

RAISING THE BAR: A NEW GEOEXCHANGE MARKET STANDARD FOR CANADA

*Denis Tanguay, President & CEO, Canadian GeoExchange Coalition
Ted Kantrowitz, Vice President, Canadian GeoExchange Coalition
1030 rue Cherrier – Bureau 501, Montréal, Québec, Canada, H2L 1H9*

Abstract: In early 2005, the Canadian GeoExchange Coalition (CGC), engaged in a major market transformation initiative for the GSHP industry in Canada. Following more than a decade of consultations at all stakeholder levels, a strong national consensus emerged for development of training and quality programme mechanisms adapted to the country's regulatory and environmental realities. CGC assessed the Canadian market and has developed products and services that fit national industry needs, thereby raising the bar and moving away from the previous models deployed in the domestic market over the past 20 years. As a result of its experience CGC strongly believes that each country should take steps to assess its own ground source heat pump market and should develop products and services fit to national needs.

Key Words: *geoexchange, market transformation, training, accreditation*

1 INTRODUCTION

The Canadian context for ground source heat pump (GSHP) technology can be distinguished from other national contexts in two aspects: technically, and in terms of market. Technically speaking, Canadian climate generally creates very heating-dominant loads and precludes air-source heat pumps use in all but the most southern latitudes and some coastal areas. Geologically, the deep and rich moraines and alluvial deposits which provide farmlands to the south of the national border increasingly yield to irregular glacial till and near-surface bedrock as we fly north. Ground-source technology can play a very valuable technical role in this environment.

The Canadian GSHP market however had - during the period leading up to 2005 – lacked the structure and unity necessary to consistently and effectively deliver these technical benefits to Canadian customers. The market, estimated to constitute approximately 0.025 % of the Canadian HVAC-R industry in 2005, consisted primarily of small installer companies with rapidly greying expertise, which had survived through many lean years. Furthermore the market itself was fragmented due in part to differing energy pricing and utility approaches as well as geological issues and political approaches in each of Canada's ten provinces and three territories.

Without a unified system of quality assurance, stakeholders such as engineering firms, financiers, large utilities, or small homeowners have no method of sourcing reliable expertise. The stakeholder at any of these levels is confronted with questions such as:

- whom can we trust and whom can we rely on if we have an installation problem?
- whom can we trust and whom can we rely on if we have a design problem?
- who will be in business in ten years for service or replacement issues?
- who will charge me a fair price and treat me ethically on a business basis?
- who is actually licensed and understands permitting issues, to do this work?
- who is actually competent to do this work?...
- ...and so on.

Up until recently in Canada this implicit barrier set forced stakeholders through a process where each *at a minimum* had to conduct their own due diligence from scratch, trust friends and/or references, learn about the industry itself in depth, and understand the technology more than the average homeowner or financier would otherwise. In contrast of course, a well-understood and simpler high-efficiency gas furnace could be installed by a well-structured industry and a professional requiring little more than a credentials check.

This barrier set puts trust and confidence issues in the way of delivering system benefits. Homeowners, engineering firms, financiers, etc, had to spend inordinate time and effort to choose and then protect themselves from the very firms which are supposed to deliver GSHP benefits to market. In this way, the North American GSHP industry has actually *organically limited itself* to a maximum size and has nearly guaranteed its cottage-industry status. This situation deprives society of the infrastructure benefits that a higher efficiency and renewable technology industry like Canada's GSHP industry has a duty to deliver.

The Canadian geosource industry is currently undergoing a major market transformation. Led by the efforts of the Canadian GeoExchange Coalition (CGC), a national training program was developed over a 16 month period in 2005-2006 by some of Canada's most qualified researchers, designers and installers. This state-of-the-art training program, fully adapted to the Canadian regulatory and geological environment, is articulated in four different modules: (1) drilling, well construction and loop installation, (2) system installation, (3) residential design and (4) commercial design.

Simultaneously, CGC developed a comprehensive accreditation and certification program. To receive accreditation industry professionals need to start with appropriate training but also must provide evidence of their experience and expertise, as well as hold current and relevant work licenses and permits. To achieve certification, geosource systems must be designed and installed in full compliance with *CAN CSA 448-02 – Design and Installation of Earth Energy Systems*. This standard is the only North American GSHP standard fully developed within the stringent framework of an independent standards organization.

This paper explores the successful story of the CGC and of Canadian industry stakeholders who have engaged in a major market transformation initiative to build a stronger Canadian geosource industry and a sustainable market transformation. This paper will address and explain the nature of the challenges and barriers encountered in this process.

2 BREAKING THE MOULD: THE CREATION OF A CREDIBLE, REPRESENTATIVE AND STRONG NATIONAL VOICE FOR THE INDUSTRY

Geosource markets in North America have historically suffered from a lack of appropriate market infrastructure capable of sustaining the long awaited market growth. Accreditation and certification programs previously deployed by national and international associations in Canada had not provided the level of confidence expected by industry stakeholders, governments, utilities and customers. Across North America, prior programmes were not comprehensive enough, or well enough adapted to market reality, to initiate a solid and sustainable geosource market transformation. (Hoshino 2002)

A comprehensive study commissioned by Natural Resources Canada in the late 1990s proposed a new market development strategy based on an inclusive multi-stakeholder approach. One of the main outcomes of this strategy exercise was the suggestion to create a strong and credible national association (Marbek 1999). The Canadian GeoExchange Coalition was formally incorporated in 2003 as a direct result of this study.

At the time, Canadian industry stakeholders had to decide on the type of industry

infrastructure they required to sustain the anticipated market growth. As is often the case in Canada, we looked south of the border: a decision was taken to try to formally duplicate the industry structure established in the United States.

In the United States, two organisations are active in the industry. The International Ground Source Heat Pump Association (IGSHPA) provides basic introductory training. Advanced and specialized training is usually provided by manufacturers. Meanwhile the Geothermal Heat Pump Consortium (GHPC) until recently engaged in government lobbying, utility and state program delivery, and created marketing tools to help support industry.

Although this model at first appeared to have some virtues in the United States, by 2005, after years of consultations, Canadian industry had concluded that the US model could not effect market transformation in Canada. The essential reasoning behind this conclusion is that the US model had been used in Canada since the mid to late 1980s without market transformation occurring. As well, consultation participants concluded that (as the idiom goes) "the same thinking that got us to this point won't get us where we're going."

Over more than a decade of consultations, Canadian stakeholders had consistently indicated that the industry's top three ranked problems were:

1. the availability and quality of training and training materials which reflect Canadian technical, regulatory, and market realities;
2. a lack of quality assurance or guarantee for potential customers, partners and/or services firms;
3. first cost of the technology, generally as relative to natural gas systems.

Consultation participants generally reported that the lack of properly trained experts, both in design and installation, has long been a problem for the consistent delivery of quality geoechange systems in Canada and throughout the world. The limited availability of experienced professionals resulted in a number of poorly performing systems across the country. This in turn has considerably harmed the credibility of the technology and the industry overall. Most importantly, the lack of properly trained and accredited experts, especially in the design community, was seen as a major bottleneck to industry growth. Accreditation of suppliers was identified as a key instrument to address the lack of quality assurance and consumer confidence, and to ensure professional standards and capacity.

The appropriate market infrastructure, most notably a solid accreditation program that would recognize both the training and professional experience of industry professionals, had never been developed in Canada. This created bottlenecks in the growth of the industry as well as successive waves of poorly designed and installed systems.

The main conclusion of over a decade of consultation was that Canada would be better served by developing and deploying its own business model and market infrastructure, including nationally appropriate, Canadian-developed training programs, to address these three barriers. The CGC was created in 2002 to assume leadership, and mandated to identify and implement infrastructure for higher professional standards and capacity.

Based on various prior industry consultations, discussions, and findings through pilot and demonstration projects, CGC commissioned a study to investigate the viability of a national quality program, and to provide recommendations and guidelines for such a program. A definitive and comprehensive consultation process followed and the **CGC Global Quality GeoExchange™ Program®** was finalised and deployed in 2007.

3 CHALLENGES AND BARRIERS

The mandate of the CGC is to work for the interests of the entire geoexchange community. The grand challenge faced by the CGC was the necessity to break a limited and static minority's current thinking (i.e. that 'things are just fine' in the old limited-market approach) and create a unified market transformation based on principles of both healthy competition and on raising the level and consistency of Canadian industry work delivered. This 'raising the bar' process, once decided upon by the consultations, demanded a mechanism.

Associations can act to either transform or hold back an industry. Associations, like any tool, can also be used for good or ill. Under certain market conditions associations can play a powerfully useful role in the marketplace by establishing the infrastructure to help foster market transformation, competition, and industry growth. This market infrastructure, i.e. the mechanism to transform a market, may take the form of entry requirements – adequate training for example – coupled with a meaningful certification process as part of industry self-regulation practices. Generalised market failure is a sufficient condition for the establishment of such market infrastructure and this is recognized by Canadian regulatory institutions. (Goldman 1989)

Very few people will disagree that in most markets, a higher degree of competition usually brings higher overall economic efficiencies. Whether entry of new firms in the market is real, or whether there is only a threat of entry into a business by new firms, the general outcome is enhanced competition.

However, what is true for the society at large may not be true for established firms operating in an oligopolistic environment. "Oligopoly is synonymous with competition among the few," or as we would add, more often competition among the happy few. (Mansfield 1979) When a market is characterized by oligopoly – only a few firms dominating the market – a potential entrant into a business may encounter a number of obstacles and face important barriers; existing firms may also undertake actions to prevent new firms from entering the industry.

A quality programme mechanism, with access to training, accreditation, and certification by all and a clear path for customers governments and financial groups to deal with recognised professionals, levels this playing field to a great degree. The mechanism therefore attacks significant industry barriers.

By attacking industry barriers however, an industry association may put itself in the awkward position of acting against some of its members' expressed or unexpressed desires. Friction is inevitable, as the minority which disagreed during earlier consultations finds itself out of step with the new direction. For this reason, extensive consultations as a basis for beginning market transformation activities can be an essential tool. Likewise, logically rigorous analysis leading to programme creation, serves as both a buffer and a tool to enact necessary changes in the market.

It bears re-emphasizing here that the job of a professional industry association is not to perpetuate a market status quo which favours the happy few, but to act in the interests of the overall market, including customers, to grow the market as sustainably and as rapidly as feasible.

4 MARKET FAILURE

Market failures may take a wide variety of forms. Asymmetric information is often the main reason for market failure. "[...] Asymmetric information [...] is essentially a knowledge gap between consumers and professionals that results in consumers being, or likely being, unable to assess the quality of professional services. Faced with asymmetric information,

consumers of professional services may not be able to determine what is in their best interests and may depend on regulation to provide some signal of quality.”

Asymmetric information can occur involuntarily, for a number of reasons specific to product, service and market. When market failure occurs involuntarily, simple market mechanisms can be used as correctives measures. Increased marketing, technical and practical guides, websites, etc., are normal methods used to correct involuntary asymmetric information. Asymmetric information may also occur intentionally of course, and CGC has spent great effort acting vigilantly and clearly regarding those attempting to confuse the market

Raising the bar and allowing the geoexchange industry to self-regulate are important market transformation characteristics. CGC quality program rules, particularly in the context of grants and financial assistance programs by governments and utilities, are meant to protect both the industry from the entry of fly-by-night companies and to protect end-use customers.

In this context, in December 2006, CGC announced that as of January 1st, 2007, as an important step of its market transformation initiative, that it would not recognize, partially or fully, any other national or international training program unless a training agreement is in place with CGC to ensure: (1) that training approach and material is fully compatible with the Canadian regulatory environment, (2) that trainers are field-experienced and, (3) that the partner organisation fully respects and complies with CGC’s Code of Conduct.

This decision was taken to effectively assure quality in the provision of training, reduce the information asymmetry in the markets and, ultimately, ensure consumer protection. Since then, CGC has signed training agreements and/or is working in close relationship with every major heat pump manufacturer and distributor in North America. Concurrently, CGC has initiated the gradual transfer of training material to about 20 Canadian community colleges and other public education institutions.

There is currently a very solid industry momentum to support the CGC market transformation initiative as hundreds of industry specialists across Canada have received their training and applied for CGC accreditation. Hundreds of other industry stakeholders in governments, utilities, financial institutions, regulatory bodies are also taking steps to align their program and policies with the CGC Global Quality GeoExchange Program. Virtually all serious industry stakeholders in Canada are aligning behind this national consultative industry effort.

5. PROGRAMME SUMMARY

The CGC Global Quality GeoExchange™ Program® can be represented graphically in a number of ways. Essentially, there are four steps and four streams within the quality programme.

The four streams were developed through analysis from the original training development group and follow the path of design and installation of a GSHP system. The four streams follow work functions and are commonly known as:

- Installer – installs the heat pump itself, any general distribution system work, and ground loop. Thought of as the eyes and ears of the rest of the team.
- Loop Installer (formerly Driller) – generally a member of the drilling company or team, the individual who actually places loop and u-bends in a borehole, grouts and seals, or constructs and installs horizontal, and pond, *inter alia*, heat exchanger systems.
- Residential Designer – designs a system, defined by CAN/CSA 448-02 as less than 15,000 square feet or three storeys
- Commercial Designer – designs a system, defined by CAN/CSA 448-02 as more than 15,000 square feet or three storeys

An individual may serve more than one of the four functions and therefore may also be accredited in more than one area.

Step One - Training

The individual goes through a classroom training, which currently ranges from two to four full days. On completing an exit exam, the individual receives a training certificate.

In certain cases, prior training is recognised by CGC. For installer training equivalency and recognition of experience in the geoeexchange industry, CGC issued a specific *Clarification Statement on CGC Global Quality GeoExchange Program® and the Installer Training Equivalency Criteria for Accreditation Under the Global Quality GeoExchange Program®*.

An installer will go on to earn a pipe fusion certificate from a recognised partner, such as a trade school or college, pipe manufacturer, or his manufacturer or distributor. A designer will earn a heat loss / heat gain certificate from a partner organisation including recognised colleges. Commercial designers are generally engineers or high-level technologists; loop installers generally will come from a trades or drilling background.

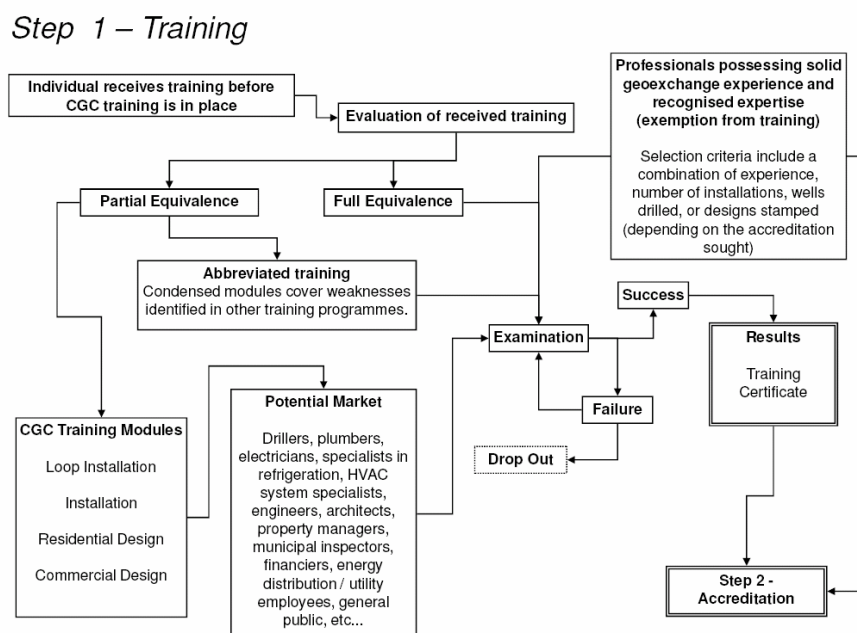


Figure 1 - Canadian GeoExchange Coalition's Training Approach & Routine

CGC's philosophical and programme intention is not to wash anyone out of the quality process during training. The goals of the training portion are to provide students with a set of best practises, provide them with a licensed copy and a thorough review of the Canadian standard CAN/CSA C-448-02, and to help students understand what they do not know and when to seek help from colleagues.

Step Two – Accreditation

An individual applies for accreditation once he has CGC training certificates or equivalent. A different application form is available for installers, loop installers, residential designers and commercial designers. Every individual interested in participating in the CGC Global Quality GeoExchange™ Program® MUST apply for accreditation.

The accreditation process for one of the four streams is summarized in figure 2:

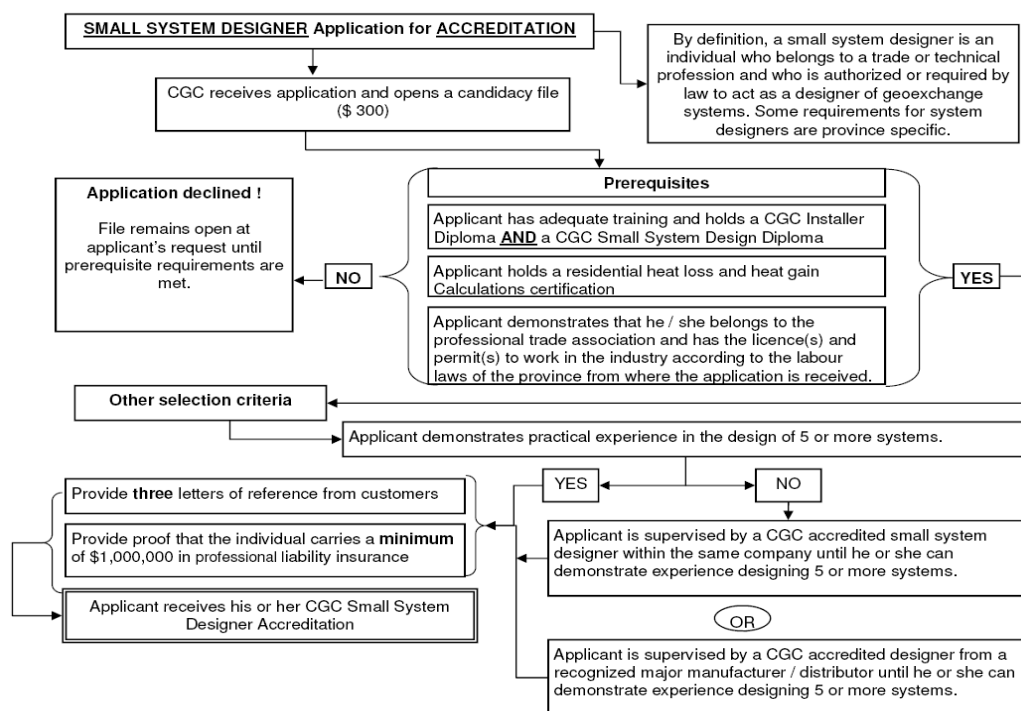


Figure 2 - One of Four Accreditation Processes at the Canadian GeoExchange Coalition

Accreditation is awarded for a two-year term, and renewal is non-automatic. Renewal depends upon the professional maintaining a complaint history of less than three customer complaints over the term and keeping all licenses current and meeting the other criteria. This means that accreditation renewal is for active industry professionals who are out in the field meeting all basic criteria and satisfying customers over the life of the accreditation.

Step 3 - Company Qualification

Once an individual professional is accredited, they are ostensibly finished with the quality programme process. Companies however show support for the professionalisation of the industry and can gain a marketing advantage by applying for *CGC Qualification*. The intent of qualification is to keep companies which wish to dip in to the market (because of available subsidies, fads, to make quick money, etc.) without committing to quality work and ethical conduct, out. Business history and registration numbers, liability insurance details, customer references etc, are required, as is an affidavit that the company will work to the national standard, follow the programme's Code of Conduct, and only work with CGC Accredited professionals. Companies receive a plaque attesting that they are among the national leaders in firms which design and install geexchange technology.

Step 4 – System Certification

The final step of the quality programme is an innovation in Canada. Professionals and system owners are asked to complete a form which includes a two-page commissioning report and a complete checklist where both customer and professional initial that steps such as “received as-built book” and “service contact information given ” have been completed. Finally, both parties complete separate affidavits that, in the case of the professional, all work has been done to the national standard and following best industry practises, and in the case of the homeowner that the form is correct, that they are the owner, that the system is providing heat and cool and that they are at the moment satisfied.

Step 4 – Certification of Systems

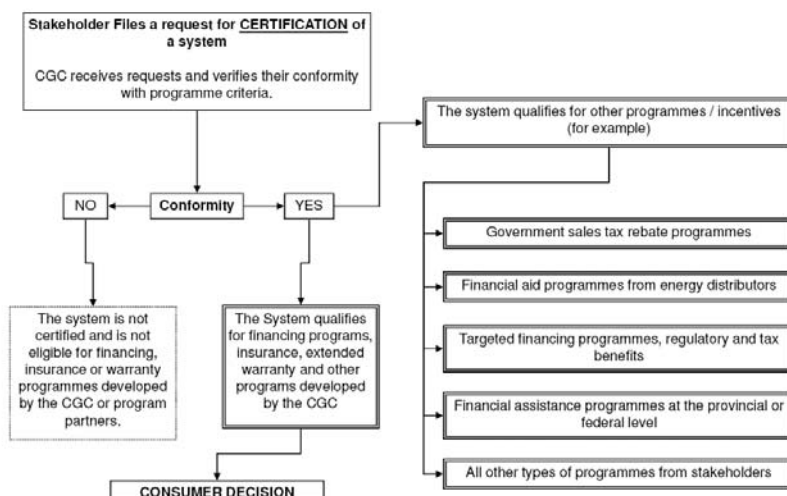


Figure 3 - CGC Certification is the proof that a residential GeoExchange™ system has been designed and installed professionally in Canada.

Numbered certificates and stickers are issued to the homeowner after a review of all forms, and random inspection brings a quality check. An industry arbitration mechanism has been established for certified systems which are found to not meet national or industry standard. The last resource for this complaints process is provincial arbitration boards.

6 RAISING THE BAR – A TRUE MULTI-STAKEHOLDER NATIONAL EFFORT

The CGC Global Quality GeoExchange™ Program® is designed to bring value to industry participants who benefit from increased market opportunities. This increase in opportunity comes from higher consumer confidence and reference to the CGC Global Quality GeoExchange™ Program® in procurement policies of the various stakeholders such as utilities, government agencies and financial institutions.

6.1 Market assessment

In the deployment of its market transformation initiative, CGC sought to develop alliances with relevant organisations both in Canada and throughout the world. As part of its market assessment, CGC staff explored venues to exchange strategic information and experiences of value in shaping and organizing national industry associations. So far, CGC has found solid potential for added-value in international networking, particularly in Europe and Asia.

But the most important and critical element of CGC's market assessment related to training. Readily available training material, books, references manuals, guidelines, codes and standards were thoroughly reviewed by Canadian industry experts as part of CGC training development. Some reference books were outdated by over 20 years or generally lacked appropriate references to Canadian climate, regulation, codes and standards. Many of the training tools were found to have some gaps in the treatment of certain topics but major weaknesses were found in most others. The existing training material was seen by those in industry as inappropriate and underdeveloped both for the Canadian context and for the purpose of a significant market transformation.

This strategy and approach was also highly compatible with the expressed desires of the Canadian industry stakeholders to engage in a continuous improvement process and review training material on an annual basis. Given the small Canadian market, this focused and committed long term result simply could not have been achieved if the training process and structure depended on inadequate material.

6.2 The Canadian approach

Drillers and loop installers, system installers and system designers are the three main components of the workforce in the geoexchange industry. Very often, those three functions will be performed by three different individuals, although it is not rare that one individual will carry forward two or even the three functions. For the CGC, it was important that the training program put in place reflect this market reality.

Until the CGC training program was deployed, only basic introductory training was available in North America. Ranging from a half day to three days, none of these programs had the scope or the depth to support a growing industry in a meaningful and sustainable manner. But most importantly, none of these programs were deployed in conjunction with the appropriate market infrastructure. Under this system, no control whatsoever was provided around the quality of in-class training.

In contrast, CGC developed its training program as part of a national market transformation initiative. This initiative is the CGC's response to many years of stakeholder requests to raise the bar in available training and in the consistency and quality of work delivered by geoexchange practitioners. CGC training now goes well beyond the basic introductory training for installers offered by other organisations. The four initial CGC courses – (1) drilling, well construction and loop installation, (2) system installation, (3) residential design and (4) commercial design – are only a part of the first national training and quality initiative. This quality program is based on Canadian climate, geology, and the Canadian national design and installation standard CAN/CSA 448-02. In short, up-to-date training material, fully adapted to Canadian market reality.

The course materials themselves are the product of over eighteen months of effort from CGC staff, with contributions from about fifty of the industry's top professionals and critical ongoing support from the federal government. The courses have gone through six drafts before release and have been fully revised once to a version 2.0. To date, more than 1,500 industry specialists have registered and taken CGC courses. The CGC courses are only a part of providing quality assurance to the consumer and about describing and delivering partners who understand that for the geoexchange industry to continue growing rapidly, consistently high quality of training and system design & installation is a top industry priority.

6.2.1 Purpose of experts' accreditation

It is crucial for the CGC and its partners that field work is performed by well trained professionals who have demonstrated understanding of current best (i.e. Canada-appropriate) practices, knowledge of current CSA standards, and other Canada-appropriate . A three-day introductory training is not sufficient to be awarded an accreditation. CGC's board of directors has likewise affirmed that simple affiliation with non-Canadian organisations or trainings is not acceptable as equivalent for the Canadian variant of the Global Quality GeoExchange™ Program®.

Accreditation is a fundamental element of the Canadian quality model. Training – comprehensive training – needs other market infrastructure tools to make it both efficient and relevant. Training alone without a meaningful accreditation, according to consultations and

our analysis, gives trainees a license to create problems and potentially seriously damage regional markets. In every serious and professionally organized industry, accreditation means “to certify as meeting all formal official requirements of academic excellence, curriculum, facilities, to make authoritative creditable, or reputable.” And certify means “to attest as certain; give reliable information of; confirm. To guarantee; endorse reliably.” (Random House 1989)

Adequate accreditation of industry professionals is a very important issue, stressed a number of times by concerned Canadian and international stakeholders. Accreditation should necessarily be a component of a quality-controlled process whereby delivery agencies can certify that card-bearing specialists currently meet all the formal requirements required to work in the marketplace. Accreditation is about recognizing competent professionals' dedication to ethics, technical abilities and credentials in order to give customers adequate confidence that they are dealing with true professionals

For this reason, a CGC trained individual does not receive automatic installer accreditation. CGC accreditation is based on real life experience and verification of permits and licences authorizing an individual to perform professional work on a geoexchange system in the province / territory where the accreditation is delivered. To be awarded CGC accreditation, drillers and loop installers, system installers and residential designers have to prove they have received appropriate training (either CGC courses or recognised equivalencies) and also prove they have positive field experience backed by customer references and manufacturers / distributor's recommendations. In addition, accreditation is given to individuals who show their provincial work permits and licenses in order and who are therefore authorized to perform professional work on geoexchange systems in the province where they provide services.

6.2.2 Protecting customers through company qualification

Companies, whether registered as individuals or sole proprietors, partnerships or corporations are, in the normal course of geoexchange-related business transactions, the responsible legal entity that provides the supervision of professional employees or subcontractors, warranties, and quality assurance. They are also expected to carry professional liability insurance as well as a positive business practices record.

Customers want their geoexchange system designed and installed by professionals. They also want quality service, not for a month, not for a year, but for the next 10 and 20 years. Customers are looking for the highest quality service possible for the longest term possible.

CGC-Qualified firms / companies demonstrate that they stand above the rest. They employ and sub-contract work to *CGC Accredited* professionals. They demonstrate their commitment to a strong national geoexchange industry by providing customers with quality service.

6.2.3 Closing the loop – System Certification, in one of the world's most advanced and integrated, quality-controlled, geoexchange quality assurance program

A well trained and accredited workforce working at serious firms and companies, are the backbone of successful market transformation for the geoexchange industry in Canada. As a final step in this quality approach, CGC requires that systems are installed in compliance with the local, regional, provincial and national codes, standards and regulations. Ongoing verifications and random inspections reinforce the integrity of the program

Serious industry associations do pay attention to this critical element of any market transformation process and industry capacity building. Every serious ground source heat

pump association and national organisation throughout the world can benefit from this hard-learned Canadian experience.

In North America, there has never been and there is currently no other geoexchange accreditation program that has such diversified and high level training requirements in combination with relevant verified professional experience.

7 A FINAL NOTE

The Canadian geoexchange industry is undergoing rapid growth at this time, based on consumer demand. Though stakeholders are working diligently, critical bottlenecks currently exist and will continue to exist for the near future in quality assurance for Canadian consumers who wish to gain the huge potential energy savings, air quality, and/or energy security improvements that geoexchange can deliver.

After many years of public and private consultations, and in cooperation with the Federal government, industry leaders, utilities, community colleges, universities, manufacturers, distributors, consumers, and other stakeholders, the Canadian GeoExchange Coalition (CGC) has built one of the world's most stringent quality assurance programmes for geoexchange technology.

Since the quality programme process started in 2005, CGC has successfully worked through much misunderstanding around the country, some of it organised, to unify the Canadian industry to an unprecedented degree. CGC membership – not required for any aspect of the quality programme or to do business in Canada in any way – has bloomed from six utilities in late 2005 to over 200 members in early 2008. Directors represent all sectors of the industry and all corners of the country and CGC as an organisation has begun to partner in areas such as municipal bylaw and inspection protocol development, technical research and development, government relations, standards development, etc.

Governments, utilities and private banks, are now requiring nationally developed CGC training and professional accreditation. This demand for quality market infrastructure is based on three solid motivations: first, to increase customer confidence that geoexchange specialists are well trained and fully screened as true professionals allowed to design and install geoexchange systems in their markets, second, to increase the confidence of services firms and, three, to ensure – through this meaningful quality control mechanism – that Canadian standards are actively respected in the design and installation of each geoexchange system.

CGC's experience has shown that international cooperation should be carried out in a manner compatible with the right of every national association to freely choose, define and develop its own market infrastructure tools including policies, self-regulations, training programs and accreditation and certification of industry professionals.

The role of national associations has been discussed here in some detail. By working with stakeholders and governments at all levels, based on the expressed and documented will of those stakeholders and governments, an essential consensus and a dialogue can be opened which leads, with honestly conducted analysis and application, to a more effective, a more sustainable, and a more quickly growing GSHP industry. This organisation for industry effectiveness and growth, conducted in Canada by the Canadian GeoExchange Coalition through the Global Quality GeoExchange Program[®], is critical to deliver GSHP technology benefits.

8 REFERENCES

- Canadian GeoExchange Coalition May 2006. "National Consultation on the Proposed GeoExchange Certification Program – Consultation Document." Montréal, Canada.
- Competition Act (R.S., 1985, c. C-34) Part VII.1 – Deceptive Marketing Practices – Reviewable Matters. Art. 74.01 (1).
- Competition Bureau, 2007. "Self-regulated professions – Balancing competition and regulation". p. 133.
- Goldman, C.S. 1989. *The Competition Act and the Professions*. Notes for an Address by Calvin S. Goldman, Q.C., Director of Investigation and Research – Bureau of Competition Policy, to the Canadian Bar Association, April 25, 1989.
- Hoshino, P.A. 2002. "Market transformation of ground-coupled heat pump systems in Canada". 7th International Energy Agency Heat Pump Technologies / Heat Pumps Better by Nature / Beijing China, 19-22 May, 2002, Session 7.
- Mansfield, E. 1979. *Micro-Economics – Theory and Applications*, Third Edition, W.W. Norton and Company, New York, p. 347.
- Marbek Resource Consultants Ltd. "Ground Source Heat Pump Market Development Strategy – Final Report", March 1999.
- Nicholson, W. 1978. *Micro-Economic Theory – Basic Principles and Extensions*, Second Edition, The Dryden Press, Hinsdale, 1978, p. 382.
- Peitchinis, S.G. 1970. *Canadian Labour Economic – An Introductory Analysis*, McGraw-Hill, Toronto, p.137.
- Random House, 1989. *Webster's Encyclopedic Unabridged Dictionary of the English Language*.
- Roscoe, B.S. 1997. "The Consumer Protection Pyramid: Education, Self-Regulation, and Law Enforcement." Prepared remarks of Commissioner Roscoe B. Starek, III Federal Trade Commission, before the Korea consumer Festival '97, Seoul, Republic of Korea, December 2, 1997.
- Scherer, F.M. 1980. *Industrial market structure and economic performance*, Second Edition, Houghton Mifflin Company, Boston, p. 523.
- Thomas, G. 1995. "Market Transformation for Residential Energy Efficiency Services." Gregory Thomas & Associates, Ithaca, Affordable Comfort Selected Readings, pp. 5-6.
- Thompson, A.A. Jr. 1981. *Economics of the Firm – Theory and Practice*, Third Edition, Prentice Hall, Englewood Cliffs, p. 380.
- United States Environmental Protection Agency, [no date]. "Home Performance with Energy Star – Contractor Participation." p. 1.
- Random House 1989. *Webster's Encyclopaedic Unabridged Dictionary of the English Language*.