KERR WOOD LEIDAL
consulting engineers

District Energy Services

Planning, Design, and Construction

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Kerr Wood Leidal Associates Ltd. (KWL) is a recognized leader in district energy system (DES) analysis, design, and construction, as well as community renewable energy resource mapping. KWL has a strong team of engineering professionals and technologists that provides an effective blend of strategic planning and technical analysis through technology neutral approaches.

KWL has civil, mechanical, and electrical expertise in high-temperature and low-temperature DES and in providing district heating and cooling. The benefits of DES include harnessing previously wasted energy sources, reducing greenhouse gas (GHG) emissions, and reducing reliance on fossil fuels. It also creates sustainable energy systems and money saving opportunities for communities, while providing space heating, domestic water heating, and cooling. DES offers investment opportunities to public and private owners as well as the flexibility to adapt to available heat sources and benefit from emerging technologies. The KWL team provides engineering in the following fields:

Strategy and Planning

- Identification of potential heating/cooling sources and end users
- Assessment of renewable energy sources
- Resource recovery
- District energy concepts and relative costs
- Triple bottom line analysis, including GHG analysis
- District energy models
- Geographic information system (GIS) database to store and map energy resource information
- Mechanical systems and civil infrastructure
- Community Energy and Emission Plans compliant with BC Hydro or other funding requirements.

Business Case Development

- Financial modelling
- Customer base
- Ownership structure
- Regulation of district energy utility
- Licensing of heat recovery projects
- Integration of a reclaimed water strategy

Preliminary and Detailed Design

- Energy load and supply profiles
- Mechanical systems
- Distribution pipe material
- Back-up energy sources
- Control system
- In-house survey and building information modelling (BIM)
- Hydraulic analysis (TERMIS)
- Piping and instrumentation drawing (P&ID) and process flow diagram (PFD)
- Stress analysis using Caesar II®

Construction and Commissioning

- Construction support/project management
- Tender management
- Field reviews
- Record drawings
- Pipe flushing and cleaning
- System bypass inspections
- Energy System Control logic

Select Projects

Alexandra District Energy Utility Phases 3 & 4

KWL's involvement in Phase 3 expansion involved over 600 m of underground ambient temperature high-density polyethylene (HDPE) piping, a 330-borehole geoexchange field and associated pumps providing approximately 1.4 MW of cooling and 0.6 MW of heating, 3x 1.5MW condensing boilers, 2x 1.5 MW cooling towers and distribution pumps, and energy centre mechanical additions. The entire project was completed in two functional stages within 16 months from pre-design to commissioning. The Alexandra District Energy Utility (ADEU) system was awarded system of the year at the 2016 International District Energy Association conference in St. Paul, Minnesota. The Phase 4 expansion involved design and construction of an air-source heat pump-based 1.8 MW mini-plant for the central at Garden City retail development. This is the first known instance of integration between air-source heat pumps and geoexchange in a DES.

University of British Columbia ADES Design and Construction

KWL was the lead consultant for the detailed design and construction support for all distribution piping system (DPS) phases of the UBC steam-to-hot water conversion project, which is one of the largest projects of its kind in North America. This project included the design and construction of over 12 km of distribution piping, replacement of steam infrastructure, installation of over 30 energy transfer station (ETS) and interior piping, a temporary 16 MW steam-to-hot water conversion station, and waste heat recovery from a combined heat and power biomass facility. KWL performed a thermal hydraulic analysis for the entire UBC campus to include a full looped system design and other optimization scenarios. KWL was also involved in the civil design to serve the UBC Peaking Plant.

Interesting elements of this project include strategic project phasing to allow economies of scale during tendering and scheduling around student semesters, use of existing steam corridors across campus, thermal pre-stressing, competitive material procurement strategies, iterative design procedures for efficiency improvement between phases, and student-led architectural design of the conversion station façade.

KWL is assisting UBC with several projects to expand the distribution piping system (DPS) by connecting new buildings on campus as they are constructed. The project as currently operated has reduced thermal energy use and GHG emissions by over 25% and reduced operational and energy costs by approximately $5.5M/year.

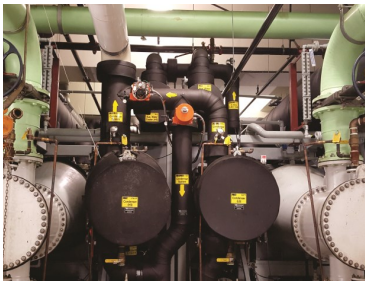
Whistler Athletes' Village Low-Temperature District Energy System

Unlike most DES that use high-temperature water, this system uses low-temperature ambient heat. Flexible ambient heat source allows for heating and cooling for up to 2,200 residential users occupying 85,000 square metres of space. Use of treated wastewater effluent heat reduces greenhouse gas emissions by over 95% by replacing natural gas. This project received the ACEC — Canada Award of Excellence and CAMA Environmental Award.

City of Vancouver Southeast False Creek – District Energy System

Hot Tap on Existing Mainline

Energy Centre



KWL completed the low carbon energy generation expansion study for the City's False Creek Energy Centre (FCEC) to evaluate the opportunity to expand the FCEC low carbon thermal heat generation serving the Southeast False Creek Neighbourhood Energy Utility (SEFC NEU) system by an additional 6 MW. This study will be used as the starting point for completing the detailed design of the expansion. KWL developed two different concept designs for the expansion, advised on the procurement strategy and developed performance specifications for the heat pumps. KWL is the City's Engineer for the heat pump procurement and will supervise the construction. KWL also completed the concept design for the VAHA plant, which will be connected to the system.

Last year, KWL completed the electrical equipment flood damage assessment that was affected by the FCEC basement flooding. KWL also completed a damage assessment for the travel screen equipment and its accessories as part of the same project. Recently, KWL completed a preliminary feasibility analysis for connecting a 3 MW temporary boiler plant to the City's SEFC NEU.

KWL is currently involved in the performance assessment of the FCEC's existing thermogenics boilers and will develop a series of potential remediation actions.

Between 2016 and 2020, KWL completed the detailed design and completed the construction support for the extension of the SEFC NEU system. The scope of work included design of 700 lin. m of LOGSTOR distribution piping and eleven building connections, including peer review of the building mechanical design and design of the building connection. Unique features of this project included a hot tap into an existing mainline using Danfoss valves and hot tapping rig, and the installation of 75 lin.m of Kelit brand PEX-R (reinforced polyethylene) piping.

KWL was also the consultant for the previous phase of development on the NEU system, including the Great Northern Way extension to the Canvas building. This project included the connection of 12 new buildings to the system between 2012 and 2015. The scope of work included building HVAC system design review; detailed design of the distribution piping system (1 km lineal m); detailed design of the 12 new ETS (mechanical, electrical and controls); engineering assistance and support during the construction stage.

KWL completed the hydraulic analysis for the NEU system, to advise the City on the system's expansion strategy and optimize the network performance.

Due Diligence Study UBC NDES UBC Campus

KWL completed the detailed due diligence study for the UBC Neighbourhood District Energy System (NDES), which proposes to recover waste heat from a campus research facility to heat residential developments on the south campus. This work involved the development of a load forecast, project phasing and sensitivity scenarios, preliminary design of the distribution piping system and energy transfer stations, concept development for a number of energy centre options, and innovative concepts for integration with the UBC academic DES. At full build-out the NDES could serve up to 50 DES customers in two neighbourhoods via 3.5 km of distribution piping.