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March 31, 2016

ONTARIO ENERGY BOARD  
Attn : Ms. Kirsten Walli  
P.O. Box 2319  
2300 Yonge Street, 27<sup>th</sup> Floor  
Toronto ON M4P 1E4

Subject: Observations – File number EB-2016-0004

Dear Ms Walli:

Pursuant to the Ontario Energy Board Rules of Practice and Procedure, and to the Notice of Generic Proceedings EB-2016-0004 issued on February 5, 2016, I am pleased to file this letter of comments, facts and observations.

I represent the Canadian GeoExchange Coalition (CGC), Canada's national ground source heat pump (GSHP) industry association. Nationwide, the CGC represents 132 members, 345 accredited GSHP installers and 263 GSHP system designers, globally, about 42 % of them in Ontario. Since 2007 with the deployment of the **CGC Global Quality GeoExchange Program**, we certified over 18,500 residential GSHP systems and trained 8147 industry stakeholders in one or another of our 7 training programs. In addition, 807 college students have taken one or more of our courses – 437 in Ontario.

Initially, the CGC elected not to intervene in these generic proceedings about the mechanisms that may be used to recover the costs of expanding natural gas service to Ontario communities that are currently not served. However, in the past few weeks, we were asked by industry stakeholders to release key industry facts and statistics. Since the CGC was specifically mentioned and referred to in some of the interveners' submissions, we are of the view that the OEB should have access to the most up-to-date and the most accurate information pertaining to the geothermal heat pump industry in Canada and in Ontario.

This being said, we do not feel that the current hearings are the best forum to discuss in a thorough and educated manner about the economic and environmental merits of alternatives to natural gas such as geothermal or ground source heat pumps in the province of Ontario.

We are generally of the view that the current proposal to extend the natural gas pipeline to rural communities in Ontario is a positive step towards improving Ontario's carbon footprint. Natural gas use goes way beyond heating buildings and homes. It is an important economic development tool and a significant step towards helping these communities – including First Nations' Communities – to access a

cheaper and cleaner source of energy and help local businesses, institutions, farms and other potential gas users to improve their competitiveness. Every community in Ontario deserves an equal access and an equal opportunity for lower energy supply options.

The current relative electricity rates and natural prices in Ontario are not favorable to the mass deployment of ground source heat pumps in the residential sector as showed in Appendix 1. Since 2009 – and net of distribution charges – electricity rates have been rising constantly and natural gas prices declining constantly. This is a market reality. It is also an industry fact that ground source heat pump systems have replaced natural gas heating system in a small proportion over the years. Data from our installation database for Ontario show that in residential retrofits, GSHP systems replaced natural gas in about 7 % of cases

Some have suggested that as the market volume increases, the price of heat pumps will go down and the market will expand. They even claim that as the heat pumps are getting more efficient, the interest in the technology will increase and mass production will create a downward movement in their price. This argument is skewed in at least two aspects.

As the industry is producing increasingly more efficient heat pumps (higher coefficient of performance – COP), it creates the adverse and counterintuitive effect that the systems require more pipes in the ground. *Ceteris paribus*, the efficiency gains on the COP – reflected on the lower costs of operation – are offset by higher initial costs (heat pumps are more expensive because technologically more complex and they require more pipes) with no foreseeable marginal payback over the lifetime of the equipment.

Second, since the 1980s and throughout North America, there were repeated attempts by governments and utilities to heavily subsidize the price of residential installations – hence reduce their price and create conditions favorable to mass production. This happened in Ontario in the early 1990s. It happened again with the federal ecoENERGY Retrofit – Homes Program from 2007 to 2012. It is happening in Québec and Manitoba at the moment. But every single time a program ends, the market falls back to its long term natural slow growth trend. And where programs still exists, the market growth is flat, at best.

If mass production is the key to lower prices, the ground source heat pump market in the United States should be skyrocketing at the moment. The US market is ten times bigger than Canada, hence 10 times more potential volume. The US federal government introduced a 30 % tax credit on ground source heat pump installations in 2009. Even under these favorable conditions, the market did not fare better than in Canada. In reality, this tax credit is the equivalent of putting a price tag of \$0 on the heat pump itself and offsetting part of the ground loop installation.

As showed in Appendix 1, sales from the two largest GSHP manufacturers in the United States have been declining ever since the 30 % tax credit was introduced. It is important to note that the reported sales figures are in current dollars so the downward trend is, in reality, more significant when translated in constant dollars. Furthermore, over the years, heat pump prices have increased by more than inflation, so this adds another discounting factor on the reported sales figures. Finally, our market research is not indicating that these declining sales by the two largest manufacturers would have been offset by the emergence of smaller manufacturers.

Despite their obvious positive impact on the carbon footprint and despite their low operating costs in markets where electricity prices are low, how can we explain that in more than 30 years of efforts,

ground source heat pumps never really represented more than 1 or 2 % of the heating and cooling equipment in homes in North America, Canada and Ontario?

Simply because as a group, the industry has never been able to solve the problem of the high initial first cost. The current path to market “manufacturer-distributor-contractor-consumer” simply doesn’t work. While it may work for most goods that are sold in our economy, we must face the reality: the business model developed back in the 1980s never worked doesn’t work and will not work in the future.

The answer to our collective market failure lies not in technical improvements, mass production or subsidies. It lies in selling the right product to the right people. Over all those years, the industry was selling heating equipment to home owners while they should have been selling the product of the equipment itself: energy.

The ground source heat pump industry needs to reinvent itself. Already, some Canadian companies have structured themselves around this new business model. These companies are known as heat utilities. They can count on patient capital interested in long term yields rather than short term profits. We firmly believe that corporate finance is the key to unlock the true and full potential of the ground source heat pump industry. Clearly, the future of our industry rests on Bay Street, not on Main Street.

This new business model is shaking up old industry paradigm and not all stakeholders like it. In addition to the financial structure of this model, the focus is now placed on the most important group of stakeholders within the industry: the contractors. Under this business model, contractors perform what they do best: install the systems. Under this model, quality in design and installation is tightly taken care of by the heat utilities themselves. Since they owned the systems over decades, it is in their best interest to ensure their systems will operate as they should.

As clearly demonstrated in Appendix 2, the history of the ground source heat pump industry in North America, and in Canada in particular, has been the theater of extreme battles over the control of industry training programs. While we all thought this regrettable page of our history was behind us, we sadly realize that ghosts from the past are still working at perpetuating a failed business model.

In this context, we would like to loudly affirm that contractors – those industry stakeholders who are currently keeping our industry alive – are not tradable goods that can be balloted from one training program to another or one association to another for the sake of satisfying the ambitions of a few individuals. This is 2016 and things need to change. Contractors deserve our respect.

The CGC firmly believes that ground source heat pumps will never emerge as a mainstream technology as long as training is left in the hands of private trainers, manufacturers, distributors and associations. Back in 2006, we stated our intention to fully transfer our training programs to Canadian colleges and technical schools. We created a permanent bursary at St. Lawrence College to help students enter into the profession. This winter, cohorts of students in Nova Scotia, New Brunswick and Ontario have successfully taken CGC training delivered by professional college instructors. In some colleges, passing the CGC examination is compulsory in order to obtain a degree. This is what should be happening in 2016.

To pursue this goal further and to follow through with its promises, the CGC is currently putting together a Technical and Scientific Committee that will be overseeing the gradual transfer of its training programs where they belong: in public education institutions. This is the path to take in 2016.

In conclusion:

- The CGC wishes to reiterate that it is not opposed to the natural gas pipeline extension to those communities that are not served. The CGC has full confidence that the OEB will find the appropriate mechanism to recover the cost of such expansion.
- The CGC is of the view that the current hearings are not the best forum to discuss in a thorough and educated manner about the economic and environmental merits of alternatives to natural gas such as geothermal or ground source heat pumps in the province of Ontario.
- If the OEB wishes to explore these alternatives, we recommend that a generic hearing be called with the purpose of exploring market mechanisms and financial options for the ground source heat pump industry in Ontario. The hundreds of contractors and industry professionals who invested time and scarce financial resources to support the CGC's Global Quality GeoExchange Program over the years deserve to be fully heard in the proper forum.

Respectfully submitted,

Yours very truly,

<< ORIGINAL SIGNED BY >>

Denis Tanguay  
President & CEO

## APPENDIX 1

### Key Industry Facts and Statistics

#### Comparative GHG Emissions

In 2010, CGC published a comprehensive study comparing GHG emissions from various heating equipment used in homes in Canada. The following table is taken from this report and shows GHG emissions for Toronto. The full methodology used to generate these figures can be found in the study available on the CGC website.<sup>1</sup>

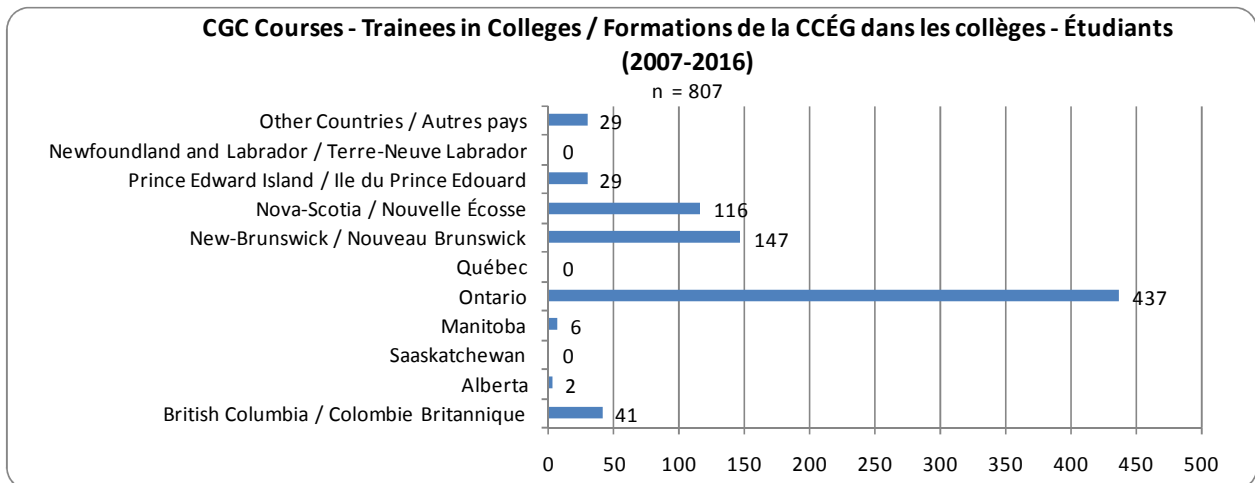
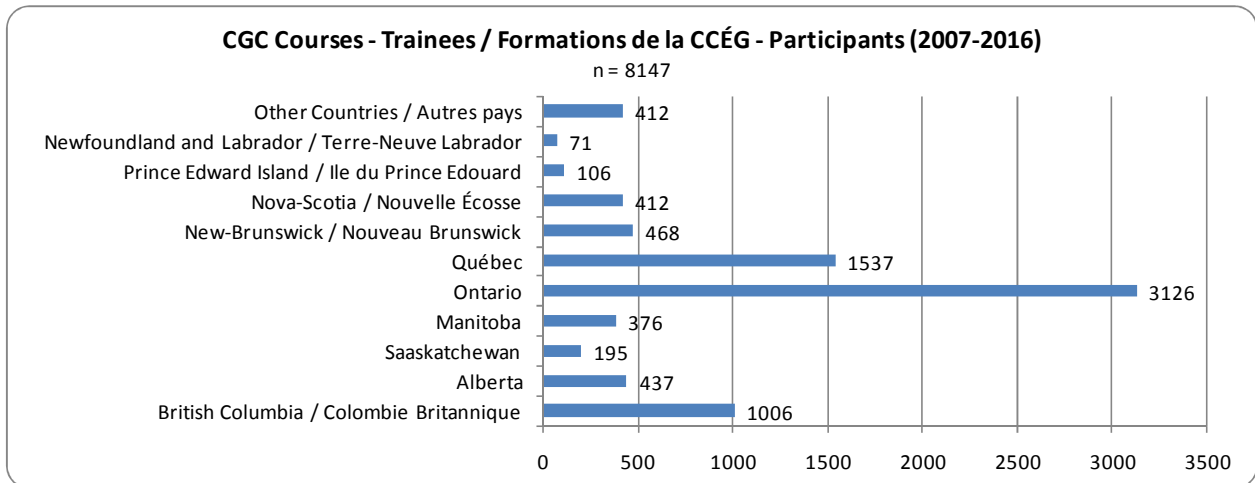
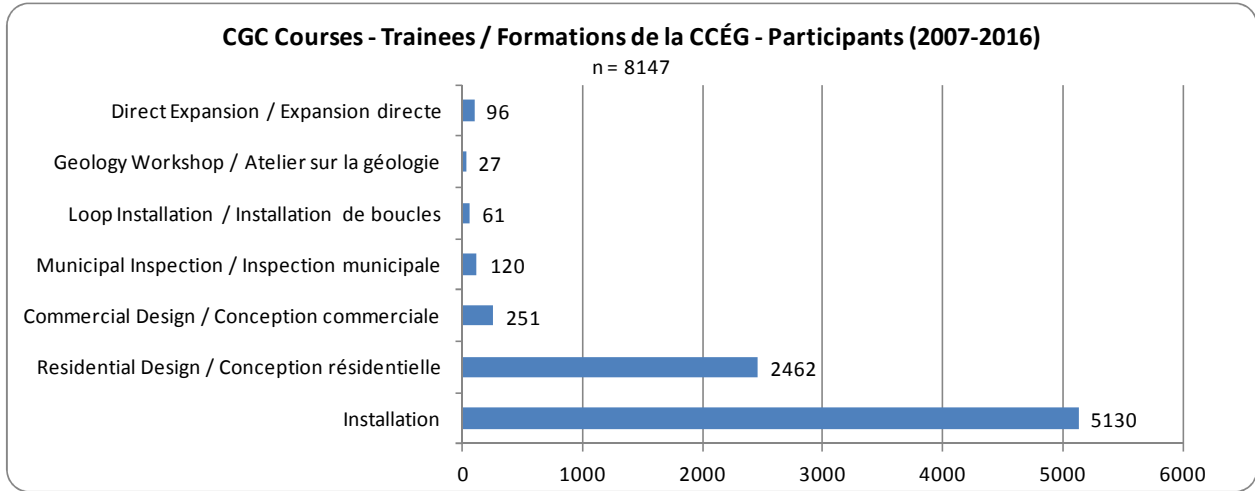
**Toronto, ON**

**Table 22: Annual GHG emissions (kg CO<sub>2</sub> eq.) - Heating only**

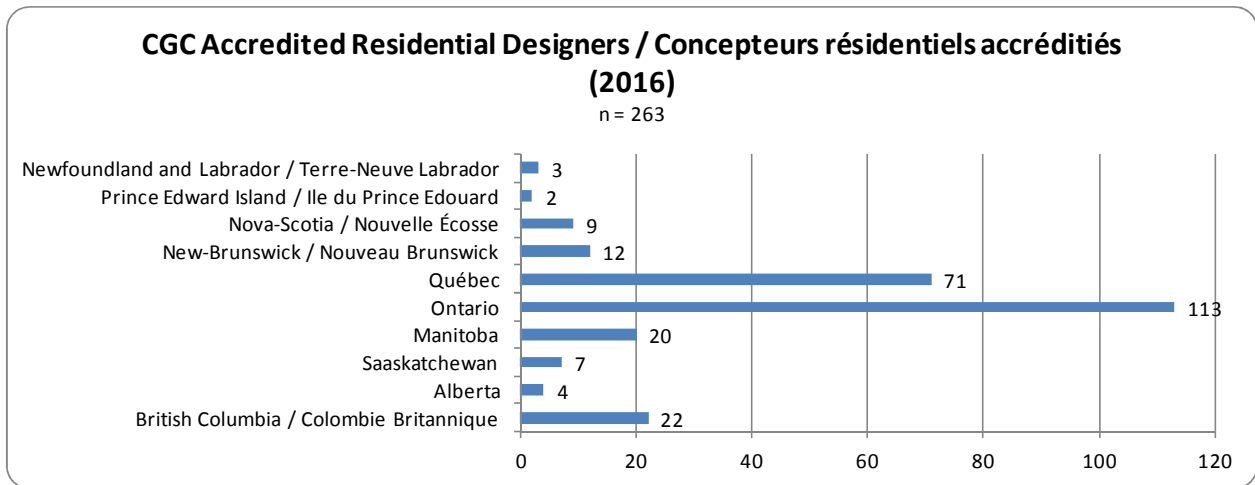
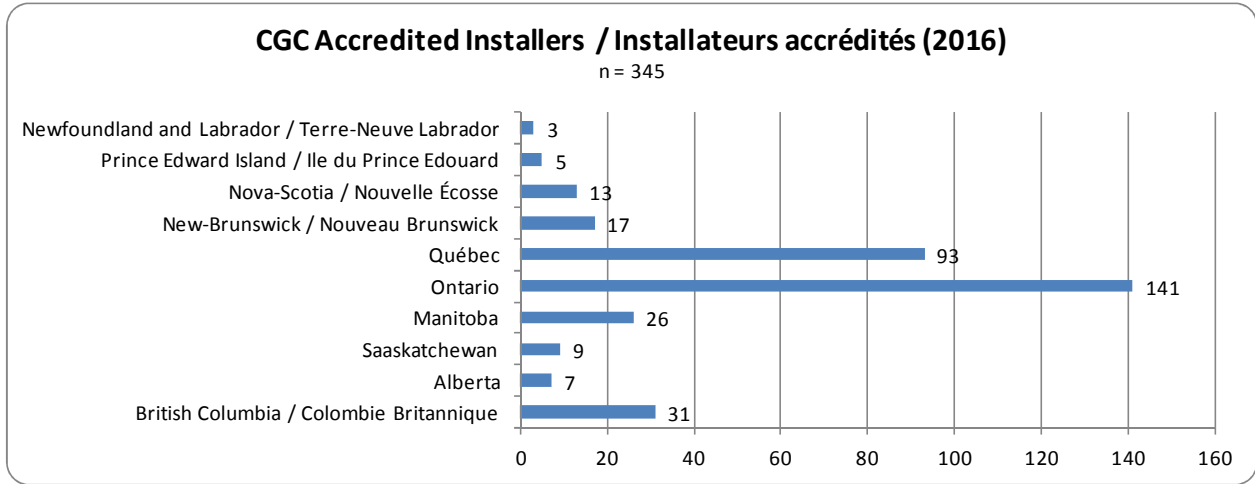
Degree-Days		Building 1500 ft <sup>2</sup> (140 m <sup>2</sup> )			Building 2000 ft <sup>2</sup> (185 m <sup>2</sup> )			Building 2500 ft <sup>2</sup> (230 m <sup>2</sup> )		
		Low	Mid	High	Low	Mid	High	Low	Mid	High
3570										
	<b>Btu/h</b>	38095	29304	22542	50792	39071	30055	63489	48838	37568
	<b>COP</b>									
<b>Electricity</b>										
Conventional	0,95	6377	4906	3774	8503	6541	5031	10629	8176	6289
Georexchange - HP	2,8	2164	1664	1280	2885	2219	1707	3606	2774	2134
Georexchange - HP	3,2	1893	1456	1120	2524	1942	1494	3155	2427	1867
Georexchange - HP	3,6	1683	1295	996	2244	1726	1328	2805	2158	1660
<b>Natural gas</b>										
Normal efficiency	0,75	6452	4963	3818	8602	6617	5090	10753	8271	6363
Medium efficiency	0,84	5761	4431	3409	7681	5908	4545	9601	7385	5681
High efficiency	0,95	5094	3918	3014	6791	5224	4019	8489	6530	5023
<b>Oil</b>										
Normal efficiency	0,75	9458	7276	5597	12611	9701	7462	15763	12126	9327
Medium efficiency	0,84	8445	6496	4997	11260	8661	6663	14074	10826	8328
High efficiency	0,9	7882	6063	4664	10509	8084	6218	13136	10105	7773

<sup>1</sup> "Comparative Analysis of Green House Gases Emissions of Various Residential Heating Systems in the Canadian Provinces." Canadian GeoExchange Coalition, November 2010, 69 pages. Since this study was released, the carbon content of electricity supply in Ontario declined. As a consequence, GHG emissions related here declined accordingly, but not significantly.

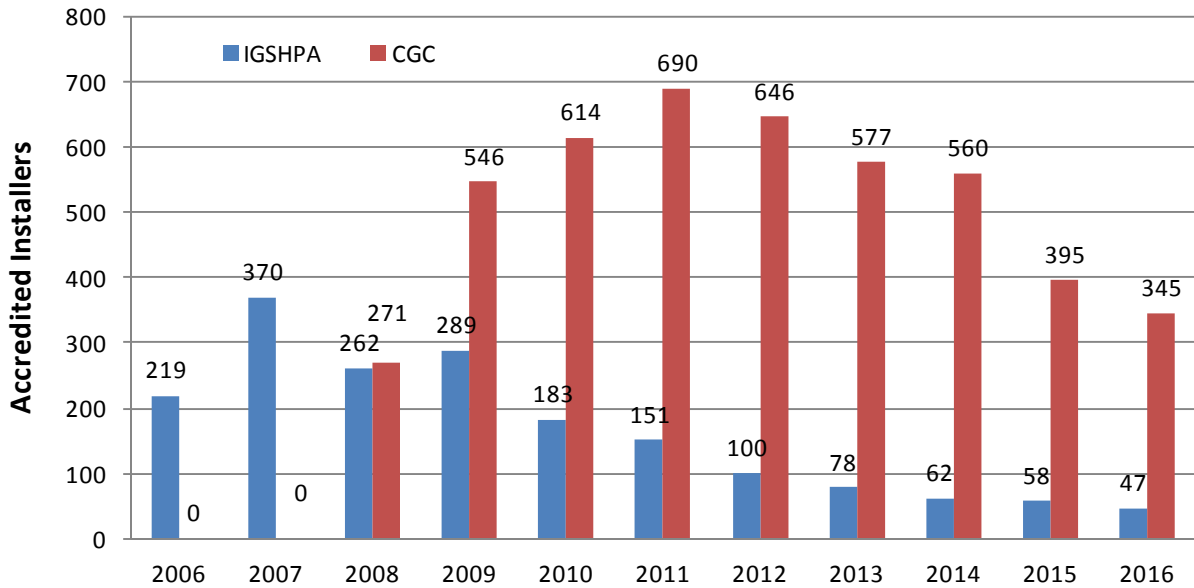
CGC Training Deployment in Canada



CGC Accredited Professionals in Canada

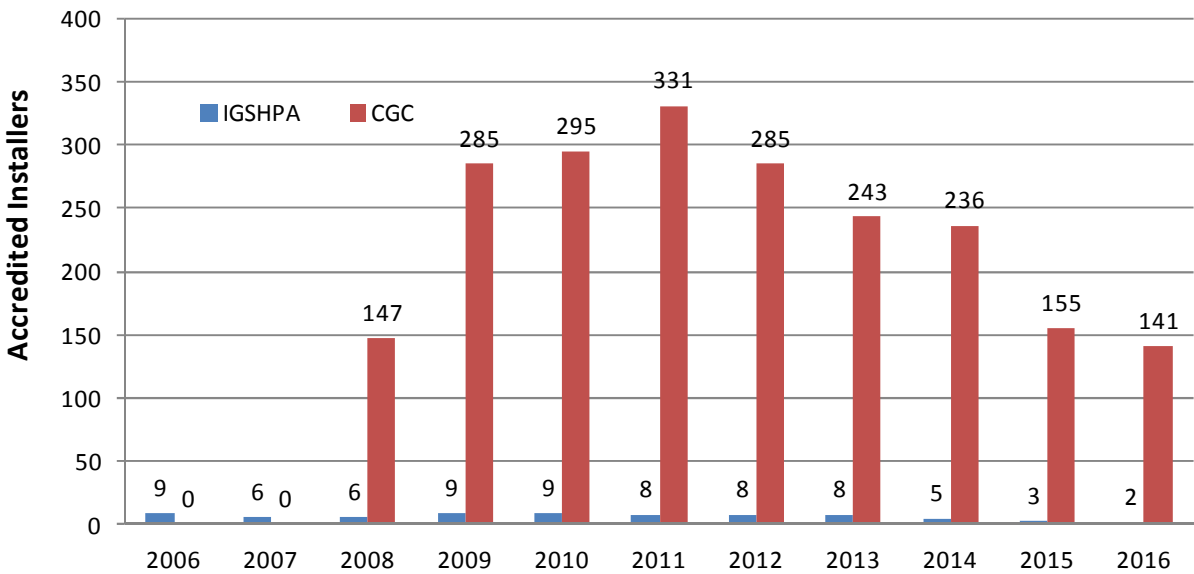


## Canada



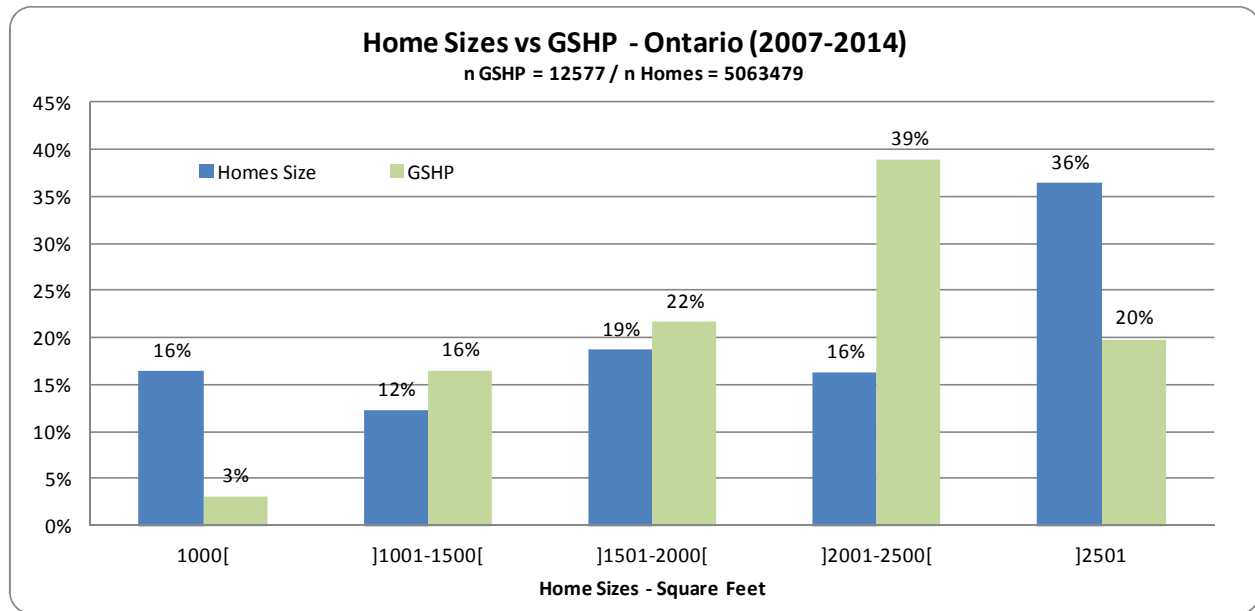
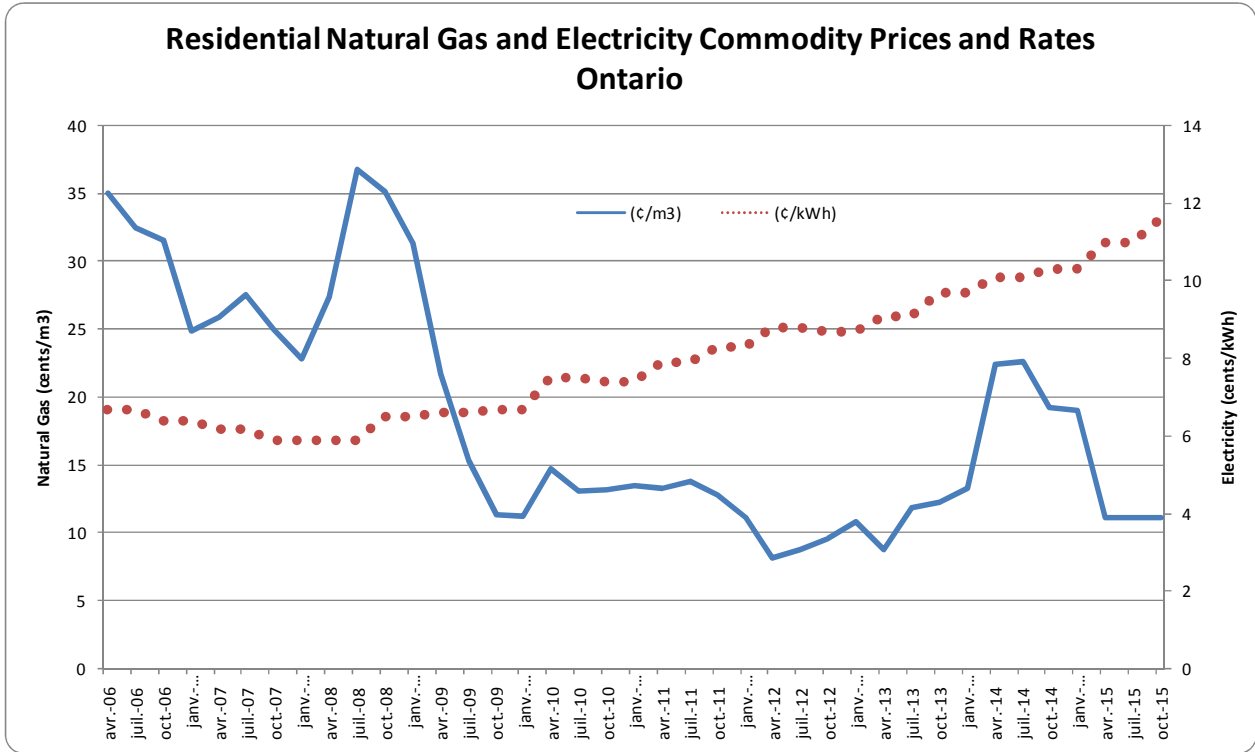
Source: IGSHPA Website 2006-2016 (monthly readings) / CGC Quality Program Database

## Ontario



Source: IGSHPA Website 2006-2016 (monthly readings) / CGC Quality Program Database

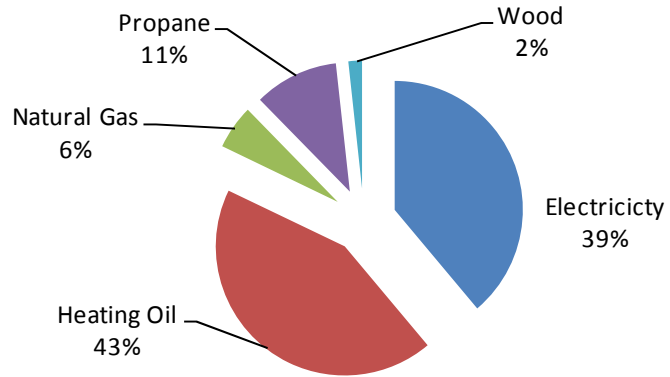
Key Ontario GSHP Market Characteristics<sup>2</sup>



<sup>2</sup> Over the years, and through its Global Quality GeoExchange Program, the CGC built the largest residential ground source heat pump systems database in the World. The information presented here is just a tiny example of what can be extracted from the database.

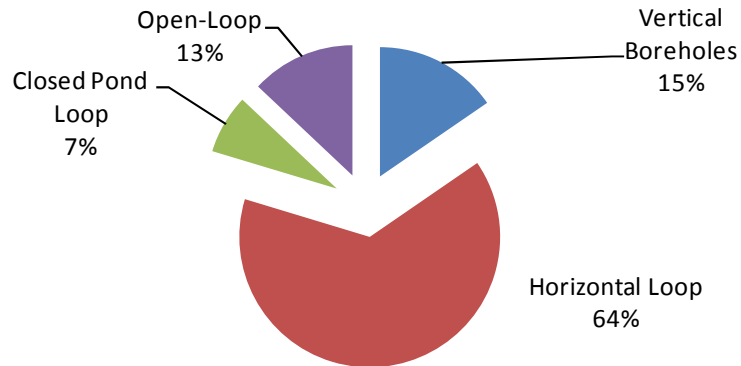
**GSHP in Existing Homes - Fuel Replaced  
Ontario 2007-2014**

(n = 10164)

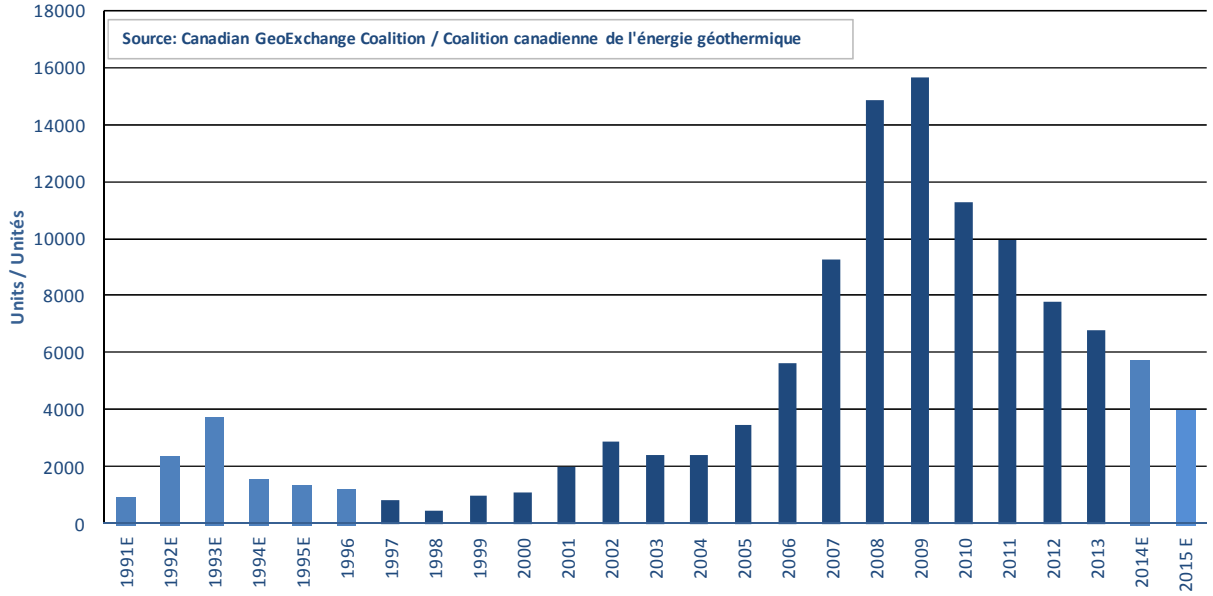


**GSHP in Existing Homes - Types of Systems  
Ontario 2007-2014**

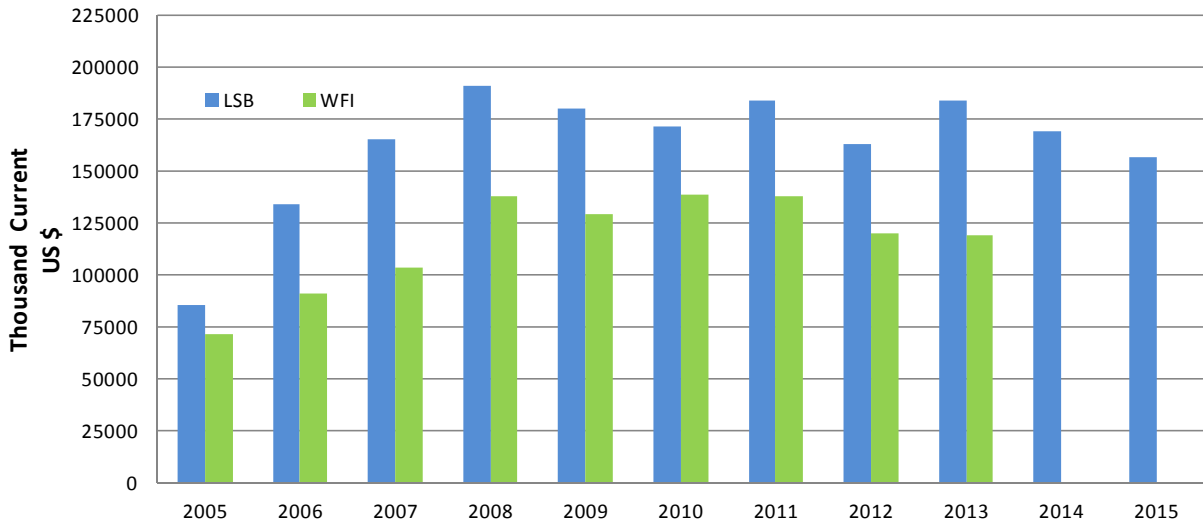
(n = 11889)



**Ground Source Heat Pumps / Systèmes géothermiques**  
**Annual Number of Units Installed / Nombre d'unités installées annuellement**  
**Canada**

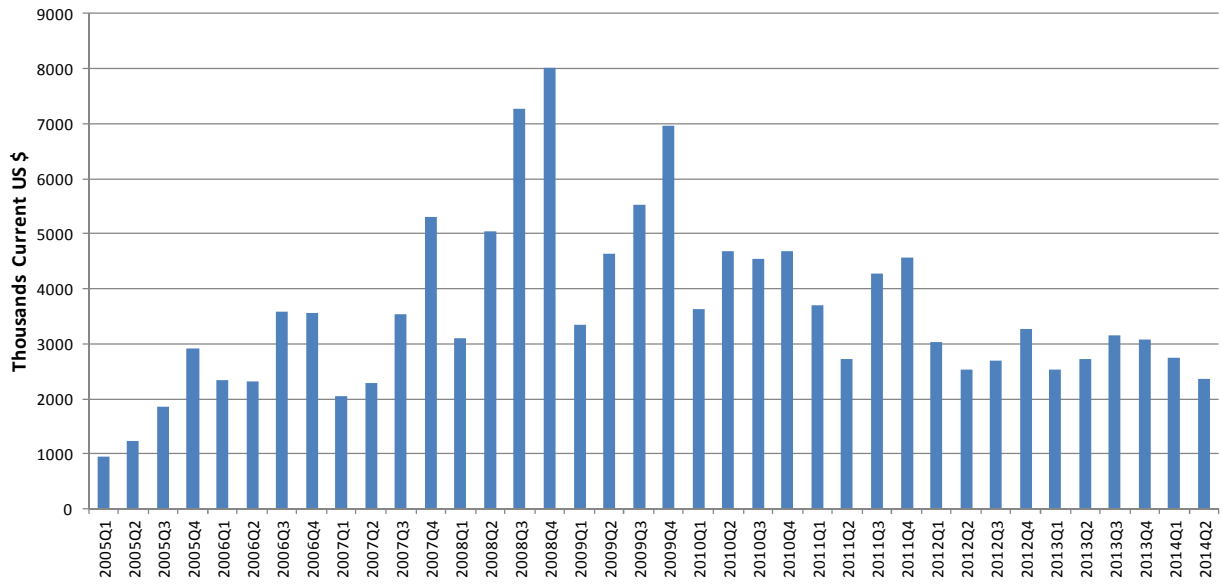


**Geothermal Sales**  
**LSB Industries / Waterfurnace**  
**Total Sales - All Markets**



Source: Corporate quarterly and annual reports 2005 to 2015. Data compiled by the Canadian GeoExchange Coalition

### Waterfurnace Quarterly Sales to Canada 2005 - 2014



Source: Corporate quarterly and annual reports 2005 to 2015. Data compiled by the Canadian GeoExchange Coalition

## APPENDIX 2

### A Comprehensive History of Ground Source Heat Pump Training in Canada

#### Design and Installation Training

In 1989, the Canadian Electricity Association (CEA), Canada's federal Department of Energy, Mines and Resources Canada, the Ontario Ministry of Energy and Ontario Hydro provided **\$143,000** to the Canadian Earth Energy Association (CEEA) to produce a ground source heat pump training manual. The first edition, first printing was released in January 1990 and titled: *Installer's Manual for the Design and Installation of Ground and Water Source Heat Pump Systems*. With the exception of a few Canadian cities temperature tables at the end of the manual, this "Canadian" training manual was a near carbon copy of the IGSHPA training manual published by the International Ground Source Heat Pump Association (IGSHPA) in 1988 and titled: *Closed-Loop/Ground-Source Heat Pump Systems – Installation Guide*. The manual was also published as a CEA Research Report (number 837U675) under the same title<sup>3</sup>. The CEA Research Report was translated into French and published in 1990.

Training was delivered to industry partly through the CEEA. An accreditation program was also developed. Ontario Hydro launched an incentive program in 1991. The program ended in 1995. CEEA struggled to survive but closed its doors shortly thereafter. Former executives of the CEEA created the Earth Energy Society of Canada (EESC) in 1998. Some of the same individuals are now executives at IGSHPA Canada, initially incorporated under the Geothermal Energy Council of Canada.

From 1999 to 2002, Natural Resources Canada, utilities and industry groups executed a number of regional and national consultations around industry barriers and needs. In deciding the type of industry infrastructure required to sustain market growth, as is often the case in Canada, stakeholders looked south of the border: a decision was taken to try to formally duplicate the industry structure established in the United States.

A comprehensive study was also commissioned by Natural Resources Canada in the late 1990s proposed a change in Government of Canada's market development strategy, based on a more inclusive multi-stakeholder approach, than previously attempted. One of the main outcomes of this exercise was the recommendation to create a strong, central, professional and credible national association. This led to the creation of the Canadian GeoExchange Coalition.

At the initiative of Natural Resources Canada and Canadian electric utilities, the CGC formally incorporated in June 2002 as a national not-for-profit association. CGC also invited the Earth Energy Society of Canada (EESC) as an observer on its board of directors. In 2003, the CGC – comprised of BC Hydro, Yukon Energy, SaskPower, Manitoba Hydro, Milton Hydro, and Hydro-Québec – signed a three-year, \$4 million contribution agreement with NRCAN in 2003. The Coalition, through its members' contribution, was required to add approximately \$7 million in project funding for a total of \$10.5 million. Of this total amount, \$9.17 million were to be invested in pilot and demonstration projects. The balance had to be invested in the development of strategic alliances, marketing, communications & information dissemination, training, technology transfer, market conditioning and project tracking and monitoring.

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<sup>3</sup> CGC acquired the copyrights on the CEA Research Reports in 2008.

On November 16, 2004, a major amendment was signed by NRCan and CGC to the original contribution agreement. An amount of \$425,000, split over two fiscal years (\$200,000 for FY 2004-2005 and \$225,000 for FY 2005-2006) was added under the express condition that the Coalition would contribute an additional \$115,000 raised through members' contributions. In light of this latter condition and the internal reorganization going on at the CGC at the time – CGC's first Executive Director died in Summer 2004 - CGC's Board could not rush into a hasty decision.

CGC held a Board meeting in Burnaby on March 19<sup>th</sup> 2005. EESC was invited to participate as an observer and was represented by its part-time Executive Director. Those present unanimously agreed on the impossibility to use these funds before the end of the fiscal year. The only sound solution was to concentrate effort on the funds available for the next fiscal year 2005-2006 rather than trying to spend \$1.2m in the eleven remaining calendar days before the end of FY 2004-2005.

Close to \$1.2 million, mainly coming from the utility pilot and demonstration project portion of the agreement were not invoiced to NRCan and those funds, including training funds, lapsed on March 31<sup>st</sup> 2005. The CGC Board of Directors took difficult decisions to ensure that public and CGC funds would continue to be invested properly. They acted diligently and with prudence in the management and delivery of the Contribution Agreement.

During that same Board meeting, the Canadian GeoExchange Coalition Board invited EESC to make a formal proposal to initiate action on the training file in the next fiscal year. Because training development involved an important proportion of public funds, it was also clearly discussed that the Coalition would not sole-source such an important mandate without obtaining a second proposal either through an RFP or by invitation. EESC's executive director did not oppose this and agreed that EESC would make a proposal to CGC.

However, on March 21<sup>st</sup> 2005, immediately after the Burnaby meeting, CGC received a proposal from EESC Executive Director to initiate training. After analysis of this proposal, CGC's CEO unequivocally rejected the offer. CGC Executive Director clearly communicated to EESC that the proposal was not acceptable. The EESC proposal, made on March 21, was to: *"Date a contract March 1. – Our invoice to be March 31, but not delivered until April 10 [...] This is the absolute base first step, and the industry would like to avoid all the FY04-05 training money from lapsing."* CGC rejected this proposal out of hand as totally unacceptable. In its response, CGC invited EESC to prepare a more appropriate proposal following the Burnaby meeting decisions and consensus. CGC never received a second proposal from EESC.

After a thorough review of the NRCan contribution agreement requirements, and an analysis of the consultation as well as discussion with and consideration of key industry members, CGC began a major market transformation initiative for the GHP industry in Canada. This led to the decision to develop Canadian training for installers and designers and to simultaneously develop a national quality program.

In June 2005, CGC issued a Request for Proposals to develop Canadian training. The same day, EESC executives went ballistic and started a smearing campaign against the CGC, its members and Natural Resources Canada. Here's a sample: *"EESC Info 165 (...) The industry has major concerns with recent actions of NRCan, which has allocated \$4.5 million of industry funds from REDI to a small group of electric utilities which have delivered nothing. The industry is preparing to go public with its concerns over this matter, which will include public criticism of NRCan's inability to stop the abuse, and this position will not enhance the partnership between EESC and the federal government."* Other actions like this one were

ongoing throughout November 2015 when they were put to rest with two consecutive formal cease and desist.

In the meantime, the CGC RFP continued its course. Four bids were received including one from IGSHPA and two of its trainers in Canada. The bid included the establishment of the IGSHPA Canadian Consortium or IGSHPA-C. This bid was disqualified on the basis that it required – in addition to the \$424,965 bid amount – the payment of ongoing royalties to IGSHPA for the use of its manual published in 1988. IGSHPA officials could not ignore that this manual was already paid for by Canadian tax and rate payers 1989-1990 and was copyrighted by the Canadian Electricity Association. The RFP was eventually awarded to the CSA Learning Center.

Much work was achieved after this initial contract. An important step occurred when in 2008, CGC contracted Seneca College to assemble sparse training material and to turn it into a comprehensive college level technical manual. The 400-page manual underwent some minor adjustment afterward and it is still use today as the main reference in all 7 CGC courses.

#### Training for Drillers and Loop Installers

On November 20<sup>th</sup>, 2006, CGC signed a consulting agreement with the Canadian Ground Water Association (CGWA) to develop a training course for drillers involved in the drilling and installation of GHP vertical loop. While the contract was to managed and the work to be technically supervised by CGWA, the training development work was to be accomplished by Fleming College of Lindsay, Ontario. The draft training material was delivered to the CGC office in December 2006. Final documents were delivered in July 2007.

In early 2008 however, doubts were raised about the course content itself during its translation as the contractor hired to oversee the translation recognized the course content from another course. CGC performed a thorough analysis of the training material. The conclusions of this review were alarming. The review concluded that more than 95 % of the material included in the training course was cut and pasted from other publications previously published by Fleming College, Natural Resources Canada or the CGC. When prompted for explanations, the CGWA responded with a request for arbitration. A Notice of Arbitration was delivered to CGWA on October 27<sup>th</sup> 2008. The final Award was rendered on March 29, 2012. In its analysis, the Arbitration Tribunal noted the following:

*“The Tribunal has reviewed the evidence and concludes that the Association’s Course comprises more than 95% of its material from a pre-existing comprehensive course by Fleming College entitled “Well Constructed – Training for Assistant Well Technicians in Ontario.” The Tribunal questioned, if virtually all the Association’s Course was copied from an existing course for ground water drilling, with little more, then how can the repackaged, condensed Fleming College material qualify as a suitable course for geothermal industry worth \$60,000.00?”*

The Tribunal ordered that a total of \$267,061.77 be paid by CGWA to the CGC in damages, costs of the arbitration and accumulated interests as of the date of the ruling. CGWA then attempted to appeal and void the ruling through the Québec Superior Court. In September 2012 however, the tribunal ruling was affirmed by the Superior Court of Québec.

Despite the hardship created by this situation, and after the Court ruling, CGC staff proposed to work with CGWA in order to deploy a new training program that was developed by the CGC during the arbitration. CGWA responded by filing for bankruptcy on March 4, 2013.

### Recent Development

The Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) recently suggested that they are working with IGSHPA to deliver training in Canada. It has also been insinuated that the current training available in Canada may not be “proper”, up to par or lacking alignment with recently adopted standards.

We are of the view that training programs are not designed with a standard in mind. The vast majority of training manual content (over 98 %) is focused on the technology itself. Standards are simply referred to if and when needed. And clearly, the C448 standard makes no exception.

The quality of the current training available in Canada, particularly through the CGC programs, is perfectly adequate to meet the needs of the industry. With 8147 individuals trained so far – 807 of them in colleges – the CGC training fits both the needs of the industry, colleges and technical schools in Canada.