September 10, 2019

SENT VIA EMAIL TO COMMISSION.SECRETARY@BCUC.COM

Attention: BCUC Commission Secretary

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Commission Secretary:

Re: Indigenous Utilities Regulation Inquiry - CanGEA Response to the Information Requests from the Commercial Energy Consumers Association of British Columbia

Attached please find the Canadian Geothermal Energy Association's response to the information request from the Commercial Energy Consumers Association of British Columbia (CEC).

CanGEA worked with Kitselas Geothermal Inc. (KGI) to determine which questions CanGEA would be best suited to answer. As a result, CanGEA was assigned questions 2.1 and 4.1 from the CEC information request document. CanGEA defers all remaining questions from the CEC to KGI.

Should you have any questions with regard to this matter, please do not hesitate to contact us.

Sincerely,

Zach Harmer, MPP
Policy Director
CanGEA
CANADIAN GEOTHERMAL ENERGY ASSOCIATION

Indigenous Utilities Regulation Inquiry

Information Request from:
CEC

2. Reference: Exhibit C6-3, KGI Written Evidence page 9 and 10

The heat market is highly competitive. On a direct basis, despite the regulation of some participants, notably natural gas distributors and occasional strata or one-off heat projects, the market is open to competition from alternate forms of supply. At any one time, an energy buyer will have the choice of selecting from one or more supply types (electricity, natural gas – pipeline, natural gas, CNG, propane, fuel oil, diesel, solar, and/or wood) from any number of sellers.

Further, this price competition is not a function of scale (or size). For all heat providers, economically efficient equipment exists at the lowest scale. During the preparation of this submission, as articulated by a colleague, the barriers to entry for a wood stove or baseboard heating are quite low when wood is plentiful and electricity is already on site.

This is an important point, as we believe there can be more than one economically viable heat IU within any given jurisdiction. As such, internal price competition within this market is a real possibility, should market pricing diverge from readily available alternatives.

2.1 Please provide a rough estimate of the costs and time required for a customer to switch from one source of heat to another source of heat.

On July 16, 2019, the City of Berkeley announced a ban on natural gas lines in new low-rise residential buildings. The announcement set off a flurry of responses from different groups, including the Canadian Gas Association, who noted that the resiliency of pipeline infrastructure, new technologies that have reduced leaks and emissions, and the fact that in many Canadian homes, natural gas would simply be displaced with less-efficient, natural gas-generated electricity (or coal).[1] CanGEA seized the opportunity to "engage in constructive dialogue regarding integrated energy solutions."[2] Within CanGEA's recent thought piece, several salient points that address the question posed were made and will be discussed further below:

> Homes that are built with radiant in-floor heating or hydronic heating fueled by natural gas could be adapted to harness the heat from geothermal fluids in the future. Although clean geothermal energy is not currently being utilized by Canadian households, building homes without the necessary "nuts and bolts" for geothermal integration down the road precludes us from the option to retrofit. To take advantage of this globally-used clean energy type in the future, we need to consider opportunities to build in flexibility today.[3]

[1] Loewen, Christal, "Our stoves are not a battleground: Integrated energy solutions the most sensible path forward," *Canadian Geothermal Energy Association Linkedin Article*, published August 20, 2019, https://www.linkedin.com/pulse/our-stoves-battleground-integrated-energy-solutions/.
[2] *Ibid*.
[3] *Ibid*.

Within this statement, CanGEA argues that building homes with radiant in-floor or hydronic heating fueled by natural gas can, be more beneficial for carbon reductions than houses that are electrified, depending on the grid's main electricity sources. CanGEA then took this further by stating:

> T.S. Eliot said, "Home is where one starts from," and each of us is responsible for examining the carbon footprint of our own household. Hybrid hydronic heating and cooling systems can be developed by integrating a geothermal heat exchanger with a gas-fired boiler. In this type of system, low-temperature geothermal fluids are exploited for basic space heating, while the gas-fired boiler "tops up" the temperature of working fluids for more heat-intensive functions like on-demand domestic hot water.[4]

In essence, CanGEA was arguing that switching heating sources would not necessarily require the complete swapping of one type to another, i.e. natural gas to geothermal heating. Instead, it is possible to have a natural gas/geothermal system that work in a complementary manner. Thus, the transition to carbon-free heating can be incremental and make use of existing heating systems. What is key within CanGEA's argument is that new housing and building developers must adopt a forward-thinking approach when designing new developments. Though the electrification of heating is an approach to reducing carbon emissions from most of BC's home and building heating sector, it is worth noting that there are several places throughout the Province where electrification may not be the best option to reduce carbon emissions, in terms of cost of service or source of electricity.

In terms of a general estimate of costs from switching from one source of heating to another, CanGEA submits that it is dependent on a number of factors such as size of building, purpose of heating, what heating source is currently being used, and other factors. However, as suggested by our response, the costs of switching from certain sources, i.e. the switch radiant in-floor or hydronic heating fueled by natural gas to geothermal heating is far lower than other switches. As such, CanGEA believes that thoughtful planning is needed to ensure that heating options and their carbon intensity are available to developers to ensure the best, forward-thinking decisions can be made.

4.1 – Please provide KGI's understanding of the rationale for the <80◦C threshold in regulation forms.

Background:

The British Columbia *Geothermal Resources Act (GRA)* (1996) defines a geothermal resource as "the natural heat of the earth and all substances that derive an added value from it, including steam, water and water vapour heated by the natural heat of the earth and all substances dissolved in the steam, water or water vapour obtained from a well, but does not include

> (a) water that has a temperature less than 80◦C at the point where it reaches the surface, or

[4] *Ibid.*

(b) hydrocarbons."[5]

Therefore, to be considered a geothermal resource in British Columbia (BC), the temperature of the water at surface must be equal to or great than 80◦C. Notably, if a person is engaged in the production of a geothermal resource, they are exempt from the *Utilities Commission Act*, meaning they are not regulated by the British Columbia Utilities Commission (BCUC).[6]

Waters that have a temperature less than 80◦C at the surface that are being used in a heating or cooling application are treated as a Thermal Energy System (TES) and are governed by the *Thermal Energy Systems Regulatory Framework Guidelines (TESRFG)*, which is regulated by the BCUC.

On March 31, 2017, the BC Oil and Gas Commission (BCOGC) became the regulator responsible for overseeing aspects of geothermal well operations in BC.[7] Under the *GRA*, the BCOGC has the authority to regulate geothermal from preliminary exploration and well authorizations, through to well closure. However, the BCOGC's regulatory authority is limited to facilities associated with the production and injection of geothermal water and does not regulate facilities that convert geothermal resources for commercial purposes (i.e. electricity generation). KGI explored this issue and learned that the regulation of such facilities falls to another regulator, Technical Safety BC. To better understand this relationship, KGI created a flowchart connecting the various stages of energy production and when different regulators become involved. This flowchart has been reproduced in Appendix A.

Rationale for the <80◦C Threshold:

CanGEA was not privy to the rationale that was used to inform the decision for the <80◦C threshold that defines whether a fluid is a geothermal resource or not. However, the following section will provide reasons as to why CanGEA believes that the regulatory situation has become what it is today.

Geothermal resources below 80◦C are typically referred to as low-temperature geothermal resources. Though there are numerous potential applications for low-temperature geothermal resources, historically geothermal energy exploration in BC was devoted to developing resources for electricity production, see excerpt below:

> Geothermal research has been conducted for many years in Canada. A geothermics program was started in 1962. In 1976 the Department of Energy Mines and Resources (Natural Resources Canada predecessor department) initiated The National Geothermal Energy Program that ran until March 31[,] 1986, with a total budget of $6 million (in 1980's dollars). This program was responsible for the collection of much of the geothermal data that currently exists for Canada and provided the initial definition of regions of Canada with the highest resource potential. The program included cooperative demonstration projects as well as technical assistance to various government agencies interested in geothermal developments. The program was terminated in response to [a] drop in petroleum prices in 1986, which made most renewable energy resources uncompetitive. It

[5] *Geothermal Resources Act*, RSBC 1996, Chapter 171, http://www.bclaws.ca/civix/document/id/complete/statreg/96171_01#section23.
[6] *Utilities Commission Act*, RSBC 1996, Chapter 473, http://www.bclaws.ca/civix/document/id/complete/statreg/96473_01.
[7] British Columbia Oil & Gas Commission, "Geothermal Energy," accessed August 16, 2019, https://www.bcogc.ca/public-zone/geothermal-energy.

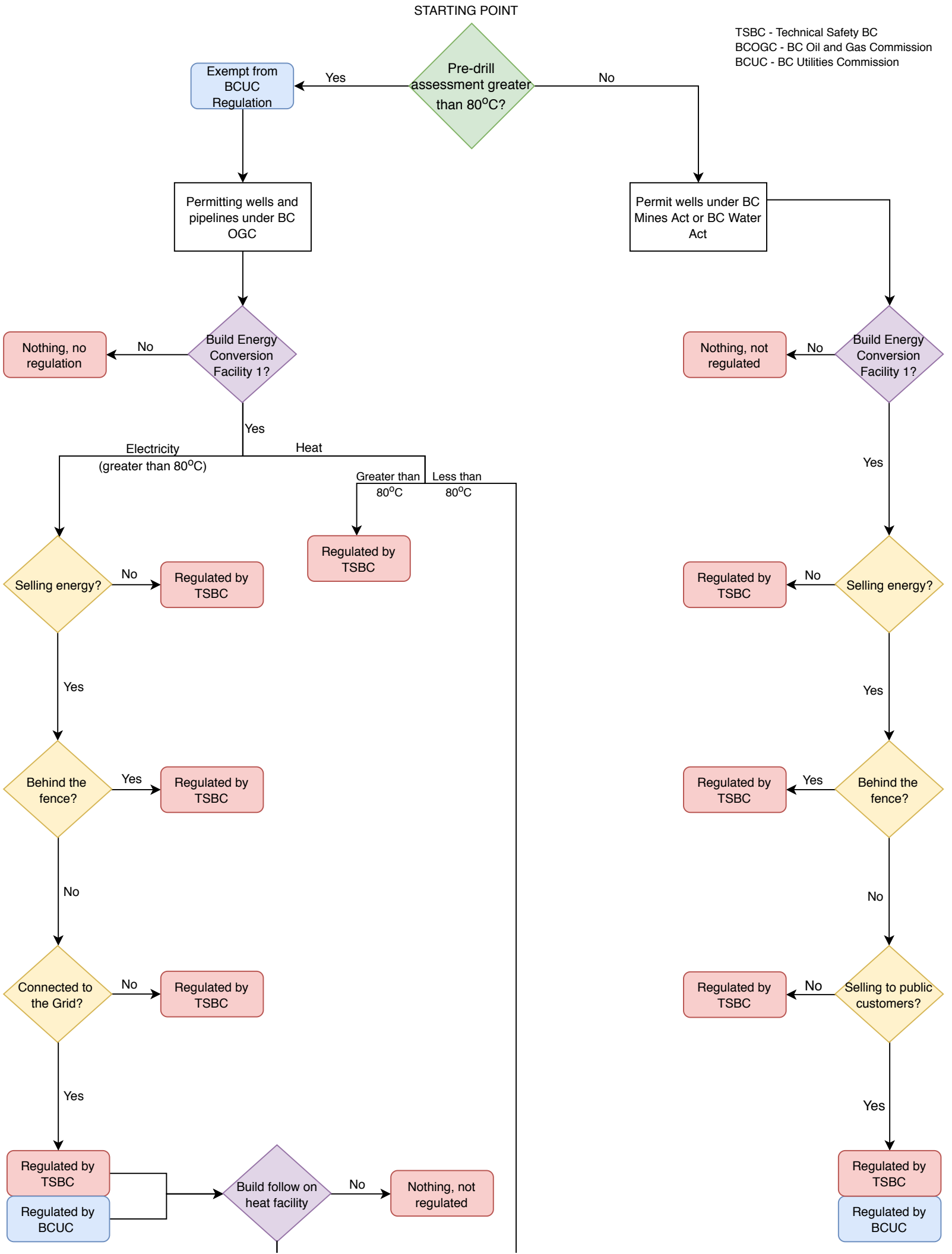
is worthy to note however that costs of carbon emissions were not accounted for at that time.

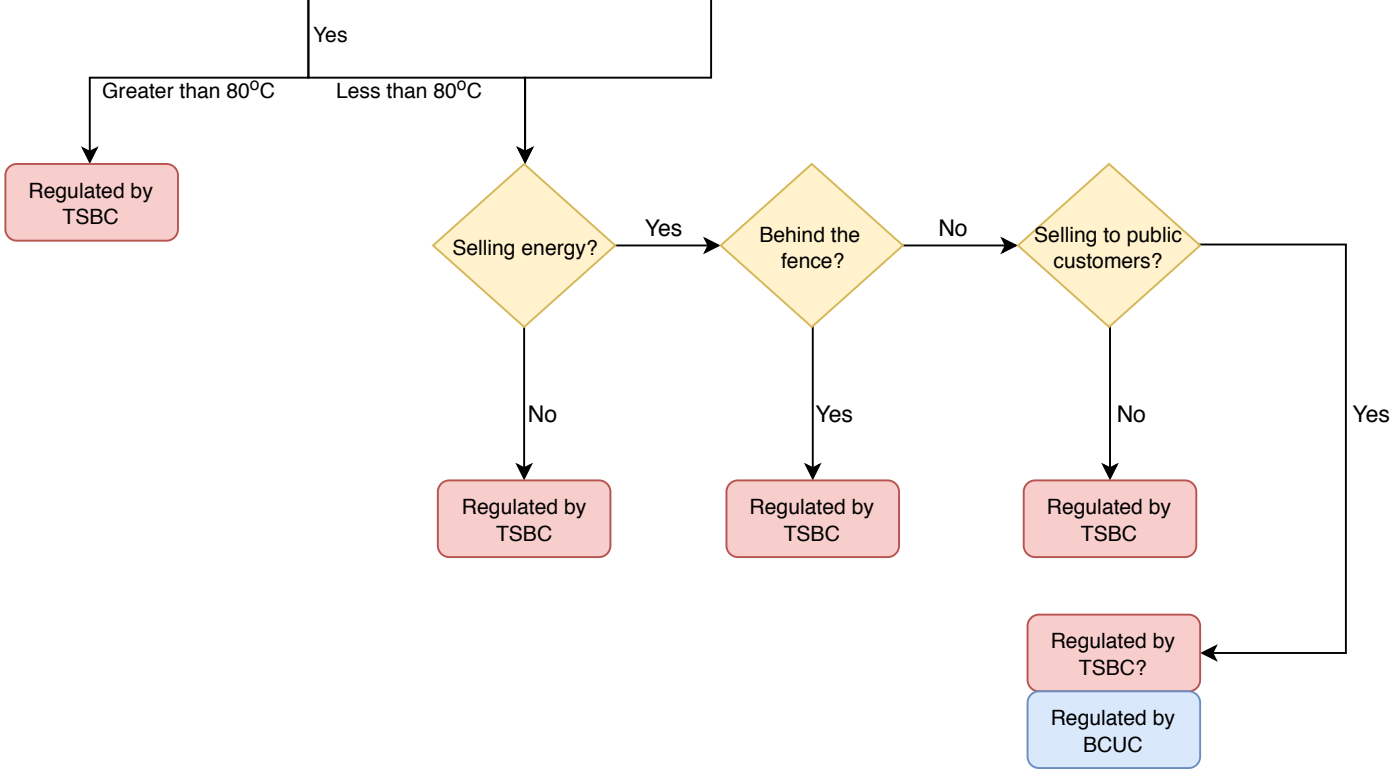
The National Geothermal Energy Program defined significant geothermal energy potential in Canada. A successful demonstration project at Meager Mountain in British Columbia discovered resources up to 290°C and culminated in the first electrical generation by geothermal power in Canada by a 20-kilowatt demonstration plant. While a success, this project was not connected to the grid and has since been left in a pre-development stage.[8]

Prior to the 1996 passing of the *GRA*, the main geothermal research in BC was focused on high-grade geothermal resources (290°C) with the goal of electricity production. Moreover, lower temperature (~80-85°C) geothermal electricity generation equipment (Organic Rankine Cycle) was first deployed in the United States in the early 1980s, which suggests that the advancement in geothermal technology influenced the temperature selected to define geothermal resources.[9] Given information, it seems the intent of *GRA* was to regulate geothermal resources for electricity production or define geothermal resources based on its ability to produce electricity.

[8] Grasby, Stephen *et al.*, "Geothermal Energy Resource Potential of Canada", *Geological Survey of Canada* (2011), pg. X-XI, http://publications.gc.ca/collections/collection_2013/rncan-nrcan/M183-2-6914-eng.pdf.
[9] Orenstein, Rahm, Delwiche, Ben, "The Don A. Campbell Geothermal Project," *GRC Transactions*, Vol. 38, 2014, http://pubs.geothermal-library.org/lib/grc/1033522.pdf.

Appendix A: KGI Flowchart


STARTING POINT
TSBC - Technical Safety BC
BCOGC - BC Oil and Gas Commission
BCUC - BC Utilities Commission
Pre-drill assessment greater than 80°C?
Yes
No
Exempt from BCUC Regulation
Permitting wells and pipelines under BC OGC
Permit wells under BC Mines Act or BC Water Act
Build Energy Conversion Facility 1?
No
Nothing, no regulation
Yes
Electricity (greater than 80°C)
Heat
Greater than 80°C
Less than 80°C
Regulated by TSBC
Selling energy?
No
Regulated by TSBC
Yes
Behind the fence?
Yes
Regulated by TSBC
No
Connected to the Grid?
No
Regulated by TSBC
Yes
Regulated by TSBC
Regulated by BCUC
Build follow on heat facility
No
Nothing, not regulated
Build Energy Conversion Facility 1?
No
Nothing, not regulated
Yes
Selling energy?
No
Regulated by TSBC
Yes
Behind the fence?
Yes
Regulated by TSBC
No
Selling to public customers?
No
Regulated by TSBC
Yes
Regulated by TSBC
Regulated by BCUC


Yes
Greater than 80°C
Less than 80°C
Regulated by TSBC
Selling energy?
Yes
Behind the fence?
No
Selling to public customers?
No
Yes
No
Yes
No
Yes
Regulated by TSBC
Regulated by TSBC
Regulated by TSBC
Regulated by TSBC?
Regulated by BCUC