

**Canadian Geothermal Energy Association  
(CanGEA)  
Pre-Budget 2016 Submission to the House of  
Commons Standing Committee on Finance**

Contact:

**Alison Thompson** | Chair | 403-801-6805 | [alison@cangea.ca](mailto:alison@cangea.ca)

**Alex Kent** | Policy Intern |

CanGEA P.O. Box 1462 St. M, Calgary, Alberta, T2P 2L6, Canada



The Canadian Geothermal Association (CanGEA) is the collective voice of Canada’s geothermal industry with a focus on power generation and industry-scale direct use of heat from geothermal resources. Our association represents 100+ members with the goal of unlocking Canada’s tremendous geothermal potential. **We champion the development of geothermal because our data supported position is that geothermal is a key ingredient to achieving a prosperous, and sustainable future for Canada - especially in northern Indigenous communities.**

**Recommendation 1: Promote energy literacy with CanGEA**

Geothermal is a clean and renewable source of power and heat derived from deep, (3 - 5 km) underground reservoirs of brine solution. There are 3 main types of geothermal resources in Canada that each use different technology and have unique costs: Volcanic/Magmatic, Hot Sedimentary Aquifer, and Enhanced Geothermal Systems in hard rock. (GroundSource Heat Pumps/Geoexchange are commonly referred to as shallow “geothermal” and are represented by the Geoexchange Coalition.)

Because there are different types of geothermal, much like there are different types of fossil fuels, the public and policy makers at all levels of government in Canada have, at times, misunderstood this renewable energy. This has led to barriers to development and a widespread sentiment that geothermal doesn’t work in Canada – or else somebody would have developed it already. Our submission aims to clarify the factual reasons for, and offer remedies to, our industry’s slow start.

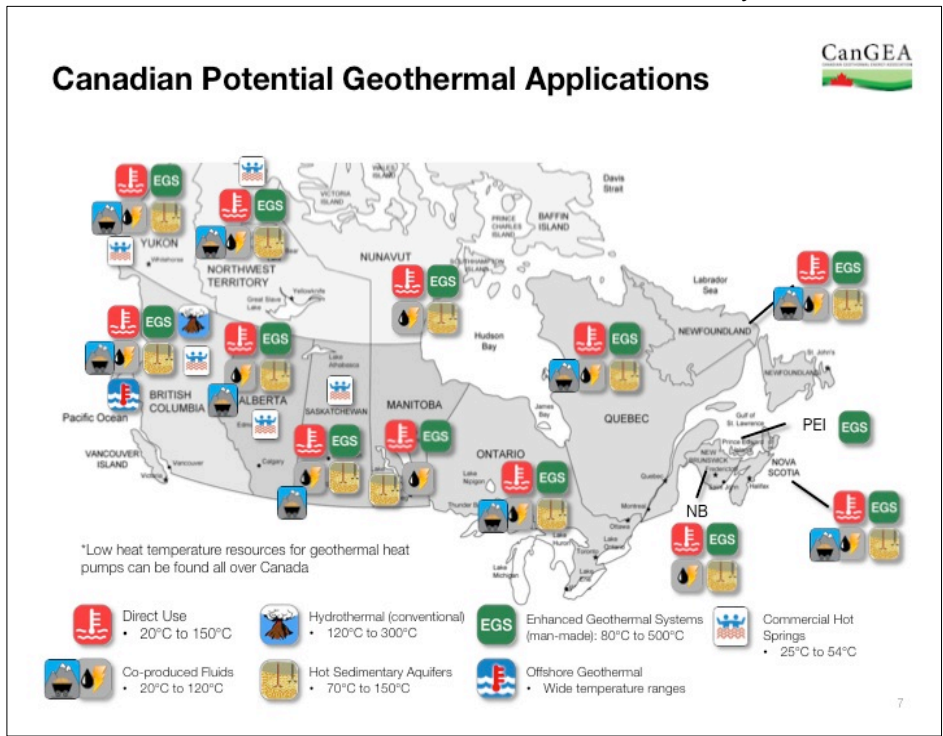


Figure 1. Geothermal resource diversity and distribution

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 the country's tremendous geothermal energy potential. Geothermal energy can provide competitively priced, renewable, round-the-clock energy to the Canadian and U.S. markets.

Despite having no geothermal power facilities in Canada, North America is still the largest continental producer of geothermal electricity thanks to the US and Mexico. The geothermal resources in all three countries are similar in distribution and quality but development of geothermal to the south has occurred because of government, industry and public understanding of the benefits that geothermal provides.

The finance committee should know that geothermal:

- Is the most affordable renewable energy with a per-kWh cost ½ of hydroelectric or wind<sup>1</sup>.
- Is a baseload generator of electricity and heat with an average capacity factor of 92% compared to 25% for solar<sup>1</sup>.
- Creates 11X more jobs than hydroelectricity and 17X more jobs than natural gas plants<sup>2</sup>.
- Supplies heat to whole communities via district energy thereby offsetting thousands of tonnes of Greenhouse Gas emissions from furnaces<sup>3</sup>.
- Increases food security for remote/northern communities by enabling otherwise impossible agriculture in cold weather conditions as Iceland has demonstrated<sup>4,5</sup>.
- Allows for commercial aquaponic fish farms that do not harm native fresh or saltwater fish species<sup>5</sup>.
- Is ideal for Canada, especially the north, because of our country's world-class geothermal resources<sup>6</sup>.
- Synergizes with Canada's established subsurface talent and infrastructure that would allow oil patch workers to return to work developing natural resources<sup>7</sup>.
- Minimizes the area required for industry or drowned for dams because geothermal has the smallest project footprint for equivalent generation requiring 1.1% of the area needed for solar photovoltaic and 3.4% of the area used by a wind farm<sup>8</sup>.
- Can deploy gigawatts of energy in less than 4 years<sup>9</sup>.
- Creates significant employment in the tourism industry<sup>10</sup>.
- Meets the Prime Minister's ministerial mandate goals to Jim Carr, Carolyn Bennet, Navdeep Singh Bains, Stéphane Dion, Chrystia Freeland, Catherine McKenna and Bill Morneau<sup>11</sup>.

For these reasons, we recommend that the Federal government provide financial assistance of \$500,000 over 4 years to CanGEA so that we may expand our current "powEARTHful" outreach, education and market development initiatives. These three activities will facilitate the development of geothermal in Canada by identifying targets for development, educating the public and policy makers about project benefits and showing businesses the opportunities of investing in geothermal.

<b>Recommendation 2:</b>	<b>Redeploy under-employed oil, gas and mining expertise and repurpose infrastructure via the development of the geothermal industry</b>
--------------------------	--

Geothermal development in Canada is aided by two major factors - resource availability and resource accessibility, both of which derive from Canada's geology and synergy with the mining and upstream petroleum sectors. Because the exploration and development of geothermal reservoirs use techniques and technologies nearly identical to the petroleum and mining industries, geothermal is the best way to redeploy existing Canadian subsurface geoscience expertise and associated services toward a sustainable energy future.

In particular, the development of geothermal provides Oil & Gas workers with a social license to use their skills and services toward a sustainable economy. (Note that Chevron is the world's largest geothermal power developer.) CanGEA continues to have meaningful conversations with the Alberta and Saskatchewan governments on how best to support the skills redeployment and infrastructure repurposing opportunities (for example, micro-electricity from existing oil & gas wells) and we welcome federal support as well. Our Recommendations 3 - 7 are designed to promote geothermal development with the aid of Oil & Gas workers without subsidizing petroleum production.

<b>Recommendation 3:</b>	<b>Amend the Federal definition of geothermal heat by removing the requirement for a system heat pump</b>
--------------------------	---

Current and past federal renewable energy programs do not consider direct use of geothermal heat as being distinct from heat pump systems. Geothermal is a primary energy source and the continued mischaracterization of geothermal as being synonymous with shallow geo-exchange heat pumps benefits neither industry. As Figure 2 demonstrates, geo-exchange is one part of a much larger resource base. As an example of the current misrepresentation of geothermal, the Accelerated Capital Cost Allowance (ACCA) technical class guide 43.2 states that a geothermal heat system requires a heat pump. **A direct use geothermal system does not use a heat pump and is therefore ineligible for the ACCA program as a source of renewable heat.** To support the geothermal industry, the government must include the opportunities from all the different geothermal resource types.

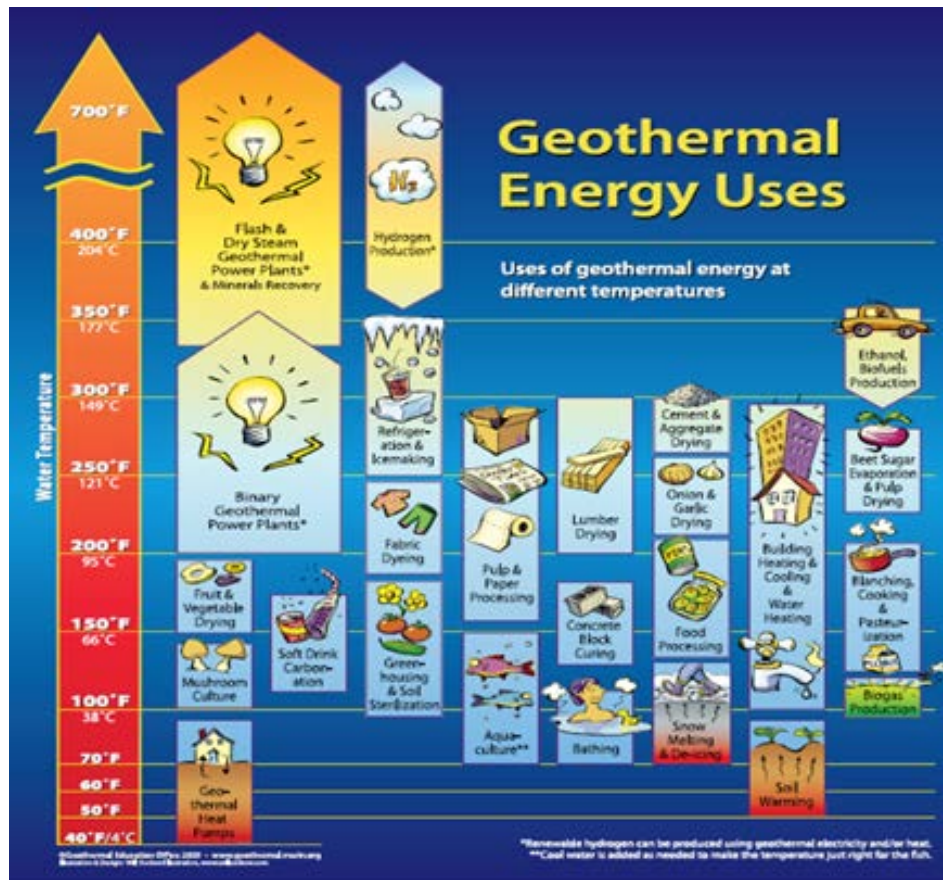


Figure 2.

<b>Recommendation 4:</b>	<b>Create a renewable heat incentive program to complement existing renewable energy programs</b>
--------------------------	---

CanGEA fully agrees with the Green Budget Coalition’s submission that **to achieve a sustainable future, renewable heat must be a major component of the economy.** The potential benefits from geothermal heat are myriad and could serve all Canadians because our geothermal resources are diverse in character and distribution across the country (Figure 1).

Figure 2 is a striking visual overview of how geothermal heat (and geo-exchange and geo-power) can empower a society. At the largest Geo-Park in Iceland, 650 jobs have been created using many of the industries shown above. In Germany in 2015, over 150 jobs were created in a geo-greenhouse operation. At the February 2016 Valemount, BC Geo-Park workshop, scores of jobs were envisioned. In MooseJaw, SK at the Temple Gardens Mineral Spa, 200 jobs have been created. CanGEA recommends that the Federal government **explicitly include renewable heat, from geothermal and other renewable energies in the Canada Infrastructure Bank, Green Bond, and Low Carbon Economy Trust programs.**

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 the country’s tremendous geothermal energy potential. Geothermal energy can provide competitively priced, renewable, round-the-clock energy to the Canadian and U.S. markets.

- Creating loan guarantees, \$/GJ incentives, etc. as part of the support for renewable heat projects would signal to industry that the Liberal government is willing to think beyond the electrical outlet for ways to achieve climate change and economic diversification targets.
- CanGEA suggests that the \$36 million Eco-Energy for Heat Incentive program be expanded to include renewable heat sources that have been so far excluded such as geothermal and other renewables. Only passive solar heating was allowed to claim the 25% capital rebate, up to \$400,000/project.

<b>Recommendation 5:</b>	<b>Adjust the tax code to enable geothermal to reach parity with other natural resources funding</b>
--------------------------	--

CanGEA makes this recommendation because it helps satisfy Bill Morneau's Ministerial mandate. The following are ways that geothermal could benefit from existing federal programs with simple amendments each of which would allow the government to support oil and gas workers without subsidizing the petroleum industry.

- The Canadian Development Expense (CDE) and Canadian Exploration Expense (CEE) programs should include geothermal projects and extend past their current 2017 expiration.
  - It is currently unclear to our industry if the full benefits of the CDE and CEE programs have been translated in the Canadian Renewable and Conservation Expense (CRCE) program to include both geothermal power and heat. We urgently request clarification on this matter.
- The Canadian Oil & Gas Property Expenses (COGPE) program allows for 10% of lease costs to be paid back to petroleum projects. Geothermal wells are nearly identical and so would benefit from reduced leasing fees without changing the program's role.
- The Mineral Exploration Tax Credit (METC) should also consider geothermal a mineral resource because geothermal developers use the same prospecting activities that are covered under the METC for miners. As well, valuable Rare Earth Elements can be recovered from certain geothermal brines.
- The Foreign Resource Expense (FRE) and Foreign Exploration and Development Expense (FEDE) only allow for foreign petroleum drilling to be claimed. Canadian geothermal developers are currently disadvantaged even though they are nearly identical operationally which limits Canada from exporting its world leading geoscience talent to help other nations meet renewable energy targets.

---

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 the country's tremendous geothermal energy potential. Geothermal energy can provide competitively priced, renewable, round-the-clock energy to the Canadian and U.S. markets.

<b>Recommendation 6:</b>	<b>Federal programs for Geothermal Power (“Activation Energy” for our industry)</b>
--------------------------	---

If Canada is to develop its geothermal industry, the government should give the same start-up advantages that were previously awarded to the wind and solar electricity industries. The wind power industry alone has received \$334 million under the Wind Power Production Incentive that was directly responsible for the creation of 924 MW of clean electricity. The Renewable Power Production Incentive was allotted \$97 million and the Eco-Energy for Renewable Power Program (EERP) has paid out \$1.4 billion to renewable power producers in Canada. No geothermal project was able to benefit from the latter 2 programs because:

- The programs did not recognize direct use heat which significantly limited the ability to integrate commercial heat opportunities into geothermal power projects in order to make them more economic.
- The tax situation outlined in Recommendation 5 made it irrational for a subsurface resource investor to drill for geothermal when conventional resources with geoscience risk offered more advantages to an investor.
- Geothermal projects would only be funded on a “case by case” basis. This stymied development for geothermal as compared to other renewable generators who were provided maximum capacity factors which allowed for their project economics to be calculated with investor confidence.
- Provinces did not offer geothermal tenure rights at the time.

Through considerable effort engaging with the Provinces, CanGEA has worked towards correcting the last point but the geothermal industry needs the federal government’s help to fix the first three.

In concert with our previous recommendations, CanGEA requests that the federal government either create a Geothermal Power and Heat Production Incentive or restart the EERP with revisions so that geothermal is not disadvantaged. For either program to see maximum use and benefit, CanGEA recommends that the new program(s) should:

- Be more flexible and reflect geothermal’s relatively higher upfront costs than other renewable energies, for example:
  - By offering upfront cash grants equivalent to the NPV of the \$/MWh payment schedule (as the USA does).
- Develop geothermal capacity factors with industry input so that developers can fully prepare an economic analysis for investors.
- Make direct use of heat a centre point. The government has helped renewable electricity in the past, it is time to help renewable heat and power get its start.

<b>Recommendation 7:</b>	<b>Fund the Geological Survey of Canada (GSC) to assess geothermal resources</b>
--------------------------	--

Scientific exploration is the foundation of innovation and CanGEA recommends that the GSC receive funding and a mandate to develop a publically accessible Geothermal Data System, Resource Assessment and Classification system. The more that Canadians know about Canadian resources, the more innovative we can be. We first requested this recommendation in our 2009 pre-budget consultation submission, and since that time, CanGEA has taken on this role and completed maps for Alberta, British Columbian and Yukon. It is more suitably a role for the GSC to take over and expand upon from CanGEA's work.

### **Conclusion**

Thank you for considering our submission to this 2016 pre-budget consultation.

We believe that our submission has outlined how Canadian geothermal will support the middle class, better our infrastructure through diverse and sustainable economic development opportunities, deliver services and security to remote communities, and is well within the grasp of the 2016 budget. CanGEA is available for follow-up questions.

Sincerely,

Alex Kent  
Policy Manager Intern, CanGEA

### **Citations**

1. USDOE(2015)Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2015.p.6.
2. CanGEA(2014)Geothermal Energy: The Renewable and Cost Effective Alternative to Site C.p.6-7&26
3. Global District Energy Awards(2015)Deep Geothermal Energy | Kirchweidach, Germany. Retrieved from <http://www.districtenergyaward.org/deep-geothermal-energy-kirchweidach/> on January 28,2016.
4. National Energy Association of Iceland(N.D.)Greenhouses. Retrieved from <http://www.nea.is/geothermal/direct-utilization/greenhouses/> on January 28,2016.
5. Ragnarsson,Á.(2005)Geothermal Development in Iceland 2010-2014.Fish farming,4,9.
6. CanGEA(2014)CANADIAN NATIONAL GEOTHERMAL DATABASE AND PROVINCIAL RESOURCE ESTIMATE MAPS. Retrieved from <http://www.cangea.ca/bc-geothermal-resource-estimate-maps.html> on January 28,2016.
7. Harvey,C.(2011)Oil and gas wells find new life with geothermal. Retrieved from <https://www.newscientist.com/article/mg21228394-100-oil-and-gas-wells-find-new-life-with-geothermal/> on January 28,2016.
8. Islandsbanki Geothermal Energy Team(2011)United States Geothermal Energy Market Report.p.9
9. Bertani,R.(2015)Geothermal Power Generation in the World 2010-2014 Update Report. p12.
10. CanGEA(2014)Temple Gardens Case Study.
11. Trudeau,J.(2015)Ministerial Mandate Letters. Retrieved from <http://pm.gc.ca/eng/ministerial-mandate-letters> on December 10,2015.

---

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 the country's tremendous geothermal energy potential. Geothermal energy can provide competitively priced, renewable, round-the-clock energy to the Canadian and U.S. markets.