British Columbia Utilities Commission
Municipal Energy Utilities Inquiry

Intervener Submission

Canadian Geothermal Energy Association (CanGEA)

Submitted October 24, 2019

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1 About CanGEA

CanGEA's mission is to accelerate Canadian exploration and development of geothermal resources in order to provide secure, clean, and sustainable energy to Canada's heat and electricity markets. CanGEA works to advance policies and regulations that enable the transition of Canadians towards the use of geothermal energy for heat.

The Canadian Geothermal Energy Association (CanGEA) is the collective voice of Canada's geothermal energy industry. As a non-profit industry association, we represent the interests of our member companies with the primary goal of unlocking Canada's tremendous geothermal energy potential. Geothermal energy can provide competitively priced, renewable, around-the-clock energy to the Canadian market and is part of the solution to growing concerns about securing sustainable and cost-effective energy sources. CanGEA promotes the industry and the potential of geothermal energy in Canada through outreach events, research, policy work and representing Canadian interests internationally.

Conducting research and providing valuable reports is an important method for CanGEA to promote the industry and the potential of geothermal energy. CanGEA acts as the conduit between industry and government to ensure that there is a supportive ecosystem for development across Canada. CanGEA participates in engagements with all levels of government, including federal departments and committees, provincial/territorial governments and utility commissions, Municipal governments, and First Nations.

2 Introduction to Submission

CanGEA is registered as an intervener in the British Columbia Utilities Commission (BCUC) Municipal Energy Utilities Inquiry. As the collective voice of Canada's geothermal energy industry, CanGEA believes that our knowledge and experience can inform the Commission regarding Municipal applications of geothermal energy.

In this submission, CanGEA will provide information on the basics of geothermal energy, proposed projects in BC, and the benefits of geothermal district heating applications. CanGEA will also provide case studies on district heating projects from around the world, with a focus on Municipally-owned projects. The district heating projects are located in Boise (Idaho), Cumberland (Nova Scotia), Klamath Falls (Oregon), and Paris (France).

Traditionally, our membership has included Municipalities across Canada. Municipalities make up a meaningful proportion of our overall membership, and we understand this Inquiry could have a significant impact on geothermal projects moving forward, as district heating is likely to be developed at the Municipal level.

The main goal of CanGEA's participation is to ensure that geothermal energy is adequately represented, and that geothermal energy and its benefits are understood in the Inquiry.

3 Background on Geothermal

3.1 Basics

Geothermal energy is a mature technology capable of producing heat and is widely used around the world. The global installed geothermal capacity for direct heat is 20.6 GW (equivalent electric power).[1]

The United States currently has 21 installed district-heating systems.[2] The U.S. Department of Energy (DOE) published a report in May 2019 titled, *GeoVision: Harnessing the Heat Beneath Our Feet*. In this report, rigorous technical analysis was conducted to evaluate future geothermal deployment opportunities across the U.S. Its models indicate that with technology improvements, the number of district-heating installations could increase to 17,500 by 2050.[3]

Geothermal energy is a renewable resource, with one of its most significant advantages being that it is a baseload and dispatchable form of energy.[4] Unlike other renewables that depend on external factors like weather to produce electricity, the Earth constantly produces heat, allowing for the continuous production of electricity and/or heat.

Figure 1, on the following page, illustrates the types of geothermal resources that can be found in Canada.

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[1] Limberger, Jon et al., "Geothermal energy in deep aquifers: A global assessment of the resource base for direct heat utilization" pg. 962, Renewable and Sustainable Energy Reviews 82 (2018) 961-975.
[2] Snyder, Diana et al., "Update on Geothermal Direct-Use Installations in the United States," *National Renewable Energy Laboratory* (February 2017): pg. 2, Produced for the 42nd Workshop on Geothermal Reservoir Engineering, https://pangea.stanford.edu/ERE/pdf/IGAstandard/SGW/2017/Snyder.pdf, accessed Sept 27, 2019.
[3] U.S. Department of Energy, "GeoVision: Harnessing the Heat Beneath Our Feet, May 2019, pg. ix, https://www.energy.gov/sites/prod/files/2019/06/f63/0-GeoVision-ExecSummary-v2-opt_0.pdf, accessed Sept 27, 2019.
[4] NRCan, *About Renewable Energy – Geothermal*, https://www.nrcan.gc.ca/energy/renewable-electricity/7295#geo, accessed June 19, 2018.

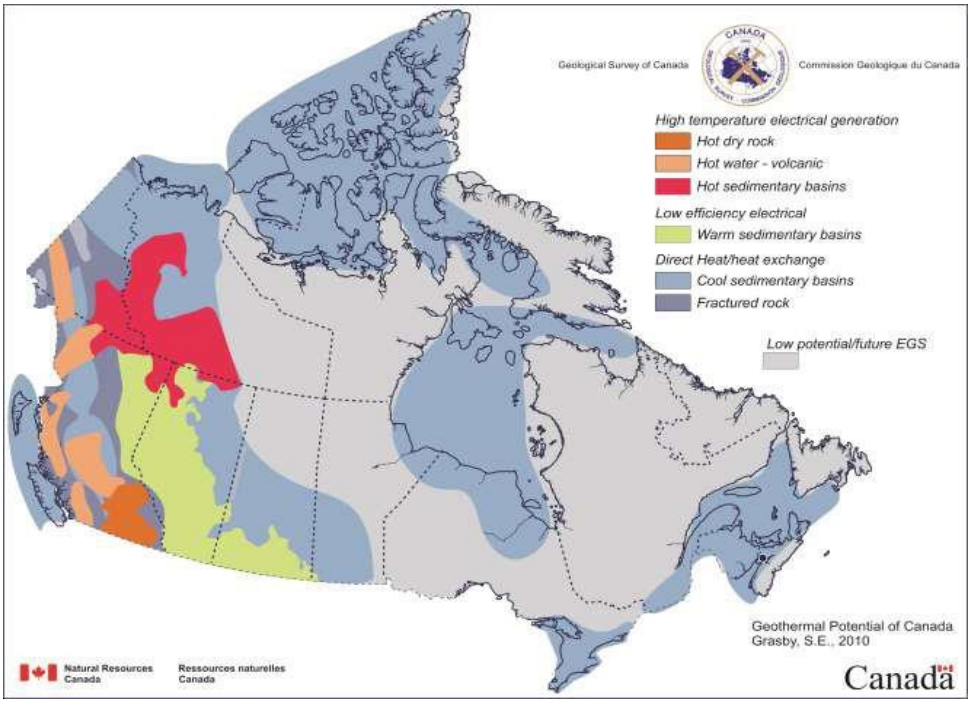

Figure 1: Geothermal Resource Types in Canada

3.2 Geothermal Resources in British Columbia

As seen in Figure 1, above, British Columbia has four main types of geothermal resources: Hot Sedimentary Aquifers (HSA – also referred to as Warm/Hot Sedimentary Basins), Volcanic, Hot Wet Rock (HWR – also referred to as Fault-controlled), and Hot Dry Rock (HDR – which require engineered geothermal systems). Figure 2, below, shows the areas of BC where geothermal energy is most viable, and therefore a priority for exploration.

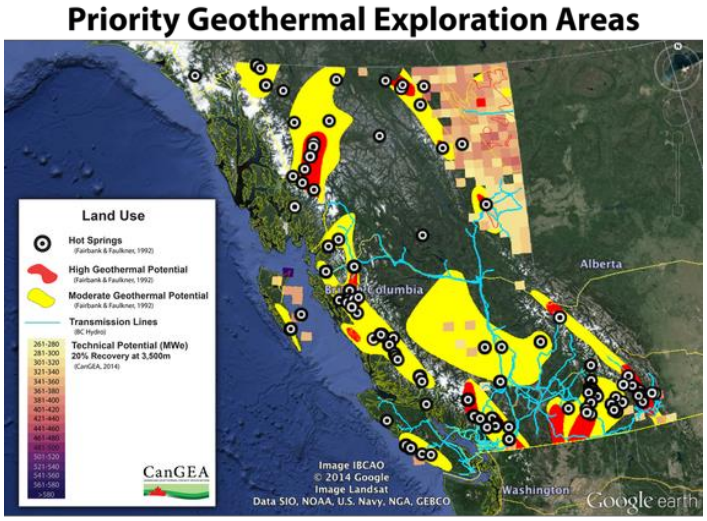

Figure 2: Priority geothermal exploration areas in BC

3.2.1 Fault-controlled and Volcanic Systems

Fault-controlled geothermal systems occur in areas where convection of subsurface waters results from tectonic (crustal movement) or volcanic activity. Meteoric waters (e.g. rain and snow waters) descend through fractures and permeable pathways to depths where they become heated, then travel back up naturally via fractured pathways to the Earth's surface and occasionally form thermal springs.

3.2.2 Hot Sedimentary Aquifer (HSA) Systems

Hot Sedimentary Aquifers (HSA) are deep, porous, and highly permeable layers of rock saturated with fluids (aquifers) that are heated naturally. For this type of geothermal system, a well is used to bring the heated fluid to the Earth's surface where it can be used for heating. The cooled water is then pumped back into the subsurface.

Though HSA resources are considered lower grade in comparison to volcanic/fault-controlled resources, they still have large potential and there are many possible heating applications. The Western Canada Sedimentary Basin in the northeast portion of BC is the most prospective region for the development of HSA geothermal resources, due to its geological characteristics and the historical knowledge obtained from oil and gas exploration. However, the geothermal potential of HSAs within other sedimentary basins in BC, such as the Bowser and Nechako basins, remains uncertain.

3.3 Direct Use Geothermal Heat Applications (30°C – 150°C)

Direct use of geothermal heat implies that geothermal energy is used for heating and other industrial or commercial processes. Direct use operations often involve drilling to a certain depth and bringing geothermal fluids to the surface to extract the heat. After the heat is extracted, the lower temperature liquid is returned to the earth via an injection well so that it can be reheated and utilized again. Industrial uses include the heating of traditional BC industries such as agriculture (in greenhouses), aquaculture, and pulp and paper manufacturing. There are also many other applications that require moderate heating. In some areas, hot springs will reach the surface naturally and the hot waters can be put to use without drilling.

Within the category of direct use, there are two sub-categories: industrial heat and direct heat. Industrial geothermal heat utilizes the heat from geothermal fluids, typically above 60°C. Applications that fall within this category include ethanol and biofuel production, refrigeration and ice making, lumber drying, cement and aggregate drying and other industrial processes. There are many possible applications of direct heat including water (pre)heating, aquaculture, bathing, snow melting and de-icing, and even industrial cooling (refrigeration), as can be seen in Figure 3, below.[5] An important note is that the heat from geothermal fluids can be cascaded, meaning that a resource can be used multiple times for different purposes until the temperature

[5] Ground Zero Energy, "Geothermal Energy Uses," accessed July 15, 2019, http://www.groundzerosoftware.net/Geo-energy-uses.

has been lowered to a point where it is no longer useful, thereby utilizing as much heat from the geothermal resource as possible.

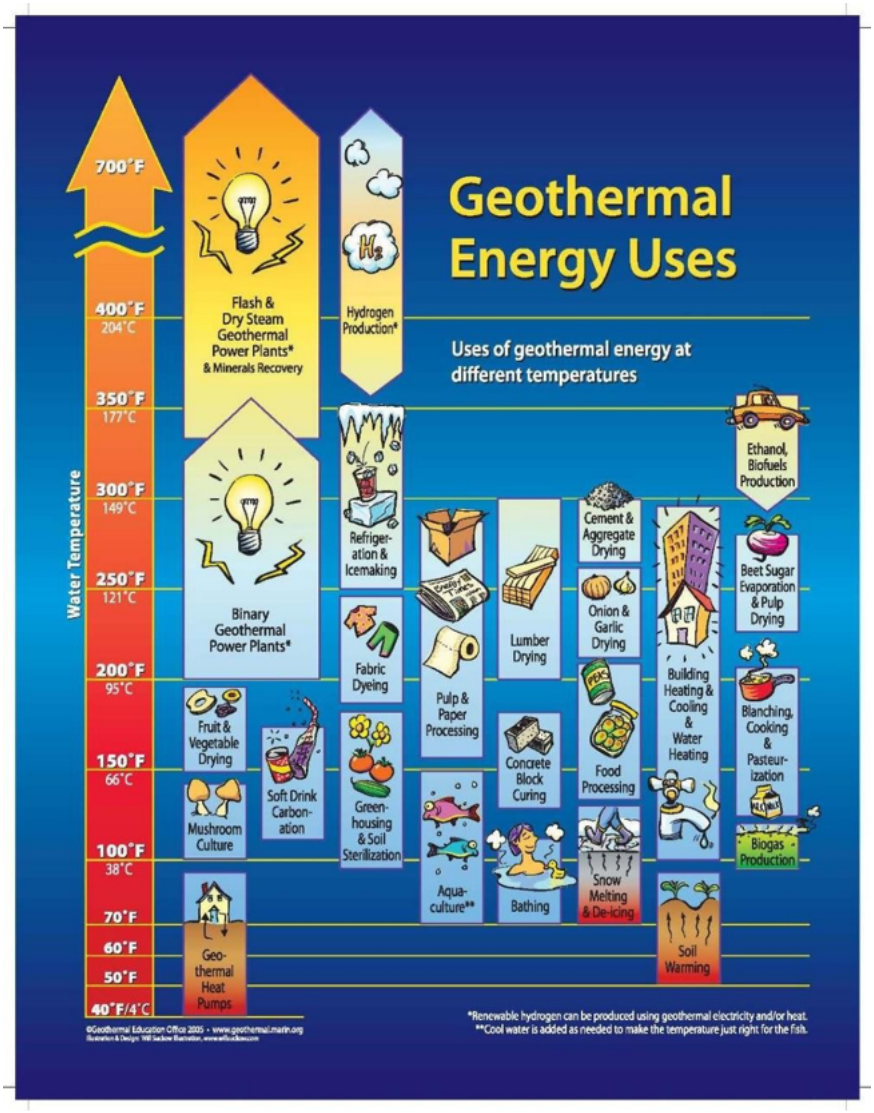

Figure 3: The possible uses of geothermal energy by temperature.

3.4 Projects in British Columbia (BC)

CanGEA members currently have two projects under development in British Columbia, one of which is majority owned by a First Nation. A third project is being undertaken by the Fort Nelson First Nation.

3.4.1 Kitselas Geothermal Inc. – Lakelse Project (CanGEA member)

Kitselas Geothermal Inc. (KGI) is a joint venture between Borealis GeoPower (BGP) and majority

owner, Kitselas Development Corporation. KGI's Lakelse geothermal project is located near Terrace, BC. The Terrace area is also located in the same airshed as the District of Kitimat, collectively referred to as the Regional District of Kitimat-Stikine. Projected GHG emissions from the LNG industry will have significant impact on air quality in the Regional District.

The project is planned to be executed in Phases. The first Phase will involve the development of a small geothermal-heated business park (geoheat park), then Phase 2 will involve ramping up the geoheat park with up to 20 times the amount of heat produced in Phase 1.

3.4.2 Borealis GeoPower – Canoe Reach Project (CanGEA member)

Borealis's Canoe Reach geothermal project is located near Valemount. The Canoe Reach project is following a similar phased approach as the Lakelse project in Terrace. Phase 1 consists of a small geoheat park. Phase 2 would expand the heat project to match the resource potential with local heat-energy market demand. BGP is working closely with the Village of Valemount and local businesses on the project.

Borealis looks forward to dialogue with the BC government on the potential for renewable heat from this project site, which has the potential to mitigate the negative emissions impact that current wood burning for heat is having on the region.

The BC Ministry of Environment and Climate Change Strategy recently released a Central Interior Air Zone Report (2015-2017). The report found that on an annual and daily concentration basis, Valemount had the highest concentration of $PM_{2.5}$ pollution in the Central Interior Air Zone (CIAZ). $PM_{2.5}$ are particles up to 2.5 micrometres in diameter that are harmful to human health and can lead to shortness of breath, cardiovascular and respiratory diseases as well as birth defects. The reduction of $PM_{2.5}$ has been a top air-quality priority across the Central Interior Air Zone over the past several years.[6] With Valemount being home to an active geothermal project, there is a prime opportunity for the community to utilize local, clean and renewable heat and electricity to help mitigate its air quality crisis.

3.4.3 Deh Tai Limited Partnership – Fort Nelson Geothermal Assessment

Deh Tai Limited Partnership is the economic development company of Fort Nelson First Nation. In August 2019, Deh Tai received $1,000,000 in funding from Natural Resources Canada's Clean Energy for Rural and Remote Communities (CERRC) program in order to assess the resource potential of several renewable energy technologies.[7] The CERRC program is designed to support

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[6] BC Ministry of Environment and Climate Change Strategy, *Central Interior Air Zone Report (2015-2017)*, accessed July 15, 2019, https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/air-zone-reports/2015-2017/central_interior_air_zone_report_2015-2017.pdf

[7] Government of Canada News Release, *Canada Supports Clean, Renewable Energy Technologies in British Columbia*, Aug 23, 2019, https://www.canada.ca/en/natural-resources-canada/news/2019/08/canada-supports-clean-renewable-energy-technologies-in-british-columbia.html.

"a responsible and strategic transition away from diesel dependency."[8]

A report was released by Geoscience BC in September 2019 titled *Clarke Lake Geothermal Pre-Feasibility Study*, assessing two potential sites close to the Clarke Lake Gas Field south of Fort Nelson.[9] The assessment includes an outline of "potential costs and revenues as well as technology recommendations and permitting requirements as a first step to understanding economic viability."

Fort Nelson Chief Sharleen Gale said the following regarding the *Clarke Lake Geothermal Pre-Feasibility Study: "*Fort Nelson First Nation is grateful for the studies by Geoscience BC that have highlighted geothermal resource opportunities immediately adjacent to our home community and located in our territory where our people have lived for thousands of years… We are grateful for this unique opportunity to pursue clean, renewable energy that can provide us with food security, energy independence and diverse economic opportunities in our territory…"

4 Benefits of Geothermal District Heating Applications

Without regulatory intervention, geothermal energy is a low-cost energy source that can be used for nearly any residential, commercial, or industrial process requiring heat. Such resources spur economic growth and are especially suited to rural areas, Municipalities, Indigenous communities, and entrepreneurs. For example, natural gas is not available in the Village of Valemount; instead, propane is trucked into the area and used for heating, along with wood. Heating could be instead provided by geothermal energy. In this context, Valemount is analogous to many rural and remote First Nations communities.

Greenhouses, fish farms, timber kilns, and hatcheries are just some examples of the types of businesses that could operate in areas that were previously deemed uneconomic. Geothermal heat applications also create jobs in order to build and maintain heating infrastructure, and the economic growth created by the heat results in job creation as well. For First Nations communities that are seeking economic independence, employment and economic growth opportunities, heat applications of geothermal energy are arguably even more valuable than electricity.

The use of geothermal heat as a by-product reduces GHG emissions and improves air quality. In December 2018, the CleanBC climate plan set targets to cut greenhouse gas emissions by 40% by

[8] *Ibid*.

[9] Geoscience BC News Release, *Study Outlines Feasibility of Using New Natural Gas Wells for Geothermal Heat and Power*, Sept 19, 2019, http://www.geosciencebc.com/study-outlines-feasibility-of-using-new-natural-gas-wells-for-geothermal-heat-and-power/.

2030, 60% by 2040 and 80% by 2050.[10] One of the largest emitting sectors is buildings (13%).[11] Although much has been done to decarbonize the electricity grid, fossil fuels are still the primary source of heat in BC. Geothermal district heating systems can provide clean heat to residential and commercial buildings. When geothermal energy is used in heating applications, it is capable of displacing a significant amount of fossil fuel consumption and wood combustion. For example, for every TJ of natural gas that is left unburned due to geothermal energy substitution, approximately 50 tonnes CO_2e of GHG emissions are eliminated.[12]

The use of geothermal also provides opportunities for improved air quality resulting from reductions in sulphur dioxide, nitrogen oxides, and fine particulate matter emissions. As previously mentioned, Valemount had the highest concentration of $PM_{2.5}$ pollution in the Central Interior Air Zone. $PM_{2.5}$ are particles up to 2.5 micrometres in diameter that are harmful to human health and can lead to shortness of breath, cardiovascular and respiratory diseases as well as birth defects. Despite air quality concerns, Valemount's residents are making the choice to burn additional wood in light of rising electricity prices due to the termination of the BC Hydro E-plus program.[13] If Valemount was able to use geothermal heat to warm homes and businesses, air quality in the valley would improve.

Geothermal energy projects also create more jobs than other renewable energy types. A study by the U.S. Department of Energy found geothermal energy projects generate 4 jobs/MW in the construction phase, while sustaining 1.7 jobs/MW throughout the project's lifetime. Wind and solar projects generate 0.09 and 0.16 sustainable jobs/MW, respectively.[14]

Another benefit of geothermal energy projects is the stimulation of regional economies. For example, geothermal heat can stimulate BC's forestry sector by providing lumber drying opportunities and value-added forest products. Geothermal heat is a valuable commodity that has the potential to change the economic landscape of a region.

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[10] Meissener, Dirk, "B.C. greenhouse gas emissions near 2007 levels despite carbon tax," 2019, https://bc.ctvnews.ca/b-c-greenhouse-gas-emissions-near-2007-levels-despite-carbon-tax-1.4585664

[11] Canada Energy Regulator, "BC Energy Profile," https://www.cer-rec.gc.ca/nrg/ntgrtd/mrkt/nrgsstmprfls/bc-eng.html?=undefined&wbdisable=true

[12] Environment Canada Low Carbon Economy Challenge GHG template - Natural Gas -Res. Comm. - BC

[13] Andru McCracken, "BC Hydro scraps E-Plus program, forces more wood burning" (July 4, 2019), *The Rocky Mountain Goat*, pg 3, online: <https://www.therockymountaingoat.com/2019/07/bc-hydro-scraps-e-plus-program-forces-more-wood-burning/>.

[14] US DOE, "Buried Treasure: The Environmental, Economic, and Employment Benefits of Geothermal Energy," https://www.nrel.gov/docs/fy05osti/35939.pdf.

5 Case Studies

5.1 Municipality of Cumberland County, Nova Scotia

The Cumberland Energy Authority (CEA) was formed in 2012 through an Inter-Municipal Agreement between the Municipality of Cumberland County, the former Town of Parrsboro, and the former Town of Springhill to promote regional energy development. The CEA's mission is to support the standard of leadership in local government for the development of renewable energy, and also to support the progressive energy industry and the sustainable future of communities.[15]

The CEA oversees the Springhill geothermal mine water project ("the Project"), which began operating in the early 1990's.[16] Ropak Can Am Limited, a manufacturer of plastic packaging products is using the geothermal energy from floodwater in abandoned mines to provide heating and cooling for the company's facility in Springhill, NS. The heat is also used by other operations such as a greenhouse.[17] Mine water at a temperature of 18°C is pumped at a rate of 4L/s from a flooded mine and passed through a heat pump system before reinjection into another separate, but linked mine.[18] Annual energy savings, compared to conventional systems, is around $45,000 CAD or approximately 600,000 kWh.[19]

More recently, the CEA began investigating how the geothermal resources at Springhill could be better utilized and have completed Phase 1 of a three-phase assessment for future development planning. In its entirety, the assessment will cover current uses, available field data, energy and cost savings, GIS analysis, and a deep mine water exploration project. They have contracted a concept design and development, engineering, promotional rendering, and feasibility studies for the Springhill Geothermal Business Park and District Energy System Concept Design.

5.2 Boise, Idaho

The city of Boise has utilized a continuously operating geothermal district heating system since the late 19th Century (1892), making it the oldest such system in the United States. Boise's district heating system was initially installed to heat 250 large homes in the Warm Springs Water District, however, it was expanded in 1983 to provide heat for 81 buildings in the downtown core (353,000 m^2 of floor space). In Boise, geothermal fluid at 77°C (170°F) is pumped from the geothermal reservoir underneath the city to provide a maximum of 22.2 MWt. The system

[15] Cumberland Energy Authority, "About us," accessed July 15, 2019, https://cumberland- energy-authority.ca/about.html.
[16] CADDET, "Geothermal mine water as an energy source for heat pumps," accessed July 15, 2019, pg 1, https://www.nrcan.gc.ca/sites/oee.nrcan.gc.ca/files/pdf/publications/infosource/pub/ici/caddet/en glish/pdf/R122.pdf
[17] *Ibid.*
[18] *Ibid.*
[19] *Ibid.*

circulates > 720 tonnes of geothermal fluid through 21 km of pipe. In 2012, the system was extended to Boise State University to heat a further 56,000 m^2 of floor space.

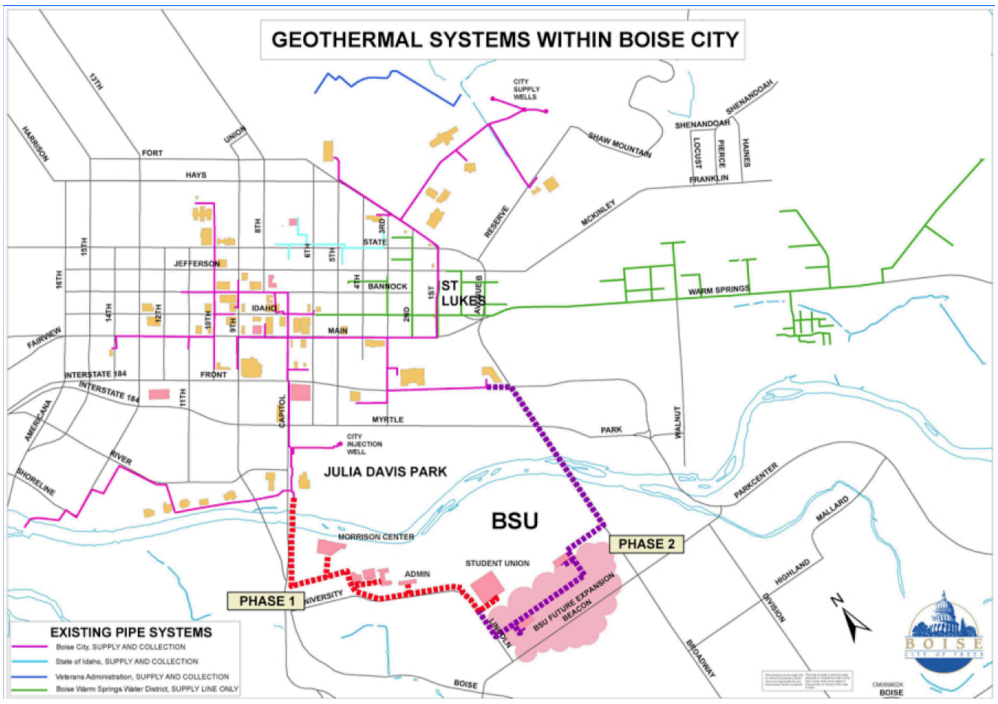

Figure 4: Boise District Heating System

5.3 Klamath Falls, Oregon

The City of Klamath Falls, in Oregon, currently operates a district heating system that provides 8.5 MWt of district heating capacity and 1.2 MWt of snow melting capacity. In total, the system uses 19.7 GWh/yr of geothermal energy and saves 13,372 tonnes/yr of CO_2 emissions. The system serves process heating at the wastewater treatment plant, as well as 24 buildings (37,000 m^2 of floor space), 14,000 m^2 of greenhouse area, and 14,000 m^2 of snow melting. The snowmelt system uses a cascaded design where the remainder of the district heating system energy is used.[20]

The district heating system uses two wells, producing a maximum of 45 L/s at 104°C and 49 L/s at 100°C, respectively.

The Oregon Institute of Technology in Klamath Falls also uses its own geothermal district heating and snow melting system which saves the campus approximately $1,000,000 in heating costs per year.[21]

[20] http://large.stanford.edu/courses/2015/ph240/crane1/docs/tp124.pdf
[21] *Ibid.*

5.4 Paris, France

Paris is targeting a 25% reduction in CO_2 emissions from 2004 levels by 2020. A key component to their emissions reduction strategy has been the use of district energy systems. The Paris Urban Heating Company (CPCU) was formed in 1927 in response to the city's air quality issues, to reduce the risk of fire in the city, and to reduce the amount of fuel deliveries in the city. By 1966 the network had expanded to serve 1,700 clients through 120 km of pipes. In 2015, the network served the equivalent of 500,000 households and distributed 5.5 TWh of heat through 475 km of piping.[22]

The CPCU network is currently transitioning away from non-renewable fuel sources in its energy mix. As part of that strategy, the CPCU is using geothermal energy to partially supply the energy demand for a new urban development zone in the north-east of the city. The project is slated to extract 60°C water from a geothermal well bored into an aquifer beneath the city. This new project that utilizes partial geothermal heating will have one tenth of the CO_2 emissions as compared to conventional gas heating.[23]

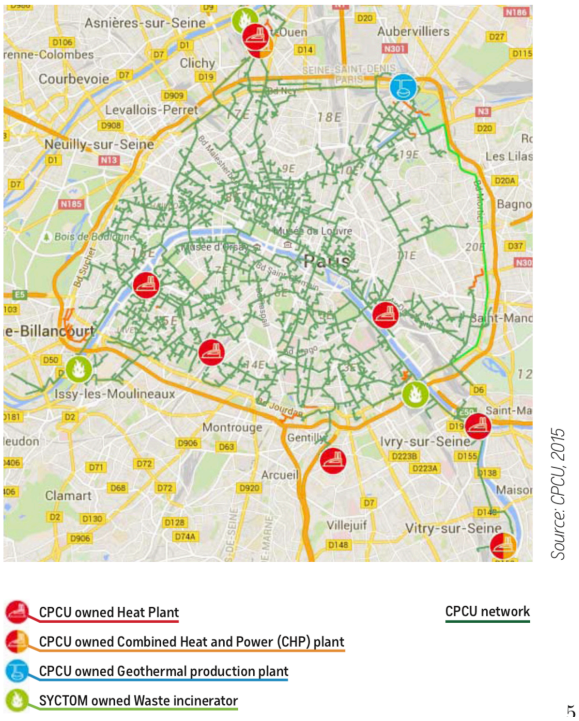

Figure 5: A network map of Paris Urban Heating Company (CPCU).

[22] Paris, U.N.E.P. (2015). United Nations Environment Programme (UNEP): District Energy in Cities. Paris Case Study, 2015. https://www.districtenergy.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=b7d8029e-fb30-d023-a362-50f251a39458&forceDialog=0

[23] *Ibid.*

Just outside of Paris, a number of geothermal heating plants are operating. One of them, located in Villejuif has a production of 220 GWh/yr, making it one of, if not the largest geothermal district heating system in Europe. The plant serves the equivalent of 30,000 homes and has the potential to serve even more when the plant increases its production to 300 GWh/yr. The geothermal resource underneath Paris is at a temperature of between 56 and 85°C at a depth of approximately 2 km. The system exchanges heat between the salty aquifer water and fresh water before distributing it throughout the area. The distribution network is optimized to cascade the heat from higher heat applications to lower heat applications. In the winter, extra heat is added to the system through a cogeneration unit that also produces electricity. Further, a heat pump scavenges remaining heat to put back into the system before the water is returned back into the aquifer. The new plant cost EUR 30MM.[24]

6 Conclusion

In this Inquiry, CanGEA is representing and coordinating with Borealis GeoPower, Kitselas Geothermal Inc., the Village of Valemount, and the Valemount Geothermal Society. As such, CanGEA's role in this Inquiry is to provide information on geothermal energy, the existing proposed projects in BC, the benefits of geothermal district heating applications, and examples of current applications.

CanGEA hopes that the information provided thus far in this submission proves to be useful for the BCUC when considering changes to the regulation of Municipal energy utilities.

CanGEA has many individual members who have entrepreneurial interests in the Geothermal industry. CanGEA also represents non-members that the Association regularly interacts with, from First Nations to community user groups. Overall, CanGEA has the public interest of all British Columbians and all Canadians in mind when executing its mission. The mission of accelerating Canadian exploration and development of geothermal resources in order to provide secure, clean, and sustainable energy to Canada's heat and electricity markets is one that CanGEA views as extremely important.

Geothermal energy can provide competitively priced, renewable, baseload energy to the Canadian market and is part of the solution to growing concerns about securing sustainable and cost-effective energy sources.

When considered in the context of BC's Energy Objectives, shown below, the use of geothermal energy for heat energy aligns with all applicable objectives.[25] It can be argued that no other type of energy aligns with BC's Energy Objectives as well as geothermal energy does.

(a) to achieve electricity self-sufficiency;

[24] http://www.thinkgeoenergy.com/new-geothermal-heating-plant-started-operation-in-paris-france/
[25] *Clean Energy Act*, SBC 2010, c 22, s 2.

(b) to take demand-side measures and to conserve energy, including the objective of the authority reducing its expected increase in demand for electricity by the year 2020 by at least 66%;
(c) to generate at least 93% of the electricity in British Columbia from clean or renewable resources and to build the infrastructure necessary to transmit that electricity;
(d) to use and foster the development in British Columbia of innovative technologies that support energy conservation and efficiency and the use of clean or renewable resources;
(e) to ensure the authority's ratepayers receive the benefits of the heritage assets and to ensure the benefits of the heritage contract under the *BC Hydro Public Power Legacy and Heritage Contract Act* continue to accrue to the authority's ratepayers;
(f) to ensure the authority's rates remain among the most competitive of rates charged by public utilities in North America;
(g) to reduce BC greenhouse gas emissions
    (i) by 2012 and for each subsequent calendar year to at least 6% less than the level of those emissions in 2007,
    (ii) by 2016 and for each subsequent calendar year to at least 18% less than the level of those emissions in 2007,
    (iii) by 2020 and for each subsequent calendar year to at least 33% less than the level of those emissions in 2007,
    (iv) by 2050 and for each subsequent calendar year to at least 80% less than the level of those emissions in 2007, and
    (v) by such other amounts as determined under the *Climate Change Accountability Act*;
(h) to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia;
(i) to encourage communities to reduce greenhouse gas emissions and use energy efficiently;
(j) to reduce waste by encouraging the use of <u>waste heat</u>[26], biogas and biomass;
(k) to encourage economic development and the creation and retention of jobs;
(l) to foster the development of first nation and rural communities through the use and development of clean or renewable resources;
(m) to maximize the value, including the incremental value of the resources being clean or renewable resources, of British Columbia's generation and transmission assets for the benefit of British Columbia;
(n) to be a net exporter of electricity from clean or renewable resources with the intention of benefiting all British Columbians and reducing greenhouse gas emissions in regions in which British Columbia trades electricity while protecting the interests of persons who receive or may receive service in British Columbia;
(o) to achieve British Columbia's energy objectives without the use of nuclear power.

[26] Emphasis Added. Examples of geothermal waste heat include the excess that is derived from a geothermal electricity facility.

Geothermal energy also aligns with the 5 pillars that BC environmental assessments consider. These pillars are environmental, economic, social, heritage, and health. In Valemount, for example, the implementation of a geothermal energy district heating system will:

- reduce GHG emissions,
- provide economic and social opportunity through the creation of local revenue, jobs, and the ability to attract energy intensive industry to the area,
- encourage the development of a sustainable and thriving rural community,
- improve the economics of the local heritage forestry industry,[27] and
- measurably improve air quality, reducing hospital visits related to respiratory distress.

CanGEA's goal in this Inquiry is to inform BC's regulations and policies, such that any changes produce the most substantial benefit for the public. It is CanGEA's conviction that by removing barriers to development for Municipally administrated geothermal energy, it would have overwhelmingly positive results for the Province.

Because district heating infrastructure involves large capital expenditures, it limits the economic feasibility of small applications of the technology. Municipal district heating projects that provide energy to a large group of users are essential because they provide the maximum number of British Columbians an opportunity to utilize this clean, renewable, and baseload source of energy. The more British Columbians use geothermal district heating, the bigger the net benefit for the Province, the Country, and the world.

Countless other jurisdictions from around the world have successfully implemented district heating systems in their populated areas. Besides the United States, Canada, and France, there are also geothermal district heating systems in operation in Iceland, Poland, Hungary, Turkey, Japan, China, Romania, and New Zealand, among others. In 2019, year to date, geothermal industry website, *www.thinkgeoenergy.com*, published the following articles on district heating systems in Germany:

- *Geothermal energy and the $298bn district heating & cooling market opportunity.*[28]
- *Second chance for a district heating network in Geretstried, Bavaria?*[29]
- *German city of Potsdam planning to tap into geothermal for district heating.*[30]
- *Munich utility finishes third well for geothermal district heating project.*[31]
- *Geothermal district heating project contributes to successful investment fund*.[32]
- *Munich taps geothermal plants outside the city for district heating.*[33]

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[27] The Village of Valemount was incorporated in 1963 as a forestry-based driven economy.
[28] http://www.thinkgeoenergy.com/geothermal-energy-and-the-298-bn-district-heating-cooling-market-opportunity/
[29] http://www.thinkgeoenergy.com/second-chance-for-a-district-heating-network-in-geretstried-bavaria/
[30] http://www.thinkgeoenergy.com/german-city-of-potsdam-planning-to-tap-into-geothermal-for-district-heating/
[31] http://www.thinkgeoenergy.com/munich-utility-finishes-third-well-for-geothermal-district-heating-project/
[32] http://www.thinkgeoenergy.com/geothermal-district-heating-project-contributes-to-successful-investment-fund/
[33] http://www.thinkgeoenergy.com/munich-taps-geothermal-plants-outside-the-city-for-district-heating/

- *The city of Hamburg bets on geothermal for district heating plans*.[34]
- *Harnessing the heat from beneath – geothermal district heating of Erding, Germany.*[35]
- *Geothermal district heating creates enticing incentive for business in Unterhaching, Germany.*[36]
- *Fifth well successfully drilled for Munich's geothermal district heating network.*[37]

The amount of investment in Geothermal energy and district heating systems in Germany is staggering, and there is no question that British Columbia could be striving to emulate Germany in that regard. It is clear that geothermal district heating is not a new concept. It is a globally adopted energy technology and it provides myriad benefits, regardless of geography and politics.

We thank the Commission for the opportunity to participate in this Inquiry. We are prepared to be a partner in the promotion of British Columbia's climate, economic development, and reconciliation goals and we truly hope that our participation in this Inquiry was helpful for the Commission in determining the future regulation of Municipal Energy.

CanGEA is available to answer more questions on this very important topic, if requested.

Sincerely,

Christal Loewen
Policy Director, CanGEA

[34] http://www.thinkgeoenergy.com/the-city-of-hamburg-bets-on-geothermal-for-district-heating-plans/
[35] http://www.thinkgeoenergy.com/harnessing-the-heat-from-beneath-geothermal-district-heating-of-erding-germany/
[36] http://www.thinkgeoenergy.com/geothermal-district-heating-creates-enticing-incentive-for-business-in-unterhaching-germany/
[37] http://www.thinkgeoenergy.com/fifth-well-successfully-drilled-for-munichs-geothermal-district-heating-network/