COFIX[®] | Cleveland Thermal

CUYAHOGA COUNTY UTILITY & MICROGRIDS

Response to Request for Information July 15, 2022



Submitted To:

Cuyahoga County Department of Sustainability 2079 East 9th Street, 8th Floor Cleveland, OH 44115

Attention:

Mike Foley

Email: mfoley@cuyahogacounty.us

Submitted By:

Corix Cleveland Thermal 1921 Hamilton Avenue Cleveland, OH 44114

Main Contact:

Seth Whitney President

Phone: 216.241.3331 Mobile: 440.668.5368 Email: <u>SethAWhitney@clevelandthermal.com</u>

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Entity / Business Name, Summary of Services, and Relevant Experience

Corix Utilities Inc. and Cleveland Thermal Energy will leverage their expertise and understanding of how to structure and deliver unique, customer-focused solutions to meet the County's requirements. We provide best-inclass service, expertise, safety, reliability, risk transfer, technical solutions, and infrastructure financing.

Corix is a leading North American utility organization that delivers safe, cost-effective, and sustainable district energy (DE) and water and wastewater utility infrastructure solutions across North America. As a utility developer, we pride ourselves on being technology-neutral, identifying the right solutions for our partners, developing, and building innovative, sustainable infrastructure, and delivering a safe and reliable service.

Cleveland Thermal is downtown Cleveland's leading business district energy provider, providing steam and chilled water. It has approximately 450,000 PPH of steam production, 13,500 tons of cooling capacity, and 1 MW of electricity from cogeneration. The utility provides critical, reliable thermal energy to over 80 commercial, municipal, and institutional buildings, including several landmark properties such as Cleveland City Hall, Cuyahoga County Complex, and the Cleveland State University campus. It is the second oldest utility franchise in Cleveland, only pre-dated by the Division of Water, and has developed a long-term relationship with Cuyahoga County for over 40 years.

Corix will be the co-developer and co-equity investor on the Project. Cleveland Thermal Energy will be the operator by leveraging its extensive local utility expertise and will be referenced, as appropriate, as "Corix / Cleveland Thermal" throughout our response.

Headquartered in Vancouver, British Columbia, and Chicago, Illinois, Corix is a fully integrated provider of multiutility infrastructure and services with over 50 years of collective history. With approximately \$2.0 billion in assets, around 800 employees, and over 1,300 thermal energy utility, water and wastewater systems, serving over one million customers across three provinces and 19 states, we have the financial capability, technical bench strength, and operational expertise to build customized multi-utility solutions for local communities, developers and institution, and municipal customers. We have extensive experience operating in regulated and unregulated markets and setting up quasi-regulated models to bring comfort and confidence to utility ratepayers and project owners.

Corix has a proven track record of building partnerships under various concession, ownership, and governance models and invests in quality North American utility systems. Corix has the financial resources and experience required to operate these systems for the benefit of all stakeholders.

The sole shareholder of Corix is the British Columbia Investment Management Corporation (BCI). Based in Victoria, BC, BCI is one of the largest institutional investors in Canada, with gross assets under management of approximately \$200 billion. 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. BCI fully supports Corix's pursuit and execution of growth opportunities in sustainable utility infrastructure.

Thermal Energy Experience

Cleveland Thermal is downtown Cleveland's leading business district energy provider, operating both district heating and district cooling systems. It has approximately 450,000 PPH of steam production, 13,500 tons of cooling capacity, and 1 MW of electricity from cogeneration. The utility provides critical, reliable thermal energy to over 80 commercial, municipal, federal, and institutional buildings, including several landmark properties such as Cleveland City Hall, Cuyahoga County Complex, and the Cleveland State University campus. It is the second oldest utility franchise in Cleveland, only pre-dated by the Division of Water, and has developed a long-term relationship with Cuyahoga County for over 40 years. In 2015 Corix acquired Cleveland Thermal and integrated it into Corix's extensive portfolio of district energy systems.

Ownership and Operations

Corix has a proven track record of building partnerships under various ownership and governance models and invests in quality utility systems in North America. Corix has the flexibility and experience to structure business and governance models to fit our clients' individual needs and objectives. We understand the critical risks associated with various project delivery models. These models range from fully private ownership to concessions (primarily in partnership with public entities) or strategic partnerships involving either fully private or partial system ownership.

In all stages of the project development, Corix cooperates closely with the project owners and other stakeholders but prefers that full ownership and responsibilities for developing, financing, operating, and maintaining DES projects remain with the experienced utility provider. However, over the years of delivering innovative solutions to our customers, we have structured win-win delivery and ownership models with other parties to meet the project objectives, owners' desires and most importantly, appropriate rate structures for customers. Corix is open to consider various ownership opportunities if it aligns with other strategic objectives.

As the long-term owner of most of the utilities we operate, Corix brings a total lifecycle and operational perspective to the project development process. Our primary focus is ensuring efficient system operations and end-user satisfaction. Over recent years, we have compiled and analyzed system performance data to optimize our existing operations and make sound decisions about future systems expansion. With the implementation of a streamlined Operations Management System (OMS) used across all our utilities, we track all operational tasks completed on utility assets, determine working time spent / costs, schedule and track preventative maintenance issues, and budget accordingly for the repair and replacements needed. Our skilled utility operations team, Supervisory Control and Data Acquisition (SCADA) systems, and continuous monitoring through our regional operations center provide Corix with sound solutions that result in overall project savings.

Project	CORIX ROLE IN THE PROJECT	DESCRIPTION	OPERATIONS AND MAINTENANCE SERVICES	CUSTOMER BASE
Cleveland Thermal, Cleveland, OH In operation	Owner Feasibility Assessment / Due Diligence, Design, Build, Finance, Own, Operations and Maintenance	District heating and cooling	 All ongoing operations, repairs, and maintenance of the CEP, DPS, and ETS equipment Full procurement responsibilities, including commodities Asset management, customer care, billing, and meter reading 	30 million sq. ft. of residential and commercial space in downtown Cleveland, serving more than 125 buildings
Fort Greely (FGA), Fort Wainwright (FWA), Joint Base Elmendorf Richardson (JBER), AK In operation	Co-Owner Design, Build, Finance, Own, Operations and Maintenance	District heating, CHPP, Electrical distribution, Water treatment and distribution, Wastewater treatment and collection	 All ongoing operations, repairs, and maintenance of all 12 utility systems Full procurement responsibilities, including commodities Asset management, customer care, billing, and meter reading 	55,000 population over three bases
Anchorage Regional Landfill Waste to Energy Plant, Anchorage, AK In operation	Co-Owner Design, Build, Finance, Own, Operations and Maintenance	CHP, Waste-to-Energy	 All ongoing operations, repairs, and maintenance of the landfill gas power plant 	Joint Base Elmendorf Richardson
Bellingham Waterfront Redevelopment, WA Ongoing	Feasibility / Due Diligence, with possibility to Design, Build, Finance, Operate and Maintain	District heating and cooling (assessment)	 Contemplated services include: All ongoing operations, repairs, and maintenance of the system Procurement responsibilities, including commodities Asset management, customer care, billing, and meter reading 	1.5 million sq. ft. of residential and commercial development
Burnaby Mountain District Energy Utility (BMDEU), Burnaby, BC	Owner Feasibility / Due Diligence, Design, Build,	District heating, Biomass	 All ongoing operations, repairs, and maintenance Procurement responsibilities, including commodities 	At full build-out the system will connect 21 buildings: 3,500 residential units and

Table 1: District Energy Project Experience

Project	CORIX ROLE IN THE PROJECT	DESCRIPTION	OPERATIONS AND MAINTENANCE SERVICES	CUSTOMER BASE
In operation, ongoing expansion	Finance, Own, Operations and Maintenance		 Asset management, customer care, billing, and meter reading 	3.6 million sq. ft. of campus
Oval Village District Energy Utility, Richmond, BC In operation, ongoing expansion	Concessionaire Feasibility / Due Diligence, Design, Build, Finance, Operations and Maintenance	District heating, Sewage heat recovery	 All ongoing operations, repairs, and maintenance of the system Procurement responsibilities, including commodities Asset management, customer care, billing, and meter reading 	6.4 million sq. ft. of connected floor space at build-out
University of British Columbia Neighbourhood District Energy System (UBC NDES), Vancouver, BC In operation, ongoing expansion	Owner Feasibility / Due Diligence, Design, Build, Finance, Own, Operations and Maintenance	District heating, Waste heat recovery	 All ongoing operations, repairs, and maintenance of the CEP, DPS, and ETS equipment Procurement responsibilities, including commodities Asset management, customer care, billing, and meter reading 	105 buildings with 13.2 million sq. ft. of connected floor area at build-out
Beaver Barracks GeoExchange System, Ottawa, ON In operation	Owner Design, Build, Finance, Own, Operations and Maintenance	District heating and cooling, GeoExchange	 All ongoing operations, repairs and maintenance of the CEP and GeoExchange Ground Loop Asset management, customer care, and billing 	Six residential mid- low-rise buildings, including 254 rental units
Dockside Green Energy, Victoria, BC In operation, ongoing expansion	Owner Design, Build, Finance, Own, Operations and Maintenance	District heating, O&M WWTF	 All ongoing operations, repairs, and maintenance of the CEP, DPS, and ETS equipment Procurement responsibilities, including commodities Asset management, customer care, billing, and meter reading 	19 buildings totaling 1.3 million sq. ft. at build-out
Sun Rivers Golf Resort Community, Kamloops, BC In operation, ongoing expansion	Owner Feasibility / Due Diligence, Design, Build, Finance, Own, Operations and Maintenance	District heating and cooling, GeoExchange, Electrical distribution, Wastewater collection, Water distribution, Natural gas distribution, Municipal services	 All ongoing operations, repairs, and maintenance of the utility systems Procurement responsibilities, including commodities Asset management, customer care, billing, and meter reading, including an emergency call center and on-site manager for customer, construction, and emergency situations 	At full build out, the community will consist of 2,000 homes and 5,000 residents, on ~460 acres
Talasa at Sun Rivers, Kamloops, BC In operation, ongoing expansion	Owner Feasibility / Due Diligence, Design, Build, Finance, Own, Operations and Maintenance	District heating and cooling, GeoExchange	 As outlined above, for Sun Rivers Golf Resort Community 	215 residential suites
Alexandra District Energy Utility, Richmond, BC In operation, ongoing expansion	Operator Operations and Maintenance, Advisory support	District heating and cooling, GeoExchange, Air Source Heat Pumps	 All ongoing operations, repairs, and maintenance of the CEP, DPS, GSHP and geofield 	Currently serving 1.9 million sq. ft of residential and commercial customers
Oakridge Energy, Vancouver, BC In development	Full limited partnership with Creative Energy Feasibility / Due Diligence, with possibility to Design, Build, Finance, Operate and Maintain	Hot water / chilled water DES	 All ongoing operations, repairs, and maintenance of the CEP, DPS, and ETS equipment Full procurement responsibilities, including commodities Asset management, customer care, billing, and meter reading 	4.9 million sq ft. of residential and commercial space at build-out (2028)
Lakeview Village District Energy System, Mississauga, ON Ongoing	Feasibility / Due Diligence, with possibility to Design, Build, Finance, Operate and Maintain	District heating and cooling (assessment)	 Contemplated services include: All ongoing operations, repairs, and maintenance of the system Procurement responsibilities, including commodities Asset management, customer care, billing, and meter reading 	11 million sq. ft. of connected floor space, at build-out including residential, retail, and commercial space

What role(s) from Section 3 would the respondent fulfill?

Corix / Cleveland Thermal are interested in fulfilling all the roles identified in Section 3 of the RFI.

1. Utility Management

a. Description of relevant experience:

Supporting the Utility Establishment

As a strong, stable, long-term partner, Corix's proven utility approach promotes reliable, affordable, and efficiently run utility systems, demonstrated in its acquisition, integration, governance, and oversight of Cleveland Thermal. Corix understands how to structure and deliver unique, customer-focused solutions to meet the Microgrid Team's specific requirements. It provides best-in-class service, expertise, safety, reliability, risk transfer, technical solutions, and infrastructure financing.

Corix has extensive experience structuring transactions to best suit the client's requirements. These structures range from fixed-price contracts, regulated and proxy regulated cost of service, and hybrid models that seek to optimize the allocation of risk between the parties in the most efficient manner.



Figure 1: The Corix Team – Organizational Project Structure

Support Management of the Utility

Corix Cleveland Thermal works in close collaboration with local utility providers on many occasions. Including working very closely with the local natural gas utility provider, Dominion East Ohio, to complete the extensive natural gas conversion project on budget and ahead of schedule, despite the aggressive project timeline.

Corix provides a full range of customer care and utility billing services to more than one million customers in North America. It provides all-encompassing services, including meter reading, meter management, billing services, payments and collections, customer care, and information management.

For each system, Corix provides customers with Customer Care and Emergency numbers to call to ask questions, express concerns, or report service emergencies. Corix's call centers offer customer care service during regular business hours and 24-hour emergency response. Work performed at these call centers integrates into Corix's Work Management Systems, which enables call center representatives to seamlessly share up-to-the-minute account information with field staff for reduced downtime, faster work order completion, and fewer customer issues.

Manage Construction and Ongoing Operations

Corix has significant experience in system development, expansion, and assessment, evidenced by its various greenfield and existing infrastructure project portfolios. Corix performs capacity and growth studies derived from operational data, known additions, growth strategies, and forecasts and works closely with stakeholders to optimize infrastructure deployment strategies.

Corix ensures that capital deployment is carefully aligned with development progress and continuously monitors, assesses, and updates capital plans. For expanding systems, Corix validates current capacity and implements improvements that maximize the existing systems and assets together with energy reduction initiatives that reduce current and future energy demands.

1. Cleveland Thermal Energy, Cleveland, OH

Cleveland Thermal completed a conversion from coal to high efficiency natural gas steam production. The project involved the construction of a new production facility at the Hamilton Avenue Plant and 1.5 miles of a new 20-inch gas main through downtown Cleveland resulting in long-term and secure access to clean and affordable natural gas.

2. Burnaby Mountain District Energy Utility, Burnaby, BC

Corix is responsible for the design, construction, financing, ownership, operation, and maintenance of the Burnaby Mountain district energy utility, regulated by the British Columbia Utilities Commission.

3. Oval Village District Energy Utility, Richmond, BC

Corix's team of experts created business models, designed a flexible district energy system, determined a cost-effective financing arrangement, sourced the necessary equipment and infrastructure, and built a customized district energy system. Corix continues to provide ongoing operating and maintenance services.

b. Edits to the roles' definition or responsibility:

Overall, the current roles have been identified. However, it will be best for the County to play a role in the utility, and that role should be defined during the development phase of the project. In addition, the County's role will be unique as they create the vision to drive businesses and municipalities to achieve sustainability goals and establish regulations or incentives that will motivate or mandate clients to connect to the Microgrid.

2. Developer of Utility Customers, Distribution Generation Projects, and/or Microgrids:

a. Description of relevant experience:

Recruit customers to join the County Utility

Eric Swain, Cleveland Thermal's Director of Business Development & Energy Services, is a fully dedicated Business Development position responsible for customer recruitment and retention within Cuyahoga County. Eric is a Certified Energy Manager with 28 years' experience in the Comprehensive Building Solutions and Utility Services industries. Eric has a successful track record of spearheading new business growth of utility-based energy solutions and customized energy conservation solutions with customers.

Corix / Cleveland Thermal has the expertise and resources to facilitate the communication and public relations requirements of the County Microgrid Project. This support ranges from upfront public consultations to ongoing customer and targeted communications marketing initiatives. Corix can develop unique plans, including detailed approaches, objectives, activities, timelines, and success metrics for the Project. These would be developed in full collaboration with the Microgrid Team and other stakeholders to support targeted initiatives and other programs benefitting the Microgrid System and its stakeholders.

1. Burnaby Mountain / Simon Fraser University District Energy Utility, Burnaby, BC

The project began as the Neighborhood Utility Service (NUS), initially serving UniverCity customers. The BC Utilities Commission approval was received in 2011 and the first customer was connected later that year. The UniverCity full build-out is expected in 2025.

2. Cleveland Thermal District Energy Utility, Cleveland, OH

As owner of the Cleveland District Energy System, Cleveland Thermal is solely responsible for the recruitment and development of Customers. It also has expertise in deploying distributed electrical generation projects within its system.

Corix has significant experience in system development, expansion, and assessment as evidenced through its various greenfield and existing infrastructure project portfolios. We perform capacity and growth studies derived from operational data, known additions, growth strategies, and forecasts, and works closely with stakeholders to optimize infrastructure deployment strategies.

Corix ensures that capital deployment is carefully aligned with development progress and continuously monitors, assesses, and updates capital plans. For expanding systems, Corix validates current capacity and implements improvements that maximize the current systems and assets together with energy reduction initiatives that reduce current and future energy demands.

We have extensive experience raising financing for capital improvements to the utility systems it owns and operates. Lessons learned from its past capital funding processes will ensure the expeditious execution of such a strategy for the future capital needs of the County Microgrid Project.

b. Edits to the roles' definition or responsibility:

The County will need to continue to be involved and utilize its' unique role to grow and develop the system through regulation and ordinance.

3. Design and Construction Team (Engineering, Procurement, Construction) of Distribution Infrastructure, Distributed Generation, and/or Microgrids:

a. Description of relevant experience:

Corix's strength is in partnering to deliver essential utility infrastructure and services. We work closely with all project stakeholders to develop and execute innovative, long-term, sustainable solutions that are practical and best meet our partners' specific needs and objectives.

In 2019 Corix along with our preferred partners, collaborated around providing a unique solution by combining

financing, construction, and operations while utilizing the benefits of the most collaborative form of project delivery - integrated project delivery (IPD). During our RFI review, we felt that this Project was a perfect fit for our Corix partnership team. We would further enhance our depth by selecting additional subcontractors.

The integrated approach gives the client increased schedule and cost control. We form partnerships with communities that could benefit from the increased rate flexibility made possible by the presence of a private sector finance and operations partner, to ensure the timely and cost-effective delivery projects.

Our finance, operate and maintain (FOM) model can be customized to meet the unique challenges facing each community (e.g., rate affordability, recruitment, funding, etc.).



Corix can provide all the capital required in the Project to deliver the desired Microgrid system, ranging from the procurement of all major equipment, design, and construction, to commissioning activities.

1. Oval Village District Energy Utility, Richmond, BC

The Oval Village is a residential development that will transform a 28-acre plot of land, with 25 residential and commercial buildings planned for construction over the next 10-12 years.

Corix is responsible for designing, building, financing, operating, and maintaining the energy system, while the Lulu Island Energy Company (LIEC), a municipal corporation, wholly owned by the City of Richmond, retains the ownership.

2. Cleveland Thermal District Energy System, Cleveland, OH

The utility serves critical, uninterruptible thermal energy to over 100 commercial, municipal, federal, and institutional buildings, including several landmark properties such as Cleveland City Hall, Cuyahoga County Complex, and the Cleveland State University campus.

Cleveland Thermal's service areas are near the Proposed Microgrid. Some of Cleveland Thermal's existing district energy customers are within the boundaries of the Microgrid District.

Cleveland Thermal has an experienced and highly skilled operations team working on the distribution systems year-round, self-performing repairs, modifications and extensions of the direct-buried steam and chilled water pipelines in the Cleveland downtown area. Cleveland Thermal has spent decades developing the in-house expertise to operate and maintain a reliable, cost-effective utility for downtown Cleveland and will leverage the established operations and supporting team in delivering the Cuyahoga Microgrid Project.



Are there other roles not identified in Section 3 that the County should be aware of?

Further discussion is required to determine the final business economical model for the project. Once a final business economic model is agreed upon, revenue flow can be strategically outlined for review and approval.

What duties would these new roles perform?

Overall, the current roles have been identified. However, it will be best for the County to play a role in the utility, and that role should be defined during the development phase of the project. In addition, the County's role will be unique as they create the vision to drive sustainability initiatives that support businesses and municipalities to achieve these goals via regulations and or targeted financial incentives.

What else should the County know about each newly defined role?

Nothing to add at this stage.

What challenges or barriers could you see for your role(s) as envisioned by the County and what might be ways for the County to address those challenges?

Signing on new customers and clients could be challenging, given competing sources of energy throughout the County. The County would need to support its Microgrid by identifying and, if possible, ensuring new businesses, through their policies, legislations, and sustainability goals, are motivated to connect to the Microgrid system.

What's the typical timeline/cycle for the respondents proposed role(s)? (e.g. it takes X year(s) to find customers for a microgrid and build it)

Development timing and connection density are significant considerations in the development of a system such as the one being contemplated by the County. Delays in development and under-subscription can have significant impact on the viability of a district energy system. Corix proposes to implement the project in phases to match the load development. In addition to mitigating upfront capital cost pressures, a phased approach to system development maximizes the options for adopting the most appropriate proven technologies at the most economically appropriate times and helps mitigate risks associated with variation in development and customer connection timelines. The cost of future energy infrastructure is minimized by phasing in equipment based on actual development progress and customer needs.

Would the respondent meet with the County and / or its representatives to present ideas and to answer follow up questions?

Corix would be pleased to meet with the County and its representatives to answer or clarify any questions you may have.

All respondents will be placed on a list for other respondents to consider for teaming and/or subcontracting. If your entity requires exclusion from this list, please state so.

Corix / Cleveland Thermal is open for teaming and / or subcontracting.

OPTIONAL / ENCOURAGED INFORMATION

Published Case Studies

Attached are several of our projects, provided in more detail.

Corix's Energy Utilities group is dedicated to the development and operation of safe, reliable, sustainable, and cost-effective thermal energy utilities in Canada and the United States. We focus on District Energy (DE) greenfield systems development.

We currently own and operate 12 thermal energy utilities, providing customers with 100% of their space heating and domestic hot water needs, and in some cases, thermal cooling. Please visit <u>https://www.corix.com/utility-solutions/thermal-energy</u> for more information.

Press Releases

Biomass Plant Powers Up SFU Burnaby & UniverCity

Richmond, BC, and Corix Partner on City Centre District Energy Program

Technical / Marketing Material

Corix District Energy Overview

Detailed Company Profile Information

Corix Corporate Overview

Questions that the County should consider in the development of potential RFQs / RFPs

- 1. In our experience, working with collaborative procurement models leads to the best results on projects. Recently we have been utilizing Integrated Project Delivery (IPD), which has unique characteristics that drive the best value and collaboration on projects. How open are the County's alternative delivery forms for this project scope?
- 2. When going to market for a Design-Builder, often the Owner has limited ability to select the key participants beyond the Construction Manager and Prime Consultant engaged in delivering the project. As we know, the key participants beyond these entities are equally as crucial to the overall success of any construction project. IPD offers flexible options where the Ownership group can be involved in the selection and interview of all key participants that will be engaged. Is this something the County would value?
- 3. A microgrid project of this scale has ample room for optimization, which the IPD model thrives on due to the collaborative design process and value-driven approach. One of the critical questions would be, is the procurement method we choose leading to the greatest chance for design optimization, efficiency, and overall value?



CLEVELAND THERMAL – DISTRICT ENERGY, CLEVELAND, OHIO

Cleveland Thermal is Cleveland's leading business district energy provider, providing district heating and cooling to buildings throughout downtown Cleveland, since 1894.

Cleveland Thermal completed a conversion from coal to low-carbon, high efficiency steam production, through the construction of a new facility at the Hamilton Avenue Plant. The project included 1.5 miles of a new twenty-inch gas main through downtown Cleveland and provides long-term and secure access to clean and affordable natural gas. As a result, plant air emissions are 84% lower than previous emissions and are now so low that the entire



production capacity can now be permitted as a minor source of air emissions.

The new plant includes 1 MW of cogeneration production that provides additional environmental, cost reduction, and reliability benefits. In addition, the team is currently evaluating the addition of a 13-40 MW cogeneration plant into the system, as well as participating in the assessment of the development of a microgrid for Cuyahoga County. The reach of the Cleveland Thermal system is unmatched, making it the most efficient and economical solution for space conditioning.

The Cleveland Thermal Corix team completed the extensive conversion project in 16 months, on time and on budget, effectively managing technical, regulatory and coordination requirements under tight legislative timelines. Benefiting from Cleveland Thermal's effective management and close collaboration with Dominion East Ohio – the local natural gas utility provider – the project was completed two months ahead of schedule.

The team work closely with existing building owners and developers in Cleveland to understand building requirements and facilitate interconnections that maximize the benefits of the district system.

The plant generates approximately 450,000 pph of steam production, 13,5000 tons of cooling capacity and 1 MW of electricity from cogeneration. Thermal energy from Cleveland Thermal accounts for roughly 30 million square feet of space in downtown Cleveland and services more than 80 commercial, municipal, and institutional buildings, including several landmark properties such as Cleveland City Hall, Cuyahoga County Complex, and the Cleveland State University campus. It is the second oldest utility franchise in Cleveland, only pre-dated by the Division of Water, and has developed a long-term relationship with Cuyahoga County for over 40 years. Cleveland Thermal's customer contracts are regulated by the Public Utilities Commission of Ohio.

Long-term customers of Cleveland Thermal include the City of Cleveland, Cleveland Public Library, Cleveland State University, Hotel Cleveland, the AmTrust Financial Building, and the PNC Center. Cleveland Thermal's customer contracts are regulated by the Public Utilities Commission of Ohio.

District steam from Cleveland Thermal can be used for heating, cooling, domestic hot water heating, humidification, and several other process applications. The extensive steam distribution system spans downtown Cleveland with more than 15 miles of underground pipe. Cleveland Thermal's steam system provides cost-effective and efficient energy to its customers, achieving 99.9% reliability as a result of N+1 redundancy in plant systems and fuel supply.

Cleveland Thermal's district chilled water system was commissioned in April 1993 with several infrastructure upgrade and capacity expansion throughout the years. It has the two largest centrifugal chillers in Cleveland, the closed loop system provides chilled water for cooling and dehumidification. Its fully automated digital control system optimizes plant performance.

System Expansion and Customer Additions

Cleveland Thermal is focused on customer service and continuous pursuit of system growth and expansion opportunities. Several new connections have been added to the system, including:

- 320,000-square-foot Virgil E. Brown commercial building (steam and chilled water)
- The Global Center for Health Innovation (steam and chilled water)
- Hilton Cleveland Downtown Hotel (steam and chilled water)
- Drury Plaza Hotel Cleveland Downtown (chilled water)
- Metropolitan at The "9" Complex (steam)
- New Cuyahoga County Administrative Headquarters (steam)

All these projects were completed on time and on budget.





BURNABY MOUNTAIN / SIMON FRASER UNIVERSITY DISTRICT ENERGY UTILITY P3, BURNABY, BC

The Burnaby Mountain District Energy Utility provides thermal energy to Simon Fraser University's (**SFU**) Burnaby campus and a portion of UniverCity, a residential and commercial mixed-use development adjacent to the campus.

The project began as the Neighbourhood Utility Service (**NUS**), initially serving UniverCity customers. The BC Utilities Commission approval was received in 2011 and the first customer was connected later that year. The UniverCity full build-out is expected in 2025.

In 2016, Corix and SFU signed an agreement to expand the scope of NUS and provide baseload lowcarbon thermal energy for the Burnaby campus, in



addition to the full thermal energy requirements of UniverCity. The project is collectively referred to as the Burnaby Mountain District Energy Utility (BMDEU).

Floor Area Served:

 $\ensuremath{\text{23}}\xspace$ buildings, 2.3 million sq. ft. by 2025

Campus Area:

5 million sq. ft.

System Overview:

- 19.5 MWt (13.5 MWt biomass providing 85% of total combined energy demand + 6 MWt natural gas for peaking and back-up)
- 26 Energy Transfer Stations
- 6km Distribution Piping System

Type of Partnership: Corix Ownership (**DBFOOM**)

Benefits:

GHG Savings: 11, 600 t CO_2 / year **Grants**:

- PSECA grant to SFU (\$4.75MM) in 2012
- BC Hydro Community Low-Carbon Grant in 2011
- BC Hydro Energy Efficiency grant for new plants in 2020

Project Phasing:

Interim Solution (2011-2020): Two Temporary Energy Centres (**TECs**) with a total 8.3 MWt output capacity serving UniverCity residents.

Permanent Solution (2020- in perpetuity): Central Energy Plant (**CEP**) consisting of 13.5 MWt biomass boiler and 6 MWt natural gas boilers for peaking and back-up serving UniverCity only.

The biomass-based Central Energy Plant was commissioned in October 2020, now providing lowcarbon thermal energy to Burnaby Mountain District Energy Utility customers.

GeoExchange Systems at UniverCity

In 2019, Corix acquired three GeoExchange systems at UniverCity serving a commercial component of the UniverCity development. These systems are not part of the BMDEU project.

- Approximately 40-60 vertical boreholes per building with depths of 300 400 ft. each
- Corix owns and operates the GeoExchange systems, while the heat pumps installed in individual commercial units are owned by the building owners



OVAL VILLAGE DISTRICT ENERGY UTILITY, RICHMOND, BC

The Oval Village is a residential development that will transform a 28-acre plot of land, with 25 residential and commercial buildings planned for construction over the next 10-12 years.

In 2011, Corix signed an agreement with Lulu Island Energy Company (**LIEC**), a wholly owned subsidiary of the City of Richmond, to evaluate, and if feasible, to develop the Oval Village District Energy Utility (**OVDEU**). Corix completed a feasibility assessment, with the



OVDEU ultimately utilizing sewage heat recovery technology to generate low-carbon thermal energy. The concession agreement was signed in 2014 with the construction starting that same year.

Corix is responsible for designing, building, financing, operating, and maintaining the energy system, while the LIEC retains the ownership.

Floor Area Served:

6.4 million sq. ft. of connected floor space at build-out

- System Overview:
- Heating and Cooling
- 4 MWt Sewer Heat Recovery Plant providing 70% of the annual energy demand +20 MWt natural gas peaking and backup
- 3 km DPS
- 20 ETS

Type of Partnership: 30-year Concession Agreement

Source of Low-Carbon Energy:

Natural Gas (Current); Sewage Heat Recovery (Future)

Benefits:

GHG Savings: 65,000 tCO₂e over 20 years with additional savings projected with the expanded project scope **Grant:** Supported City of Richmond's application for a Clean Energy BC grant

Project Phasing:

<u>Interim Solution</u>: Two containerized natural gas boiler interim energy centers (8 MWt and 3 MWt) serving the initial phases of the development. A third interim plant (6 MWt) was completed in 2020.

<u>Permanent Solution</u>: Sewer Heat Recovery from Metro Vancouver sewer mains. 4 MWt capacity with the opportunity to increase the capacity to 8 MWt. The construction is scheduled for 2022 with the expected commencement of operation in 2024.

In addition, Corix is heavily involved in the continued efforts to develop an expansion to the system, which could possibly include a potential total of 60 million sq. ft. of serviceable floor area to be built-out over the next 30 years, totaling 152 MWt of heating capacity.



UNIVERSITY OF BRITISH COLUMBIA NEIGHBOURHOOD DISTRICT ENERGY SYSTEM, BC



In 2013, as a part of a competitive process, the University of British Columbia (**UBC**) selected Corix Utilities to be its district energy utility partner to develop a Neighbourhood District Energy System (**NDES**), which would centralize the heating energy supply of three residential neighborhoods on UBC's endowment lands and help achieve its progressive GHG reduction targets.

Final due diligence to confirm the business case for the proposed NDES was completed and BCUC Certificate of Public Convenience and Necessity (**CPCN**) approval was obtained by Corix in 2015.

Project Phasing:

Since 2015, the Wesbrook neighbourhood residential and commercial mixed-use customers have received efficient and reliable thermal energy service from NDES.

Interim Solution: Two natural gas Temporary Energy Centres (**TECs**) (8 MWt and 6.5 MWt) at Wesbrook.

The NDES will eventually serve the Stadium and Acadia neighborhoods and potentially Block F – a new Musqueam Capital Corporation development.

<u>Permanent Solution</u>: A nodal system including several energy centres utilizing a mix of sewer heat recovery, electric boilers, air-source heat pumps, and potentially biomass are currently envisioned for future phases of the project and will be determined during a detailed due diligence evaluation.

Corix designs, builds, finances, owns, and operates the NDES in its entirety, and is responsible for all customer care, metering, and billing. The NDES is BCUC regulated.

Floor Area Served:

105 buildings with 13.2 million sq. ft. of connected floor area at build-out

System Overview:

- 50 MWt total system capacity
- 10 MWt waste heat recovery facility providing 60% of total energy demand plus natural gas for peaking and backup

Type of Partnership:

Corix ownership (with 3 option-to-purchase milestones at 30, 50, and 70 years

Source of Low-Carbon Energy: Natural Gas (current) Waste Heat Recovery (Future)

Benefits:

GHG Savings: 14,000 tCO₂e / year (at a full buildout)



BELLINGHAM WATERFRONT DEU, BELLINGHAM, WA (IN DEVELOPMENT)



In 2018, Corix was selected by Port of Bellingham through a competitive process to undertake detailed due diligence on district heating and cooling for a new development in the Downtown Waterfront area. The district energy system will serve 1.5 million sq. ft. of residential and commercial development with the opportunity to expand into the adjacent development areas, and Bellingham Downtown corridor.

The parties are currently in definitive agreement negotiations for Corix to design, build, finance, own, operate and maintain the DEU.

Project Phasing:

Interim Solution: The project is intended to utilize a lowcarbon energy source from conception and will include a TEC containing a 500 kW to 1 MWt biomass module with natural gas for peaking and back-up, as well as a TEC providing cooling.

<u>Permanent Solution</u>: The future low-carbon energy source is contemplated to be sewer heat recovery in combination with biomass and possibly waste heat recovery from the Encogen plant.

The project will be regulated by an independent expert panel with the possibility to transfer to the Washington State regulation by the Washington Utilities and Transportation Commission, should district energy become regulated in the future.

Floor Area Served:

1.5 million sq. ft. of residential and commercial development

System Overview:

500 kW-1 MWt biomass interim solution (containerized TEC) 2.5 MWt SHR 4 MWt natural gas peaking 1,400 tons cooling

Type of Partnership: Corix Ownership

Source of Low-Carbon Energy: Biomass plus natural gas for peaking and back-up. Sewer heat recovery contemplated in future

Benefits:

Low-carbon energy implemented from conception **GHG Savings:** 2,376 tCO₂e year (at build-out)

Biomass Plant Powers Up SFU Burnaby & UniverCity

Jun 10, 2021

This Release can also be found on the Simon Fraser University Media Releases webpage. Broll: https://vimeo.com/521548830/da96fafcb5 Video interviews: https://vimeo.com/521187522/2918734114



A new biomass plant located on Burnaby Mountain is now in full operation, providing heat and hot water to most of SFU's Burnaby campus and approximately half of the UniverCity community. This plant has drastically decreased greenhouse gas (GHG) emissions, making Simon Fraser University (SFU) a leader in the use of green energy with one of the smallest GHG footprints of any university in Canada.

Developed in partnership with Corix Utilities, a leading developer and operator of district energy systems, the \$33-million high-efficiency plant diverts wood waste, once destined for the landfill, into a low carbon energy source providing heat and hot water. The "fuel" is made up of clean wood waste (e.g. wood chips and shavings) from harvested log processing, local urban wood waste and construction projects. The biomass is delivered to the site, located on South Campus road, during off-peak traffic hours.

"SFU Burnaby's greenhouse gas emissions from heating are expected to drop by 80 per cent, the equivalent of emissions from 900 homes every year," says Larry Waddell, chief facilities officer, SFU. "This facility will also allow SFU to achieve 97 per cent of the province's 2050 greenhouse gas target, making SFU one of the public sector leaders in Canada in reducing GHG emissions. I'm grateful for our partnerships with the Province, Corix Utilities and SFU Community Trust in taking this plant from idea to reality, to benefit our SFU community and local environment."

"The SFU Community Trust have been advocates for low carbon energy solutions coupled with energy efficient buildings for over 10 years," says Dale Mikkelsen, chief operating officer, SFU Community Trust. "Having buildings at UniverCity connect to the Corix energy plant will ensure that homes will have high quality energy for space heating and hot water, while significantly reducing their carbon footprint." "The SFU biomass plant is representative of the many exciting advances being made in renewable and district energy technology, and how we'll need to design and build communities if we're to reduce our dependency on fossil fuels," says Travis Hickford-Kulak, president, Energy Services Canada, Corix Utilities. "We're very proud to have partnered with SFU, the SFU Community Trust, the Province, and other stakeholders, in bringing this innovative project to fruition."

Carys Kenny-Howell, a chemistry and molecular biology and biochemistry student at SFU, who lives on campus, supports the project. "It's just something that's really important. Having an alternate energy source creating the energy for all of the people living and working up here, I think that's a really big step," says Carys.

FAST FACTS:

The Burnaby Mountain District Energy Utility (BMDEU), is a collaboration between Simon Fraser University (SFU), SFU Community Trust and Corix Multi-Utility Services Inc.

Biomass energy is more reliable compared to traditional electricity-based systems resulting in less weather-related power outages

The plant's efficiency translates to lower customer rates compared to individual systems

The project created 80 locally hired, green infrastructure jobs during design and construction

While fossil fuel combustion takes carbon from underground and puts it into the atmosphere in the form of carbon dioxide (CO2), the primary cause of climate change, biomass combustion recycles the carbon already in the natural carbon cycle with no additional CO2 added to the atmosphere.

The Corix plant helps to achieve SFU's Sustainability 2025 Plan targets which aim to reduce SFU's total direct GHG emissions by 50 per cent by 2025.

SFU received a \$4.75 million Public Sector Energy Conservation Agreement grant from the Province of British Columbia to assist with financing of the project. The plant was financed and constructed, and is owned and operated by Corix Utilities and regulated by the BC Utilities Commission.

Richmond, B.C., and Corix partner on City Centre district energy program

The city of Richmond, B.C., has created a novel public-private partnershi Corix Utilities to develop district energy services for its downtown core Peter Russell, MCIP RPP, Senior Manager, Sustainability and District Energy, City of Richmond, B.C.

City Centre, Richmond, B.C.

Photo Peter Russell

ocated on Lulu Island in the Fraser River estuary, the city of Richmond is part of the Metro Vancouver area in the lower mainland of British Columbia. This coastal city of nearly 220,000 residents was a key venue during the 2010 Winter Olympic Games, site of the long-track speed skating events. In recent decades, Richmond has experienced rapid growth and today continues its transition from suburban community to a regional town center with international clout. In the process, its downtown core is undergoing a major redevelopment: City Centre (fig. 1), the fastest-growing part of

Richmond (fig. 2), is being transformed from a low-density, predominantly commercial precinct into a series of highdensity, mixed-used neighborhoods that will have an estimated 50,000-80,000 residents at buildout by 2040.

Today, providing space and domestic hot water heating in City Centre is the new Oval Village District Energy Utility. Located adjacent to the Richmond Olympic Oval - now an indoor multisport arena - this district energy system has been in commercial operation since 2014 and connected its first customer in April 2015. The first phase of the project currently serves

1.9 million sq ft of space in eight customer buildings from two temporary energy centers, both equipped with natural gas-fired boilers totaling 11 MW (37.5 MMBtu/hr) of hot water heating capacity. Future plans for the system call for construction of a larger permanent energy plant that will extract low-carbon heat from a sewer force main, reducing system greenhouse gas emissions by up to 80 percent.

As it develops the Oval Village system, Richmond has been leading the way in creating a novel model for a public-private partnership that will see the provision of district energy services throughout





Source: City of Richmond, B.C.

Source: City of Richmond, B.C.

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FIGURE 3. Aerial rendering of the Oval Village District Energy Utility service area.



Source: City of Richmond, B.C.

City Centre. The model leverages privatesector design, financing, construction and operations expertise while ownership of the utility is retained via the city's energy company. The utility is regulated by Richmond City Council, which defines rates and service areas. The approach stands out as an efficient model for delivering district energy services in Canada – a model catching the interest of other cities.

THE BACKGROUND STORY

When the city of Richmond developed its Community Energy & Emissions Plan in 2012, it was estimated that Richmond residents, businesses and institutions spent CA\$440 million (\$354.5 million) on energy in 2010. Those dollars were largely directed to major energy utilities and multinational oil companies. At the time, the city already understood through the 2012 launch of its Alexandra District Energy Utility in Richmond's West Cambie area (adjacent to City Centre) that district energy was an effective tool for reducing community greenhouse gas emissions. District energy could also raise new non-tax-base revenues while creating local jobs. Each new building connected to district energy in Richmond represented (and represents) a new significant retention of energy spending in the community, effectively "localizing" energy generation. Of those cities and universities seizing the opportunity in British Columbia, some began investing directly using their own resources while others sought to engage the private sector.

The city saw the opportunity to "get ahead" of redevelopment by planning for

district energy in its City Centre. Richmond's City Centre Area Plan was rapidly being implemented; the 2,500-acre area, largely defined by low-density commercial uses, was transforming into several high-density mixed-use neighborhoods. The city envisioned that district energy services would be developed in a phased program, with smaller nodes emerging in different areas but eventually connected to form a City Centre-scaled system with multiple energy plants.

An early opportunity emerged to get district energy planning work going. As a host city for the 2010 Winter Olympic Games, Richmond committed to building a speed skating oval venue. To raise a portion of the funds to build the venue, the city disposed of a number of consolidated sites in 2006, while retaining a major waterfront parcel in the center on which to construct the Olympic Oval; significant residual funds raised from the disposition were used to replenish and further grow the city's land inventory. The land disposition also created the opportunity for the city to approach the waterfront parcel developer to work together to assess the viability of district energy to service buildings on that site. The result of the city's direct engagement with the developer eventually led to the parties signing a memorandum of understanding to work together. This site and eventually surrounding sites would become the service area for the Oval Village District Energy Utility (fig. 3).

Around the same time, seeing the long-term potential of district energy across City Centre, the city also began including a "district energy-ready" require-

ment for new buildings undergoing rezoning. District energy-ready buildings must be designed to utilize energy from the district system when a neighborhood utility is available. Connection to the future utility is secured with a legal agreement prior to the rezoning adoption. Further down the development approvals, this commitment is also registered on the land title. Since implementing this practice in 2009, the city has secured over 8,000 district energy-ready residential units to date in the City Center area, ensuring the necessary demand for energy services needed to support a low-risk investment environment.

SINCE IMPLEMENTING A "DISTRICT ENERGY-READY" REQUIREMENT, THE CITY HAS SECURED OVER 8,000 DISTRICT ENERGY-READY RESIDENTIAL UNITS.

To date, most of these buildings are still in the design or approval stages. Some have already been constructed as district energy-ready but without a district energy connection. These buildings are built using hot water hydronic heating systems with a developer-installed boiler plant instead of an energy transfer station. Given the pace of development and the varied locations of where redevelopment is occurring throughout City Centre, the city had to make strategic choices regarding where and when it would service new buildings. The Oval Village was the first such area, but other areas with potential for servicing exist throughout City Centre. The city expects that over time and with Richmond council endorsement, those buildings could eventually be connected once the distribution network is more established in those areas.

ESTABLISHING A NEW ENERGY COMPANY

Given the investment potential of the developer's waterfront site alone and given the multiple rezonings under way in the immediate surrounding area, the city realized a new approach to financing a district energy project would be required. Rather than become encumbered with debt, the city sought a private-sector partner in 2010 to design, build, finance and operate the Oval Village District Energy Utility, choosing Corix Utilities. Then in 2013, the city established Lulu Island Energy Co. (LIEC) as a wholly owned municipal corporation to work directly with its private-sector district energy partner.

For context, under the British Columbia Community Charter, local governments have broad powers to provide services to their citizens that "council considers necessary or desirable, and may do this directly or through another public authority or another person or organization" (Section 8.2); local governments also have the "authority to regulate, prohibit and impose requirements under the Community Charter in relation to a municipal service" (Section 8(3)a). Another regional local government in British Columbia, the city of North Vancouver, incorporated the Lonsdale Energy Co. to operate its district energy system in a similar way.

WORKING WITH A PRIVATE-SECTOR PARTNER

The city of Richmond had selected Corix Utilities as its district energy partner through a rigorous procurement process. Corix is a privately held corporation, principally owned by the British Columbia Investment Management Corp., with offices in Vancouver, B.C., and Wauwatosa, Wis. Both parties would enter into an MOU to define roles and responsibilities in 2011, a process for working together and a compensation commitment to Corix should an agreement not be reached. The process for working together included two distinct stages: first, a due diligence phase that included infrastructure, business and financial planning, and, second, development and execution of a long-term concession agreement.

Given the MOU the city held with the developer who purchased the waterfront site, the due diligence phase started with initially understanding development timing for the waterfront site alone and developing an appropriate infrastructure plan and financial model. The developer's plan was to develop the site strategically over an approximately 15-to-20-year timeline. The Corix MOU also set specific expectations to use local renewable energy resources, which would be assessed as part of the due diligence process. In the meantime, however, more district energyready buildings in the surrounding area were finalizing development approvals, and the regional government had plans to replace a major sanitary force main that ran through the service area. Further analysis undertaken by Corix revealed that the district energy system buildout timeline could be significantly shortened if these buildings were serviced and that sewer heat was a viable energy source for the utility. These two opportunities supported a positive business case allowing both parties to move to the next stage of the process.

Hammering out a concession agreement of this magnitude was a new venture for LIEC and city staff. The process began with identifying the material terms of an agreement. Using the terms as a basis for a broader legal document, both LIEC and Corix worked together for over a year to



The Richmond Olympic Oval, site of 2010 Winter Olympic Games speed skating, is now a multisport arena containing a 20,000-sq-ft fitness training facility, two skating rinks, six hardwood sport courts, a track, climbing wall, cafe and other amenities.

come to a final agreement that could be executed. Critical terms of the agreement included

- capital investment structure (debt/ equity) with a defined debt rate and return on equity for Corix;
- capital, capital expenditure and operating plan review and approval processes;
- customer service standards;
- a process whereby LIEC had the right to complete a service-level review;
- expectations on service levels to be measured using clear performance metrics;
- competitive and transparent procurement processes for design and construction;
- service areas defined by a development plan in the agreement (as amended over time); and
- Richmond bylaws and development permit process developments as the tools to support customer connections.

The 30-year concession agreement was executed in October 2014 whereby LIEC would own the infrastructure, and Corix would design, build, finance and operate the system. At the same time, Richmond City Council enacted the Oval Village District Energy Utility through the adoption of a service area bylaw that requires mandatory connections to the district energy utility and defines customer rates. As regulator, Richmond City Council approved this approach with clear direction that utility rates must be competitive with business-as-usual customer rates, defined as conventional electric and/or natural gas utility rates for the same level of service for the lifecycle of the equipment.

THE AGREEMENT WAS EXECUTED IN 2014 WHEREBY LIEC WOULD OWN THE INFRA-STRUCTURE, AND CORIX WOULD DESIGN, BUILD, FINANCE AND OPERATE THE SYSTEM.

Broadly, in British Columbia, rate reviews can be carried out by the city council under the province's Community Charter; a similar approach is under consideration in Nova Scotia on the east coast.¹ Some municipally owned district energy operations in B.C. have also creat**FIGURE 4.** The 2 River Green residential development on Richmond's Fraser River, estimated for completion in 2020, will be among the customers of the Oval Village District Energy Utility.



Source: City of Richmond, B.C.



This vinyl mural, *Underwater* by Andrea Sirois, wraps around the 53-ft shipping container that houses one of the Oval Village system interim plants.

ed an additional and separate dedicated body to oversee the rate review process, but city councils in these cases still approve rates.² Otherwise, private companies wishing to establish district energy utilities in the province are required to seek the approval of the B.C. Utilities Commission. Meanwhile, in Ontario, the Municipal Act gives local governments the authority to create bylaws respecting climate change and energy (excluding electricity), heating and cooling.³

EXPLORING EXPANSION OPPORTUNITIES

For context, LIEC and the city always envisioned that a City Centre-scaled district energy system would be viable but considered that growth of the system would occur through a phased construction program. Bit by bit, service area nodes could be connected to form a City Centrescaled district energy system serviced by multiple energy plants. LIEC's approach is to ensure infrastructure is phased in time to provide thermal energy services prior to the commissioning of new buildings, thus avoiding the unnecessary deployment of capital. As demand for services grows, capital costs will be offset by additional revenues generating a positive rate of return. All costs are fully recovered through user fees applied to serviced properties. (See example customer property in figure 4.)

Using this approach since its inception in 2012, LIEC now is responsible for the operation of two service areas – the Alexandra District Energy Utility and Oval Village District Energy Utility – using four energy plants, two of which are temporary, to provide energy to over 3.5 million sq ft of residential, commercial and institutional space. This has eliminated an estimated 2,300 tonnes of greenhouse gas emissions in the community to date.

For a new energy utility like the Lulu Island Energy Co. that is wholly owned by a local government, the accountability and performance stakes are higher than for a privately owned utility; citizens have higher expectations related to transparency and prompt response to their concerns, which, in turn, influences the city council's expectations of staff. These expectations have led staff to focus on customer service excellence and innovation. In this context and after LIEC assessed Corix's ability to successfully deploy district energy services in the Oval Village (a program that included an interim energy center; distribution piping; capital planning and project management processes; and, finally, managing customer and developer concerns), LIEC had the confidence to begin considering how buildings in other subareas of City Centre could be serviced by district energy through the public-private partnership model the company had established.

TODAY BOTH PARTIES ARE COMPLETING DUE DILIGENCE WORK TO DETERMINE HOW BEST TO SERVICE THE WHOLE OF CITY CENTRE.

Efforts to understand the potential for expansion began in 2016 in the area immediately surrounding the Oval Village. Using development projections in the larger Oval Village area, LIEC worked with Corix to complete an expansion test to assess infrastructure and business strategies for extending the distribution network and adding generation capacity. The work showed positive results. Development was also proceeding rapidly in the northern part of Richmond, which led LIEC staff to consider how this area could be serviced. City Centre North is currently planned to include a broader mix of land uses such as apartments, hotels and large multiuse entertainment complexes. For this reason, LIEC considered that providing cooling services in addition to heating services in this area would be viable.

With these opportunities and the introduction of new private district energy service providers in the Greater Vancouver area, LIEC decided to test the market through a new provider procurement process. Corix was once again selected in 2017 as the lead proponent based on its experience and approach; today both parties are busy completing the important due diligence work to determine how best to service the whole of City Centre.

BUSINESS MATTERS

The Lulu Island Energy Co. is a wholly owned corporation as approved by the B.C. Office of the Inspector of Municipalities. As an administrative matter and with a strong company in place, the Alexandra District Energy Utility, initiated by the city's engineering department, was transferred in full to LIEC in 2017.

With respect to local economics, LIEC calculated that the buildout of district energy in City Centre could provide an estimated 630 design and construction jobs by 2040. An estimated 10 operating jobs will turn into full-time positions over the duration of the project. Currently, local artists are involved during the design to incorporate public art into the energy plant buildings' exteriors. Furthermore, 25 percent of the contractors have headquarters in Richmond, and district energy jobs provide a strong incentive for them to continue anchoring their businesses in the city.

LESSONS LEARNED

Through this initiative, Richmond and LIEC created a replicable model using district energy to create a low-carbon community, at a lower cost. Lessons learned to date in Richmond include the following:

- Seize those early opportunities to catalyze action; you don't need all the answers to get started. Trust that your knowledge will grow and your thinking will shift to address concerns or challenges. In Richmond's case, the opportunity was partnering with private developers that either had experience operating geoexchange systems, as in the case of the Alexandra District Energy Utility (see cover story in this issue and article in Second Quarter 2014 *District Energy*), or had a major land holding, as in Oval Village.
- Spread the risk; partners offer value beyond their resources and expertise. In addition to the risks that can be managed by your partner, the city found that it can also manage risks using municipal regulatory powers identified in this article (i.e., rezoning, building permits).
- Take the time to build confidence in

your partner, and invest in building your local council's confidence in staff and the new venture. Consistent messaging, highlighting the benefits and addressing community concerns and customer complaints as a priority are a must in this context.

- Rate-competitiveness with business as usual is a great starting place. It pushes innovation and strategic phasing of infrastructure and deployment of capital. Matching business-asusual costs also reduces public fears of future utility costs.
- Every phase of infrastructure development has to stand on its own.
 "Self-sufficient" business cases and construction programs are a must, given the potential for shifting council priorities and housing market fluctuations. For many local governments in Canada, energy utilities are not a core service area; district energy, however, builds on local government utility management expertise (e.g., water and sanitary utilities).
- Establish a level playing field for private developers. If developers all have the same costs related to district energy in their pro forma and disclosure requirements, they will have less concern about the competition in marketing their developments.

The city of Richmond benefited from a unique starting point: a city center area ripe for redevelopment. Richmond's City Centre Area Plan most recently updated in 2009 included a far-reaching community consultation to produce a vision for a higher-density, mixed-use, transit-oriented City Centre area. Introducing district energy services in this area simply made sense, but this followed extensive business case analysis, stakeholder consultation and, most importantly, securing a private-sector partner to design, build, finance and operate the district energy utility. Today, supplied with thermal energy from the city's wholly owned Lulu Island Energy Co., district energy customers benefit from Richmond City Council's mandate to provide customer service excellence and competitive rates using low-carbon energy systems.



Peter Russell is the senior manager, Sustainability and District Energy, for the city of Richmond, B.C.; his team focuses on community, corporate and district energy programs and environ-

mental protection. He is a trained environmental engineer, an award-winning *Registered Professional Planner with the* Canadian Institute of Planners and an experienced sustainability manager, having worked with the cities of Vancouver and Surrey, B.C., prior to Richmond. Russell also worked with cities across western Canada as a consulting planner for 10 years, developing sustainability, land-use and energy plans. He holds a Bachelor of Applied Science degree in environmental engineering from the University of Windsor and a Master of Science degree in community and regional planning from the University of British Columbia. He can be contacted at peter.russell@richmond.ca.

End notes

- ¹ Ken Church, Natural Resources Canada on behalf of Canadian District Energy Working Group – Market Development Subcommittee, *Encouraging District Energy Growth through Municipal Policies and Programs – A Discussion Paper on Possible Growth Strategies* (draft), October 2017.
- ² Ibid. ³ Ibid.

FOR MORE INFORMATION, PLEASE VISIT:

- CITY OF RICHMOND, B.C. www.richmond.ca
- LULU ISLAND ENERGY CO. www.luluislandenergy.ca, for current service areas and rates, future plans, and resources for customers including educational videos and a Kids' Corner
- ENERGYSAVE RICHMOND www.energy.richmond.ca, for energy efficiency programs for existing and new buildings
- CORIX UTILITIES www.corix.com/corix-companies/corix-utilities

Corix Quick Facts

The Corix Group of Companies are leaders in water, wastewater, and thermal energy utility infrastructure solutions for small to medium-sized communities across North America. We finance, design, build, own, and operate local utility infrastructure on behalf of municipal and commercial customers. We deliver these solutions in 3 provinces and 19 states. We are a private company, owned by the British Columbia Investment Management Corporation (BCI), with head offices in Vancouver, BC and Chicago, IL.



District Energy Systems in Canada*				
Number of Customers Served	GHG Savings	Total Energy Sales	Kilometers of Underground Assets	System Availability
8,200 Units	Approximately 12,000 Tonnes CO ₂ e	90,500 MWh	14 Km	99.5%

* 2021 data



Energy Services Overview

CREATIVE, CUSTOM AND SUSTAINABLE SOLUTIONS

One-Stop Shop – In-house expertise to evaluate, design, build and operate custom, sustainable energy solutions for infrastructure demands of all sizes and degrees of complexity

Transparency and Flexibility – Transparent cost model with flexible, technology-agnostic low-carbon solution deployment

De-Risking Capital – Capital spending matches development timing

Win-Win Focus – Capital savings for the developer and customer rates comparable to "Business as Usual"

DISTRICT ENERGY EXPERIENCE

Corix has a track record of successful development and operation of district energy utilities (DEUs). We currently own and / or operate nine DEUs utilizing various types of lowcarbon technologies, including:

- Beaver Barracks (GeoExchange), Ottawa, ON
- Burnaby Mountain DEU (Wood Waste), Burnaby, BC
- University of British Columbia Neighbourhood District Energy System (Air Source Heat Pumps, Sewer Heat Recovery, Electric Boilers), Vancouver, BC
- Oval Village DEU (Sewer Heat Recovery), Richmond, BC
- Alexandra DEU (GeoExchange, Air Source Heat Pumps), Richmond, BC



OPTIONS FOR POTENTIAL COLLABORATION

Ownership Models

- Full ownership from concept to operations
- Partnerships / Joint Ventures
- Concessions
- Full or partial acquisitions

Governance

- Full or partial provincial regulation
- Governance by contract
- Quasi regulation (regulation by an independent panel)

DEVELOPING GREENFIELD DISTRICT ENERGY PROJECTS



5/202

CORIX

CORPORATE OVERVIEW

Corix is a leading provider of sustainable water, wastewater and thermal energy systems serving small-tomedium-sized communities across North America. We develop, finance, construct, own, operate and maintain local utility infrastructure on behalf of municipal, residential, university, and commercial customers through a variety of utility business models.

Corix manages approximately \$2 billion in assets consisting of more than 1,300 water and wastewater utilities, comprising collection, treatment, storage, distribution, reuse and disposal, and 11 thermal energy systems ranging in size, scope and technology from large-scale CHP and chilled water plants to low-temperature GeoExchange-based systems. Corix serves over 1 million customers in 3 provinces and 19 states across North America and employs nearly 800 people. Our Corporate offices are based in Vancouver, BC and Chicago, IL.

Corix is a private company owned by Victoria-based British Columbia Investment Management Corporation (BCI). BCI is one of Canada's largest institutional investors with gross assets under management exceeding \$199.6 billion. In addition to core holdings such as Corix, BCI has an active direct infrastructure investment program that includes water, electric and gas utilities, energy and power companies, liquid transportation pipelines, and rapid transit infrastructure. BCI consistently supports Corix's growth mandate with capital for new acquisitions and investments and views Corix as a platform for further growth opportunities.

Our Purpose "We help people enjoy a better life and communities thrive."



Includes one or a combination of electricity distribution, natural gas distribution and proprane storage and distribution.
 In Canadian dollars.



CORIX TODAY

The Corix Group of Companies are leaders in water, wastewater, and thermal energy utility infrastructure solutions for small to medium-sized communities across North America.

At Corix, we believe in building strong community relationships to deliver long-term, cost-effective, and efficient essential utility services. Our growing list of water systems is a direct result of matching the right resources – human, financial, technological – to local requirements.

We are Local

As our name suggests, Corix is a group of companies who leverage shared economies and efficiencies but provide localized services through regional and state operations. Local operations are backed-up by regional and national teams, which provide operational redundancy and risk mitigation in emergencies, such as severe weather events.

Choosing Corix brings the full breadth of our North American resources, expertise, and on-the-ground know-how to your local utility.

Utilities is Our Only Business

With over 50 years of experience in the utility industry, Corix knows community utilities.

Water and wastewater are at the core of our business. Unlike some of our competitors, we offer these services separately or combined. Bundling services can produce significant operating efficiencies and economies of scale. As a result, most of our customers enjoy one-supplier water and wastewater services.

We also own and operate several systems that enjoy multi-utility services - typically water and wastewater together with either gas, electricity, biomass, or geothermal. And we are always looking for new, innovative ways to provide essential utility services to the communities we serve.

We Invest for the Long-Term

COPIX

A reliable, stable source of financing and capital is vital to maintaining utility services, implementing significant system improvements, and/or building new infrastructure. Corix has that financial expertise, with access to non-traditional sources of capital and the ability to unlock the equity value of existing capital assets. We can do that because we're backed by the British Columbia Investment Management Corporation (BCI), one of North America's largest asset management companies.



TECHNOLOGIES

Corix applies industry-leading technologies to manage our systems, resources, and information. Our seamless integration of these platforms results in quality utility services for our customers.

- Computerized Maintenance and Management System
 Lowers costs and improves customer service
- Geographic Information System Helps keep systems running efficiently and reliably and quickly respond to any issues
- Asset Management

Manages maintenance and end-of-life replacement providing highest value to customers

- Supervisory Control and Data Acquisition (SCADA) Realtime control and monitoring to lower costs, enhancing safety and security
- Customer Care and Billing
 Billing and call center support integrated with online customer
 services

Our command of these technologies ensures efficiency, safety, health and environmental compliance, and the provision of quality, essential utility services for customers at fair and reasonable rates.



REGULATORY

Corix has a centralized regulatory affairs team with the knowledge, expertise, experience, relationships, and resources needed to meet all applicable regulatory and compliance requirements for our regulated water, wastewater, and energy utility operations in the US and Canada. These regulatory agencies govern specific aspects of utility operations, including customer rates and service quality, health (customer and staff), safety and environment.

1. Vision

a. What is your vision as to how the County Utility could fit into the emerging energy ecosystem?

Corix and Cleveland Thermal are committed to executing the transformational visions and objectives of the County and designing an optimal Microgrid System by leveraging existing infrastructure where appropriate and using modern distribution equipment and proven industry-leading and mature technologies. We welcome the opportunity to work collaboratively with the County and other relevant parties at a later stage of the process to ensure an optimal outcome for the Cuyahoga County Microgrid Project.

b. How might the County Utility improve services compared to traditional systems?

With the County Utility implementing Microgrid systems, these localized grids can disconnect from the traditional grid to operate independently. Because the Microgrid system can operate while the conventional grid is down, it will help mitigate grid disturbances by providing fast and responsive system recovery, which will strengthen grid resilience and help diminish grid disturbances. Overall, the inherent design of the systems will significantly improve the reliability, resilience, and sustainability of electrical power service to off-takers of the system.

c. How would you propose building a system in a manner that constrains costs based upon available loads, yet is flexible enough to adapt to new end users who are attracted to the system?

Corix has significant experience in system development, expansion, and assessment, evidenced by its various greenfield and existing infrastructure project portfolios. Corix performs capacity and growth studies derived from operational data, known additions, growth strategies, and forecasts and works closely with stakeholders to optimize infrastructure deployment strategies.

Corix ensures that capital deployment aligns with development progress and continuously monitors, assesses, and updates capital plans. For expanding systems, Corix validates current capacity and implements improvements that maximize the existing systems and assets together with energy reduction initiatives that reduce current and future energy demands.

Corix develops current and forecasted future load curves based on these assessments to create long-term utility master plans. These plans include infrastructure upgrades and additions to ensure that the capital plans are affordable, achievable and address future infrastructure growth.

Oval Village District Energy System, Richmond, BC adapts to changing demands and is technology agnostic

 it can be expanded to serve higher loads and is designed to use a wide range of energy sources. LIEC can
 use the system immediately to serve the new Oval Village and, when the surrounding area has been further
 developed, utilize the most practical low-carbon energy resource available at that time to serve higher
 demands created by planned future buildouts.

d. How might your approach be different for new developments, such as industrial or commercial parks, versus existing customers? Would you envision merging district energy or transportation or hydrogen into the development?

Corix / Cleveland Thermal and its preferred partners bring combined expertise and specialization in developing and managing projects with unique requirements. We do specialize in constructing energy systems that are modular in design, which avoids stranding of assets and provides the flexibility to expand as additional off-takers connect to the system.

e. How might you go about marketing your vision to end users?

Corix's centralized Marketing and Public Relations Team currently supports utility systems across North America. It has the expertise and resources to support the communication and public relations requirements of the Cuyahoga Microgrid Project. It ranges from upfront public consultations to ongoing customer communications and targeted communications and marketing initiatives. Corix can develop unique plans, including detailed approaches, objectives, activities, timelines, and success metrics for the Project. These would be developed in full collaboration with the County and other stakeholders to support targeted initiatives and other programs benefitting the Microgrid System and its stakeholders.

2. Business Economic Models

a. How do you envision revenue flowing through the various entities?

Further discussion is required to determine the project's finalized business economic model. Once a business economic model is agreed upon, revenue flow can be strategically outlined for review and approval.

b. The County envisions a scenario where the developer/concessionaire is compensated through a pass-through model from power purchase agreements with individual customer/off-takers. Do you see any problems with this model or have suggestions on possible alternative compensation models?

We are open to discussing the power purchase agreement in further detail.

However, given the organic and evolving nature of the Microgrids, we believe the long term needs of the Microgrid developer / concessionaire would be best served by implementing a utility cost of service structure.

Authorized returns could be bench-marked against those prescribed by the Public Utilities Commission of Ohio for comparable regulated energy utilities in the state. We believe this provides the most transparent and cost-effective means to support its prospective customers. The model allows for maximum flexibility to incorporate future growth of the Microgrid District combined with the lowest cost of financing.

c. What process would you take with the County to design customer billing (i.e., tariffs) in a fair and transparent way?

Utilities represent a monopoly on providing an essential service by their very nature. Although there is considerable debate on the efficiency and effectiveness of public-sector utility ownership, from the perspective of public perception, government-owned utilities tend to be viewed in a different light as any profit earned by the utility belongs to the public rather than the shareholders of a company. Governments have established independent regulators to address this issue related to electricity, gas, and district energy provision. They aim to ensure fairness in the rate of return utilities can earn and the rates charged to ratepayers. The presence of these regulators provides ratepayers with the assurance that utilities will not earn excessive profits by charging exorbitant rates for a monopoly service.

Rate Setting Under Rate Base

Rate Base regulation is a form of regulation whereby the utility invests capital and earns an allowed after-tax rate of return on that capital. Prudent operating and administrative costs are flowed through at cost, with no mark-up. With Rate Base regulation, the utility calculates a Revenue Requirement, which is equal to the sum of the following:

- Operating Costs (with no mark-up)
- Administrative Costs and Overheads (with no mark-up)

- Depreciation and Amortization (return of capital)
- Interest on Debt (return on the imputed debt component of capital)
- Allowed Return on Equity (ROE) (return on the imputed equity component of capital)
- Income Taxes Paid

For mature utilities, customer rates are set at a level that enables total revenue to equal the Revenue Requirement; however, for greenfield development, rates are typically set at sustainable long-term levels that are competitive with the surrounding areas. The resulting annual Revenue Shortfalls in the early years of the development (Actual Revenue – Revenue Requirement) accumulate in a Revenue Deficiency Deferral Account (RDDA). They are treated as an additional capital investment by the utility. As the development builds out, the customer base eventually grows to the point where actual revenue exceeds the Revenue Requirement. The corresponding Revenue Surpluses are deducted from the RDDA until paid down to zero, at which time rates are typically adjusted so that actual revenue will equal the revenue requirement. The utility invests additional capital to cover losses in the early years to stabilize rates, and support development is known as rate levelization.

Establishing Parameters

One of the significant benefits of Rate Base regulation is that most components of a utility's Revenue Requirement can be independently verified. Capital and operating costs can be verified through third-party invoices and employee time sheets. The useful economic lives that form the basis for the Depreciation of assets are defined by the manufacturer and recognized as an industry standard. Capital cost allowances can be tracked, and the corresponding income tax liability can be calculated. There are a minimal number of variables that can be considered "subjective" in nature, namely:

- The Imputed Capital Structure of the utility
- The Applicable Interest Rate on Debt
- The Allowed Return on Equity
- Allowed Allocations for overheads and shared services

Shared service allocations may be the least understood of the items on this list. Like many larger companies, Corix capitalizes on economies of scale and scope by utilizing a shared service model for the provision of most supporting services, including Accounting, Accounts Payable, Billing, Customer Service, Regulatory, Financial Planning and Analysis (FP&A), Tax, Legal, People and Culture, Information Technology (IT), Treasury, Safety, and Management & Governance. These services are provided at two senior organizational levels (Corporate and Regional) and allocated over the range of utilities served by those organization(s).

The above list refers to imputed values for such items as capital structure, cost of debt, and taxes paid. Like most larger utilities, Corix manages its capital structure at the parent company level, which benefits ratepayers of all utilities by enabling it to maintain a stable capital structure regardless of the terms of individual debt instruments. The capital structures of individual subsidiaries are typically established based on complementary factors such as overall corporate tax efficiencies.

Recognizing this fact, regulators allow utility companies to calculate "regulated" financial statements based on imputed values for certain key variables. Capital structures are defined up-front, regulator-prescribed formulas determine the cost of debt, overheads and shared services costs are allocated through regulator-approved formulas, and income tax liabilities are imputed based on the assumption of a stand-alone entity.

Transparency and Oversight

The key to establishing public trust in utility services is transparency. Once the subjective items noted above have been contractually defined, the objectives of the utility and its ratepayers will be aligned. All inputs will be

verifiable, and there will no longer be any opportunity for the utility to earn excess returns. Thus, there is no reason for the ratepayers to be skeptical of the utility's motivations. The objectives of all parties are aligned toward efficient and effective utility operation.

d. What types of tariffs are needed to support the County initiative?

Further discussion is required to determine the finalized ownership model for the project. Once an ownership model is agreed upon, all contractual arrangements and tariffs will be evaluated.

e. Would you be willing to provide the capital for the scope/role the County envisions?

Yes. Corix has a proven track record of building partnerships under various concession, ownership, and governance models and invests in quality North American utility systems. Corix has the financial resources and experience required to operate these systems to benefit all rights holders and stakeholders.

Corix, a privately owned corporation, has a strong balance sheet and a stable growth and revenue generation history. Our owner, British Columbia Investment Management Corporation (BCI), consistently supports Corix's growth mandate. BCI is based in Victoria, BC, and is one of North America's largest institutional investors, with gross assets under management of approximately \$200 billion. BCI is the leading BC public sector investment and pension management service provider.

BCI supports Corix with capital for new acquisitions and investments and views Corix as a platform for further growth opportunities. In addition to equity provided by its owner, Corix has established term debt and a revolving loan facility with a syndicate of banks. Corix has a successful track record of securing utility and project-specific debt financing for various contractual and regulated rate base structures.

f. How would you ensure prices for specific projects (e.g. new distribution line or a microgrid) are competitive?

Corix's Total Asset Management Framework provides the overarching processes for capital planning, project management, operations, and maintenance.

Capital planning is an essential element of Corix's Total Asset Management Framework. Corix leverages this framework to identify and assess capital projects, costs, and timeframes and develop realistic, long-term capital plans that minimize operational risks, spending spikes, and unplanned or emergency projects. Corix continuously monitors capacity versus demand, condition of the assets, growth plans, industry trends, and commodity forecasts, providing critical information to refine, update and optimize procedures on a routine basis. Where applicable, plans are reviewed with Corix's partners at regular, pre-defined intervals to meet stakeholder objectives. Corix strives to plan, design, and execute projects at the optimum lifecycle cost, balancing the initial investment with operating expenses regardless of the financing model.

Corix leverages its Capital Project Management Process to ensure that the projects meet all specifications within budget and on time. It coordinates projects to be undertaken during optimum windows to minimize customer disruptions and designs, procures, and executes projects to manage costs and provide long-term value effectively. Corix typically uses a three-bid process for materials and services, partnering with reliable contractors and allowing schedule flexibility where applicable for favorable pricing.

3. Organization Models

a. Would you be willing to contract directly with the County to be responsible for the full scope of this initiative?

We are willing to contract directly with the County and be responsible for the full scope of the initiative. Corix is committed to developing a productive and collaborative relationship with County by effectively communicating, being responsive, and meeting commitments. As mentioned above, the County has a unique role, and we would encourage the County to be a fully vested participant in the project.

b. What are the tradeoffs for one firm serving all roles versus separate firms serving separate roles?

Many, primarily control and consistency. If acceptable, Corix would use an Integrated Project Delivery approach which gives the client increased schedule and cost control. Our process combines financing, design, construction, and operations, utilizing the benefits of the most collaborative form of project delivery coupled with the long-term thinking of finance, operate, and maintain.

TRADITIONAL MODEL	IPD FOM
Hire consultant to develop business case	Client already has strong business case
Hire bridging team	No need
Hire consultant to drive procurement	Client issues a simple expression of interest
Capital amortization periods are driven by debt terms	Capital amortization periods are based on the expected useful life of the assets
Find holes in owners' scope to win tender	Develop scope of responsibility collaboratively with client
Design-builder carried ~10% risk money	Risk money polled, collectively managed
10% social procurement costs money	10% social procurement costs nothing
Cost savings go to design-builder	Cost savings are shared with the client
Focused on cost	Focused on value and customer rates

Table 2: IPD Versus Traditional Model

c. How would you structure the relationship between yourself, the County, and other entities (if applicable)?

Corix would be the co-developer and co-equity investor on the Project and will act as the operator by leveraging the extensive local utility expertise of its wholly owned indirect subsidiary, Cleveland Thermal.

Seth Whitney at Cleveland Thermal would act as the single point of contact with the Microgrid Team.

Corix, Cleveland Thermal, and its preferred contractors bring combined expertise and specialization in developing and managing projects similar in size and scope to the Project. As long-term equity investors and asset owners, Corix is well versed in managing multi-disciplinary teams to meet a project's design, construction, operations, and maintenance requirements under an IPD model.

In addition, the intrinsic alignment of interest between Corix and Cleveland Thermal, and the IPD team, respectively, brings an integrated whole-life perspective to the Project. All Team Members' participation across various facets of the Project, including equity investment, development, financing, design, construction, operations, and maintenance, will facilitate communication and collaboration across all areas of expertise while aligning the design-construction and operations to optimize the whole lifecycle decisions.

d. What level of responsibility, if any, would you be willing to have for microgrid project identification and development, customer identification and selection, customer contract negotiations, etc.?

We are willing to discuss the potential of Corix/ Cleveland Thermal, and a co-development partnership team is responsible for multiple facets of the microgrid project. We have established partner alliances between Corix (including Cleveland Thermal) and our IPD contractors, with Seth Whitney at Corix / Cleveland Thermal acting as the single point of contact with the Microgrid Team. An executed consortium MOU governs the partnership; as such, Corix is already functioning as an integrated team to ensure the successful delivery of the Project.

e. What level of pre-design and other information or assurances would you need to respond to an RFP/Q and engage in negotiations with the County?

By utilizing an IPD model, this level of information or assurances would be unnecessary. The first phase of the IPD – Validation – would have all the stakeholders in the big room. The required design and other information would be arrived at collectively / collaboratively together, including engineers, construction, and operations. Therefore, we would write our response to reflect the IPD process, and the County would not be obliged to provide this information prior to issuing its RFP.

The structure of IPD is based on a group leadership model and allows for more diversity of thought, shared leadership, and higher accountability among team members. IPD provides a transparent framework that can place economic development and investment in local communities at the forefront of the Microgrid Project.

f. What level of commitment would you need to have from potential County utility customers to respond to an RFP/Q and engage in negotiations with the County?

We will respond to a future RFP/Q.

4. Concession Agreement & Other Contracts

a. What contracts will need to be in place and between what entities?

Corix would need a Letter of Intent (LOI) to begin the Validation Process and negotiate the Definitive Agreements. Additional agreements would be necessary but would depend on the financial and ownership structure used for the utility.

Potential Ownership and Financial Structures

Below are three possible financial and ownership structures representing three widely distributed points along the potential spectrum. Each is one that Corix has adopted or closely replicated in its current business, which will reduce risks and simplify preparing legal agreements.

Franchise in Perpetuity

This structure is to set up a stand-alone Corporation or Limited Partnership that is initially 100% owned by Corix. The Corporation would enter into a Franchise Agreement with the County to become the exclusive utility provider. The Franchise Agreement would be in perpetuity, subject to the performance requirements and default remedies typical of agreements of this nature.

Franchise Granted for a Fixed Term with Renewable Options

Under this structure Corix is granting a Franchise Agreement for a fixed term, with options to renew. In this case, the utility would be a corporation or limited partnership and 100% owned by Corix through the Franchise Term. At

the end of the term, the County would have the option to purchase the utility for its Rate Base value or renew the Franchise Agreement for another term.

Concession / P3 Agreement

Another possible option is using a Concession / P3 Agreement, whereby the County would maintain 100% ownership of the utility from inception. Corix would function as the "effective" owner and operator, controlling all aspects of the management and operation of the utility and being solely responsible for all financing and operations. The Concession Agreement is equivalent to a DBFO / P3 structure. The utility is granted a franchise agreement, and Corix is granted the benefits and risks associated with ownership of that utility through a set of commercial contracts.

b. What critical terms and conditions need to be addressed?

Corix / Cleveland Thermal and the County will discuss the details of terms and conditions once the ownership and financial structure are finalized during future discussions.

c. What term lengths would respondent be comfortable with for a distributed energy or microgrid PPA?

Term lengths will be dependent on the ownership arrangement and financial structure of the project. These details will be finalized in future discussions with the County.

d. What additional information would you need to sign a contract with the County for a scope of work?

The main pieces of information needed to sign a contract for the scope of work would be the preferred ownership structure of the utility and identifying potential customers and their needs.

5. Initiative Timelines

a. What is a typical turn-around time for you to sign a contract for your role(s)?

Contract signing can take one to six months and can happen simultaneously with the Validation Process. The Validation process will determine the design / build, which will reflect in the Definitive Agreements.

b. What is a typical development time for a microgrid, from customer recruitment through operation? What are the major milestones?

The typical development of microgrid projects is 12-24 months. However, each project has unique characteristics, which may extend the development cycle of the project.

Project Milestones:

- 1. Consultation
- 2. Feasibility Study
- 3. Initial Engineering
- 4. Final Design Utility Interconnect Procurement
- 5. Installation Start-up Commissioning
- 6. Operate and Maintain

c. What impact on this initiative do you foresee, if any, from the current supply chain disruptions?

Supply chain disruptions potentially increase cost and timelines, which is why we are strongly recommending the IPD model which traditionally addresses both those components.

6. Technology

a. What technologies should the County consider to address power issues for commercial and industrial customers? (power quality issues vs. short power outages vs. long power outages)

Corix / Cleveland Thermal, and its preferred Design-Build partner Schneider Electric, bring unparalleled experience and capability in designing and constructing complex Microgrid systems combined with expertise and specialization in developing and managing projects with unique requirements.

Our preferred partner will act as the Design-Builder on the Project. It will lead in managing the design, construction, installation, and commissioning of the Microgrid System and will ensure that the design guarantees maximum resiliency, redundancy, and security system wide. Only the highest quality equipment and components will be used in the Microgrid System. During the operating phase, they will offer appropriate service packages on control equipment and automation software supplied and installed and provide other O&M support.

Ranked as the industry leader by Navigant for best-in-class Microgrid technology and solutions, our preferred partner has unparalleled experience and capability in designing and constructing complex Microgrid systems similar or larger in size and scale to the County Microgrid System Project. As a world-leading supplier of medium and low-voltage electrical equipment, software, services, and advanced analytics in the United States.

The Microgrid and distributed energy resources segment frequently design, supply, and integrate electrical distribution equipment, including switchgear, transformers, inverters, metering, safety and protection equipment, SCADA systems, controls, and more. Their extensive experience integrating new solutions with third-party and legacy equipment and their understanding of the impacts of using existing equipment on project financials and installation downtime. To this end, their team specializes in retrofitting and replacing electrical distribution equipment.

Throughout the design and construction phase, Corix and Cleveland Thermal will remain fully integrated with the process to ensure that maintenance, operations, and lifecycle matters are considered in all design and development decisions. We are confident in our ability to work with the Microgrid Team to deliver the locally generated power, distribution network, Microgrid operations, and controls that will enable the system to meet the specific project goals and objectives.

b. Can you provide high-level cost estimates for distribution infrastructure, distributed generation, and/or microgrid technologies across different sizes? (e.g. 14.4 kV feeder, 1 MW/1 MWh battery, 5 MW solar PV)

Once a conceptional design of the County Microgrid is established, Corix / Cleveland Thermal and its preferred Design-Build partner will provide economic feasibility modeling to guide future planning and design strategies.

c. Are there ranges of economic feasibility that the County should be aware of when considering onsite generation, storage, etc. For example, do projects only over X MW prove to be economically feasible in your experience?

Each project needs to be evaluated on its specifics, and our ability to take a modular / scalable approach allows each project to be built out as economically feasible.

Recognizing the rapid innovation and development of renewable energy technologies worldwide, Corix's phased approach to system development maximizes the options for adopting the most appropriate proven technologies.

This approach reduces the risk of future technology change by designing the system backbone to be technologyagnostic. The cost of future energy infrastructure is minimized by phasing in equipment based on development progress and customer needs. Energy "modules" can be added over time as the load demand increases. This ensures that the system capital profile can better match the development and load profile and allows the system to incorporate best-in-class technology when a new generation is needed.

- 1. Burnaby Mountain DEU, Burnaby, BC utilized interim Energy Centres using high-efficiency natural gas boilers from 2012 until 2020 when there was sufficient load to implement the permanent biomass-based Central Energy Plant (CEP). The CEP was also designed to add ORC for power generation in the future.
- 2. Bellingham Waterfront DEU, Bellingham, WA will provide heating and cooling from a modular energy centre designed to be scaled out as development occurs and additional capacity is required. A wide range of energy sources will be implemented, including the immediate use of power station cooling towers and chilled water return, with future options for geothermal, sewer-, ocean-, and air-source heat recovery.

c. How should cybersecurity of the utility, individual microgrids, customers, or other pertinent entities be ensured?

Microgrid Standards

Corix / Cleveland Thermal has extensive experience designing, constructing, and operating systems following relevant regulatory requirements and specific customer standards. We will work with the Microgrid Team throughout the design and implementation process to establish system requirements, including security standards, ensuring these requirements and individual component specifications are embedded in the system. Cybersecurity is a native feature of the Schneider Electric EcoStruxure platform, which will be an essential component of the Microgrid controls.

Information Technology Security

Robust security starts in the design and construction phase and continues to operations. Corix, Cleveland Thermal, and our preferred partner's system design will put hardware and software design security at the forefront. In addition to hardware and software security design capabilities, their specialized team of Cybersecurity experts offers and delivers end-to-end lifecycle services. A team of experts with extensive cybersecurity experience, deep industry knowledge, and in-depth network design and implementation expertise can address various cybersecurity compliance requirements.

For over 50 years, our preferred partner has provided the highest professional support to customer systems and is a globally recognized cybersecurity leader within industrial control system environments. They have engaged with numerous customers with AWWA, DHS, NEI, NERC, and NIST program development, assessment, and solution implementation activities.

Corix's Information Security Program

Corix's information security program uses a framework based on industry standards and best practices. Corix's security program is formalized and defined by a security charter approved and supported by the Board and the Executive Leadership Team. Corix's Information Security Program utilizes an information security framework. This framework integrates several best practices such as NIST SP800-53, COBIT 5, and ISO 27000.

Corix Information Security team maintains a mapping between its framework and NIST Cybersecurity Framework. A mapping of the security controls between Corix's framework and NIST SP800-53 and SP800-171 is also maintained to assure areas of its business require compliance with these Frameworks. This expertise, from design to operation, delivers a system that addresses the needs of the County Microgrid project.



Figure 2: Corix's Information Security Program

Security Culture and Awareness

The fast evolution of the cybersecurity landscape requires security training and awareness programs that are frequently updated and improved.

Corix's Security Culture and Awareness program utilize the most up-to-date training materials to equip its employees with the knowledge and technics to recognize and detect cybersecurity threats and attacks. The program also goes through periodic evaluation and receives end-user feedback to improve itself and remains relevant. Improving the security culture and awareness also provides a more supportive atmosphere for effectively integrating info-security processes with business processes, enhancing Corix's security posture.

Detection and Prevention

Corix network and critical assets are protected using a multi-layer detection and defense architecture. Utilizing a unified Advanced Threat Protection supported by integrated Log management and SIEM solution provides the incident response team with best-of-class visibility, detection, and protection capability.

e. What is your approach to managing: capacity and transmission peak load contributions? Energy market arbitrage? Frequency regulation?

Corix / Cleveland Thermal's preferred Design-Build partner has engineered, manufactured, and installed medium and high voltage systems of varying sizes, including Microgrids that are less than 100 MW and manufactures and delivers a wide variety of control devices and SCADA software to the utility and power consumer industry. The

EcoStruxure Power platform incorporates well-known legacy brands, including OASyS, SCADA, ADMS, Modicon (PLC), PowerLogic, and Foxboro. Our preferred partner is also a top vendor for monitoring, protections, controls, and SCADA, which are required and must be carefully considered on all Microgrid projects. Its wide-ranging product portfolio allows it to right-size the solution for every application. Furthermore, because control systems can integrate many different aspects of projects and may become exceedingly complex, the EcoStruxure platform provides validation and assurance to clients through its tested architectures.

7. Diversity, Equity, and Inclusion

a. How will you ensure Diverse, Equitable and Inclusive (DEI) partnership(s) throughout this Initiative?

Corix, Cleveland Thermal, and our IPD partners acknowledge and share the County's commitment to diversity and inclusion of minority, women-owned, historically underutilized, and disadvantaged business enterprises. We are committed to promoting minority and disadvantaged-owned business participation and recognize that equal opportunity and commitment to building an inclusive community are basic philosophies for all organizations.

Diversity Programs

Corix / Cleveland Thermal is committed to cultivating a diverse workforce. True diversity starts with a mission to gain strength as an organization by recruiting various outstanding people with diverse backgrounds, skills, ideas, and cultures. When people think of traditional recruitment advertising, they typically think of online job postings, newspaper print ads, and perhaps even radio ads. When Corix thinks of recruitment advertising, it is about reaching out and communicating to the future employees where they live and breathe. That means an active and local recruiting strategy focused on attracting candidates with backgrounds representative of the communities Corix serves. Corix constantly looks at staffing profiles, community-based civic and social organizations, and the lifestyles of all kinds of candidates in all industries to draw individuals to its headquarters and operating subsidiaries (such as Cleveland Thermal).

Affirmative Action Plan

Corix / Cleveland Thermal is committed to inclusion and has experience both internally (from a full-time employment perspective) and externally (from a subcontractor retention perspective) upholding the American values of diversity and inclusion.

Corix has an Affirmative Action Plan in place to provide equal employment opportunity to all individuals regardless of their race, creed, color, religion, gender, age, national origin, disability, veteran status, genetic information, or any other characteristic protected by federal, state, or local law. Corix is strongly committed to this plan and has policies and practices in place to meet these standards.

Equal Employment Opportunity Policy Statement

It is the policy of Corix / Cleveland Thermal to provide equal employment opportunity to all individuals regardless of their race, creed, color, religion, gender, age, national origin, disability, military service, protected veteran status, genetic information, sexual orientation, gender identity, or any other characteristic protected by federal, state, or local law. Corix is strongly committed to this policy and believes in the concept and spirit of the law.

8. Other

a. What potential risks, setbacks, or hurdles do you see for this Initiative?

None identified at this stage.

b. Please provide any other information that you feel would be pertinent to the County at this stage of the process.

None currently.