



*"Accelerate Canadian exploration and development of geothermal resources in order to provide secure, clean and sustainable energy"*

**Empowering Canadian Geothermal – 5, 000 MW by 2015!**

**Right Honourable Stephen Harper P.C., M.P.  
Office of the Prime Minister  
80 Wellington Street  
Ottawa  
K1A 0A2**

January 19, 2010

**Re: Canadian Geothermal Resource Development**

Dear Prime Minister Harper,

Please accept this letter on behalf of the Canadian Geothermal Energy Association and its members, (see appendix). This is a pivotal time for the Canadian geothermal industry and we believe the Federal Government can play an important role in the development of this carbon-free, renewable energy source to harvest its great potential and satisfy Canada's growing energy needs.

Often considered the workhorse of renewable energy mediums, geothermal power is a base-load source of clean energy that operates at **over 90% reliability** – independent of atmospheric conditions. This **mature and proven technology** is well poised to tackle two of Canada's greatest challenges; **climate change** (reducing GHG emissions) and **energy security**. Furthermore, with the continued growth of the American and Mexican geothermal industries who share similar geological resources we believe there has never been a better time for Canada to embrace this exciting industry. (See appendix for country comparison)

**Climate Change**

Addressing climate change through the reduction of carbon emissions (20% by 2020) will require Canada to move increasingly towards the development of zero emissions energy sources (90% renewable energy by 2020). Geothermal power is clean, green, and reliable. It can operate at or near full capacity day and night generating a consistent supply of power **free from fuel costs or carbon emissions**. Additionally, geothermal energy can effectively **offset emissions** when used in conjunction with other resource development such as **oil & gas** and/or **mining**.

**Energy Security**

The potential for geothermal energy in Canada is immense. This abundant source of clean, reliable energy can fortify our domestic energy supply and provide a lasting contribution to satisfy the energy demands of the future. At the same time, a strong geothermal energy supply would further support energy exports to markets demanding clean, renewable energy such as the United States.



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### **Northern & Remote Community Development**

In Northern and Remote Communities energy security is a major concern. Geothermal power is well suited to address the needs of these communities as it can provide clean, reliable electricity while also providing heat energy for space heating in residential or commercial uses such as green houses to grow local produce. **Geothermal energy can free these communities from their reliance upon fuel imports** of diesel fuel for power generation.

### **First Nations Engagement**

Indigenous peoples around the world have long recognized the importance of geothermal resources in their community. The indigenous people of New Zealand have long used geothermal surface features for traditional purposes such as heating and cooking, and in recent decades have also developed geothermal resources beneath their lands for electricity generation. We believe the First Nations of Canada, in partnership with the Federal Government, can similarly be leaders in developing a truly Canadian geothermal industry.

## **Key Policy Recommendations**

The **Federal Government** can play a pivotal role, both as a **leader** and **innovator**, to drive this industry forward. Current barriers to development can easily be overcome with properly funded programs to address geo-science knowledge gaps, drilling risks, jurisdictional uncertainty, and environmental permitting.

### **1. Geothermal Resource Assessment & Mapping**

The geothermal energy potential in Canada is immense. However, in order to gain an accurate understanding of the full geothermal potential in Canada a **comprehensive resource assessment and mapping study** must be undertaken, similar to those compiled for the oil, gas, hydro-electric, wind, and solar industries. This study should include not only the mapping of heat resources but also other key factors such as hydrology and rock permeability which all play a part in geothermal energy extraction. This comprehensive study would establish a **nationwide geothermal resource database** to help identify and assess the resource while further research may focus on development of the resource using innovative sensing, exploration, and well-drilling technologies. This comprehensive study will yield results in determining applicable technological requirements as well resource potential and categorization.

Public investment in geosciences has a proven track record. It has provided the fundamental knowledge base needed to support the development of conventional and renewable energy in Canada. A similar program is needed to support the geothermal energy industry.

## **2. Exploration & Drilling Fund**

Similar to other resource industries such as mining and petroleum, geothermal resource development incurs high upfront capital costs and risk. To encourage resource development an exploration and drilling fund must be established to reduce upfront capital costs while helping to defray costs over the lifespan of the project (often 30+ years). This will spur domestic geothermal development and increasingly attract public and private investment. In Australia and the United States, geothermal developers have been awarded \$7M and \$5M respectively per project to encourage resource development. Currently nearly all capital raised by Canadian listed geothermal developers (over \$419M) is being spent abroad where geothermal development policies and incentives are more attractive. The US Department of Energy awarded more than \$32M USD to Canadian listed developers in 2009 alone – **a proportional contribution for Canadian development is long overdue**. Elsewhere the geothermal energy industry has received similar government support, ranging from the \$50M Geothermal Drilling Program in Australia to the \$76M Deep Geothermal Drilling incentive in Germany, not to mention US DOE grants totalling \$339 in 2009 alone. **Around the globe nations are becoming acutely aware of the need for and potential of geothermal energy – a clean, renewable energy source that can effectively satisfy our growing energy demands.**

While current resource potential is predominantly located in Western and Northern Canada, a sizable investment in explorations and drilling programs would open geothermal energy development to the whole of Canada from coast to coast. With deeper drilling technology Canadians could effectively draw power from this universal resource anywhere within Canada. Similarly, geothermal heat extraction from co-produced fluids from oil & gas and mining activities can be tapped to generate electricity and heat for residential or commercial applications. These Enhanced Geothermal Systems (EGS) and Co-Produced Systems place this cost-effective energy resource within proximity of most every Canadian. In Australia and Germany, where geothermal resources are less tangible, they have sought to develop their geothermal resource potential through EGS technology, (see appendix). However, Canada's strong geothermal resource is much more easily accessible. As such, Canada should first focus on traditional geothermal resource development as this would avoid costs associated with more expensive enhanced systems that require a greater number of wells and more costly equipment.

## **3. Other Government Incentives**

Government incentives can have a tremendous impact on the successful development of a sustainable geothermal industry in Canada. Clear and consistent policy combined with a preference for renewable, base-load energy would help expedite this development and foster an atmosphere of innovation within the industry.



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The EcoEnergy for Renewable Power and EcoEnergy for Renewable Heat programs did well to spur development of green energy sources but largely failed to include geothermal power and direct use applications. This omission has put geothermal resources at a disadvantage and should be rectified. The simple inclusion within these programs would bring to par the geothermal industry and level the playing field among renewable energy sources. Similarly, a standing offer or specified allotment for geothermal power under portfolio standards would greatly encourage the development of a domestic geothermal industry. Developers need to be assured that there is a market for clean, carbon-free power.

Geothermal developers would also welcome tax incentives such as flow-through shares, accelerated depreciation, and the expensing of dry wells as is common to other resource industries. Furthermore, the elimination of sales taxes on qualifying environmental equipment like steam turbines and generators would also help drive this industry forward to power our economy. As well, the establishment of comprehensive, one-stop-shop environmental permitting would help build momentum within the industry.

Federal loan guarantees would help to de-risk the industry and improve access to capital while reducing upfront costs of development. The geothermal industry requires a level of support similar to that extended to other industries to gain its footing and grow.

### **Federal Leadership**

The development of the geothermal industry requires the cooperative effort of the public and private sectors. CanGEA and its members are looking to the Federal Government to provide leadership in this regard. In addition to the public investment in geosciences, R&D, pilot projects, etc. mentioned above, the federal government will also need to work closely with the provinces and territories to reduce existing barriers that fall under provincial/territorial jurisdiction.

While challenging, this remains a very exciting time for geothermal resource development in Canada. CanGEA, on behalf of its members, believes strongly that with Federal support this industry is poised to become a growing sector with tremendous employment and investment potential – not to mention a source of clean, carbon-free base-load power, (see appendix).

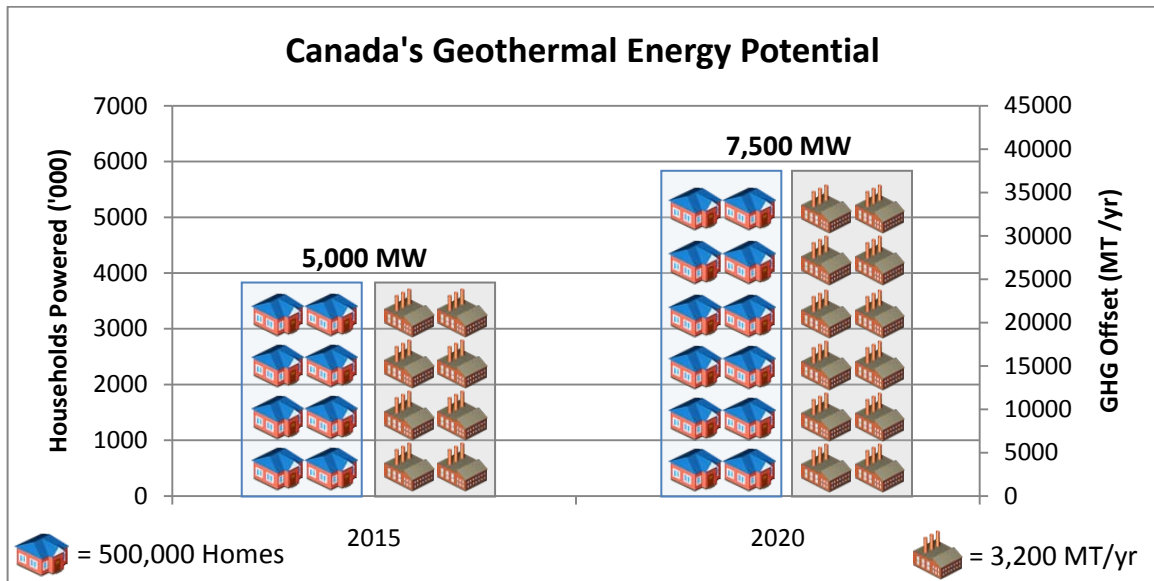
**Investment today will drive domestic development and yield options for the future.**

Moderate federal investment over the next five years would result in **5,000 MW online by 2015**, and **10,000 MW by 2025**. As such, geothermal energy is truly a **massive opportunity** for the Federal Government and Canadians alike. We can no longer afford to lag behind on the world stage – the time for action is now. **The inclusion of Geothermal Energy in the 2010 Budget is a**

**strong step towards developing a cleaner energy infrastructure that would strengthen Canada's energy security for decades to come.**

The chart below illustrates the massive potential of geothermal energy in Canada and the role it can play in supplying Canadians with clean, renewable energy while also effectively offsetting green house gas emissions.

Figure 1.0 – Canada's Geothermal Energy Potential



\*Assuming 90% reliability; 10,000 kWh/household/year; 0.65 tonnes GHG/MW

As Canada moves to reduce GHG emissions by 20 percent and achieve 90 percent renewable power generation by 2020 geothermal energy must play an increasingly important role. In turn, **the Federal Government can play an important role as leader and innovator to foster the development of this exciting industry.**

We thank you for your consideration and welcome any questions you may have. We would greatly appreciate the opportunity to discuss these policy recommendations with you and your staff at your convenience.

Yours sincerely,

Alison Thompson, B.Eng, M.Eng, P.Eng, MBA

Chair & Founder, Canadian Geothermal Energy Association

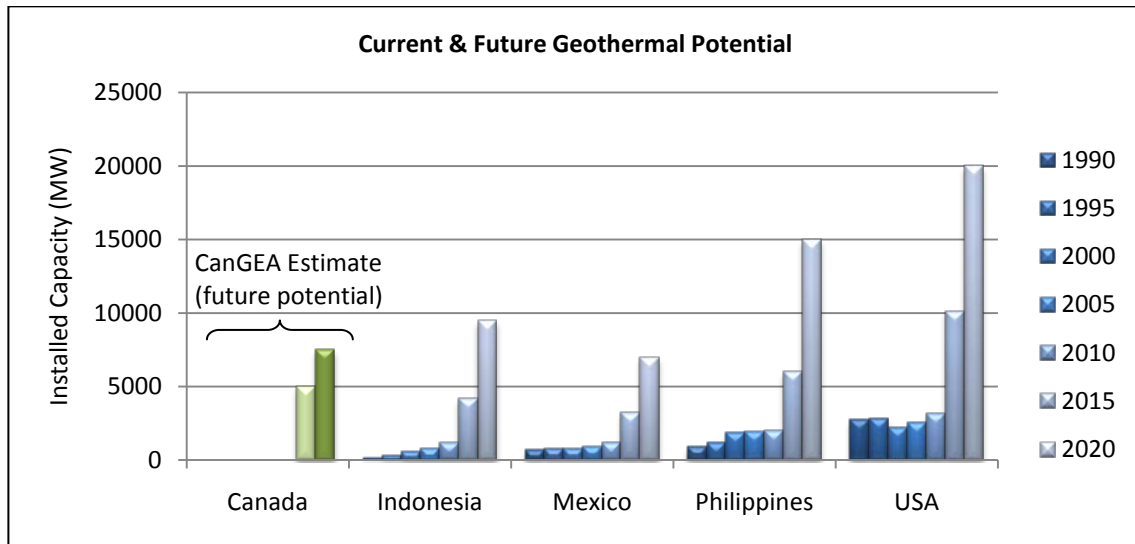
Cc: The Honourable Jim Flaherty, Minister of Finance  
The Honourable Christian Paradis, Minister of Natural Resources Canada  
The Honourable Jim Prentice, Minister of Environment  
The Honourable John Baird, Minister of Infrastructure

**Appendix**

Figure 2.0 – Canada’s Geothermal Energy Potential

Year	Geothermal Power	Canadian Households Powered	Green House Gas Offset	Job Creation (Temp. & Full Time)	
2015	5,000 MW	3,942,000	25,625,000 tonnes/yr	30,000	5,000
2020	7,500 MW	5,913,000	38,434,500 tonnes/yr	45,000	7,500

Figure 3.0 – Geothermal Energy Production by Nation



Source: R. Bertani, Geothermal Energy: An overview on Resources and Potential, GEA, IGA

Figure 4.0 – Geothermal Energy Production with Enhanced Geothermal Systems (EGS)

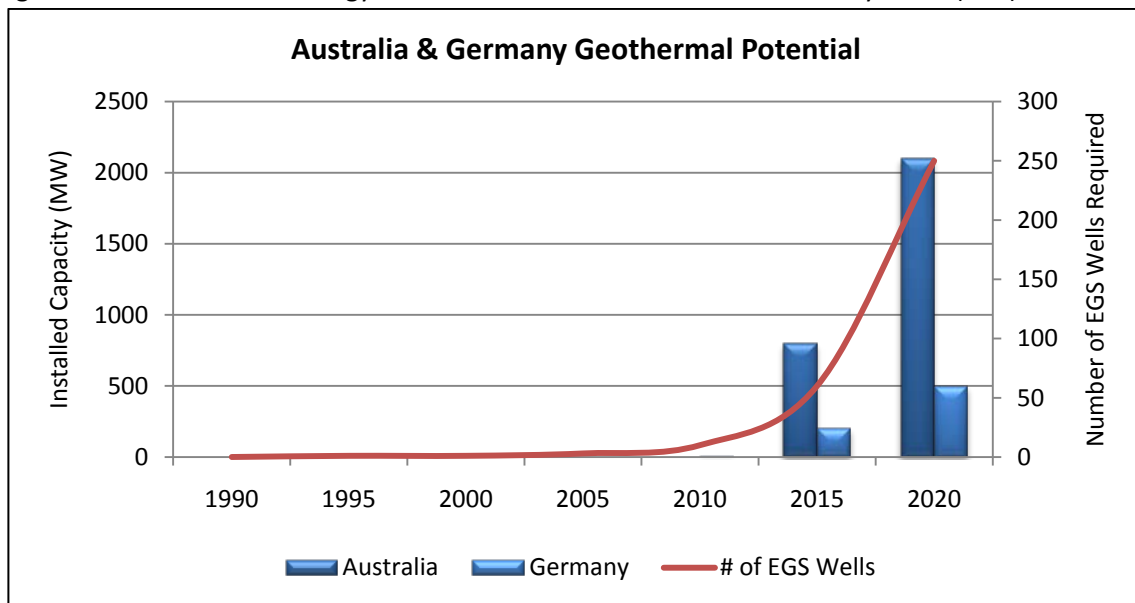
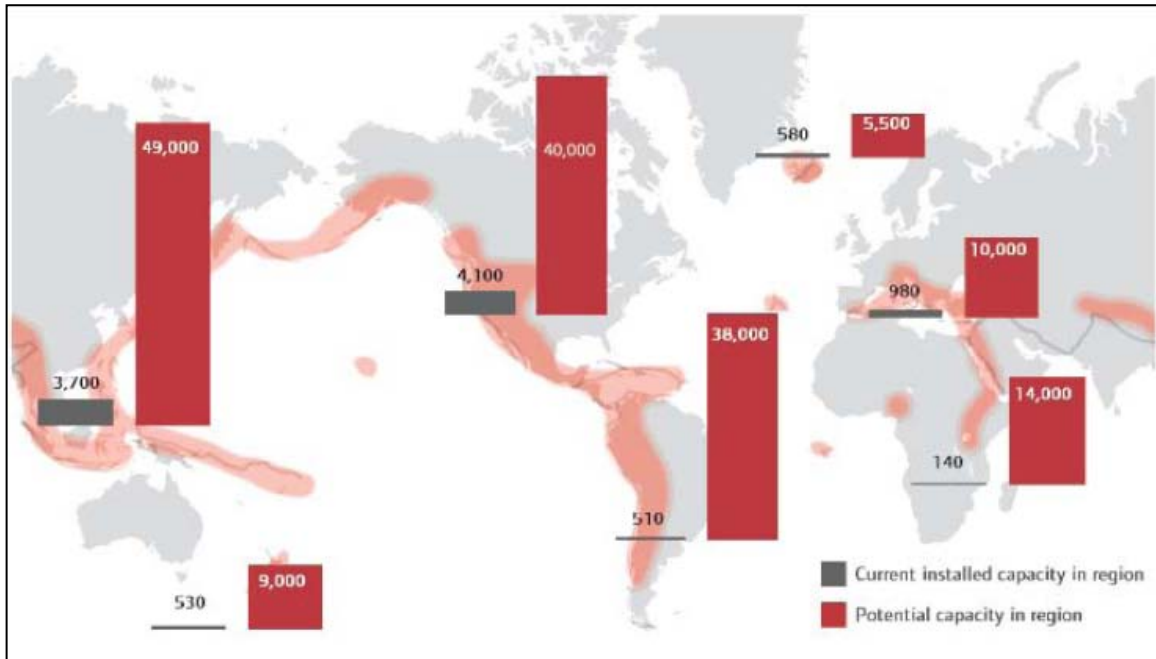
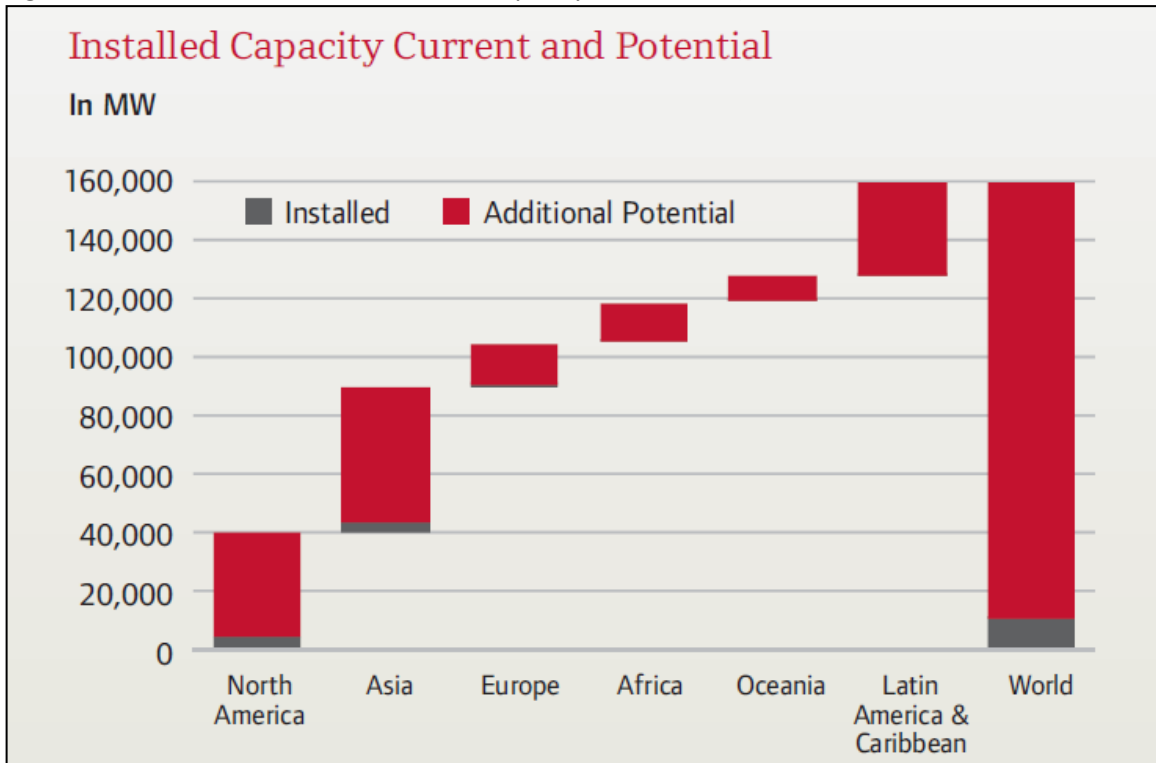


Figure 5.0 – Global Geothermal Installed Capacity & Potential (note Canada’s absence)



Source: Islandsbanki estimates based on data by IGA, Bertani, GEA

Figure 6.0 - Global Geothermal Installed Capacity & Potential (does not include Canada)



Source: Islandsbanki estimates based on data by IGA, Bertani, GEA

## CanGEA Members

