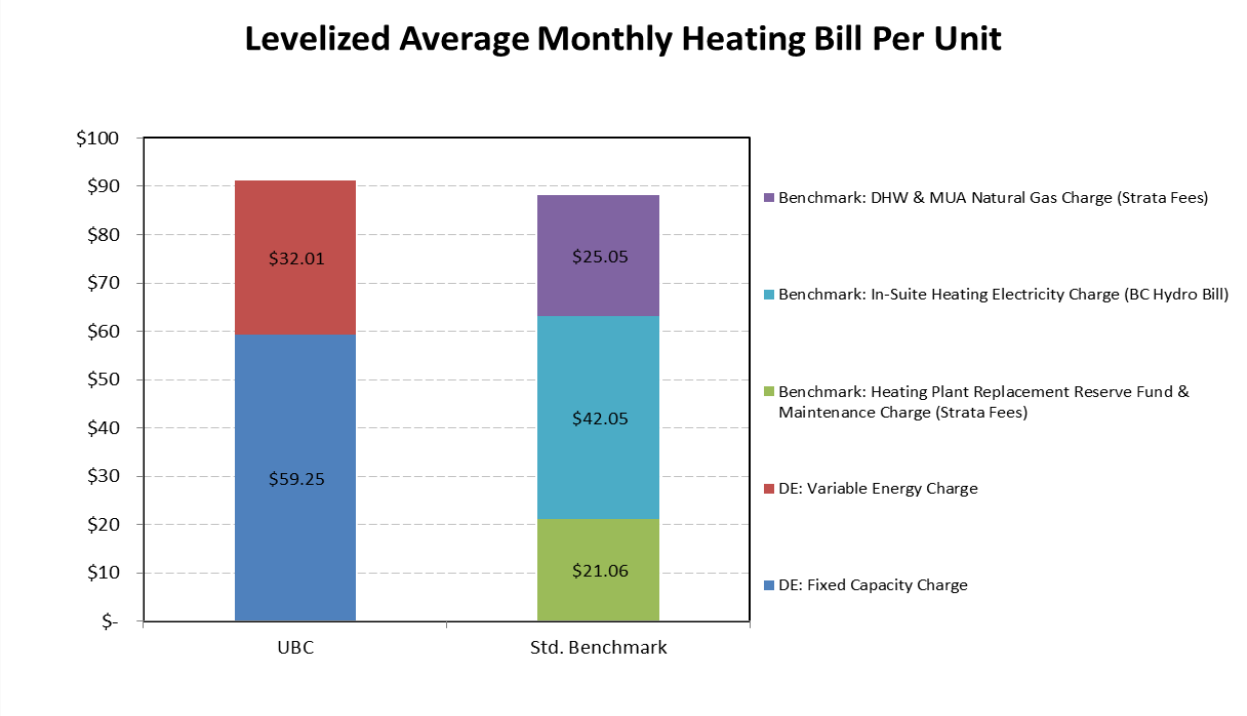
As stated above, the NDES competitive carbon neutral benchmark scenario reflects 100% electric energy, which is considered the cleanest energy source. On a net present value (NPV) basis, the NDES levelized cost over the 30-year forecast period is approximately $133, which is favourable to the competitive benchmark levelized cost of $147, as shown in *Figure 23: 30-year NPV Levelized NDES Coat vs. Competitive Carbon Neutral Benchmark* on the following page.

Figure 23: 30-year NPV Levelized NDES Coat vs. Competitive Carbon Neutral Benchmark



A comparison of the monthly heating bill for future residents is shown in *Figure 24: Monthly In-Suite Heating Bill.* The DE bill is on a suite level and is comprised of a capacity charge and variable charge. The standard benchmark bill consists of in-suite electric billed directly by BC Hydro, a heating plant reserve maintenance charge that would be in strata fees, plus the natural gas charge for domestic hot water and makeup air units, also billed in strata fees.

Figure 24: Monthly In-Suite Heating Bill



2.10.1 Fixed and Variable Charges

Table 22: Residential Rate Design: Facts and Assumptions below summarizes the principal facts and assumptions to determine the annual NDES rates per MWh and to allocate this rate between a fixed and variable (i.e., a Basic and Commodity) component.

Table 22: Residential Rate Design: Facts and Assumptions

RESIDENTIAL RATE DESIGN, INDICATIVE		
Annual escalation		2.50%
Rate per MWh (year 1)	$	98.23
Levelized rate per MWh	$	133.28
Basic charge %		66.3%
Commodity charge %		33.7%
Basic charge per sq. metre (partial year 1)	$	0.667
Commodity charge per kWh (year 1)	$	0.033

Corix proposes an initial allocation of the annual NDES rate per MWh shown in *Table 22: Residential Rate Design: Facts and Assumptions* above based on 66.3% fixed charges and 33.7% variable charges. For this purpose, the fixed charges in the annual revenue requirement include all capital charges (i.e., depreciation, amortization, interest, return on equity and taxes) and all indirect charges (i.e., insurance, administration and overhead, land leases, water and sewer fees, UBC service levy, UBC franchise fee, and property tax) as well as operating costs (i.e., labour and maintenance). Variable charges include fuel. The 66.3% / 33.7% allocation is supported by the relative fixed versus variable charges included in the NDES portion of annual revenue requirement, calculated on an NPV basis over the 30-year forecast period. The calculated NPV proportions are 66.3% fixed and 33.7% variable. The annual rates, apportioned on a

monthly basis, will reflect a 66.3% basic charge expressed as an amount per square meter of floor space for each connected building, and a 33.7% commodity charge expressed as an amount per MWh of energy provided to the customer building.

2.10.2 Financial Projections

In addition to the forecast balance sheet presented in *Table 18: Balance Sheet (thousands, nominal $)*, and the forecast annual revenue requirement presented in *Table 20: Revenue Requirements (thousands, nominal $)* the forecast statement of earnings and the forecast cash flow statement are shown below in *Table 23: Statement of Earnings* and *Table 24: Cash Flow*.

Table 23: Statement of Earnings

Earnings, indicative (thousands, nominal $)	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
	1	2	3	4	5	6	7	8	10	30
Revenue										
NDES basic charges	65	351	538	837	1,242	2,326	2,762	3,252	4,516	9,592
NDES commodity charges	33	179	274	426	633	1,185	1,407	1,656	2,300	4,886
Total residential charges	98	530	812	1,263	1,875	3,511	4,169	4,909	6,817	14,478
ADES basic charges	0	0	0	0	0	0	0	0	617	498
ADES commodity charges	0	0	0	0	0	0	0	0	634	339
Total campus charges	0	0	0	0	0	0	0	0	1,251	836
Miscellaneous revenue	0	0	0	0	0	0	0	0	0	0
Total revenue	98	530	812	1,263	1,875	3,511	4,169	4,909	8,067	15,315
Fuel	59	279	427	651	939	1,710	1,997	2,312	2,598	5,863
Operating costs	10	55	85	102	122	211	384	396	684	1,691
Indirect costs	171	182	208	224	231	240	352	365	497	1,774
Total operating expenses	241	516	720	976	1,292	2,162	2,734	3,072	3,779	9,328
Operating cash flow (EBITDA)	(143)	14	92	287	583	1,349	1,435	1,836	4,288	5,986
Depreciation & amortization	0	70	158	308	396	453	669	694	787	1,945
Interest (including deferral interest)	28	99	172	222	254	393	522	562	1,122	1,055
Earnings before tax	(171)	(155)	(238)	(243)	(67)	503	243	580	2,380	2,987
Income tax	0	0	0	0	0	0	0	0	0	1,135
Earnings before deferral	(171)	(155)	(238)	(243)	(67)	503	243	580	2,380	1,852
Revenue deficiency deferral	220	330	540	632	513	188	674	407	(410)	0
Net earnings, indicative	49	174	302	389	446	691	917	987	1,970	1,852
ROE	9.50%	9.50%	9.50%	9.50%	9.50%	9.50%	9.50%	9.50%	9.50%	9.50%

Table 24: Cash Flow

Cash flow (thousands, nominal $)	2015	2016	2017	2018	2019	2020	2021	2022	2024	2044
	1	2	3	4	5	6	7	8	10	30
Operations										
Net earnings	49	174	302	389	446	691	917	987	1,970	1,852
Depreciation & amortization	0	70	158	308	396	453	669	694	787	1,945
Carbon emissions rider collected (applied)	6	32	47	70	100	123	145	168	(889)	0
Revenue deficiency deferral	(220)	(330)	(540)	(632)	(513)	(188)	(674)	(407)	410	(0)
Cash from operations	(165)	(54)	(34)	135	429	1,080	1,057	1,442	2,277	3,797
Investments										
Property, plant & equipment	(1,560)	(3,183)	(1,267)	(381)	(682)	(10,564)	(1,097)	(2,413)	(46,397)	0
Project development costs	(880)	0	0	0	0	0	0	0	0	0
Lowrise connection credit account	0	(190)	(1,261)	(783)	(413)	(289)	0	0	0	0
Cash used for investments	(2,440)	(3,373)	(2,528)	(1,164)	(1,094)	(10,854)	(1,097)	(2,413)	(46,397)	0
Financing										
Debt issue (repayment)	1,526	2,070	1,646	815	639	6,017	550	1,126	26,502	(1,118)
Equity issues	1,079	1,356	915	214	26	3,757	0	0	17,618	0
Equity distributions	0	0	0	0	0	0	(510)	(155)	0	(2,678)
Cash from financing	2,605	3,427	2,561	1,029	665	9,774	40	971	44,120	(3,797)
Net cash flow	0	0	0	0	0	0	0	0	0	0

2.10.3 Sensitivity Analysis

Although there are a number of variables that will have an unknown impact on future rates, the primary categories are capital cost, energy demand, inflation, and fuel costs. *Table 25: Sensitivities* below shows the impact on the Base Case levelized annual rate per MWh of variations in these keys categories. The results shown should be considered in light of the likelihood that there would be a corollary impact on the competitive benchmark case.

Table 25: Sensitivities

SENSITIVITY, NDES LEVELIZED REVENUE	LOW	BASE	HIGH
Change in capital costs, –10% and +10%	$ 128	$ 133	$ 139
Change in energy demand, +10% and –10%	$ 122	$ 133	$ 147
Change in gas commodity$/GJ cost, –10% and +10%	$ 131	$ 133	$ 135
Change in electricity $/KWh cost, –10% and +10%	$ 131	$ 133	$ 136
Change in CPI, –1% and +1%	$ 124	$ 133	$ 144

2.11 PROJECT ALTERNATIVES COMPARISON

In 2011, UBC conducted a pre-feasibility study of a district energy system for Wesbrook Place. The study evaluated and screened Alternate Energy Sources to identify the most viable options for evaluation. The four energy supply options evaluated were:

- Connection to the future campus medium temperature hot water system
- Heat capture from the TRIUMF cooling facilities
- Biomass combustion from a facility located on South Campus
- Sewer heat capture from South Campus Sewer Lines

The pre-feasibility study concluded that there are several technically feasible Alternate Energy Sources, that waste heat captured from TRIUMF and connection to the ADES are preferred options, and the study recommended a full feasibility study to further refine the opportunity. Both studies are attached in Appendix Two, which details the justification for the project alternatives.

3 CONSULTATION

3.1 FIRST NATIONS CONSULTATION

Block F is a parcel of land owned by the Musqueam First Nations, and was considered in various scenarios in the feasibility study and due diligence process as a proposed future Development Area for the NDES. First Nations have been welcomed in the public consultation process. On September 3, 2013, Corix's Chairman of the Board met with the Musqueam Chief Nolan Charles. Subsequently Corix's Chief Operating Officer, Eric Van Roon met with Chief Nolan again on September 12, 2013. Development plans, including the prospect of a DES connection to Block F, were shared with the Musqueam. Chief Nolan indicated that the community is interested in the project and will review with key staff as the project moves forward. Chief Nolan and the Musqueam were invited to attend a stakeholder meeting on June 24, 2014 and will continue to be consulted during all phases of the project. The next meeting with the community is being scheduled for the fall with Corix's First Nations consultation team, Glen Ohs and Owen Matheson.

3.2 PUBLIC CONSULTATION

Prior to the selection of Corix as UBC's NDES partner, UBC engaged with a number of parties that were considered important stakeholders. These included the Musqueam First Nation, University Neighbourhoods Association, TRIUMF and the UBC Board of Governors.

- **Musqueam** – The Musqueam Capital Corporation were presented with the results of the Pre-Feasibility Study and requested that the proposed Musqueam Block F development be included in the NDES Feasibility Study.
- **University Neighbourhoods Association (UNA)** – The UNA and UBC jointly funded the development of a Community Energy and Emissions Plan (CEEP). Development of this plan included public consultation with the UNA community. The plan recommended a low carbon district energy system servicing all new residential buildings starting 2015. In 2013, the plan was presented to the UNA Board of Directors and a motion to implement the plan was approved. The results of the NDES Pre-Feasibility Study and Feasibility Studies were presented to the Operations and Sustainability Committee of the UNA.
- **TRIUMF** – TRIUMF were presented with the results of the NDES Pre-Feasibility Study and Feasibility Studies. In 2011, the former Director of TRIUMF, Nigel Lockyer, signed a Letter of Intent (LOI) between UBC and TRIUMF, agreeing that the NDES could capture and use the waste heat generated by TRIUMF operations. The LOI was extended by TRIUMF in 2014. TRIUMF carried out a separate Feasibility Study that evaluated how much waste heat could be made available to the NDES.
- **UBC Board of Governors** – The Board of Governors were presented with the results of the NDES Pre-Feasibility Study and Feasibility Studies and Due Diligence. In April 2014, the Board of Governors gave approval for staff to proceed with implementation of the NDES, including executing definitive agreements and supporting the application by Corix for a CPCN.

After Corix was selected as UBC's NDES partner, Corix and UBC included a stakeholder and public consultation as part of the project, understanding the importance of keeping the public informed about the progress and to enable the public to provide input or raise potential concerns before the project implementation. The public consultation is a vital component of the entire UBC NDES development, and UBC and Corix encouraged the residents and other stakeholders through open house meetings, small stakeholder meetings and online to provide their input or seek information about the NDES project.

Corix and UBC held two open-house sessions to address various important project milestones. Key stakeholders were identified in order to deliver the information presented to a broad audience and provide

communication tools to assist with information distribution to their networks. They included students, campus residents and student residences. Two stakeholder meetings were also held to provide information and address concerns of direct stakeholders, including developers and various University associations.

Notification of the events was provided through print advertisements and online channels, including the Vancouver Courier, the Ubyssey, the Campus Resident, myuna and UBC Properties Trust announcements, campus digital signage and NDES pages on the Campus + Community Planning (C+CP) website.

Samples and copies of the material related to the public consultation, including a stakeholder notification list, are provided in Appendix Three.

The following Public Meetings were organized by Corix and UBC:

1. November 2013 – the first public consultation was an Open House that was organized upon commencement of the feasibility study. The purpose of the first meeting was to provide the public with information about the project, feasibility study and future implementation process, and the NDES concept and its benefits.

   C+CP provided notification of the public consultation period to over **38,200** contacts through advertising, email, in-person meetings and stakeholder outreach. As a result of the outreach activities, there were:

   - A total of **12** people attended the first Open House held Tuesday, November 26, 2013.
   - **47** unique page views to the Neighbourhood District Energy System pages on C+CP website

2. June 2014 - a second public consultation focused on the next steps of the NDES development and impacts to the community, environment and stakeholders. A stakeholder meeting was held with members of the UBC community, which included an overview and status update of the project presented by UBC and Corix. The material presented at the stakeholder meeting was the same information provided in the second Open House display boards, and stakeholders were also given a handout with the same details. During the stakeholder meeting, there was an open Q+A/discussion session and attendees were given a feedback form and invited to the Open House. In addition to the stakeholder meeting, a public Open House was held. C+CP provided notification of this public consultation opportunity to **over 40,414** contacts through advertising and outreach activities. As a result of the outreach activities:

   - **9** invitees attended the stakeholder meeting held Tuesday, June 24, 2014.
   - A total of **15** people attended the second Open House held Wednesday, June 25, 2014.
   - **59** unique page views to the Neighbourhood District Energy System pages on C+CP website
   - **130** unique page views to the C+CP event calendar.

The information material was provided via presentation boards and hand-out brochures. As part of the online consultation, the C+CP website provided the same information that was available during the Public Open Houses. The web content was posted to the C+CP website, and the link to the online questionnaire was also posted to the Public Consultation page. The online questionnaire included links to the relevant supporting information on the Campus + Community Planning website. The online questionnaire included the same set of questions as those asked in the feedback forms provided at the Public Open House.

In terms of the material provided during the consultation phase, the vast majority of respondents felt the information gave them a better understanding of the NDES, the project goals, how district energy systems work and the associated benefits. The presentation material and information provided by Corix and UBC representatives were positively received. Attendees expressed their interest to learn more about the project as it progresses.

There was a request by a small number of respondents for more information on alternative sources and a business model, with the same respondents expressing concern for consideration of the future.

During the second consultation phase, the information most requested from the feedback forms was the costs of the project and comparisons to other systems, such as electric, ambient and solar and some respondents expressed concern about mandatory connection of future buildings to the NDES. Many respondents recognized the NDES as a tangible solution to reducing greenhouse gas emissions and meeting sustainability goals. Conversely, the same number of participants also responded that the benefits were unclear.

There was no unanimous agreement from participants on the appearance of the TEC, though the marginal preference was to blend it into the natural landscape.

Key themes from the stakeholder meeting include location of the TEC's and permanent facility, the opportunity for sub-metering, rate structure and comparison to the market, existing building compatibility for tie-in, and timing of connection to TRIUMF.

Consultation reports for both events can be found in Appendix Four.

Corix and UBC responded to specific questions and concerns raised in an email received from the University Neighbourhood Association, and also attended their board meeting to review the material presented during the latest consultation phase and subsequent Consultation Summary Report, and address any additional questions. This information was positively received.

On July 8, 2014, Corix, with UBC, gave a presentation to the University Neighbourhood Association Board Meeting outlining the NDES project. That presentation can be found in Appendix Five.

4 PROJECT DESCRIPTION

4.1 OVERALL PROJECT PLAN

This section provides a more detailed description of the NDES including an overview of the Project Plan, with a focus on Phase 1 for which this application is requesting approval.

Development of the NDES will be phased and is designed to coincide with growth of the new developments at UBC. The NDES Project Plan proposes that the NDES approach be implemented in two phases, with Phase 1 being a temporary natural gas solution serving early loads and Phase 2 being the implementation of the Alternate Energy Source, which is currently contemplated to be waste heat recovery from TRIUMF. The NDES will provide heating and domestic hot water to buildings located within the Development Areas at UBC.

Corix is applying for Phase 1 of the NDES which will provide DES service to new buildings in Wesbrook Place that are scheduled for completion between 2014 and 2023 and for Acadia East and Block F buildings to be built between 2020 and 2023. Thermal energy for Wesbrook Place will be provided by two natural gas temporary energy centres (TEC) located within Wesbrook Place. In 2022, it is anticipate that the boiler portion of the Wesbrook EC/ETS will be installed. The Wesbrook EC/ETS, which is a component of the permanent system, will provide an addition 5MW of thermal energy necessary prior to TRIUMF installation. Acadia East and Block F loads will be fed from the ADES through a direct connection to the ADES peaking plant.

Phase 2 is currently contemplated to occur in 2024 when thermal load can support the installation of the alternate energy source, which will be the utilization of waste heat from TRIUMF cooling towers. UBC has a Letter of Intent (LOI) with TRIUMF supporting the project.

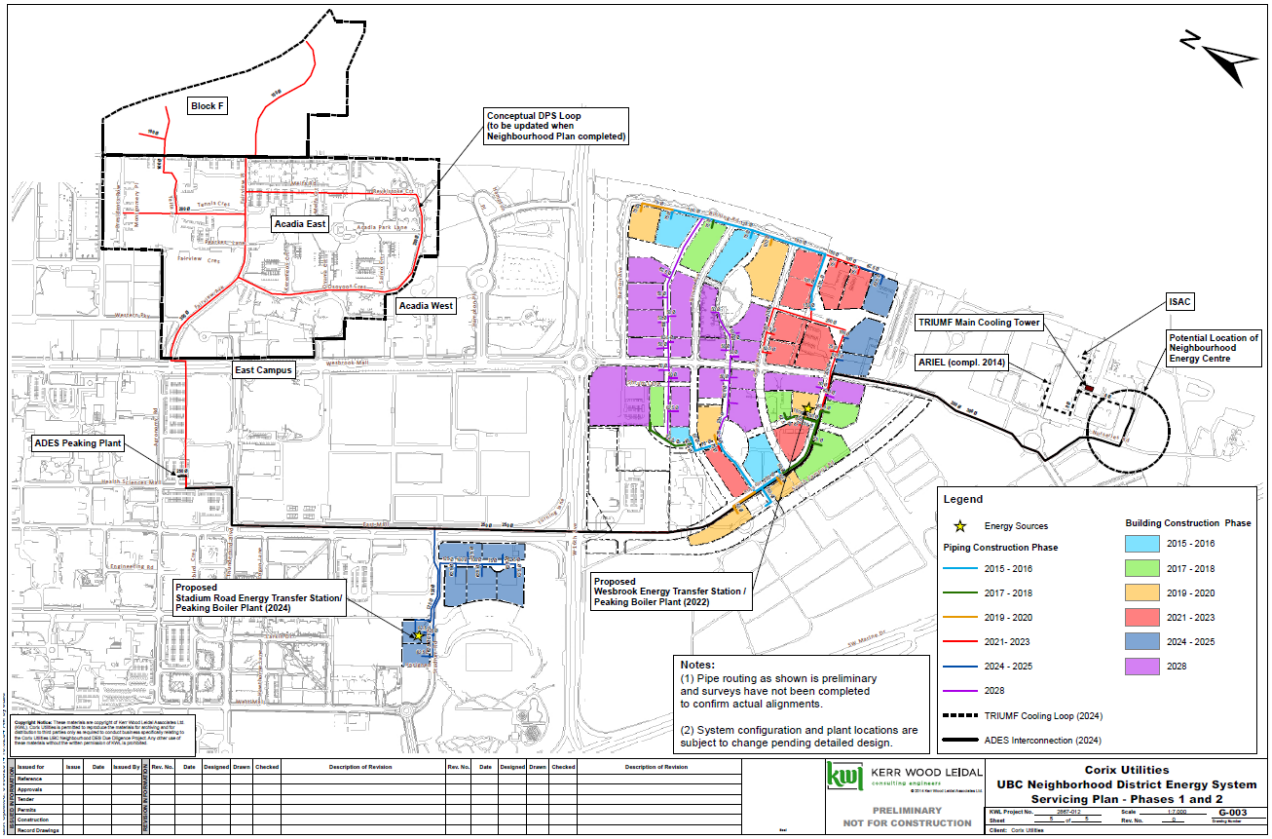
The trigger to initiate Phase 2 of the NDES is either or both of the following events:

- the interconnection of the Wesbrook portion of the NDES and the ADES; and/or
- the connection of a permanent CEP to an Alternate Energy Source

Phase 2 of the NDES Project Plan outlines the interconnection of Wesbrook Place, Stadium Road, the ADES and Acadia East/Block F with a main trunk supply-return pipeline. A permanent Central Energy Plant (CEP) will be constructed to the south of Wesbrook Place, as close as possible to the TRIUMF research facility.

Figure 25: Project Plan Phasing below summarizes both phases of the Project Plan. This diagram can also be found as Drawing G003 in Appendix One.

Figure 25: Project Plan Phasing



4.2 PHASE 1 PROJECT PLAN

Phase 1 involves the construction of two separate district heating loops, one for Wesbrook Place and one for Acadia East and Block F, with further extensions as required. The Wesbrook Place loop would be fed initially by two approximately 6.0 MW temporary gas boiler plants, supplemented with the installation of the Wesbrook EC/ETS (1- 5 MW boiler) in Wesbrook Place in 2022. The Acadia East/Block F loop would be fed from the ADES through a direct connection to the ADES peaking plant. Phase 1 includes each loop's energy supply capacity or connection, associated distribution piping and energy transfer stations.

The distribution piping system (DPS) is comprised of:

1. Main Trunk Distribution Pipes;
2. Branch Connections.

Table 26: System Components Summary and Ownership below summarizes the system components and the party responsible for the ownership, installation, operation and maintenance.

Table 26: System Components Summary and Ownership

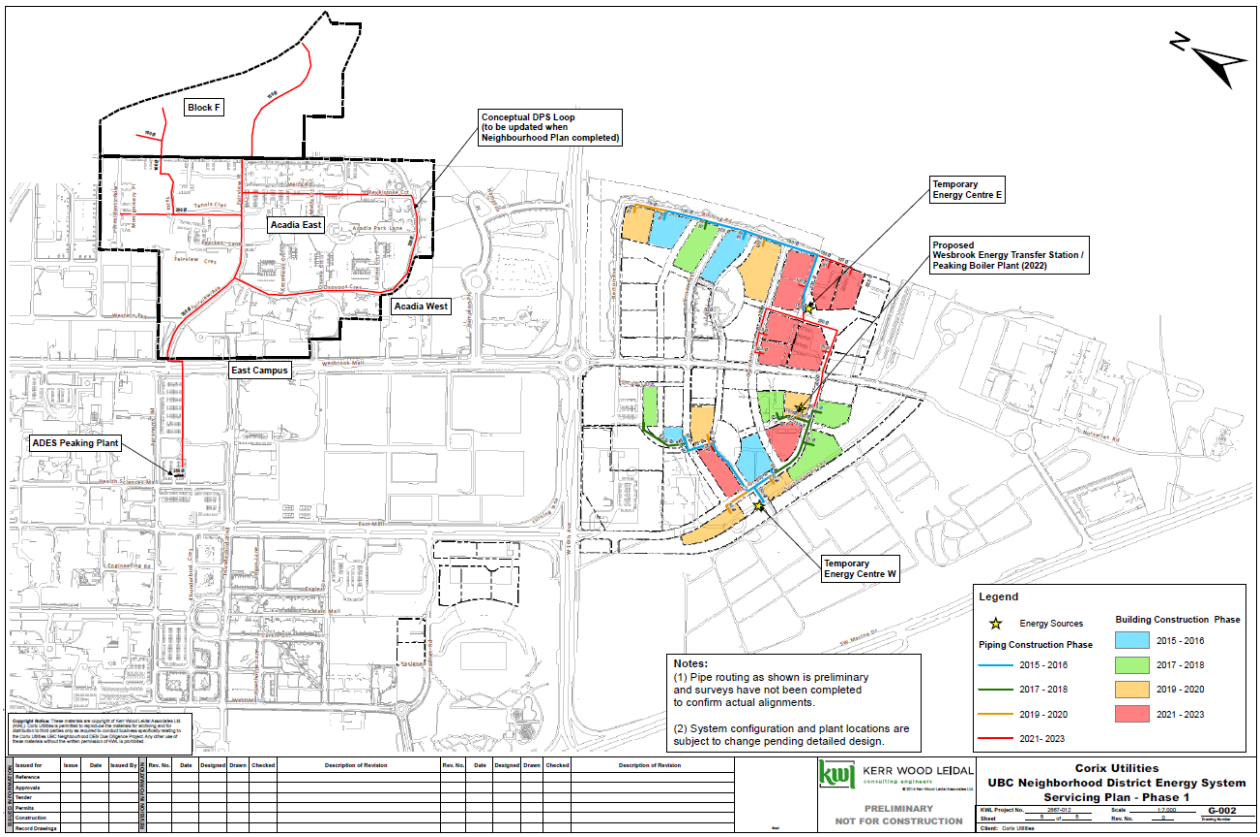
System Component	Ownership
Temporary Energy Centres	NDES
Main trunk distribution lines	NDES
Permanent Gas Fired Plant	NDES

System Component	Ownership
Branch Connections	NDES
Energy Transfer Stations	NDES
Internal energy distribution systems within buildings	Building Owner

4.2.1 Phase 1 Phasing

Figure 26: Phase 1 Project Plan Summary summarizes Phase 1 of the Project Plan. This figure can also be found as Drawing G002 in Appendix One.

Figure 26: Phase 1 Project Plan Summary



The Phase 1 TECs are labelled TEC-W and TEC-E. TEC-W will be the first natural gas plant and will be constructed to deliver energy to the first building (Prodigy) on the west side of Wesbrook Place in 2015. TEC-E will be constructed to serve new buildings beginning in 2016. Between 2016 and 2020, the two TECs will serve ongoing development as itemized in *Table 4: Expected Load Forecast Summary* (Load forecast summary and energy centre details). In 2020, the first buildings in the Acadia East and Block F development will be connected as NDES customers, however, until the CEP is built and the DPS extension to the ADES is made in 2024, it is contemplated that the NDES will purchase energy from the UBC ADES to serve the buildings in Acadia East and Block F.

In 2022, the peak demand in Wesbrook Place is forecasted to exceed the capacity of TEC-W and TEC-E. At this time, the two temporary energy systems will be connected together through an extension of the DPS, and a portion of the Wesbrook EC/ETS will come into service. Ultimately it is anticipated that the Wesbrook EC/ETS will comprise two 5 MW boilers which will be installed within the building on Lot #27. In 2022, only

1-5MW boiler will be installed to provide additional thermal energy for remaining Wesbrook Place development from 2021 to 2024 (the second boiler will be installed in Phase 2 in 2028). Subsequent to implementation of the alternate energy source (likely TRIUMF), the Wesbrook EC/ETS will have two functions: 1) transfer heat from the main transmission lines between permanent CEP and the ADES to the neighbourhoods, and 2) provide local peaking to the neighbourhood. In 2024, the ETS for the Wesbrook EC/ETS will be installed.

4.3 PHASE 1 SYSTEM COMPONENTS

4.3.1 Temporary Energy Centres

The TEC concept is shown on Drawing G002, and general arrangement drawings for the TEC-E and TEC-W locations are shown on Drawings C101 and C102, all in Appendix One. Each TEC consists of two 2.9 MW[11] non-condensing boilers housed within a standard 53 foot shipping container. In addition to the boilers, the TEC will house circulation pumps, an expansion tank and all necessary communications and controls.

The TECs will require a concrete pad for seismic anchoring and electrical and gas connections.

The temporary energy centre design is based on the following criteria:

- Peak heating loads of 4 MW in both the eastern and western branches of the Phase 1 NDES
- Required turndown ratio of 10:1 to meet base load conditions
- Minimum of 70% of peak load redundancy
- Containerized plant to be assembled off-site
- Supply temperatures of up to 90°C
- Return temperatures as low as 50°C
- Thermal efficiency of 84% and
- Maximum fireside heating surface area of less than 150 m^2 to allow for unsupervised operation.

4.3.2 Distribution Piping

Phase 1 of the NDES distribution piping system (DPS) is designed to accommodate the higher flow rates present at full build out demand of Wesbrook Place, including the connection of existing buildings later in Phase 2. However, the construction of the DPS will be phased to match the development in Wesbrook Place, Acadia East and Block F such that the DPS will reach new buildings just as they are reaching completion.

The DPS design is based on the following criteria:

- DPS routing is designed to follow roadways wherever possible and to avoid Wesbrook Mall, which has many existing underground utilities,
- Pipes are sized to meet projected diversified peak heating demand in the Project Plan with a supply temperature of 90°C and a return temperature of 50°C,
- During off-peak periods, the outdoor air temperature reset schedule will adjust the supply temperature and flow rate of the NDES to maximize overall system efficiency,
- Pipe sizes are based on a maximum head loss of 2.05 m/100 m and a maximum flow velocity of 3.4 m/s, and

[11] The current concept is based on a boiler selection at 2.9 MW, but this may vary (3 MW to 3.5 MW) depending upon final equipment selections.

- The DPS design pressure is 16 bar for Series 1 Logstor pre-insulated piping and components.

4.3.3 Energy Transfer Stations

Energy transfer stations in Phase 1 NDES will be designed based on the concept shown on Drawing M07 in Appendix Six. Generally, there will be one ETS per building consisting of one space heating heat exchanger and one domestic hot water heat exchanger, however the exact number of heat exchangers will depend on the individual building load.

The ETS design will be based on the following criteria:

- Building heating systems return temperature of 45°C to enable low return temperatures to the energy centre. This is an important design requirement that must be met in Phase 1 so that buildings provide suitable return temperatures for the heat pumps in the CEP in Phase 2.
- Domestic hot water may be cascaded with the return on the space heating heat exchanger in buildings if needed to meet required return temperatures to the energy centre. The design of the ETS will be done on a building by building basis, including whether or not to use cascading.

Additional considerations for designing buildings to be connected to the NDES are provided as part of the DES Compatibility Guide in Appendix Seven.

4.3.4 Nodal Energy Centre/Energy Transfer Stations

The energy centres/energy transfer stations (EC/ETS) at Wesbrook Place and Stadium Road perform two functions; they transfer heat from the main transmission lines between the CEP and the ADES to the neighbourhoods, and they provide local peaking to the neighbourhoods.

Between 2022 and 2024, the nodal Wesbrook EC/ETS peaking plant provides addition thermal energy to the Wesbrook DES loop via one 5 MW natural gas boilers. This boiler is required to meet the heat demand in the Wesbrook Place neighbourhood, in excess of what the two temporary energy centres are able to provide. A second 5 MW natural gas boiler will be added in Phase 2 to serve additional loads.

In 2024 it is planned that the CEP at TRIUMF will be commissioned and the Wesbrook EC/ETS will begin to function also as an ETS, transferring base load alternative energy from the CEP to Wesbrook Place via the heat exchangers in the nodal ETS. The two 5 MW natural gas boilers in the Wesbrook EC/ETS will continue to provide peaking and backup energy to the Wesbrook Place neighbourhood. While the primary function of the heat exchangers in the Wesbrook EC/ETS is to transfer heat from the main transmission line and the neighbourhood, they also serve to isolate the Wesbrook peaking boilers from the CEP boilers, thus reducing the plant supervision requirements of the boilers in the Wesbrook EC/ETS.

The design of the nodal Wesbrook EC/ETS is based on the following criteria at full build-out, in Phase 2:

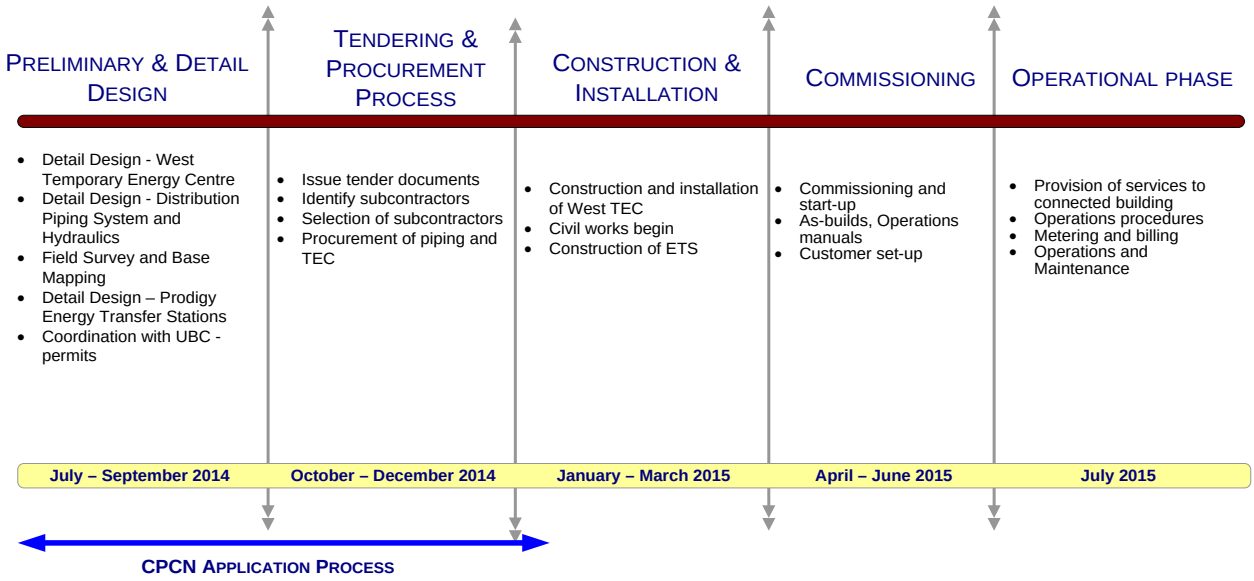
- Heat Exchanger Capacity of 15.8 MW
- Gas Boiler capacity of 10 MW
- Wesbrook peaking boiler capacity combined with CEP boiler capacity to provide 70% of Wesbrook peak demand or 15.8 MW at 90°C
- Wesbrook DPS pumps selected to provide peak heating flows to the neighbourhood and

In Phase 2, a similar nodal EC/ETS will be constructed for the Stadium Road neighbourhood.

4.4 IMPLEMENTATION SCHEDULE

The implementation schedule for the project including design and engineering, and construction and commissioning of the TEC-W, DPS and Prodigy ETS through to December 2015 is provided in Appendix Eight. *Figure 27: Initial Development Schedule* below shows the estimated timing, through the summer of 2015, of the next steps required in developing the NDES, including the CPCN filing and review process.

Figure 27: Initial Development Schedule



4.4.1 Construction Issues and Public Works

The construction of the TEC-W will have a minimal impact on public works as it will be constructed on the unused South Campus Road right-of-way. The DPS will be installed in existing roadways and the neighbourhood 'Green Streets', and leasehold parcels will be avoided. Surveys will be completed prior to design to identify the specific pipe alignments and avoid conflicts with existing and future utilities. Corix will coordinate with UBC Utilities, BC Hydro and FortisBC if there are any requirements for relocating existing utilities to accommodate the DPS.

Connection branch lines will extend to the buildings along the right-of-way frontage. The connections will be installed concurrently with other service connection for the new buildings. The DPS will be installed on a "just in time" basis and in smaller sections that will be completed in a timely manner and following UBC's construction requirements. DPS connections will be coordinated with the building developers to ensure the installation does not conflict with other building services.

4.5 HUMAN RESOURCES REQUIREMENT

The project's work force requirement varies for each stage of the project implementation. The project will have a dedicated project manager who will be responsible for overall project coordination, budget functions and scheduling, as well as liaison with the subcontractors, client, developers and other project stakeholders to ensure the successful project delivery. An assigned project sponsor will provide strategic direction and ensure that the project manager has the necessary resources to execute the project efficiently and effectively.

Corix will subcontract the design and engineering of the NDES components to KWL, the company that will also provide construction supervision and will support Corix in issuing and evaluation of the tender document for the supply and installation of the various components of the work.

Corix will employ a competitive tendering process for construction and installation components of the project. Upon commissioning of the temporary solution, the operations and maintenance requirements will be covered by a subcontractor until the full-time personnel are required for the project.

The staffing requirements for the temporary and permanent energy centres are based on needs and regulations. Corix estimates that the staffing requirements for all operation and maintenance services will range from 0.1 FTE in 2015 to 4.9 FTE in 2024 (the year the CEP is connected).

The BC Safety Authority has regulations governing the requirements for energy centres. For staffing requirements, the appropriate regulation is the Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation. The key factors determining plant classification and hence staffing requirements are fluid temperatures and pressures plus surface area of boiler installed, for boiler plants, and prime mover (i.e., compressor) nameplate capacities connected to the same header, for heat pumps.

Based on our interpretation of the current regulation and the concept proposed, the temporary energy centres, while on separate heating loops, will have less than 150 m^2 of heating surface area each, and will be exempt from supervision requirements under section 6 of the regulation. Once the two temporary plants are connected together via the DPS, they will become 5th Class Low Pressure Fluid Plants under 500 m^2 boiler surface area, and therefore would be eligible for general supervision status. General supervision requires the supervision of a qualified engineer 7 hours per day, 7 days a week, rather than 24-hour supervision, which is key to a viable business case for this scale of system.

The heat pumps in the proposed CEP concept combine 2,800 kW of prime mover nameplate capacity (to be confirmed once equipment is selected). As a result, under the current regulation the CEP would require continuous supervision. The regulation states that a Refrigeration or Power Engineer with a 4th Class or higher certification would be required to be in charge of the plant, 24 hours per day, 7 days per week.

Note that final rulings on plant status are determined solely by the BC Safety Authority.

The billing and customer care functions will be provided by Corix Customer Care Centre.

4.6 RISK ANALYSIS

Corix will strive to minimize risk to the NDES and its customers. Corix has successfully implemented the district energy system serving UniverCity and will apply experience from that project as well as our utility operations in other jurisdictions. *Table 25: Sensitivities* summarizes sensitivity effects of changes to key elements in the project plan.

4.6.1 Development Risk

4.6.1.1 Timing of Development is Delayed

There is a risk that development does not occur as forecasted.

Mitigating Factors:

1. The Project Plan has been designed with two phases to address development timing. If development is delayed, the temporary plants can be utilized until the load is sufficient to implement Phase 2.
2. Phased approach to capital deployment. The TEC's will be installed as required, and there is a possibility to reduce the size of boilers within East TEC to reduce capital. Also, installation of the distribution system will be done just in time, to match development construction.

3. Corix will pursue capital grants for future phases. If successful, these grants will service to reduce customer rates
4. Corix is in discussion with Musqueam to determine a plan for having Block F tie into the system. If this does not occur, it is possible to reduce the size of the permanent system that serves only the UBC development lands

4.6.1.2 Developer Connection to NDES

UBC has a mandatory connection requirement. However, the early load consists of low-rise buildings that may have a cost premium to install hydronic systems for DE connection.

Mitigating Factors

1. Connection credit for early buildings that will support installation of the hydronic system.

4.6.1.3 Unable to secure agreement with TRIUMF

There is a risk that an energy supply agreement with TRIUMF cannot be obtained. Although waste heat from TRIUMF is not utilized in Phase 1, there may be risk to the overall intent of the Project Plan.

Mitigating Factors

1. UBC has been in discussions with TRIUMF since the beginning of the project and has an LOI in place. Please refer to Appendix Nine for reference.
2. The system will be designed and constructed to operate on natural gas from a temporary energy source. As the system develops, Corix will work with TRIUMF to negotiate terms. If it is determined that an agreement cannot be negotiated, the system can continue to run on natural gas while the Alternate Energy Source is identified.
3. During the feasibility and final due diligence, a biomass system was screened and found to be viable. If there is a risk to TRIUMF implementation, more detailed analysis will be completed for biomass in advance of the Phase 2 CPCN application.

4.6.1.4 Performance Risk

There is a risk that the system does not perform as designed, constructed and operated.

Mitigating Factors

1. Corix has implemented similar systems and will continue to apply learnings as the NDES is developed.
2. Corix has retained recognized experts with local experience to design the system and will continue to do this throughout the entire project.

4.6.1.5 Construction Cost Risk

There is a risk that construction and equipment costs may be higher than projected.

1. Corix has implemented similar systems and will continue to apply best practices as the NDES is developed.
2. Corix has retained recognized experts with local experience to design the system and will continue to do this throughout the entire project. KWL, Corix's technical partner, is currently working at UBC for the steam to hot water conversion, and will apply any learnings from that project.
3. Corix will work closely with the UBC Campus Planning group to ensure that all permits and construction rules are followed.
4. There will be a competitive tendering process for third-party suppliers, including all plant materials, piping, and services.
5. A defined tendering process, with appropriated contract structures will be pursued to control price risk.

4.6.1.6 Public Acceptance

There may be a concern with the system construction and operation. Furthermore, there may be concerns with the use of TRIUMF waste heat.

Mitigating Factor

1. A Community Energy and Emissions Plan (CEEP) was completed in consultation with the residential community.
2. UBC has been communicating with the University Neighbourhood Association (UNA) through the entire process.
3. A public consultation process has been undertaken for this project and to date there have been no significant concerns regarding the project.

4.7 PHYSICAL, BIOLOGICAL AND SOCIAL IMPACTS

Once the CEP is commissioned and waste heat is being utilized from TRIUMF, the NDES will result in substantial reductions in greenhouse gas (GHG) emissions as compared to typical building-scale thermal energy systems. At build-out, a target of 60% of total energy requirements will be supplied using the Alternate Energy Source. *Figure 28: GHG Emissions Profile*, outlines the GHG emissions over the duration of the Project Plan and compares it to standard benchmark. Phase 1 of the Project Plan has 100% of the NDES energy supplied by natural gas, therefore there will be higher GHG emissions during this phase.

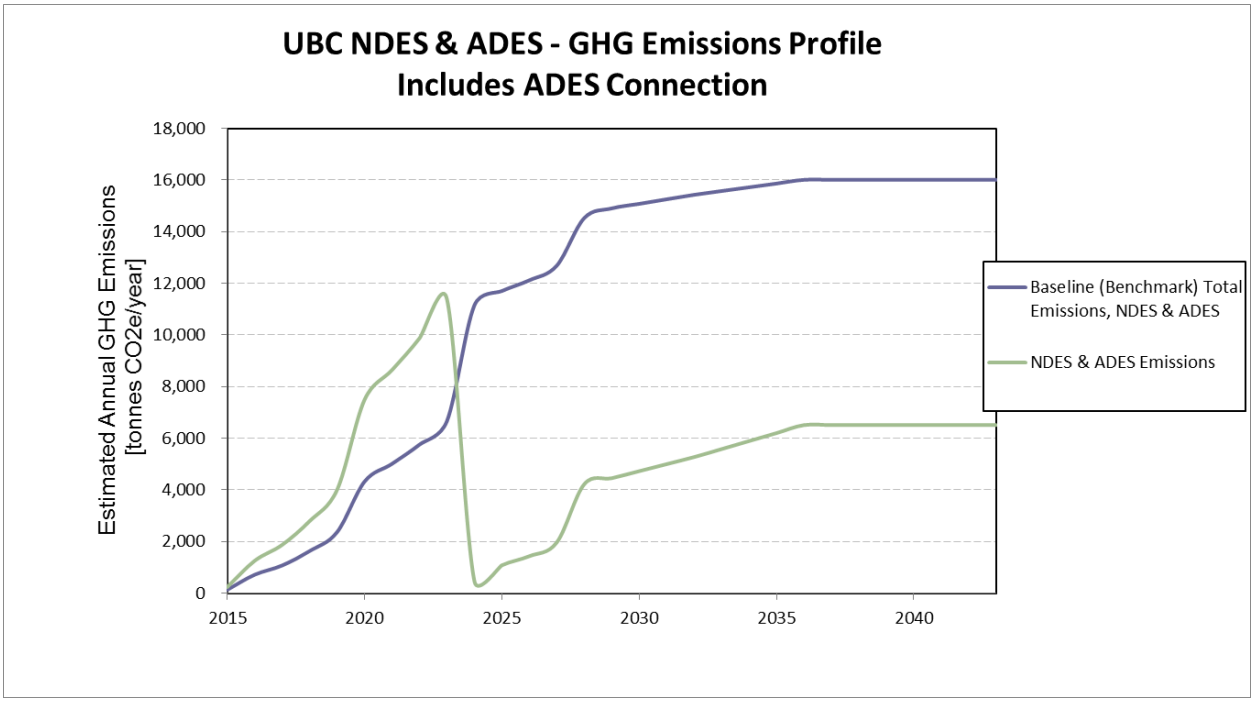
The temporary energy centres will be located in areas that have minimal impact on the neighbourhood. TEC-W will be located in an abandoned roadway, adjacent to the UBC Farm that will ultimately become a pedestrian greenway.

TEC-E is currently planned to be on a future green street bordered by BCR1, BCR2 and BCR7. Alternatively, it is possible to build the temporary plant in a building mechanical room of the future building in Lot 6 (Binning Tower) and discussion with developer has been initiated.

Wesbrook EC/ETS is currently planned to be installed within a building on Lot #27, within a designed mechanical room, thereby minimizing neighbourhood impact.

The permanent CEP is currently planned to have a site footprint of up to 0.5 ha. Based on the current Project Plan, this is likely to be a brownfield site. The redevelopment of the site will provide an opportunity to improve storm water management and landscaping.

Figure 28: GHG Emissions Profile

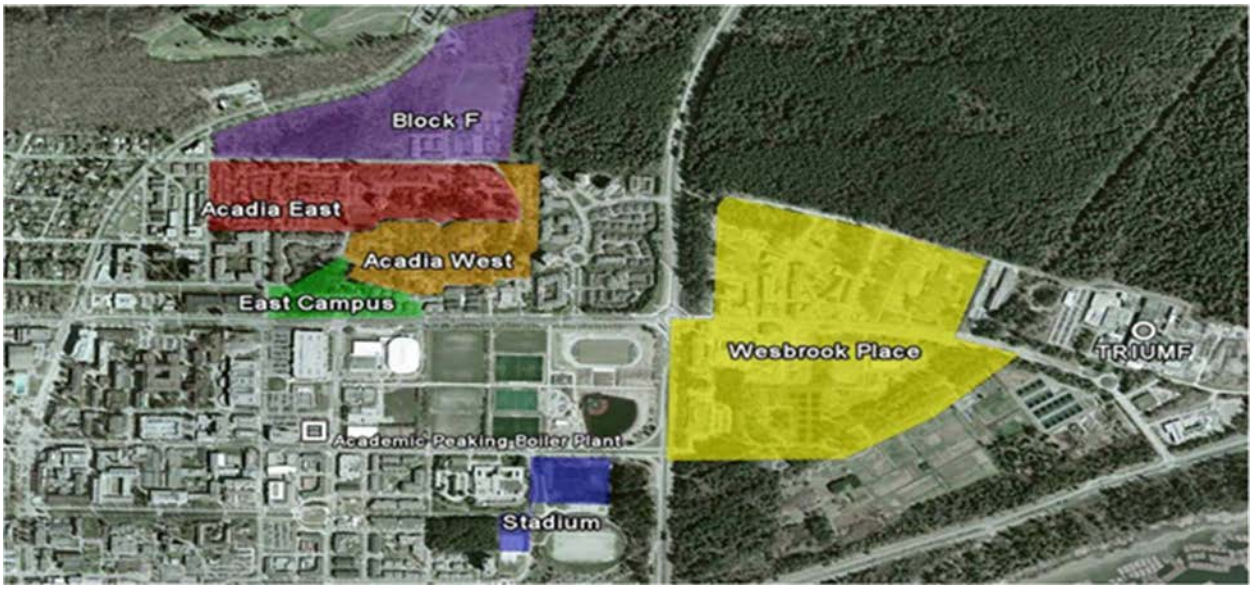


4.8 CUSTOMERS

Customers served in Phase 1 by the NDES will primarily be residential customers in Wesbrook Place, with some later residential customers in Acadia East and Block F. The overall Project Plan contemplates customers that are considered residential or mixed use, commercial, institutional for academic Buildings and an ADES class of customer for provision of Energy Services to the ADES.

Customers will reside in Wesbrook Place, Stadium Road, and Acadia East and potentially within the Musqueam First Nation's Block F parcel in the UEL. *Figure 29: Geographic Area* on the following page, outlines the geographic area.

Figure 29: Geographic Area



4.9 PERMITS AND APPROVALS

The NDES will require a CPCN to operate.

Development and Streets and Landscape permits will be required through UBC to construct the temporary energy centres.

Approval and determination of staffing requirements by the BC Safety Authority will be required prior to operation of the temporary and permanent energy centres.

An air quality permit is not currently required under the base Project Plan.

SRWs will need to be obtained through the province for pipeline crossings of certain roadways. UBC will support Corix in this process.

5 PROJECT COSTS

5.1 CAPITAL COST ASSUMPTIONS

5.1.1 Capital Cost Estimate

5.1.1.1 Project Cost Assumptions

5.1.1.1.1 General Assumptions

The overall cost estimate of the UBC Neighbourhood District Energy System (NDES) is a Class C estimate, which the Association of Consulting Engineering Companies British Columbia (ACEC-BC) defines in the following way:

> "An estimate prepared with limited site information, based on probable conditions affecting the project. It represents the summation of all identifiable project elemental costs and is used for program planning, to establish a more specific definition of client needs and to obtain preliminary project approval. Class C estimates typically have an accuracy of +/- 25-40%."

However, some elements of this cost estimate have a higher degree of accuracy and can be classified as Class B, defined by ACEC-BC in the following way:

> "Class B estimate (+/- 15-25%): this is prepared after site investigations and studies have been completed and the major systems defined. It is based on a project brief and preliminary design."

5.1.1.1.2 Temporary Energy Centres Containerized Plants – Class B

The cost estimate for the TEC is based on 2014 tender pricing received for a similar containerized boiler plant for another lower mainland district energy project that KWL is leading. The tender price was for two (2) (2.5 MW) non-condensing boilers installed inside a 53' shipping container complete with expansion tanks, piping, valves, pumps, controls and a 58 kW boiler for meeting turndown requirements in the early years of the DES.

The price has been adjusted to allow for higher capacity boilers by the same manufacturer (2.9 MW), and the feasibility of installing larger boilers within the same layout has been confirmed with the contractor.

General conditions have been estimated at 4.5% of the contract value.

Engineering costs have been estimated at 6% of the contract value (for design and specifications, tendering, contract administration and construction support).

A contingency of 10% has been applied to the TEC cost estimate, given that the estimate is based on recent tender pricing.

5.1.1.1.3 Temporary Energy Centre Installation – Class C

The cost estimate for the TEC installation is based on averaged unit pricing received for the installation of similar containerized plants in the Lower Mainland.

The installation cost of the TEC includes the following:

- reinforced concrete foundation and seismic anchoring of the container;
- sanitary sewer connection;

- water service connection;
- gas service connection;
- electrical service connection; and
- supply and return piping for the district energy system.

TEC locations have not been finalized, but will be under the UBC permit process. Storm sewer connections have not been included in the estimates as the TEC-W is expected to be installed on an existing asphalt surface, and runoff for the TEC-E can likely be infiltrated on-site.

The cost to tie the TEC into the distribution piping system (DPS) was also based on averaged tender pricing on recent projects administered by KWL.

Service agreements, including any connection costs have not been finalized with BC Hydro, FortisBC or UBC Utilities. An allowance of $25,000 has been made for the electrical and gas service connections. The cost estimate for the water and sanitary service connections are based on averaged unit rate pricing for similar work. It was assumed that 20 m of pipe would be required to tie into the water and sanitary mains in Wesbrook Place.

Demolition and site restoration costs for the TECs are included in the estimate at $25,000 per TEC.

General conditions were estimated at 7% of capital cost, engineering at 15% and a contingency of 20% has been added.

5.1.1.1.4 Central Energy Plant – Class C

The cost estimates of the CEP are based on the following:

- 2013 supplier quotations for 4 x 2.5 MW Heat Recovery Heat Pumps and 3.4 MW Non-condensing Natural Gas Boiler;
- Electrical consultant estimate for the Electrical Balance of Plant;
- KWL expertise for the Mechanical Balance of Plant; and
- Scaling of the 85% design cost estimate of the UBC Combined Heat and Power Plant for Mechanical and Electrical Services as well as Building, Structure and Site Work.

General conditions have been estimated between 3% and 7% of capital costs, engineering between 10% and 15%, and contingency between 10% and 20%, depending on the level of detail and uncertainty of the associated capital cost. The higher rates apply to all Building, Structure and Site Work costs, since the location for the CEP has not been finalized.

Site Work costs include 250 m of supply and return HDPE piping to connect the TRIUMF Cooling Towers to the CEP.

5.1.1.1.5 Nodal Energy Centres / Energy Transfer Stations & Pump Station– Class C

The cost estimates of the Wesbrook and Stadium Road EC's and of the Heat Pump Station are based on the following:

- 2013 supplier quotation for the 5 MW Non-condensing Natural Gas Boiler;
- Recent tender unit pricing for similar projects for Electrical & Control; and
- KWL expertise for the Mechanical Balance of Plant and the Heat Pump Station.

It is assumed that the Wesbrook EC/ETS and the Stadium EC/ETS will be integrated into future residential buildings (i.e., they will not be in standalone buildings). As a result, the cost estimate does not include building costs, but only space allowance provisions.

The locations of the plants have not been finalized. General conditions have been estimated at 3% of Mechanical, Electrical and Equipment capital costs and 7% of Building, Structure and Site Work costs; engineering at 15%; and contingency at 20%.

5.1.1.1.6 Distribution Piping System – Class C

KWL has extensive experience with the design and installation of pre-insulated piping for hot water district energy systems in the Lower Mainland, particularly at UBC. The per-linear-meter cost factors for individual pipe diameters are based on actual installed costs of DPS in the Lower Mainland. The quantities and sizing of pipe in the cost estimate are based on the DPS layout shown in drawing G-002, which was developed using a WaterCAD model to optimize the pipe sizing and the pipe lengths were determined using GIS.

DPS alignments and locations have not been finalized. General routing has been identified, however major utility conflicts have not been identified or included in the cost estimates.

DPS service connection allowances are included for all building and energy centre connections.

General conditions were estimated at 7% of capital cost, engineering at 15%, and a contingency of 20% of capital has been added.

5.1.1.1.7 Energy Transfer Stations – Class C

KWL has extensive experience with the design and installation of energy transfer stations (ETS) in both new and existing buildings in the Lower Mainland. In KWL's experience, an ETS installed in a new high-rise or low-rise building will cost approximately $115,000, including general conditions, engineering and contingencies. KWL has found that the design capacity of the ETS is a relatively insignificant factor in the overall cost of an ETS for Multi-Unit Residential Buildings in the Lower Mainland.

The ETS cost for existing buildings is generally higher than that of new buildings because of additional constraints and demolition costs in existing mechanical rooms. In KWL's experience, an ETS installed in an existing high-rise or low-rise residential building will cost approximately $155,000, including general conditions, engineering and contingencies, and the cost of an ETS in an existing commercial building $65,000.

General conditions have been estimated at 3% of total capital cost for the ETS, while engineering has been estimated at 6% for design, specification, tendering and construction support. A contingency of 10% has been added to the capital cost.

5.1.1.1.8 Exclusions

The following specific items are excluded from the cost estimates:

- Land acquisition costs associated with the temporary and permanent energy facilities, including the TECs, Wesbrook and Stadium EC/ETSs, CEP, DPS and ETSs.
- Geotechnical work required to assess foundation requirements for any buildings or structures;
- Contaminated site investigations or remediation;
- Environmental impact mitigation;
- Allowances for utility conflicts;
- Cost premiums due to critical shortages of labour and/or materials; and Goods and Services Tax (GST).

5.1.1.2 Project Capital Cost and Budget

Table 27: Project Capital Cost and Budget

NDES Element	Base Cost	General Conditions, Engineering	Total
Temporary Energy Centres (W-TEC & E-TEC)	$1,636,460	$397,394	**$2,033,854**
Wesbrook EC/ETS	$1,968,000	$766,920	**$2,734,920**
Stadium EC/ETS	$721,800	$282,684	**$1,004,484**
Central Energy Plant (CEP)	$20,108,233	$5,947,794	**$26,056,027**
Distribution Piping System (DPS)	$16,959,427	$7,122,959	**$24,082,386**
DPS Unit Cost ($/per trench meter)	*$2,207*	*$927*	***$3,134***
DPS 2015 - 2023	$8,197,783	$3,443,069	**$11,640,852**
2015-2023 DPS Unit Cost	*$2,108*	*$886*	***$2,994***
DPS 2023 - 2044	$8,761,644	$3,679,890	**$12,441,534**
2024 - 2044 DPS Unit Cost	*$2,308*	*$969*	***$3,277***
Energy Transfer Stations (ETS)	$10,153,462	$1,929,158	**$12,082,620**
No. of ETS	103	n/a	n/a
2015-2023 No. of ETS	*38*	*n/a*	*n/a*
2024-2044 No. of ETS	*65*	*n/a*	*n/a*
ETS Unit Cost	*$98,577*	*$18,730*	***$117,307***
Total	**$51,547,383**	**$16,446,909**	**$67,994,292**

6 PROVINCIAL GOVERNMENT ENERGY OBJECTIVES AND POLICY CONSIDERATIONS

The UBC NDES Project aligns with several provincial government objectives under the 2007 *BC Energy Plan* and the *Clean Energy Act*.

1. The Province has set ambitious goals to reduce the growth in electricity demand so that, by 2020, 10,000 GWh of currently forecast needs will be met through demand reduction measures. By implementing hydronic heating systems in buildings there will be a reduction in the direct use of electricity for space heating when compared to benchmark. Considering that 40% of annual energy is used for space heating, it is estimated that implementation of the NDES will provide direct energy savings of 25,300 MWh/year, approximately 40% lower than the competitive benchmark.
2. The utilization of waste heat recovered from TRIUMF in Phase 2 will reduce overall GHG emissions as depicted in *Figure 28: GHG Emissions Profile*. 60% of total energy demand will be supplied by an Alternate Energy Source. The project will reduces GHG emissions by 4,800 tonnes/year approximately 64% less than the competitive benchmark.

7 NEW SERVICE AREAS

The NDES will be a new utility at UBC, providing space heating and domestic hot water services to the new residents in the Development Areas.

Corix will be responsible for operation of the utility as well as emergency response, billing and customer care.

In the initial phase of operation, before the CEP is developed, the TECs will provide energy service. This facility will be remotely monitored with regular visits by Corix personnel.

An emergency response phone number will be set-up prior to the start-up of the NDES. Customer bills will include emergency contact information as well as contact information for customers having any questions and concerns regarding billing and customer care. The emergency contact information will be also posted at the central energy plant. The TECs and ETSs will be equipped with a remote monitoring system that will automatically contact Corix operations personnel in the event of any unusual situation or problem with system performance.

Once the permanent facility is built, a dedicated Operations Manager and full-time Plant Operators will be assigned to the project. Any additional operating staff will be available from Corix to address any immediate needs. Corix has a pool of 50 certified operators and operates several DES across North America with the closest being the UniverCity Neighbourhood Utility System on Burnaby Mountain and the Dockside Green Energy system in Victoria.

A review of potential customers outside of the proposed service areas for the UBC NDES has identified the following opportunities. These other customers -may be considered in future through individual extension tests.

- University Endowment Lands
- Connection to UBC's Academic District Energy System
- Other "non-district energy ready" buildings located in other UBC neighbourhoods such as Hawthorn Place, Chancellor Place and Hampton Place (likely only domestic hot water and common-space)

Corix will undertake all extensions consistent with the capital plan and rates in the Project Plan, as approved by the BCUC. Where an extension of the Infrastructure deviates significantly from the capital plan and such extensions would increase rates beyond the rates contemplated in the Project Plan and approved by the BCUC, Corix will notify UBC and seek approval from the BCUC accordingly. In such cases, Corix may still seek such extensions if they can be deemed in the public interest, including the development objectives set out by UBC and/or undertake the extensions with an appropriate contribution in aid of construction from UBC and/or loads. The Project Plan notwithstanding, Corix will continue, as reasonable, to seek out and implement viable strategies that reduce rates and/or increase GHG savings relative to the approved Project Plan.

APPENDIX ONE: DRAWINGS

Please find attached in this Appendix:

- Drawing C101: West Temporary Energy Centre
- Drawing C102: East Temporary Energy Centre
- Drawing G002: Servicing Plan – Phase 1
- Drawing G003: Servicing Plan – Phases 1-2

APPENDIX TWO: PRE-FEASIBILITY STUDY AND FEASIBILITY STUDY

Please find included in this Appendix:

- Final Report for the District Energy Pre-Feasibility Study for Wesbrook Place (South Campus) as prepared by Stantec Consulting Ltd., dated June 24, 2011
- Feasibility Study for the Neighbourhood District Energy System for UBC Expansion Areas as prepared by Compass Resource Management Ltd. In Association with FVB Energy, dated November 30, 2012

APPENDIX THREE: PUBLIC CONSULTATION OPEN HOUSE AND FEEDBACK

Please find included in this Appendix:

- First Public Consultation
- First Public Open House Feedback Form
- Second Public Consultation
- Second Public Open House Feedback Form

APPENDIX FOUR: PUBLIC CONSULTATION SUMMARY REPORTS

Please find attached in this Appendix:

- UBC NDES First Public Consultation Summary Report from November 2013
- UBC NDES Second Public Consultation Summary Report from June 2014

APPENDIX FIVE: UNA BOARD PRESENTATION

Please find enclosed in this Appendix:

- UNA Board Presentation dated July 8, 2014

APPENDIX SIX: PROCESS SCHEMATIC

Please find included in this Appendix:

- Process Schematic for the Energy Transfer Station

APPENDIX SEVEN: UBC DISTRICT ENERGY COMPATIBILITY GUIDE

Please find included in this Appendix:

- UBC District Energy Compatibility Guide

APPENDIX EIGHT: 2014-2015 PROJECT SCHEDULE

Please find included in this Appendix:

- BCUC Application – 2014-2015 Project Schedule

APPENDIX NINE: UBC TRIUMF LETTER OF INTENT

Please find enclosed in this Appendix:

- UBC-TRIUMF LOI Executed
- UBC-TRIUMF LOI Extension - Oct 31-2014_signed

APPENDIX TEN: INFRASTRUCTURE AGREEMENT

Please find enclosed in this Appendix:

- Infrastructure Agreement

INFRASTRUCTURE AGREEMENT

by and between

THE UNIVERSITY OF BRITISH COLUMBIA

and

CORIX MULTI-UTILITY SERVICES INC.

Dated as of September __, 2014

August 29, 2014

BCUC FILING DRAFT

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INFRASTRUCTURE AGREEMENT

THIS AGREEMENT dated the ____ day of September, 2014

BETWEEN:

> **THE UNIVERSITY OF BRITISH COLUMBIA**, a corporation continued under the *University Act*, R.S.B.C. 1996, c. 468, having an address at 2075 Wesbrook Mall, Vancouver, British Columbia V6T 1Z1
>
> ("**UBC**")

AND:

> **CORIX MULTI-UTILITY SERVICES INC.,** a British Columbia corporation having an address at Suite 1160, 1188 West Georgia Street, Vancouver, British Columbia, V6E 4A2
>
> ("**Corix**")

WHEREAS:

A. Reduction of Greenhouse Gas emissions is an important part of UBC's vision for UBC's Vancouver Campus, as reflected in UBC's Land Use Plan, and in the Community Energy and Emissions Plan (the "**CEEP**") completed in 2013 by UBC and the UNA and which identified district energy as one of the most significant actions for reducing Greenhouse Gas emissions;

B. British Columbia's energy objectives (as that term is defined in the *Clean Energy Act* (British Columbia)) encourage, among other things, communities to reduce Greenhouse Gas emissions, to use and foster innovative technologies and to use waste heat and alternative energy sources;

C. UBC wishes to enable the development of a neighbourhood district energy utility system (the "**NDES**") that will use Low Carbon energy sources to generate and provide Thermal Energy to customers in the Development Areas;

D. Corix Utilities Inc. ("**CUI**") is an experienced public utility owner and operator with expertise in the area of water, wastewater and energy utility operations and measurement services for municipal and utility customers and private developers;

E. Corix is a wholly-owned subsidiary of CUI;

F. Pursuant to a Request for Information and its Supplement, issued by UBC on February 25, 2013 and May 6, 2013 respectively (together, the "**RFI**"), and the resulting Memorandum of Understanding between UBC and CUI dated September 30, 2013, as amended (the "**MOU**"), CUI has undertaken technical and economic feasibility assessments and commenced engineering, design and other work relating to the NDES, and UBC has decided to proceed with the NDES;

G. UBC has selected Corix, and Corix has agreed, to design, construct, finance, own, operate and maintain the required infrastructure for the NDES, and to provide Energy Services to customers in the

Development Areas as a public utility regulated by the British Columbia Utilities Commission under the *Utilities Commissions Act* (British Columbia), all on the terms and conditions set out in this Agreement;

H. The NDES may also provide Thermal Energy to UBC (via interconnection with the ADES) and to the area owned by the Musqueam Nation and known as Block F (subject to agreement with the Musqueam First Nation) and, potentially, cooling services to TRIUMF;

I. UBC and Corix currently expect that waste heat recovered from TRIUMF cooling towers will eventually be used in one or more central energy plants to provide the bulk of Thermal Energy to residential and other customers in the Development Areas, though other Alternate Energy Sources that meet cost-competitiveness and environmental objectives, as agreed upon by the Parties from time to time, may also be used; and

J. In furtherance of British Columbia's energy objectives (as that term is defined in the *Clean Energy Act* (British Columbia)) and the CEEP, the Parties intend that Alternate Energy Sources will, by final build-out of the NDES, generate a minimum of 60% (plus or minus 5%) of the NDES Customers' annual Thermal Energy requirements;

NOW THEREFORE the Parties covenant and agree as follows:

1. INTERPRETATION

1.1 Definitions

In this Agreement, the following terms have the meanings respectively set out below:

"**Additional Work**" and "**Additional Work Cap**" have the meanings given to them in Section 22.1(c).

"**ADES**" means the academic district energy system developed and owned by UBC to generate, distribute and provide Thermal Energy to academic or other institutional buildings situated within UBC's Vancouver Campus.

"**ADES Interconnection**" means, collectively, the system of water pipes, fittings and all ancillary equipment and facilities necessary to connect the NDES and the ADES, and to allow the transfer of Thermal Energy between the NDES and the ADES, as further described in the Project Plan.

"**Affiliate**" has the meaning given to it in the *Business Corporations Act* (British Columbia).

"**Allocated Taxes**" has the meaning given to it in Section 7.2(g)(iii).

"**Alternate Energy Sources**" means:

(i) waste heat recovered from TRIUMF cooling towers; or

(ii) such other energy sources that meet the standards the Parties accept for Low Carbon energy.

"**Assignment and Assumption Agreements**" means, collectively, the agreements made between UBC and Corix pursuant to which UBC has assigned, and Corix has assumed, all of UBC's right, title and interest in and to those Community Energy Covenants described in Schedule C.

"**BCUC**" means the British Columbia Utilities Commission or a successor entity.

"**BCUC Applications**" has the meaning given to it in Section 4.2(a).

"**Building**" means a residential or other building constructed by a Developer in any of the Development Areas.

"**Building System**" means the system of water pipes and heat and hot water delivery and storage equipment used for distributing and storing Thermal Energy within a Building, connected to but downstream of and excluding the Service Connection and Energy Transfer Station for that Building.

"**Business Day**" means any day except a Saturday, Sunday, statutory holiday in the Province of British Columbia or any other day on which banks are generally not open for business in Vancouver, British Columbia.

"**CEP**" means a temporary or permanent central energy plant for the generation of Thermal Energy, and including any or all of the following: natural gas boilers, heat recovery equipment and all associated mechanical and electrical interconnections, control systems and structures.

"**Change of Law**" means any change in applicable Laws, industry standards, regulatory orders, or conditions affecting the performance of obligations or the exercise of rights under this Agreement.

"**Commencement Date**" means the date on which the last of the conditions precedent set out in Section 2.1 is satisfied or waived by the applicable Party, as evidenced by an acknowledgement in writing by such Party.

"**Community Energy Covenant**" means an agreement made between UBC and a Developer, or between Corix and a Developer, pursuant to which such Developer grants to UBC or Corix, as the case may be, (i) a covenant under Section 219 of the *Land Title Act* (British Columbia) governing the construction, heating and occupancy of a Building and (ii) a statutory right of way under Section 218 of the *Land Title Act* (British Columbia) permitting the grantee, or a third party appointed by the grantee, to provide to the Building service from a community energy system and to access the Building and the lands on which it is built in connection with the provision of such service, a complete list of which agreements, as at the date of this Agreement, is set out in Schedule C, together with a list of all Developers and their Buildings which are not, as at the date of this Agreement, subject to a Community Energy Covenant.

"**Connection Credit**" has the meaning given to it in Section 8.4(a).

"**Contaminants**" means any radioactive materials, asbestos materials, urea formaldehyde, underground or above ground tanks containing contaminants, pollutants, deleterious substances, dangerous substances or goods, hazardous, corrosive, or toxic substances, hazardous waste, waste, pesticides, defoliants, or any other solid, liquid, gas, vapour, odour, heat, sound, vibration, radiation, or combination of any of them, the storage, manufacture, handling, disposal, treatment, generation, use, transport, remediation, or Release into the Environment of which is now or hereafter prohibited, controlled or regulated under Environmental Laws.

"**Contaminated Site**" has the meaning given to it in the *Environmental Management Act* (British Columbia).

"**Corix Cap"** has the meaning given to it in Section 22.1(b).

"**Corix Group**" means, collectively, Corix and its Affiliates and their respective officers, directors, shareholders, employees, contractors, agents, contractors, successors and permitted assigns.

"**Cost of Service**" means an approach used to determine customer rates based on the revenue required by a utility to fully recover design and development costs, operation and maintenance costs, depreciation, debt service costs, a return on equity for capital costs, and all fees and Taxes, all as approved from time to time by the BCUC.

"**costs**" as used in this Agreement means costs including any applicable Taxes, unless this Agreement expressly states otherwise.

"**CPCN**" means a certificate of public convenience and necessity granted by the BCUC pursuant to the *Utilities Commission Act* (British Columbia) authorizing the construction and operation of the Infrastructure or a portion thereof.

"**CUI**" means Corix Utilities Inc.

"**Design Guide**" means the Design Guide for Compatibility with District Energy, as administered and issued by Corix, and as amended from time to time.

"**Developer**" means a Person having entered into an offer to lease or lease for a development site within a Development Area, for the purpose of developing and constructing a Building.

"**Development Areas**" means, collectively, the Wesbrook Place, Acadia Road (which is contemplated to include the Acadia West Neighbourhood and Acadia East student housing precinct), East Campus and Stadium neighbourhoods of UBC's Vancouver Campus, all as designated in UBC's Land Use Plan and shown on the map attached as Schedule A, and "**Development Area**" means any of them.

"**Development Forecast**" means the forecast of timing and order of development for the Development Areas, prepared by UBC Properties and presented to the UBC Board of Governors, a copy of which, as at the date of this Agreement, is attached as Schedule D, as amended from time to time.

"**Distribution System**" means, collectively, the system of water pipes, fittings and ancillary equipment and facilities necessary to connect the CEP(s) to and including all of the Energy Transfer Stations and the Service Connections, and which distributes Thermal Energy to Buildings.

"Due Diligence" means the financial, legal and technical investigations conducted by Corix in respect of the NDES.

"Due Diligence Consultants" means, collectively, the third party consultants and other service providers engaged by Corix in connection with its conduct of the Due Diligence.

"**Encumbrance**" means any mortgage, lien, pledge, judgement, execution, charge, security interest, restriction, claim or encumbrance of a financial nature, including, without limitation, builders liens and claims of the WorkSafe BC, Canada Revenue Agency and any other Governmental Authority.

"**Energy Services**" means the provision of Thermal Energy via the Infrastructure in accordance with the Project Plan.

"**Energy Services Contract**" means an agreement between Corix and a Developer, strata corporation or other NDES Customer, setting out the terms and conditions on which (i) a Building(s) will be connected to the NDES (including, among other things, terms and conditions relating to design of the Building, disclosure by the Developer of information to potential occupiers of space in the Building and, if applicable, the Connection Credit) and (ii) Corix will provide Energy Services to the Developer, strata corporation and/or other eventual NDES Customer(s) who occupy space in such Building(s).

"**Energy Transfer Station**" means, collectively, the system of separate heat exchangers for space heating and domestic hot water (excluding domestic hot water storage tanks), energy meter (including temperature sensors and flow meter), control panel and all pipes, fittings and ancillary equipment and facilities necessary to measure and control the transfer of Thermal Energy from the Distribution System to a Building System.

"**Environment**" includes the air (including all layers of the atmosphere), land (including soil, sediment deposited on land, fill, lands submerged under water, buildings, and improvements), water (including oceans, lakes, rivers, streams, groundwater, and surface water), and all other external conditions and influences under which humans, animals, and plants live or are developed and "**Environmental**" will have a corresponding meaning.

"**Environmental Credits**" means any income, credit, right, benefit or advantage, whether in the form of Greenhouse Gas offset credits, monetary value or some other form or character, relating to Environmental matters including type and level of Environmental emissions or emission reductions, input energy sources and compliance with Environmental Laws; and any market instrument, including without limitation any Environmental emission allowances and Environmental emission reduction credits that accrue to businesses that perform better than certain government, industry, trade organization or Environmental international emission reduction guidelines, net of any costs incurred by Corix associated with obtaining the Environmental Credit.

"**Environmental Laws**" means all applicable statutes, laws, regulations, orders, bylaws, standards, guidelines, protocols, permits, and other lawful requirements of any Governmental Authority relating to the Environment or

its protection, environmental assessment, health, occupational health and safety, protection of any form of plant or animal life, or transportation of dangerous goods, including the principles of common law and equity.

"**Extension Test**" means the test used to assess the economic viability of a proposed NDES Extension.

"**Fair Market Value**" has the meaning given to it in Section 7.2(g)(i).

"**Force Majeure**" has the meaning given to it in Section 23.2.

"Franchise Fee" has the meaning given to it in Section 11.3(a).

"**Greenhouse Gas**" has the meaning given to the term "greenhouse gas" in the *Greenhouse Gas Reduction Targets Act* (British Columbia).

"**Governmental Authority**" means any federal, provincial, regional, municipal, local or other government, governmental or public department, court, tribunal, arbitral body, commission, board, bureau or agency and any subdivision, agent, commission, board or authority, including without limitation UBC (in its capacity as Municipal Authority Having Jurisdiction) and the BCUC.

"**Income Tax Act**" means the *Income Tax Act* (Canada).

"**Infrastructure**" means, collectively, the CEP(s), Distribution System, Energy Transfer Stations, Service Connections, ADES Interconnection, connections to the Alternate Energy Source(s), equipment to recover, upgrade, top-up, etc. waste heat from TRIUMF and includes any ancillary equipment and facilities.

"**Infrastructure Specifications**" means, collectively, the standards, specifications, procedures, design criteria, design guidelines and other requirements applicable to all design, construction and installation activities included in the Infrastructure Work.

"**Infrastructure Work**" means, collectively, the work required to complete the engineering, design, construction and installation by Corix of any and all portions of the Infrastructure while this Agreement is in force.

"**Laws**" means any law, statute, regulation, bylaw, Permit, order or legal requirement of or issued by or under the direction or authority of any Governmental Authority having jurisdiction.

"**Low Carbon**" is a description of the quantity of Greenhouse Gas emissions produced by an energy-producing process or technology if:

(a) the quantity of Greenhouse Gas emissions is equal to or less than that associated with waste heat recovered from TRIUMF cooling towers; or

(b) the process or technology is considered carbon neutral in accordance with recognized Greenhouse Gas accounting protocols such as British Columbia's SMARTTool or equivalent protocol.

"**Low Rise Building**" means a wood-frame Building of less than 7 storeys.

"**Material Permits**" means, collectively, the Permits that are required for the construction and operation of the NDES, including those permits described in Schedule E.

"**Meter**" means any measuring device installed by Corix, and is the delineation point between the Infrastructure and the property leased, subleased or otherwise occupied by an NDES Customer. For further clarity, Corix will Meter to Buildings, but will not submeter individual suites.

"**MOU**" has the meaning given to it in Recital F.

"**Municipal Authority Having Jurisdiction**" means The University of British Columbia's Department of Campus & Community Planning in its capacity as regulatory, inspection and permitting authority for UBC's Vancouver Campus or such other department of The University of British Columbia as becomes responsible for this function from time to time. In the event that UBC's Vancouver Campus become part of a municipality or the UEL, or any other governing body acquires jurisdiction over UBC's Vancouver Campus similar to that of

municipalities and assumes these functions, that governing body will become the Municipal Authority Having Jurisdiction.

"**NDES**" has the meaning given to it in Recital C.

"**NDES Customer**" means any Person who receives Energy Services.

"**NDES Extension**" means any addition to or upgrade of the Infrastructure in connection with any of the following:

(i) addition of an NDES Customer or group of NDES Customers;

(ii) a physical extension of the Distribution System;

(iii) addition of a temporary or permanent CEP;

(iv) addition of an Alternate Energy Source to or for one or more CEPs;

(v) addition of capacity to a CEP; or

(vi) interconnection of the NDES and the ADES.

"**Neighbourhood Plan**" means a document approved by the UBC Board of Governors that contains a detailed land use plan, development controls, design guidelines, and servicing and transportation strategies applicable to a particular Development Area, and consistent with UBC's Land Use Plan.

"**Net Book Value**" has the meaning given to it in Section 7.2(g)(ii).

"**New Development Areas**" has the meaning given to it in Section 5.4(a).

"**Option to Purchase**" has the meaning given to it in Section 7.2(a)(i).

"**Party**" means either UBC or Corix and "**Parties**" means both of them.

"**Permanent CEP Site**" means those UBC-Owned Lands on which a permanent CEP is or will be situate.

"**Permits**" means all permits, licences, certificates, approvals, authorizations, consents and the like issued by UBC or any other Governmental Authority for the Infrastructure or the provision of the Energy Services.

"**Person**" means an individual or his or her legal personal representative, an unincorporated organization or association, or a corporation, partnership, trust, trustee, syndicate, joint venture, limited liability company, union, Governmental Authority or other entity or organization.

"**Phase I Application**" has the meaning given to it in Section 3.2(a).

"**Phase I CPCN**" means a CPCN authorizing the construction and operation of those portions of the Infrastructure described in or otherwise contemplated by the Phase I Application.

"**Phase II Application**" has the meaning given to it in Section 3.2(b).

"**Phase II CPCN**" means a CPCN authorizing the construction and operation of those portions of the Infrastructure described in or otherwise contemplated by the Phase II Application.

"**Project Plan**" means the plan for carrying out the Infrastructure Work, the operation of the NDES and the provision of Energy Services, a copy of which as at the date of this Agreement is attached as Schedule B, setting out:

(i) an indicative development and load forecast;

(ii) technical design specifications, including DPS layout, and current and future energy sources;

(iii) a capital plan reflecting the indicative development and load forecast and technical specifications;

(iv) operating assumptions, including equipment efficiencies, labour requirements and all costs to provide the Energy Services;

(v) input fuel price assumptions;

(vi) the Project Plan Pro Forma;

(vii) rate design and rate setting principles; and

(viii) the Extension Test;

as approved by the BCUC and as amended thereafter in accordance with this Agreement, including so as to reflect changes in the Development Forecast and in NDES operating costs that are a flow-through to NDES Customers.

"**Project Plan Pro Forma**" means the financial model forming part of the Project Plan and reflecting the forecast loads, capital and operating costs of the NDES and from which indicative rates will be determined, as amended from time to time in accordance with the Project Plan.

"Purchased Assets" as at any time means, collectively, all of the Infrastructure then in service, together with all work-in-progress at such time and reasonably expected to be included in rate base once in service (including any design, development or construction work related thereto), and together with all NDES Customer contributions in aid of construction, pending or unused grants, regulatory assets (including any carbon offset funds accumulated and not yet spent on Alternate Energy Sources), all leases, licences, registered rights of way, easements or other rights, all contracts and Permits, NDES Customer information (including historical records) and all other assets relating to the NDES.

"**Release**" includes any release, spill, leak, pumping, pouring, emission, emptying or discharge, injection, escape, leaching, migration, disposal, or dumping.

"**Right to Purchase**" has the meaning given to it in Section 7.2(a)(ii).

"RFI" has the meaning set out in Recital F.

"**Service Connection**" means, collectively, the system of water pipes, fittings and ancillary equipment and facilities necessary to connect a Building to the Distribution System via an Energy Transfer Station.

"**SRW**" means a statutory right of way agreement, substantially in the form attached as Schedule F which permits Corix exclusive access to the lands and improvements thereon for the purpose of performing Corix's obligations under this Agreement.

"Support and Indemnity Agreement" means the agreement made between UBC and Corix in respect of the rights and obligations of Corix, as assignee pursuant to the Assignment and Assumption Agreements, under the Community Energy Agreements described in Schedule C.

"**Taxes**" means all applicable taxes, including without limitation all income tax, sales tax, excise tax, transfer taxes or fees, and further includes property taxes, levies, penalties including interest, franchise fees and royalties, if validly levied by a federal, provincial, regional, municipal, or other local governmental authority, including UBC, and exigible upon Corix or the NDES customers, as applicable.

"**Temporary CEP Site**" means a site agreed to by the Parties for the location of a temporary CEP.

"**Thermal Energy**" means thermal energy for space heating, ventilation heating and domestic hot water heating.

"**TRIUMF**" means Canada's national laboratory for particle and nuclear physics, situate at 4004 Wesbrook Mall, within UBC's Vancouver Campus and owned and operated pursuant to a joint venture agreement made as of March 31, 2008 among UBC and certain other universities and institutions.

"**UBC Cap**" has the meaning given to it in Section 22.1(a).

"**UBC-Owned Lands**" means those lands within UBC's Vancouver Campus that are owned in fee simple by UBC.

"**UBC Properties**" means UBC Properties Investments Ltd., in its capacity as trustee of UBC Properties Trust.

"**UBC's Land Use Plan**" means the land use plan adopted by the Minister of Community and Rural Development pursuant to Part 10-2010 of the *Municipalities Enabling and Validating Act (No.3)* [SBC 2001], c.44.

"**UBC's Vancouver Campus**" means the lands within the boundaries described in the *Point Grey Campus Lands Regulation* (195/2010).

"**UEL**" means the administration set up pursuant to the *University Endowment Land Act*, R.S.B.C., 1996, Ch. 496 and amendments thereto for the purpose of administering all land included within the definition of land set out in Section 1 of the *University Endowment Land Act*, which lands can be generally described as being situate in the areas east of Wesbrook Mall and north of Agronomy Road.

"**UNA**" means the University Neighbourhoods Association, a society incorporated under the *Society Act* (British Columbia).

1.2 Interpretation

Unless otherwise expressly provided, in this Agreement:

(a) "this Agreement" means this agreement, including any recitals and schedules, as it may from time to time be supplemented, amended or restated;

(b) all references in this Agreement to a designated "Section", "subsection" or "Schedule" is to the designated Section or subsection of or Schedule to this Agreement;

(c) the words "herein", "hereof" and "hereunder" and other words of similar import refer to this Agreement as a whole and not to any particular portion hereof;

(d) the headings are for convenience only, do not form a part of this Agreement and are not intended to interpret, define or limit the scope, extent or intent of this Agreement or any provision hereof;

(e) the singular of any term includes the plural, and vice versa; the use of any term is equally applicable to any gender and, where applicable, a body corporate;

(f) the word "including" is not limiting whether or not non-limiting language (such as "without limitation" or "but not limited to" or words of similar import) is used with reference thereto;

(g) references to time of day or date mean the local time or date in Vancouver, British Columbia; and

(h) all references to amounts of money mean lawful currency of Canada.

1.3 Statutory References

Unless otherwise specified, each reference to a statute is deemed to be a reference to that statute, and to the regulations made under that statute, as amended or re-enacted from time to time.

1.4 Schedules

The following are the Schedules to this Agreement:

Schedule A	Development Areas
Schedule B	Project Plan
Schedule C	Community Energy Covenants and Chart of Applicability
Schedule D	Land Use Plan and Development Forecast
Schedule E	Material Permits
Schedule F	Form of Statutory Right of Way
Schedule G	Form of Licence Agreement – Temporary CEP Site
Schedule H	Form of Lease Agreement – Permanent CEP Site
Schedule I	Form of Energy Services Contract

2. CONDITIONS PRECEDENT

2.1 Conditions Precedent to Commencement of Phase I

(a) The obligation of Corix to carry out any of the Infrastructure Work shall be subject to fulfilment, on or before September 1, 2015 or such other date as the Parties may agree, of each of the following conditions precedent:

(i) the BCUC will have issued the Phase I CPCN and approved rates for the Energy Services (including tariff terms and conditions and a form of Energy Services Contract), on terms and conditions that are reasonably acceptable to Corix, by reference to the Project Plan;

(ii) the board of directors of Corix, as necessary, will have approved the execution and delivery of the Licence Agreement, an Assignment and Assumption Agreement for each of the Community Energy Covenants described in Schedule C, and the Support and Indemnity Agreement;

(iii) UBC will have executed and delivered to Corix the Licence Agreement, an Assignment and Assumption Agreement for each of the Community Energy Covenants described in Schedule C, and the Support and Indemnity Agreement;

(iv) all Material Permits (other than the Phase I CPCN) necessary to allow Corix to commence the Infrastructure Work will have been obtained on terms and conditions acceptable to Corix, acting reasonably;

(v) the representations and warranties of UBC set out in Section 16.1 continue to be true; and

(vi) all licences (other than the Licence Agreement), statutory rights of way, easements, leases or other agreements required for Phase I, granting Corix access as contemplated in Section 5.2, will have been executed and delivered by, or otherwise obtained from, UBC and other Persons, as applicable, on terms and conditions acceptable to Corix, acting reasonably.

Corix will use commercially reasonable efforts to satisfy the conditions contained in this Section 2.1(a), provided, however, that each such condition is for the sole and exclusive benefit of Corix and may be waived by Corix in whole or in part at any time.

(b) The obligations of UBC in connection with the Infrastructure Work associated with Phase I shall be subject to fulfilment, on or before September 1, 2015 or such other date as the Parties may agree of each

of the following conditions precedent:

(i) the BCUC will have issued the Phase I CPCN and approved rates for the Energy Services (including tariff terms and conditions and a form of Energy Services Contract), all on terms and conditions that are reasonably acceptable to UBC, by reference to the Project Plan;

(ii) the UBC Board of Governors, as necessary, will have approved the execution and delivery of the Licence Agreement, an Assignment and Assumption Agreement for each of the Community Energy Covenants described in Schedule C, and the Support and Indemnity Agreement;

(iii) Corix will have executed and delivered to UBC the Licence Agreement, an Assignment and Assumption Agreement for each of the Community Energy Covenants described in Schedule C, and the Support and Indemnity Agreement;

(iv) all Material Permits, (other than the Phase I CPCN) will have been obtained on terms and conditions acceptable to UBC, acting reasonably; and

(v) the representations and warranties of Corix set out in Section 16.2 continue to be true.

UBC will use commercially reasonable efforts to satisfy the conditions contained in this Section 2.1(b), provided, however, that each such condition is for the sole and exclusive benefit of UBC and may be waived by UBC in whole or in part at any time.

3. PROJECT PLAN AND PHASING

3.1 Project Plan

(a) Corix will design, construct, develop, extend, operate and maintain the NDES in accordance with the Project Plan.

(b) Corix will, from time to time but in any event no less frequently than annually after issuance of the Phase I CPCN, consult with UBC on any amendments to the Project Plan considered by either Party to be necessary or desirable as a result of changes in key input assumptions or identification of new opportunities. The Parties may amend the Project Plan from time to time after issuance of the Phase I CPCN, but subject always to further BCUC approval as applicable.

3.2 Phases

The Parties expect Corix will develop the NDES in two phases, as follows:

(a) Phase 1: Corix will prepare and submit to the BCUC an application (the "**Phase I Application**") for a CPCN authorizing Corix to construct and operate the NDES. As part of the Phase I Application, Corix will submit the Project Plan and will request that the BCUC authorize the use of the Project Plan Pro Forma for determining the ongoing feasibility of all anticipated NDES Extensions and for determining the feasibility of all unanticipated NDES Extensions.

(b) Phase 2: Promptly after the occurrence of the target date identified in the Project Plan for commercial viability of either or both of:

(i) the interconnection of the Wesbrook portion of the NDES and the ADES; and

(ii) the connection of a permanent CEP to an Alternate Energy Source;

and provided that all material assumptions set out in the Project Plan in support of the selection of such target date remain valid at that time, Corix will prepare and submit to the BCUC, with sufficient lead time to meet the relevant target in-service date set out in the Project Plan, and thereafter diligently prosecute, an application (the "**Phase II Application**") for a CPCN authorizing Corix to interconnect the NDES and the ADES and/or connect a permanent CEP to an Alternate Energy Source.

3.3 Commencement of Phase I Work

Corix will commence the Infrastructure Work contemplated by the Phase I Application within 90 Business Days after the Commencement Date.

3.4 Commencement of Phase II Work

Corix will commence the Infrastructure Work contemplated by the Phase II Application within 120 Business Days after the last to occur of the following:

(a) all Material Permits, statutory rights of way, easements, licences, leases and other rights of access requisite for the Infrastructure Work contemplated in the Phase II Application have been obtained and are in effect on terms satisfactory to Corix, acting reasonably;

(b) Corix has entered into one or both of the following agreements, as relevant and applicable:

(i) an agreement with UBC to interconnect the Wesbrook portion of the NDES and the ADES for the purposes of supplying to or purchasing from UBC an Alternate Energy Source;

(ii) an agreement with one or more Persons for the supply from an Alternate Energy Source for the Permanent CEP; and

(c) the BCUC will have issued the Phase II CPCN on terms and conditions that are reasonably satisfactory to each of Corix and UBC, by reference to the Project Plan.

3.5 Lack of Funds

Lack of funds will not be a ground for any failure or refusal by Corix to:

(a) commence the Infrastructure Work contemplated by the Phase I Application, in accordance with Section 3.3;

(b) extend the Infrastructure as a result of anticipated or unanticipated customer additions in accordance with the Project Plan and subject to the Extension Test;

(c) make the Phase II Application, subject to and in accordance with Section 3.2(b); or

(d) commence the Infrastructure Work contemplated by the Phase II Application, subject to and in accordance with Section 3.4.

4. SUBMISSIONS TO REGULATOR

4.1 Regulation of Rates

(a) Corix will be regulated, as applicable, by the BCUC as a public utility (as that term is defined in the *Utilities Commission Act* (British Columbia)).

(b) Corix will charge for the Energy Services on a Cost of Service approach, subject to BCUC approval as applicable.

(c) The NDES will operate as an integrated energy system and distribution network, and, subject to BCUC approval as applicable, there will be a distinct tariff, applicable in all Development Areas, for each class of NDES Customer.

4.2 BCUC Applications

(a) Corix will prepare and submit to the BCUC such applications for CPCNs under the *Utilities Commission Act* (British Columbia) as may be necessary for development of the NDES in accordance with the Project Plan, including the Phase I Application, the Phase II Application (subject to Section 3.2(b)) and any other applications that may be necessary in accordance with the Project Plan and the *Utilities Commission Act* (British Columbia (collectively, the "**BCUC Applications**").

(b) UBC will provide reasonable support for the BCUC Applications, as requested by Corix, provided such applications are in accordance with this Agreement and the Project Plan.

(c) Corix will comply with the respective terms and conditions upon which each of the Phase I CPCN and the Phase II CPCN was issued, and with the terms and conditions upon which any other order or decision of the BCUC is issued for the NDES.

4.3 NDES Extensions

Subject to BCUC approval, as applicable:

(a) Corix will use the Project Plan Pro Forma as a reference for determining the ongoing feasibility of all anticipated NDES Extensions and for determining the feasibility of unanticipated NDES Extensions;

(b) Corix will carry out all NDES Extensions contemplated in the Project Plan;

(c) Corix may carry out any NDES Extension not contemplated in the Project Plan, if:

(i) it would result in rates for the NDES Customers that are comparable to or lower than those projected in the then-current Project Plan; or

(ii) Corix wishes to design, construct and install such NDES Extension at its own cost and expense;

(d) if a proposed NDES Extension would increase any of the rates chargeable to NDES Customers above the rates projected in the then-current Project Plan, Corix may, after first giving reasonable advance notice to UBC, apply to the BCUC for approval of the proposed NDES Extension on the basis that the

NDES Extension is (or should be deemed to be), despite the anticipated increase in rates, in the public interest; and

(e) Corix may, if applicable, mitigate any anticipated increase in rates for the NDES Customers by seeking a voluntary contribution in aid of construction from UBC or any customers who seek to be connected to the NDES via the proposed NDES Extension and any applicable grants or other consideration that would reduce impacts to rates for the NDES Customers.

5. EXCLUSIVITY AND ACCESS TO LAND

5.1 Exclusive Franchise and Obligation to Serve

(a) UBC grants Corix an exclusive franchise and right to provide Energy Services to NDES Customers in the Development Areas in accordance with the Project Plan, and to effect any NDES Extensions from time to time contemplated thereby, and UBC shall provide such access to any UBC-Owned Lands as is necessary for Corix, in the exercise of such franchise:

(i) to carry out the Infrastructure Work; and

(ii) to operate and maintain the Infrastructure.

(b) Subject only to the rights of those Developers or strata corporations whose Buildings are not subject to a Community Energy Covenant, the powers and rights granted to Corix under this Agreement are exclusive to Corix and UBC will not perform, or allow any other Person (except subcontractors and agents of Corix) to perform, any Infrastructure Work or to construct, install or operate the Infrastructure or any other system (not permitted by applicable building regulations or the Design Guide) that would provide Thermal Energy to NDES Customers, to provide the Energy Services or to exercise any other right or privilege granted to Corix under this Agreement, except as necessary during Force Majeure events.

(c) Corix acknowledges that:

(i) certain UBC-Owned Lands within the Development Areas that are leased by UBC to certain Developers are subject to a Community Energy Covenant, and UBC Properties has entered into offers to lease certain other UBC-Owned Lands within the Development Areas, which offers to lease require the Developer(s) to enter into and register against title to the applicable lands a Community Energy Covenant, a complete list of which lands is set out in Part 1 of Schedule C; and

(ii) certain UBC-Owned Lands within the Development Areas that were leased prior to the date of this Agreement by UBC to certain Developers are not subject to a Community Energy Covenant, a complete list of which lands is set out in Part 2 of Schedule C.

(d) Corix will have no obligation to connect to the NDES any Building constructed by a Developer on lands described in Section 5.1(c)(ii).

(e) Despite Sections 5.1(a), (b) and (c):

(i) UBC will have no responsibility for or in relation to any Developer or strata corporation who fails to comply with its obligations, or otherwise defaults, under a Community Energy Covenant for which the Parties have entered into an Assignment and Assumption Agreement, except and

to the extent expressly so provided in such Assignment and Assumption Agreement and in the Support and Indemnity Agreement; and

(ii) UBC will have no responsibility for or in relation to any Developer or strata corporation not subject to a Community Energy Covenant who chooses not to enter into an Energy Services Contract with Corix.

(f) Upon the exercise by UBC of its Option to Purchase, or upon termination of this Agreement and exercise by UBC of its Right to Purchase or exercise by Corix of the Required Purchase, Corix will assign to UBC (or, at UBC's direction, to another Person designated by UBC) all of Corix's relevant right, title and interest in and to any and all Community Energy Covenants.

5.2 Access Rights within UBC's Vancouver Campus

(a) Except in relation to those UBC-Owned Lands already subject to a Community Energy Covenant, UBC will from time to time grant, and, where applicable, UBC and Corix will each use commercially reasonable efforts to cause the relevant Developers, strata corporations or other lessees to grant, to Corix and its subcontractors, agents, employees and representatives (subject to any requisite consents, authorizations or approvals from any applicable Governmental Authority), for nominal consideration, pursuant to licences, statutory rights of way, easements or other agreements, as applicable, on terms and conditions acceptable to Corix and UBC, each acting reasonably, such non-exclusive, and where appropriate exclusive, access and other rights to, on, over and under such of the UBC-Owned Lands as may be required to enable Corix to perform its obligations under this Agreement, without undue interference from UBC, such Developers or any of their respective contractors, agents, employees or representatives or any other Person.

(b) Each SRW, easement or other registrable interest granted by UBC pursuant to Section 5.2(a) may be registered by Corix in the relevant Land Title Office, together with any priority agreements as Corix may deem advisable.

(c) UBC will use commercially reasonable efforts to assist Corix from time to time in obtaining such non-exclusive access rights to, on, over and under such other lands within UBC's Vancouver Campus (other than the UBC-Owned Lands) as may be required to enable Corix to perform its obligations under this Agreement.

5.3 Rights of Way for Infrastructure

(a) UBC will from time to time grant to Corix and its subcontractors, agents, employees and representatives (subject to any requisite consents, authorizations or approvals from any applicable Governmental Authority), and duly register in the relevant Land Title Office, a SRW containing terms and conditions acceptable to Corix and UBC, each acting reasonably, on and over each parcel of land within the UBC-Owned Lands in which any portion of the Distribution System is or will be constructed, as required to enable Corix to perform its obligations under this Agreement.

(b) UBC will use commercially reasonable efforts to assist Corix from time to time in obtaining such statutory rights of way, or similar rights or interests, on, over and under such other lands within UBC's Vancouver Campus (other than the UBC-Owned Lands) in which any portion of the Distribution System is or will be constructed, as may be required to enable Corix to perform its obligations under this Agreement.

5.4 New Development Areas

(a) If UBC amends UBC's Land Use Plan to:

(i) designate as a "Neighbourhood Housing Area" an area of UBC's Vancouver Campus not so designated as at the date of this Agreement; or

(ii) expand the boundaries of any of the Development Areas (as shown on the map attached as Schedule A);

(such newly designated area or area of expansion, as the case may be, being hereinafter called a "**New Development Area**"),

it will, by notice to Corix, grant Corix a right of first offer to construct an NDES Extension into such New Development Area for the purpose of providing Energy Services to NDES Customers who may lease, sublease or otherwise occupy any space within such New Development Area. The notice will identify, with reasonable particularity, the New Development Area and provide information reasonably required in order for Corix to perform the Extension Test as set out in the Project Plan.

(b) Corix will perform the Extension Test for the NDES Extension proposed to serve the New Development Area and provide the results to UBC, for UBC's consideration, all within such period of time as may be agreed between the Parties, each acting reasonably.

(c) The Parties may, subject always to the Project Plan, agree on certain accommodations for any New Development Area, including allowing construction of Buildings within the New Development Area having standalone energy systems that are not directly or immediately connected to a CEP, or the use of temporary facilities by Corix as a bridging strategy.

(d) If:

(i) Corix fails to provide to UBC the results of the Extension Test within the agreed-upon time period; or

(ii) the results of the Extension Test are unsatisfactory to either of the Parties (each acting reasonably) and the Parties cannot, within 60 days after Corix has provided such results to UBC, agree upon a contribution in aid of construction for the NDES Extension proposed to serve the New Development Area;

then UBC may pursue other alternatives for providing Thermal Energy services in the New Development Areas including allowing stand-alone (on-site) systems, extension of the ADES, or soliciting from any other Persons offers for the provision of Thermal Energy services to the New Development Area or any part or parts thereof.

(e) Corix will be responsible for seeking to negotiate with the Musqueam Nation, using reasonable diligence exercised in good faith, a plan for the provision of Energy Services to the area known as Block F, and for that purpose Corix will also prepare any relevant forecasts and other requisite documents and materials.

6. INFRASTRUCTURE

6.1 Design, Engineering and Construction of Infrastructure

(a) Corix will, at its own cost and expense, engineer, design, construct, install, operate and maintain the Infrastructure in a good and workmanlike manner, consistent with industry standards and in compliance with the Project Plan and all applicable Laws.

(b) UBC requires utility and other service infrastructure installed within UBC's Vancouver Campus to be located, as much as is commercially reasonable, within existing utility corridors, roadways, greenways and other public rights of way or public spaces. Accordingly, Corix will cooperate with UBC and, as applicable, Developers and other Persons to:

(i) acquire any rights contemplated in Sections 5.2 and 5.3; and

(ii) install the Distribution System;

as much as is commercially reasonable within such existing utility corridors, roadways, greenways and other public rights of way or public spaces. Corix will use commercially reasonable efforts to exercise all such rights with minimal cost and disruption to such utility corridors, roadways, greenways, public rights of way or public spaces, and to other holders of rights therein or thereto and users thereof.

6.2 Material Permits and Authorizations

Each Party will apply for and use commercially reasonable efforts to obtain and maintain all Material Permits for which it has primary responsibility as set out in Schedule E**.** The Parties will cooperate and coordinate with each other to obtain and maintain all Material Permits.

6.3 Provision of Infrastructure Specifications

Corix will promptly give UBC all of the proposed Infrastructure Specifications available as at the date of this Agreement. Any addition to or modification of such Infrastructure Specifications will form part of the ongoing updates to the Project Plan.

6.4 ADES Interconnection

When the Parties decide to proceed with the interconnection of the NDES and the ADES, in accordance with the Project Plan, they will negotiate a written agreement to provide for such interconnection and allow for the transfer of Thermal Energy between the NDES and the ADES.

7. OWNERSHIP OF INFRASTRUCTURE

7.1 Corix as Owner

(a) Corix will own the Infrastructure and all related materials, supplies, equipment and facilities that become a part of the NDES.

(b) Notwithstanding any degree of annexation or affixation of any part of the Infrastructure to the UBC Lands, all components of the Infrastructure will, as between Corix and UBC, be owned by Corix.

7.2 UBC Purchase

[NTD: the Parties have agreed upon an option to purchase, a right to purchase and a right to require repurchase. Terms surrounding potential purchase structure and valuation (subject to BCUC approval) are being finalized.]

7.3 Grant to UBC of Right of First Refusal

Corix grants to UBC a right of first refusal (the "**ROFR**") on the following terms and conditions:

(a) Corix will not sell, assign or transfer or otherwise dispose of or lease any interest in the Purchased Assets or any part thereof (the "**Offered Assets**") to any Person other than UBC unless and until the Offered Assets are first offered for sale to UBC upon the same terms and conditions as will have been contained in a bona fide written offer (the "**Offer**") to Corix from a Person (the "**Offeror**") with whom Corix deals at arm's length, and which Offer Corix intends to accept.

(b) Any offer required to be made to UBC by Corix will be made in writing and delivered to UBC, will contain a copy of the Offer received by Corix and will set forth the name of the Offeror, the price and all the terms and conditions of such proposed purchase.

(c) UBC will have 60 days from the date of receipt of such Offer to elect to acquire the Offered Assets on the same terms and conditions as those in such Offer except that the sale and purchase will be closed as hereinafter provided and UBC will have the right to pay all cash for the Offered Assets.

(d) Subject always to the approval of the BCUC, and subject to Section 7.3(c) above, UBC may exercise the ROFR by delivering to Corix a notice in writing exercising the ROFR.

(e) If UBC does not exercise the ROFR by notifying Corix in writing of its election to do so within the time set out in Section 7.3(c), Corix may, within a period of 90 days thereafter, enter into a binding agreement with the Offeror for the purchase and sale of Corix's interest in the Offered Assets upon the same terms and conditions as set forth in the Offer but not otherwise, and failing such disposition, the provisions of this Section 7.3 will apply again.

(f) If the BCUC approves the exercise of the ROFR, the contract of purchase and sale arising therefrom will be completed on a day agreed by the parties (the "**ROFR Completion Date**").

(g) Corix will deliver to UBC at the closing duly executed transfers or assignments in registrable form conveying to UBC all interests in land that comprise part of the Offered Assets free and clear of all financial encumbrances and non-registered charges, except as may be disclosed and agreed to in advance, and Corix will deliver to UBC any other documents reasonably requested by UBC to ensure the balance of the Offered Assets are transferred to UBC free and clear of all financial encumbrances and non-registered charges.

(h) UBC will deliver payment of the purchase price to Corix by electronic funds transfer, certified cheque or bank draft payable at par or otherwise as the Parties may agree, at Vancouver, British Columbia, on the ROFR Completion Date.

(i) Corix will deliver vacant possession of the Offered Assets upon the closing on the ROFR Completion Date.

7.4 Removal or Abandonment On Termination

To the extent UBC does not elect to purchase any portion or portions of the Infrastructure pursuant to its Right to Purchase under Section 7.2 upon termination of this Agreement, Corix may:

(a) within 120 days after the effective date of termination, remove from the UBC-Owned Lands such portion or portions of the Infrastructure as Corix wishes to remove, restoring the surface of such UBC-Owned Lands as nearly as may reasonably be possible to the same condition as they were on the date of this Agreement, to the satisfaction of UBC, acting reasonably; or

(b) abandon all or part of the Infrastructure provided it is safely decommissioned and does not pose or constitute any Environmental or other hazard, and release the rights granted to Corix under this Agreement. Any such abandoned Infrastructure will belong to the respective owners of the lands on, in or under which it is located.

8. DEVELOPMENT AND CONNECTION OF BUILDING SYSTEMS

8.1 Design, Engineering and Construction of Building Systems

(a) Each Building System has been or will be designed, engineered, constructed and installed by the relevant Developer(s) and will be operated and maintained by the relevant Developer(s) or strata corporation (as applicable).

(b) Except to the extent expressly provided in Section 8.1(e), Corix will not be responsible for any aspect of the design, engineering, construction, installation, operation or maintenance of any Building System.

(c) Except to the extent expressly provided in Section 8.1(d), UBC will not be responsible for any aspect of the design, engineering, construction, installation, operation or maintenance of any Building System.

(d) UBC will, as Municipal Authority Having Jurisdiction, for the Developer(s) of each Building constructed in any of the Development Areas after the date of this Agreement (unless such Building is situated on lands described in Section 5.1(c)(ii)), make compliance with the reasonable requirements of Corix, as operator of the NDES, a condition precedent or subsequent to UBC's issuance of a development permit for the Building.

(e) The Design Guide will be attached as a schedule to each Energy Services Contract and/or Community Energy Covenant. If, for any particular Building, Corix wishes to waive, alter or amend any of the standards or requirements set out in the Design Guide it will first consult with UBC.

8.2 Development and Connection

UBC will cause UBC Properties to make it a condition of any offer to lease and/or lease it enters into with a Developer after April 15, 2014 for the lease of lands within any of the Development Areas, that the offer to lease and/or lease must contain terms that require the tenant to enter into both an Community Energy Covenant and an Energy Services Contract with Corix.

8.3 Amendments to Forecasts and Plans

(a) UBC Properties may from time to time, in its sole discretion, amend the Development Forecast and any of the Neighbourhood Plans. UBC will, or will cause UBC Properties to, give prompt notice to Corix of any such amendments and provide copies of such amended documents, but UBC will have no liability to Corix for any such amendment.

(b) At the date of this Agreement, Neighbourhood Plans have been approved only for the Wesbrook Place

and East Campus Development Areas. Corix will consult with UBC before planning any NDES Extension intended to serve any Development Area for which UBC has not at that time adopted a Neighbourhood Plan.

(c) UBC may from time to time initiate or propose amendments to UBC's Land Use Plan. UBC will give notice to Corix of any such proposed amendments and provide copies of such amended documents. If an amendment to UBC's Land Use Plan causes all or a portion of any assets which, immediately prior to the initiation or proposal of such amendments already comprise, or are under construction and intended in good faith to comprise, part of the Infrastructure (except to the extent such assets are used solely to provide Energy Services to the area owned by the Musqueam Nation and known as Block F) to become stranded then, to the extent that Corix cannot, despite having used commercially reasonable efforts, mitigate the loss, cost or expense it would otherwise suffer as a result of such stranding of assets (the "**Stranded Asset Losses"),** UBC will indemnify and hold harmless Corix from and against any such Stranded Asset Losses.

8.4 Connection Credit

(a) Subject to BCUC approval, Corix will offer to the Developer(s) of each new Low-Rise Building constructed in the Development Areas after the date of this Agreement a connection credit (the "**Connection Credit**") to assist in offsetting the additional incremental cost such Developer(s) are expected to incur to construct such Low-Rise Building so as to be capable of using heat from the NDES for space heating within suites, in addition to domestic hot water and ventilation air.

(b) The Connection Credit will be offered to such Developer(s) pursuant to an Energy Services Contract made between Corix and the Developer(s), and will be available, calculated and paid in accordance with the applicable terms and conditions set out in the Project Plan, which terms and conditions will be incorporated into each such Energy Services Contract.

(c) Each Energy Services Contract will be conditional upon the BCUC first having approved Corix's recovery of the full costs of all funds provided as Connection Credits in customer rates as applied for in the Phase I Application.

(d) Subject to BCUC approval, Corix will recover in the rates chargeable to NDES Customers an amount equal to the total costs of Connection Credits provided to Developers, including financing, to be recovered over a period of no less than 10 years.

8.5 Developer Contributions

During implementation of Phase I, no Developer contributions will be levied for the costs of the NDES. Before commencement of Phase II, the Parties will revisit the issue, and may consider levying Developer contributions where the efficiency or Low Carbon status of the Thermal Energy generated by an Alternate Energy Source provides significant benefits to Developers in terms of avoided costs for meeting applicable building code and certification requirements.

9. ENERGY SERVICES

9.1 Purchase and Sale of Thermal Energy

(a) Corix will sell Energy Services only at rates based on a Cost of Service approach, consistent with the rate design and rate setting principles set out in the Project Plan, and with a distinct tariff, applicable in all Development Areas, for each class of NDES Customer, all as approved by the BCUC and otherwise

on the terms and conditions of service approved by the BCUC.

(b) Corix will perform all metering, billing, collecting and other customer service functions associated with the operation and maintenance of the NDES.

9.2 Energy Services Contracts

Corix will enter into an Energy Services Contract with each NDES Customer. Each such Energy Services Contract (except in the case of any Energy Services Contract between Corix and UBC, the terms and conditions of which will be separately negotiated and settled between the Parties) will be in substantially the form set out in Schedule I. In circumstances in which a Developer is the initial signatory to an Energy Services Contract but is not an NDES Customer in the relevant Building, such Energy Services Contract will be assignable to and enforceable against the NDES Customer(s) in that Building.

9.3 Standard of Performance

In providing the Energy Services, Corix will:

(a) use qualified personnel and exercise the same degree of care, skill and supervision as would be exercised by a reasonable and prudent utility operator experienced in performing like services;

(b) comply with all applicable Laws; and

(c) provide service levels and quality substantially similar to current market standards for similar services provided to similar customers in British Columbia at the time the Energy Services are provided.

10. COST RECOVERY

10.1 Cost Recovery

Corix will, based on a Cost of Service approach and subject to BCUC approval, recover through the rates it charges NDES Customers for Energy Services the following items as provided in the Project Plan:

(a) all prudently incurred costs and expenses, including operating costs, capital costs (including design, development and construction costs), depreciation expenses, debt service costs and a return on equity, a return on working capital, Permit and licence fees, and all federal, provincial, regional and municipal or other local Governmental Authority Taxes incurred by it; and

(b) subject to the UBC Cap, all external development costs incurred by UBC and reimbursed by Corix;

in connection with the development and construction of the NDES and the supply of Thermal Energy to NDES Customers.

10.2 Grants

The Parties will each use commercially reasonable efforts to obtain grants from applicable Governmental Authorities to assist in financing the costs of construction and operation of the Infrastructure. Any grants received that are specific to a particular rate class of NDES Customers will be allocated as a contribution in aid of construction to reduce the applicable rate for that NDES Customer rate class (including the ADES, as applicable). All other grants that are not specific to a particular rate class of NDES Customers will be applied to the entire NDES capital costs and allocated to each rate class in proportion to its respective allocation of capital costs.

10.3 Environmental Credits

(a) Notwithstanding any other provision of this Agreement, all right, title and interest in any Environmental Credit related to the construction or operation of the Infrastructure will be the property of Corix to be applied for the sole benefit of NDES Customers (including UBC).

(b) Any costs associated with quantifying or validating the volume and/or value of such credits will be paid for by the beneficiary(ies) of such credits.

11. LICENCE/LEASE OF LANDS

11.1 License of Temporary CEP Sites

UBC will license to Corix the Temporary CEP Sites pursuant to licence agreements substantially in the form set out in Schedule G. If, despite the reasonable efforts of Corix to commence the Infrastructure Work contemplated by the Phase II CPCN, extension of any of such licence agreements is necessary beyond its initial five-year term but UBC does not agree to such extension, UBC will pay any and all costs necessary to relocate any (or all) CEPs from the Temporary CEP Sites to such other sites as are acceptable to both Parties, acting reasonably. Corix will reimburse UBC for all such costs, if such costs are recoverable through rates chargeable to the NDES Customers as approved by the BCUC.

11.2 Lease of Permanent CEP Site

UBC will lease to Corix a portion or portions of the UBC-Owned Lands for any permanent CEP pursuant to a lease agreement substantially in the form set out in Schedule H. The location of the portion(s) of the UBC Lands to be so leased will be determined during the design process for the permanent CEP, including the Alternate Energy Source contemplated as part of Phase II. Subject to the Project Plan and to BCUC approval as applicable, UBC will lease the relevant land to Corix at then-current market rates (which, for greater certainty, will be no higher than as approved by the BCUC for recovery in the rates Corix charges NDES Customers for Energy Services) on a 99-year triple net ground lease, and on such other terms as are consistent with the ground leases used by UBC in the Wesbrook Place neighbourhood, adapted for the permanent CEP or as otherwise agreed by the Parties, each acting reasonably and in good faith.

11.3 Franchise Fee

(a) UBC will charge Corix a franchise fee (the "**Franchise Fee**"), calculated as three (3%) percent of the gross revenues (before any additional Taxes chargeable to NDES customers that are not otherwise included in the calculation of monthly rates) collected by Corix in connection with its provision of the Energy Services, provided that such Franchise Fee is recoverable through rates chargeable to the NDES Customers, as approved by the BCUC.

(b) Despite Section 11.3(a), UBC will waive and will not charge Corix the Franchise Fee at any time during the period commencing on the Commencement Date and ending on the date that is the 15th anniversary of the Commencement Date. For any year(s) after the 15th anniversary of the Commencement Date, UBC may waive Corix's obligation to pay the Franchise Fee, or reduce the Franchise Fee, if it determines, in its sole discretion, that the rates then chargeable to the NDES Customers exceed a generally-accepted competitive benchmark for the provision of Thermal Energy, whether via on-site systems (including total costs of ownership for on-site systems) or by reference to some other comparable benchmark for Thermal Energy service.

12. STAKEHOLDER COMMUNICATIONS

Corix will initiate and both Parties will participate in:

(a) cooperative interaction with stakeholders, including Developers, on the NDES; and

(b) BCUC process planning and communication.

13. SHARED SERVICES

(a) The Parties may at any time negotiate and execute a shared services agreement, if they consider it mutually advantageous to do so.

(b) If economically beneficial to the NDES Customers and to UBC, UBC:

(i) may collaborate with Corix to negotiate a supply of the requisite electricity service from the UBC-owned power distribution system; and

(ii) will collaborate with Corix to negotiate a supply of the water and sanitary sewer services managed by UBC.

14. DATA COLLECTION, REPORTING AND USE OF INFORMATION

14.1 Collection and Use of Data

(a) Corix may, as commercially reasonable and allowable under applicable laws, collect and provide to UBC data regarding:

(i) the performance of the NDES, on a system-wide basis;

(ii) the performance of the NDES, in relation to specific Buildings, as reasonably requested by UBC; and

(iii) any other aspect of the NDES, the Infrastructure, or any of the NDES Customers, as reasonably requested by UBC;

together with such reports as UBC may reasonably request, all with such frequency as UBC may reasonably request.

(b) UBC shall bear the costs of collection and provision of any data described in Section 14.1(a)(iii).

(c) UBC may use any and all data provided by Corix pursuant to:

(i) Section 14.1(a)(i), for any purpose or purposes;

(ii) Section 14.1(a)(ii), for any purpose or purposes relating to the administration or performance of this Agreement;

(iii) Section 14.1(a)(iii), for academic research purposes only.

(d) Corix will include in its Energy Services Contracts the right to provide to UBC the data described in

Section 14(a), for the purposes described in Section 14(c)(ii) or (iii), as applicable.

14.2 UBC Subject to FIPPA

(a) UBC is a public body that is subject to the *Freedom of Information and Protection of Privacy Act* (British Columbia) ("**FIPPA**"). UBC will comply with the provisions of FIPPA. Under FIPPA, UBC may be required to release books, records, reports, documents, maps, drawings, correspondence, system logs, system development records, accounts, invoices, backup data (including original source documents) and other similar documents, images, writings or information by any means whether graphic, electronic, audio, mechanical or otherwise, that are in its custody or control.

(b) UBC agrees that in the event that it or its employees or agents are requested or required under a FIPPA request or by any judicial, administrative or governmental proceeding to disclose this Agreement or any information regarding or arising from this Agreement or the business arrangements between UBC and Corix, UBC will notify Corix so that Corix may seek any appropriate protective order it so wishes.

(c) UBC agrees that it will not reveal trade secrets of Corix, or commercial, financial, labour relations, scientific or technical information of or about Corix, except:

(i) in accordance with (and after complying with the requirements of) FIPPA; or

(ii) with the prior written consent of Corix.

(d) Subject to Sections 14.2(b) and (c), if, in the absence of a protective order, UBC or its employees or agents are nonetheless, in the opinion of its legal counsel, legally required to disclose this Agreement or any information regarding or arising from this Agreement or the business arrangements between UBC and Corix or else stand liable for contempt or suffer other censure or penalty, UBC may disclose such information.

15. COORDINATING COMMITTEE

15.1 Appointment of Representatives

The Parties will form a Coordinating Committee consisting of representatives of each Party.

15.2 Meetings

The Coordinating Committee will meet (in person at a location convenient to the Parties or by telephone or video conference) as often as required to carry out its duties and responsibilities under this Agreement, and in any event at least once each calendar year, and will keep written records of its meetings and determinations. Either Party may require that a meeting of the Coordinating Committee be held by giving notice of the time and location (or telephone or video conference arrangements) and notice of the topics to be discussed at the meeting, to the other Party at least 10 days prior to the date of the meeting. The Coordinating Committee may establish additional rules, procedures and terms of reference governing its own meetings and determinations.

15.3 Role of Coordinating Committee

The Coordinating Committee will:

(a) share information regarding the Project Plan, the Development Forecast, Neighbourhood Plans and

other information as relevant;

(b) confirm periodic updates to the Design Guide;

(c) negotiate any applicable Energy Services Contract relating to the ADES;

(d) coordinate the design of the interconnection between the NDES and the ADES;

(e) coordinate operations between the NDES and ADES in the event of interconnection between those two systems, in order to ensure compatibility and efficiency;

(f) coordinate arrangements for contracting for natural gas or Alternate Energy Sources for any service provided to UBC; and

(g) make such determinations, take such actions and perform such roles and responsibilities as are contemplated by this Agreement, or as the Parties from time to time direct.

16. REPRESENTATIONS AND WARRANTIES

16.1 Representations and Warranties of UBC

UBC represents and warrants to Corix the following, and acknowledges that Corix is relying on such representations and warranties in entering into the transactions contemplated by this Agreement.

(a) Status of UBC. UBC is a corporation duly continued and validly existing under the laws of British Columbia, with full power and authority to enter into and perform all of its obligations under this Agreement.

(b) Litigation. To the best of its knowledge, UBC is not a party to any action, suit or legal proceeding, actual or threatened, and there are no circumstances, matters or things known to UBC which might give rise to any such action, suit or legal proceeding, and there are no actions, suits or proceedings pending or threatened against UBC before or by any Governmental Authority, which could affect UBC's ability to perform its obligations under this Agreement.

(c) No Breach of Agreement. This Agreement and the performance of the obligations of UBC under this Agreement does not and will not breach any provisions of any other agreement or Law that is binding on or applicable to UBC as of the date of this Agreement.

(d) No Conflict with Constating Documents. Neither the entering into of this Agreement nor the consummation of the transactions contemplated hereby will result in a breach of any of the provisions of the incorporating statute of UBC and all necessary corporate action on the part of UBC has been or will be taken to authorize and approve the execution and delivery of this Agreement and the performance by UBC of its obligations hereunder.

16.2 Corix's Representations and Warranties

Corix represents and warrants to UBC the following, and acknowledges that UBC is relying on such representations and warranties in entering into the transactions contemplated by this Agreement.

(a) Status of Corix. Corix is a corporation duly incorporated and validly existing under the laws of British Columbia, with full power and authority to enter into and perform all of its obligations under this Agreement.

(b) Litigation. To the best of its knowledge, Corix is not a party to any action, suit or legal proceeding, actual or threatened, and there are no circumstances, matters or things known to Corix which might give rise to any such action, suit or legal proceeding, and there are no actions, suits or proceedings pending or threatened against Corix before or by any Governmental Authority, which could affect Corix's ability to perform its obligations under this Agreement.

(c) No Breach of Agreement. This Agreement and the performance of the obligations of Corix under this Agreement does not and will not breach any provisions of any other agreement or Law that is binding on or applicable to Corix as of the date of this Agreement.

(d) No Conflict with Constating Documents. Neither the entering into of this Agreement nor the consummation of the transactions contemplated hereby will result in a breach of any of the terms or provisions of the constating documents of Corix and all necessary corporate action on the part of Corix has been or will be taken to authorize and approve the execution and delivery of this Agreement and the performance by Corix of its obligations hereunder.

(e) Resident. Corix is not a non-resident of Canada within the meaning of the *Income Tax Act* (Canada).

17. ENVIRONMENTAL MATTERS

17.1 Environmental Condition of the Development Areas Lands

Except as set out in this Section 17, Corix will have no liability for any Contaminant or any Environmental matter in relation to, any of the UBC-Owned Lands, including the portion(s) of the UBC-Owned Lands on which the Infrastructure will be constructed and installed.

17.2 UBC Environmental Representation and Warranties

UBC represents and warrants to Corix, as at the date of this Agreement that, to the knowledge of UBC:

(a) the UBC-Owned Lands within the Development Areas are free of Contaminants, except in amounts that are permissible under Environmental Laws and which have been disclosed in writing to Corix;

(b) no part of the UBC-Owned Lands within the Development Areas is a Contaminated Site; and

(c) there are no actions, proceedings, investigations, claims (including remediation cost recovery claims) pending or threatened, that relate to the presence or Release of Contaminants on or from the UBC-Owned Lands within the Development Areas.

17.3 UBC Environmental Covenants

(a) UBC will comply with Environmental Laws in its use and occupancy of the UBC-Owned Lands within the Development Areas and will use commercially reasonable efforts to cause its tenants, contractors, subcontractors and other occupants and users of any of the UBC-Owned Lands within the Development Areas to comply with Environmental Laws in their respective use and occupancy of such lands. Without limiting the generality of the foregoing, UBC will not, except in compliance with Environmental Laws:

(i) install or use or allow to be installed or used on, in or under any of the UBC-Owned Lands within the Development Areas any materials, equipment or apparatus, the installation, use or storage of which is likely to cause the generation, accumulation or migration of any Contaminant; or

(ii) use or allow to be used any of the UBC-Owned Lands within the Development Areas to dispose of, handle or treat any Contaminant in a manner in whole or in part that violates Environmental Laws or causes any of the UBC-Owned Lands within the Development Areas to become a Contaminated Site.

(b) UBC will remediate, and will be responsible for the remediation of, in accordance with Environmental Laws, any and all Contaminants relating to any of the UBC-Owned Lands within the Development Areas, except to the extent such remediation is Corix's responsibility pursuant to Section 17.6.

17.4 UBC Environmental Liability

UBC:

(a) will be liable for, and acknowledges that Corix is not and will not under any circumstances be liable for any and all liabilities, actions, damages, claims (including remediation cost recovery claims), losses, costs, orders, fines, penalties and expenses (including all consulting and legal fees and expenses on a solicitor-client basis and the costs of removal, treatment, storage and disposal of Contaminants and remediation of any UBC-Owned Lands within the Development Areas or any portions thereof and any affected adjacent property) which may be paid by, incurred by or asserted against any member of the Corix Group arising from or in connection with:

(i) any breach of or non-compliance with the provisions of Section 17.2 or 17.3 by UBC;

(ii) the presence or any Release or alleged Release of any Contaminant at or from any of the lands within or adjacent to the UBC-Owned Lands within the Development Areas, other than Contaminants brought onto, or adjacent to the UBC-Owned Lands within the Development Areas by Corix or by any act or omission of Corix or any Person for whom Corix is at law responsible; and

(b) releases, forever discharges and will indemnify, defend and save harmless the Corix Group from and against any and all claims, claims for remediation costs, demands, actions, causes of action and suits which UBC or any of the members of its Board of Governors, or its officers, employees, agents or contractors has or may hereafter have or bring against any member of the Corix Group for or by reason of, or arising from, breach or non-compliance by UBC of any of its obligations under Section 17.2 or 17.3.

17.5 Corix Environmental Covenants

(a) Corix will comply with Environmental Laws in its performance of the Infrastructure Work and the Energy Services and, without limiting the generality of the foregoing, Corix will not, except in compliance with Environmental Laws:

(i) install or use in the Infrastructure or on, in or under any of the UBC-Owned Lands within the Development Areas or any adjacent property any materials, equipment or apparatus, the installation, use or storage of which is likely to cause the generation, accumulation or migration of any Contaminant; or

(ii) dispose of, handle or treat any Contaminant in a manner in whole or in part that violates Environmental Laws or causes any of the UBC-Owned Lands within the Development Areas or any adjacent property to become a Contaminated Site.

(b) Corix will remediate, and will be responsible for the remediation of, in accordance with Environmental Laws, any and all Contaminants relating to any of the UBC-Owned Lands within the Development Areas to the extent that Corix, or any Person for whom Corix is at law responsible, has caused or contributed to the Release of such Contaminants.

17.6 Corix Environmental Liability

Corix:

(a) will be liable for, and acknowledges that UBC is not and will not under any circumstances be liable for, any and all liabilities, actions, damages, claims (including remediation cost recovery claims), losses, costs, orders, fines, penalties and expenses (including all consulting and legal fees and expenses on a solicitor-client basis and the costs of removal, treatment, storage and disposal of Contaminants and remediation of any UBC-Owned Lands within the Development Areas or any portions thereof and any affected adjacent property) which may be paid by, incurred by or asserted against UBC or any of the members of its Board of Governors, its officers, employees, agents or contractors arising from or in connection with:

(i) any breach of or non-compliance with the provisions of Section 17.5 by Corix;

(ii) any Release or alleged Release of any Contaminant at or from any of the UBC-Owned Lands within the Development Areas related to or as a result of the operations of Corix or any act or omission of Corix or any Person for whom Corix is at law responsible; and

(b) hereby releases, forever discharges and will indemnify, defend and save harmless UBC from and against any and all claims, claims for remediation costs, demands, actions, causes of action and suits which any member of UBC has or any Person has or may hereafter have or bring against any member of the Corix Group for or by reason of, or arising from, breach or non-compliance by Corix of any of its obligations under Section 17.5.

17.7 Survival

Notwithstanding any other provision in this Agreement, the indemnities granted in Sections 17.4 and 17.6 will survive the expiry or termination of this Agreement.

18. ENCUMBRANCES

18.1 No Encumbrances.

Neither Party will, without the prior written consent of the other Party, such consent not to be unreasonably withheld or delayed, create, incur, assume or permit to exist any Encumbrance on or in respect of the UBC Lands within the Development Areas or any part that may adversely affect the operation of the Infrastructure as contemplated by this Agreement or the interests of such other Party (a "**Conflicting Encumbrance**"). Notwithstanding the foregoing, Corix acknowledges and agrees that Developers may grant to their respective lenders security in respect of their interests in certain UBC Lands within the Development Areas. Corix acknowledges that UBC may from time to time enter into leases or subleases with Developers or other Persons

for the use of occupation of portions of the UBC Lands within the Development Areas, and such lease or subleases will not be or be deemed to be Conflicting Encumbrances so long as they have no adverse effect on Corix's rights with respect to the construction, ownership or operation of the Infrastructure.

18.2 Removal of Encumbrances

If any of the UBC Lands within the Development Areas becomes subject to any Conflicting Encumbrance (other than a Conflicting Encumbrance that has been consented to by the other Party under Section 18.1) as a result of an act or omission of either Party (the **"Encumbering Party"**), then the Encumbering Party will immediately take all necessary steps to remove or to assist the other Party in the removal of such Conflicting Encumbrance. If the Encumbering Party fails to remove such Conflicting Encumbrance within ten Business Days after notice from the other Party to remove the Conflicting Encumbrance, the other Party may take whatever steps it deems necessary to remove the Conflicting Encumbrance at the cost of the Encumbering Party.

19. INSURANCE

19.1 UBC Insurance

UBC will obtain and maintain at its own expense throughout this Agreement the following insurance coverage:

(a) Comprehensive General Liability Insurance against claims for personal injury, death or property damage arising out of its operations, in amounts it deems adequate but in any event, not less than $5 million per occurrence;

(b) Property Insurance insuring the property of UBC or owned by others but for which UBC is legally responsible against perils normally included in a standard "all risk" policy, in an amount equal to 100% of the current replacement cost of such property, and adjusted at least annually to reflect changes in replacement value due to inflation or other factors; and

(c) a standard automobile policy including standard contractual liability endorsement against claims for bodily injury, death and damage to property, in an amount of not less than $2 million per occurrence.

19.2 Responsibility

UBC will be responsible for the full amount of all premiums and deductibles required under Section 19.1. All policies required must be effective at the Commencement Date and must, to the extent obtainable, provide that the insurance will not be cancelled without the insurer giving at least 30 days' written notice to Corix. Insurance will be purchased from reputable insurers registered and licensed to underwrite insurance in British Columbia. Where UBC fails to comply with the requirements of Section 19.1 or Section 19.2, Corix may take all necessary steps to effect and maintain the required insurance coverage at UBC's expense.

19.3 Evidence of Insurance

If requested by Corix, UBC will deliver or cause to be delivered to Corix evidence of all insurance policies required to be obtained and maintained by UBC under Section 19.1 and any amendments, modifications or replacements thereof.

19.4 Corix Insurance

Corix will obtain and maintain at its own expense throughout the term of this Agreement the following insurance coverage:

(a) Comprehensive General Liability Insurance against claims for personal injury, death or property damage, covering its operations, in an amount not less than $5 million per occurrence;

(b) All Risks Builder's Risk policy covering the Infrastructure during construction against fire and other perils from time to time included in such policies affecting similar properties in British Columbia with extended or additional perils supplemental coverage as would be insured against by a prudent owner in an amount not less than 100% of the replacement cost;

(c) Property Insurance insuring the Infrastructure post-construction against perils normally included in a standard "all risk" policy, in an amount equal to 100% of the current replacement cost of the Infrastructure, and adjusted at least annually to reflect changes in replacement value due to inflation or other factors;

(d) a standard automobile policy including standard contractual liability endorsement against claims for bodily injury, death and damage to property, in an amount of not less than $2 million per occurrence; and

(e) Corix and/or its prime engineering consultant will provide errors and omissions liability insurance for a value of not less than $2 million in the aggregate.

19.5 Responsibility

Corix will be responsible for the full amount of all premiums and deductibles required under Section 19.4. All policies required must be effective at the Commencement Date and must, to the extent obtainable, provide that the insurance will not be cancelled without the insurer giving a least 30 days' written notice to UBC. Insurance will be purchased from reputable insurers registered and licensed to underwrite insurance in British Columbia. Where Corix fails to comply with the requirements of Section 19.4 or Section 19.5, UBC may take all necessary steps to effect and maintain the required insurance coverage at Corix's expense.

19.6 Evidence of Insurance

If requested by UBC, Corix will deliver or cause to be delivered to UBC evidence of all insurance policies required to be obtained and maintained by Corix under Section 19.4 and any amendments, modifications or replacements thereof.

19.7 Additional Insured

Each Party will ensure that the other Party will be added as additional insured party as applicable and where permitted under the insurance to be obtained and maintained pursuant to Section 19.1 and Section 19.4 and in the event of a claim the insurance carried by the Party responsible for actions which give rise to such claim will be the primary insurance with respect to such claim.

20. INDEMNITY AND LIABILITY

20.1 Corix Indemnity

Without limiting any other obligation of Corix provided herein, Corix will indemnify, defend, and save harmless UBC, the members of its Board of Governors, its officers, employees, agents and contractors (collectively the "**UBC Indemnitees**") from any and all liabilities, actions, damages, claims, losses, costs, orders, fines, penalties, and expenses (including the full amount of all legal fees and expenses on a solicitor and own-client

basis) which may be paid by, incurred by, or asserted against the UBC Indemnitees or any one or more of them, arising from or in connection with any negligence or wilful misconduct perpetrated by Corix or any Person for whom it is in law responsible.

20.2 UBC Indemnity

Without limiting any other obligation of UBC provided herein, UBC will indemnify, defend, and save harmless the Corix Group from any and all liabilities, actions, damages, claims, losses, costs, orders, fines, penalties, and expenses (including the full amount of all legal fees and expenses on a solicitor and own-client basis) which may be paid or incurred by, or asserted against the Corix Group or any one or more of them, arising from or in connection with any negligence or wilful misconduct perpetrated by UBC or any Person for whom it is in law responsible.

20.3 Liability

Notwithstanding anything to the contrary in this Agreement, none of the Corix Group is responsible or liable for any loss, injury (including death), damage or expense incurred by UBC or any other Person caused by or resulting from, directly or indirectly, any discontinuance, suspension, or interruption of, or failure or defect in the supply of Thermal Energy or the Energy Services, or in the construction, operation or maintenance of the Infrastructure, except to the extent the loss, injury (including death), damage or expense is directly attributable to the negligence or wilful misconduct of a member or members of the Corix Group.

20.4 Consequential Loss

Notwithstanding any other provision of this Agreement, in no event will either Party be liable to the other Party for any indirect or consequential loss, cost or expense suffered by the other Party or its Affiliates or their respective governors, directors, officers, shareholders, employees, contractors, agents, successors or permitted assigns.

20.5 Survival

Notwithstanding any other provision in this Agreement, the indemnities set out in this Section 20 will survive the termination or expiry of this Agreement.

21. TERMINATION AND PAYMENTS DUE ON TERMINATION

21.1 Termination if Phase I Not Commenced

If a condition precedent set out in Section 2.1 has not been satisfied or waived in writing by the applicable Party by the date specified in the relevant paragraph, this Agreement will thereupon be terminated and thereafter neither Party will have any further obligation to the other Party under this Agreement, except with respect to those terms which expressly or by their nature survive termination.

21.2 Termination for Corix Default

Corix will be in default under this Agreement (a "**Corix Default**") if:

(a) it passes a resolution for its winding-up or dissolution and its right, title and interest in this Agreement are not assigned to another Person, or it is adjudged bankrupt or insolvent by a court of competent jurisdiction, commences or consents to the institution of bankruptcy proceedings, proposes a compromise or an arrangement, files any petition seeking reorganization, arrangement, composition,

liquidation or similar relief for itself, has a receiver or a receiver-manager appointed with respect to its affairs, or makes a general assignment for the benefit of its creditors under any Law relating to bankruptcy, insolvency or other relief for or against debtors generally; or

(b) it is in breach of Section 3.2, Section 3.4, Section 4.2(c) or any other material term, covenant, agreement, condition or obligation under this Agreement, or is in breach of multiple terms, covenants, agreements, conditions or obligations under this Agreement which in the aggregate are material, and fails to cure such default within 30 days after receipt of written notice thereof from UBC or, if such default is not capable of being cured within such 30 day notice period, fails to commence in good faith the curing of such default forthwith upon receipt of written notice thereof from UBC or, having so commenced, fails to diligently pursue the curing of such default until cured; or

(c) it is in breach of any material term, covenant, agreement, condition or obligation under any other agreement between the Parties or is in breach of multiple terms, covenants, agreements, conditions or obligations thereunder which in the aggregate are material, and fails to cure such default within 30 days after receipt of written notice thereof from UBC or, if such default is not capable of being cured within such 30 day notice period, fails to commence in good faith the curing of such default forthwith upon receipt of written notice thereof from UBC, or, having so commenced, fails to diligently pursue the curing of such default until cured.

In the event of a Corix Default, UBC may, at its option and without liability therefor or prejudice to any other right or remedy it may have, terminate this Agreement by further written notice to Corix.

21.3 Termination for UBC Default

UBC will be in default under this Agreement (a "**UBC Default**") if:

(a) it passes a resolution for its winding-up or dissolution and its right, title and interest in this Agreement are not assigned to another Person, or it is adjudged bankrupt or insolvent by a court of competent jurisdiction, commences or consents to the institution of bankruptcy proceedings, proposes a compromise or an arrangement, files any petition seeking reorganization, arrangement, composition, liquidation or similar relief for itself, has a receiver or a receiver-manager appointed with respect to its affairs, or makes a general assignment for the benefit of its creditors under any Law relating to bankruptcy, insolvency or other relief for or against debtors generally;

(b) it is in breach of Section 5.1, 5.2, 5.3, 5.4(a) or any other material term, covenant, agreement, condition or obligation under this Agreement, or is in breach of multiple terms, covenants, agreements, conditions or obligations under this Agreement which in the aggregate are material, and fails to cure such default within 30 days after receipt of written notice thereof from Corix or, if such default is not capable of being cured within such 30 day notice period, fails to commence in good faith the curing of such default forthwith upon receipt of written notice thereof from Corix, or, having so commenced, fails to diligently pursue the curing of such default until cured; or

(c) it is in breach of any material term, covenant, agreement, condition or obligation under any other agreement between the Parties or is in breach of multiple terms, covenants, agreements, conditions or obligations thereunder which in the aggregate are material, and fails to cure such default within 30 days after receipt of written notice thereof from Corix or, if such default is not capable of being cured within such 30 day notice period, fails to commence in good faith the curing of such default forthwith upon receipt of written notice thereof from Corix, or, having so commenced, fails to diligently pursue the curing of such default until cured.

In the event of a UBC Default, Corix may, at its option and without liability therefor or prejudice to any other right or remedy it may have:

(a) suspend its work hereunder until the default has been fully remedied, and no such suspension will relieve UBC from any of its obligations under this Agreement, provided that Corix will not suspend or interrupt Energy Services to NDES Customers; or

(b) terminate this Agreement by further written notice to UBC, and exercise the Required Purchase as provided in Section 7.2.

22. TREATMENT OF PARTIES' RESPECTIVE COSTS

22.1 Caps on Cost Recovery

Subject as hereinafter provided, each Party agrees to the following limits on the amounts for costs and expenses incurred for which they may claim reimbursement from the other Party in the event this Agreement is terminated pursuant to Article 21:

(a) for UBC, for the period from the effective date of the MOU (being September 30, 2013) to the date on which the BCUC issues the Phase I CPCN, a limit of $365,000.00 (excluding applicable Taxes) (the "**UBC Cap**");

(b) for Corix, for the period from the date of the RFI (being February 25, 2013) to the date on which the BCUC issues the Phase I CPCN, a limit of $515,000.00 (excluding applicable Taxes) (the "**Corix Cap**"); and

(c) for clarity, the Corix Cap includes a cap on costs for additional work commenced in respect of the initial connection to the Prodigy Building (the "**Additional Work**"), recovery of which costs were agreed by the Parties under the MOU to be subject to an additional work cap of $225,000 (the "**Additional Work Cap**");

recognizing that each such Cap is an estimate based partly on projected expenditures, and therefore may be modified from time to time, as agreed by the Parties in writing, acting reasonably, to reflect actual expenditures.

22.2 Costs Recoverable by Corix in Rates

Subject to the approval of the BCUC, Corix will recover the following costs and expenses through rates chargeable to NDES Customers:

(a) all costs and expenses incurred by Corix in connection with the Due Diligence, including all costs associated with Due Diligence Consultants; and

(b) all external costs reasonably incurred by UBC in connection with the NDES

  (i) prior to September 30, 2013 (including: (A) the cost of pre-feasibility studies, (B) the Feasibility Study referred to in the RFI, and (C) costs paid by UBC to any unsuccessful RFI proponent(s) to a maximum of $75,000 in connection with their respective due diligence-related activities), provided that such amount shall not in any event exceed $300,000.00; and

(ii) during the period commencing on September 30, 2013 and ending on the date on which the BCUC issues the Phase I CPCN, provided that such amount shall not in any event exceed the UBC Cap;

and reimbursed by Corix, if such reimbursement is approved by the BCUC.

22.3 Treatment of Costs in event of Corix Default

If:

(a) at any time before the BCUC issues the Phase I CPCN, Corix commits a Corix Default and UBC terminates this Agreement pursuant to Section 21.2; or

(b) except in the circumstances described in Section 22.5, the BCUC issues the Phase I CPCN on terms that Corix (acting unreasonably) considers unacceptable and this Agreement terminates pursuant to Section 21.1;

then:

(c) UBC may deliver to Corix an invoice for 100% of the external fees, costs and expenses incurred by UBC in connection with NDES, provided that the amount of such invoice will not in any event exceed an amount equal to the UBC Cap, and Corix will pay such invoice within 30 days after its delivery by UBC; and

(d) Corix will bear responsibility for 100% of its own costs, fees and expenses both external and internal incurred in connection with the NDES up to the date of termination of this Agreement, and UBC will have no liability for paying or reimbursing Corix therefor.

22.4 Treatment of Costs in event of UBC Default

If, at any time before the BCUC issues the Phase I CPCN, UBC commits a UBC Default and Corix terminates this Agreement pursuant to Section 21.3, then:

(a) Corix may deliver to UBC an invoice for 100% of the fees, costs and expenses paid or owing by Corix to Due Diligence Consultants, provided that the amount of such invoice will not in any event exceed an amount equal to the Corix Cap, and UBC will pay such invoice within 30 days after its delivery by Corix; and

(b) UBC will bear responsibility for 100% of its own costs, fees and expenses, both external and internal incurred in connection with the NDES up to the date of termination of this Agreement, and Corix will have no liability for paying or reimbursing UBC therefor.

22.5 Cost Sharing in event of Unacceptable BCUC Decision

If the BCUC issues the Phase I CPCN, but on terms that Corix (acting reasonably) considers unacceptable and this Agreement terminates pursuant to Section 21.1, then:

(a) each Party will bear responsibility for 100% of its own costs, fees and expenses, both external and internal incurred in connection with the NDES up to the date of termination of this Agreement and neither Party will have any liability for payment or reimbursing the other Party for such costs, fees or expenses of that other Party,

(b) notwithstanding Section 22.5(a), Corix may deliver to UBC an invoice for 100% of the fees, costs and expenses paid or owing by Corix to Due Diligence Consultants in respect of the Additional Work (subject to the Additional Work Cap) and UBC will pay such invoice within 60 days of delivery by Corix; and

(c) if, in the circumstances described in this Section 22.5, UBC determines in its sole discretion to acquire the Proponent Work Product and Consultant Work Product pursuant to Section 22.7, then notwithstanding Section 22.5(a):

(i) UBC will so notify Corix in writing and Corix will deliver to UBC within 60 days after delivery of such notice an invoice for 100% of the fees, costs and expenses paid or owing by Corix to Due Diligence Consultants, provided that the amount of such invoice will not in any event exceed an amount equal to the Corix Cap, taking into account any amount previously paid by UBC in respect of the Additional Work Cap under Section 22.5(b), and UBC will pay such invoice within 30 days after its delivery by Corix; and

(ii) UBC will bear responsibility for 100% of its own costs, fees and expenses, both external and internal incurred in connection with the NDES up to the date of termination of this Agreement, and Corix shall have no liability for paying or reimbursing UBC therefor.

22.6 Costs in event BCUC Rejects Phase I Application

If the BCUC does not approve the Phase I Application and this Agreement terminates pursuant to Section 21.1, then each Party will bear responsibility for 100% of its own costs, fees and expenses, both external and internal incurred in connection with the NDES up to the date of termination of this Agreement and neither Party will have any liability for payment or reimbursing the other Party for such costs, fees or expenses of that other Party, except that Corix may deliver to UBC an invoice for 100% of the fees, costs and expenses paid or owing by Corix to Due Diligence consultants in respect of the Additional Work (subject to the Additional Work Cap) and UBC will pay such invoice within 60 days of delivery by Corix.

22.7 Work Product

(a) Subject only to the exceptions set out in this Section 22.7, Corix will own and hold title to all Work Product (as defined below) prepared, produced or developed by Corix pursuant to the MOU (the "**Proponent Work Product**").

(b) Upon payment of an invoice delivered pursuant to Section 22.4 or 22.5, Corix will:

(i) immediately transfer to UBC title to all Proponent Work Product; and

(ii) use commercially reasonable efforts to transfer to UBC title to all Work Product related to the Due Diligence that is prepared, produced or developed for Corix by Due Diligence Consultants pursuant to the MOU (the **"Consultant Work Product**") promptly thereafter. UBC grants to Corix an irrevocable, non-exclusive, royalty-free and perpetual license to use and copy the Consultant Work Product.

(c) Upon the occurrence of the circumstances set out in Section 22.3 or 22.6, if UBC wishes to share in ownership of the Proponent Work Product and Consultant Work Product, then UBC will so notify Corix in writing and Corix will, without any additional payment from UBC:

(i) immediately transfer to UBC a 50% interest in title to all of the Proponent Work Product; and

(ii) use commercially reasonable efforts to transfer to UBC a 50% interest in title to all of the Consultant Work Product promptly thereafter.

The Parties will also grant each other any necessary licenses for the Proponent Work Product and Consultant Work Product promptly thereafter.

(d) In this Section 22.7, "**Work Product**" means all data and information, as well as final studies and reports prepared, produced or developed by or for Corix in connection with the Due Diligence and related directly and exclusively to the NDES, whether in written or electronic form, and all copies of same. For clarity, "**Work Product**" does not include any calculation, proprietary information, model (financial, engineering or otherwise) or methodology which may be of a proprietary or commercially valuable nature or otherwise used in the generation of the Due Diligence final studies and reports, or the generation of data or information comprising Work Product.

23. FORCE MAJEURE

23.1 Suspension

Subject to the other provisions of this Section 23, if either Party is unable or fails by reason of Force Majeure to perform in whole or in part any of its obligations or covenants set forth in this Agreement (except an obligation or covenant to pay), such inability or failure will be deemed not to be a breach of such obligation or covenant and the obligations of both Parties under this Agreement will be suspended to the extent necessary during the continuation of any inability or failure so caused by such Force Majeure.

23.2 Definition of Force Majeure

For purposes of this Agreement, "**Force Majeure**" means any event or occurrence not within the control of the Party claiming Force Majeure, and which by the exercise of reasonable diligence such Party is unable to prevent or overcome, including any acts of nature such as lightning, earthquakes, storms, washouts, landslides, avalanches, epidemics and floods; strikes, lockouts or other industrial disturbances; acts of the Queen's or public enemies, sabotage, wars, blockades, insurrections, riots or civil disturbances, fires, explosions, breakages of or accidents to machinery or lines of pipe; any delay by or actions of Governmental Authorities; and Changes of Law. For the purposes of this Section 23.2, a party is deemed to have control over the actions or omissions of those Persons to which it, its agents, contractors or employees, have delegated, assigned or subcontracted its obligations and responsibilities.

23.3 Exceptions

Neither Party will be entitled to the benefit of Section 23.1 under any of the following circumstances:

(a) to the extent that the inability or failure was caused by the negligence or contributory negligence of the Party claiming Force Majeure;

(b) to the extent that the inability or failure was caused by the Party claiming Force Majeure having failed to diligently attempt to remedy the condition and/or to resume the performance of such covenants and obligations with reasonable dispatch;

(c) if the inability or failure was caused by lack of funds or is for any amount due hereunder; or

(d) unless, as soon as possible after the happening of the occurrence relied upon or as soon as possible after

determining that the occurrence was in the nature of Force Majeure and would affect the claiming Party's ability to observe or perform any of its covenants or obligations under this Agreement, the claiming Party will have given to the other Party notice to the effect that the claiming Party is unable by reason of Force Majeure (the nature whereof will be therein specified) to perform the particular covenants or obligations.

23.4 Resumption of Obligations

As soon as possible after the Force Majeure condition is remedied or discontinued, the Party claiming Force Majeure will give notice to the other Party of such remedy, and that such Party has resumed, or is then in a position to resume, the performance of its suspended covenants and obligations hereunder either in whole or in part.

23.5 Settlement of Labour Disputes

Notwithstanding any of the provisions of this Section 23, but subject to Section 23.3, the settlement of labour disputes or industrial disturbances in which a Party is involved is entirely within the discretion of that Party, which Party may make settlement of it at the time and on terms and conditions as it may deem to be advisable and no delay in making settlement will deprive the Party of the benefit of Section 23.1.

23.6 No Exemption for Payments

Force Majeure will not in any event relieve or release either Party from its obligations to make payments to the other Party under this Agreement.

24. DISPUTE RESOLUTION

24.1 Informal Dispute Resolution

The Parties will make a *bona fide* attempt to settle all disputes that may arise under, out of, in connection with or in relation to this Agreement by amicable negotiations and will provide frank and timely disclosure to one another of all relevant facts and information to facilitate such discussions. Failing such resolution, and except for those matters for which the BCUC has exclusive jurisdiction, the British Columbia courts will have jurisdiction to resolve all disputes between the Parties.

24.2 Continuation of Services

Except as otherwise expressly provided, each of the Parties will perform all of its respective obligations under this Agreement notwithstanding the existence of any dispute that arises from time to time between the Parties with regard to any matter related to this Agreement or during the resolution of any dispute in accordance with this Section 24.2 except where to do so would threaten public health and safety or the environment.

24.3 Injunctive Relief

Nothing in this Section 24 will preclude either Party from applying to a court of competent jurisdiction for interlocutory or interim relief (including relief by way of a mandatory injunction).

25. GENERAL

25.1 Notices

Any notice or other communication required or permitted to be given under this Agreement will be effective only if in writing and when it is actually delivered (which delivery may be by facsimile or other telecommunications device) to the party for whom it is intended at the following address or such other address in British Columbia as such Party may designate to the other Party by notice in writing delivered in accordance with this Section 25.1:

(a) if to Corix:

Corix Multi-Utility Services Inc.
Suite 1160, 1188 West Georgia Street
Vancouver, British Columbia V6E 4A2

Attention: Eric van Roon
Fax: 604.697.6703
Email: eric.vanRoon@corix.com

With a copy to:

Corix Group of Companies
Suite 1160, 1188 West Georgia Street
Vancouver, British Columbia V6E 4A2

Attention: General Counsel
Fax: 604.697-6703
Email: Hamish.cumming@corix.com

(b) if to UBC:

Finance Leadership Office, Koerner Library 6th Floor
1958 Main Mall
Vancouver, British Columbia V6T 1Z2

Attention: Vice President, Finance, Resources and Operations
Email: Pierre.ouillet@ubc.ca

With a copy to:

University Counsel
6328 Memorial Road, Vancouver, BC V6T 1Z2

Tel: 604.822.4306
Fax: 604.822.8731
Email: University.counsel@ubc.ca

As an alternative to the methods of giving notice described above in this Section 25.1, a Party may give notices, directions and other instruments required or permitted to be given under this Agreement by electronic mail to the other Party's representative(s) identified in this Section 25.1 who continues to be employed by the other Party and is not to the knowledge of the sending Party unavailable; provided (i) the notice, direction or other instrument is stated to be a notice, direction or other instrument required or permitted to be given under this Agreement, and (ii) the notice, direction or other instrument is concurrently also given by electronic mail to the General Counsel (in the case of Corix) or to the University Counsel (in the case of UBC), as applicable. Any notice, direction or other instrument given by electronic mail will be deemed to have been received on the Business Day next following the date of sending, provided that no such notice will be effective unless such notice is actually received by the representative(s).

25.2 Confidentiality

Each Party (the "**Receiving Party**") will treat as confidential the terms of this Agreement and all Confidential Information (as defined below) of the other Party (the "**Disclosing Party**") and will at all times during the term of this Agreement and for a period of two years thereafter hold the same in confidence and will not, without the prior written consent of the Disclosing Party, disclose or divulge to any Person the terms of this Agreement or any Confidential Information of the Disclosing Party, provided that nothing in this Section 25.2 will restrict or prevent either Party from making any disclosure of such terms or any Confidential Information:

(a) that is reasonably necessary or desirable for the Receiving Party to carry out and give full effect to the terms, conditions and intent of this Agreement;

(b) that is required by any Law or Governmental Authority;

(c) to an Affiliate of the Receiving Party or to the governors, directors, officers or employees of such Party or its Affiliates;

(d) to the professional advisors of the Receiving Party;

(e) that the Receiving Party, in its sole discretion determines is required, prudent or necessary to be disclosed by that Party in connection with any prospectus filing, public securities offering or other applicable securities matters or laws; or

(f) that is already in the public domain, that was in the possession of the Receiving Party prior to its receipt of the information from the Disclosing Party or that was disclosed to the Receiving Party by a third party free of any obligation of confidentiality.

Without limiting the generality of the foregoing, UBC may disclose Confidential Information:

(g) pursuant to Section 14.1(c)(i);

(h) pursuant to Section 14.1(c)(iii), to UBC students or other Persons who are subject to the direction of the UBC employee responsible for conducting the relevant academic research; and

(i) pursuant to and in accordance with Section 14.2.

For the purposes of this Section 25.2, "**Confidential Information**" means proprietary information of the Disclosing Party such as data, plans, drawings, manuals, or specifications which have been provided by the Disclosing Party or its employees, contractors, agents, subcontractors or Affiliates to the Receiving Party pursuant to this Agreement, or proprietary information conceived or developed by or for the Disclosing Party

concerning construction practices, operation and maintenance practices, agreements, marketing plans and strategies, profits, costs, pricing and systems of procedure, but excluding information developed or conceived by the Receiving Party without using the Confidential Information of the Disclosing Party.

25.3 Governing Law

This Agreement and each of the documents contemplated by or delivered under or in connection with this Agreement are governed exclusively by, and are to be enforced, construed and interpreted exclusively in accordance with, the laws of British Columbia and the laws of Canada applicable in British Columbia which will be deemed to be the proper law of the Agreement.

25.4 Time of Essence

Time is of the essence of this Agreement.

25.5 Severability

Each provision of this Agreement is severable. If any provision of this Agreement is or becomes illegal, invalid or unenforceable in any jurisdiction, the illegality, invalidity or unenforceability of that provision will not affect:

(a) the legality, validity or enforceability of the remaining provisions of this Agreement, or

(b) the legality, validity or enforceability of that provision in any other jurisdiction,

except that if:

(c) on the reasonable construction of this Agreement as a whole, the applicability of the other provision presumes the validity and enforceability of the particular provision, the other provision will be deemed also to be invalid or unenforceable, and

(d) as a result of the determination by a court of competent jurisdiction that any part of this Agreement is unenforceable or invalid and, as a result of this section, the basic intentions of the Parties in this Agreement are entirely frustrated,

the Parties will use all reasonable efforts to amend, supplement or otherwise vary this Agreement to confirm their mutual intention in entering into this Agreement.

25.6 No Waiver

No waiver by either Party of any default by the other in the performance of any of the provisions of this Agreement will operate or be construed as a waiver of any other or future default or defaults hereunder, whether of a like or different character.

25.7 Enurement

This Agreement will enure to the benefit of and be binding upon the Parties and their respective successors and assigns.

25.8 Further Assurances

Each Party will execute and deliver all such further documents and do all such further things as may be reasonably requested by the other Party to give full effect to the intent and meaning of this Agreement.

25.9 Subcontracting and Assignment

(a) Either Party may assign this Agreement or any of its rights or obligations hereunder with the consent of the other Party, such consent not to be unreasonably withheld, and in the case of Corix, subject to the requirements of the *Utilities Commission Act* (British Columbia).

(b) Notwithstanding the foregoing, Corix may, without the consent of UBC, assign this Agreement or any of its rights or obligations hereunder to, or sell the majority of its shares or business or its material assets to, or amalgamate with, any of its Affiliates, subject to the requirements of the *Utilities Commission Act* (British Columbia) and any necessary approval of BCUC.

(c) Corix may subcontract to any Person any of its rights or obligations hereunder for the Infrastructure, provided that each such subcontractor and its subcontractors will be subject to the prior approval of UBC, which approval will not be unreasonably withheld or delayed.

25.10 Relationship

Nothing in this Agreement will create a partnership or joint venture, or a relationship of landlord and tenant between UBC and Corix.

25.11 Counterparts

This Agreement may be executed in counterparts and transmitted by electronic means with the same effect as if the Parties had signed the same original document. All counterparts will be construed together and will constitute one and the same agreement and, if transmitted by electronic means, each Party will promptly dispatch an original to the other Party.

IN WITNESS WHEREOF the Parties hereto have executed this Agreement as of the day and year first above written.

THE UNIVERSITY OF BRITISH COLUMBIA	**CORIX MULTI-UTILITY SERVICES INC.**
Per: _____	Per: _____
Name:	Name:
Title:	Title:

SCHEDULE A

MAP OF DEVELOPMENT AREAS

[NTD:s.1.1, def'n of "Development Areas"]

SCHEDULE B
Project Plan
[NTD: s.1.1, def'n of "Project Plan"]

SCHEDULE C
Community Energy Covenants and Chart of Applicability
[NTD: s.1.1, def'n of "Community Energy Covenants"]

SCHEDULE D
Land Use Plan and Development Forecast
[NTD:s.1.1, def'n of "Development Forecast"]

SCHEDULE E
Material Permits
[NTD: s.1.1., def'n of "Material Permits"]

SCHEDULE F
Form of Statutory Right of Way
[NTD: s.1.1, def'n of "SRW"]

SCHEDULE G
Form of Licence Agreement – Temporary CEP Site

SCHEDULE H
Form of Lease Agreement – Permanent CEP Site

SCHEDULE I
Form of Energy Services Contract)

SCHEDULE A
Map of Development Areas

Path: Q:\2800-2899\2867-005\430-GIS\MXD-Rpt\Final Report\2867005_Figure2-1_Overview.mxd Date Saved: 3/18/2014 10:59:58 AM
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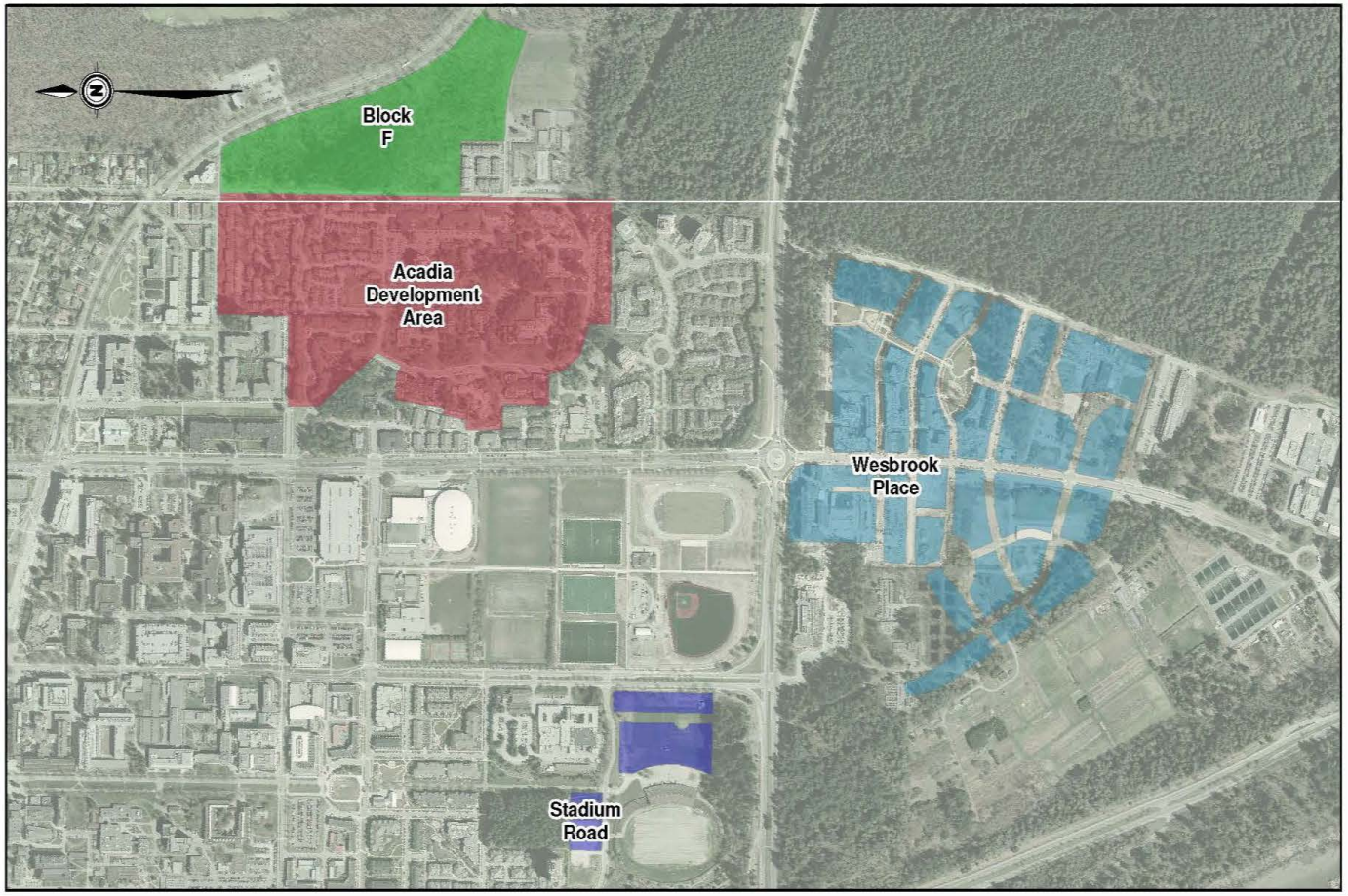

KERR WOOD LEIDAL
consulting engineers
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Corix Utilities
UBC Neighbourhood DES Detailed Due Diligence Study

Project No.	Date
2867-005	March 2014

100 0 400 (m)
1:10,000

Neighbourhood DES Service Areas

SCHEDULE B
Project Plan

To be provided.

SCHEDULE C
Community Energy Covenants and Chart of Applicability

Project Name	**Lot No.**	**Developer (parent company)**	**Strata Plan Number (if available)**
Developments without a DE Covenant			
Pathways	Lot 9	Pathways Adera Projects Ltd.	BCS2694
The Wesbrook	Lot 1	South Campus 2A Holdings Ltd. (ASPAC)	BCS3567
Tapestry- Seniors rental residence	Lot A	Concert Properties (UBC Seniors Residence) Ltd.	BCS3867
Tapestry – Seniors market housing	Airspace Parcel 1, Airspace Plan BCP 44718 of Part of Parcel A, Plan BCP 33333	Concert Properties (Tapestry West) Ltd.	BCS3915
Sage	Lot 2	Kenstone-Rize Alliance (Wesbrook) Projects Inc.	BCS4265
Spirit	Lot 17	Spirit Co-Development Company (Wesbrook Place) Ltd.	BCS3970
Pacific	Lot 42 (also known as Lot 3W)	Pacific Spirit Co-Development Company (Wesbrook Place) Ltd.	BCS 3736
Ultima	Lot 30	Pacific Spirit	BCS4140

		Ultima Adera Projects Ltd.	
Crescent West	Lot 16	Wesbrook Place (South Campus Townhomes) Ltd.	BCS3362
Keenleyside	Lot 12	Keenleyside Co-Development Company	BCS2822
MBA House	Lot C	UBC Properties Investments Ltd. as Trustee for UBC Properties Trust	n/a
Larkspur	Lot 11	UBC Properties Investments Ltd. as Trustee for UBC Properties Trust	n/a
The Mews	Lot B	UBC Properties Investments Ltd. as Trustee for UBC Properties Trust	n/a
Dahlia & Magnolia	Lot 28	UBC Properties Investments Ltd. as Trustee for UBC Properties Trust	n/a
Granite Terrace 1, 2 and 3 (Commercial/office/residential)	Lot A	UBC Properties Investments Ltd. as Trustee for UBC Properties Trust	n/a
Village Green (under construction)	Lot 45	UBC Properties	n/a

		Investments Ltd. as Trustee for UBC Properties Trust	
Developments with a DE covenant:			
Yu	Lot D	Modern Investment Group (Canada) Ltd.	EPS807
Faculty and Staff housing (Under construction)	Lot 22	UBC Properties Investments Ltd. as Trustee for UBC Properties Trust	n/a
Binning Tower (Under construction)	Lot 6	Wall Centre (Point Grey) Nominee Ltd.	(not yet filed)
Prodigy (under construction)	Lot 32	Prodigy Adera Projects Ltd.	(not yet filed)
The Laureates (Under construction)	Lot 13	Polygon	(not yet filed)
Sail	Lot 31	0912064 B.C. Ltd. (Adera)	EPS1525
Academy	Lot 3, sometimes called 3E to distinguish from Pacific site	Polygon Academy Homes Ltd.	EPS1813

SCHEDULE D
Land Use Plan and Development Forecast

- The Land Use Plan is posted here: http://planning.ubc.ca/sites/planning.ubc.ca/files/images/planning-services/policies-plans/LUP-2012.pdf. The current version is dated August 27, 2012, which is the date of the Minister's Order under MEVA.

- Development Forecast – To be provided.

SCHEDULE E
Material Permits

To be provided.

SCHEDULE F
Form of Statutory Right of Way

To be provided.

SCHEDULE G
Form of Licence Agreement – Temporary CEP Site

To be provided.

SCHEDULE H
Form of Lease Agreement – Permanent CEP Site

To be provided.

SCHEDULE I
Form of Energy Services Contract

To be provided.