
# Policies supporting Heat Pump Technologies in Canada

**IEA Heat Pump Workshop**
**London, UK**
**November 13, 2012**

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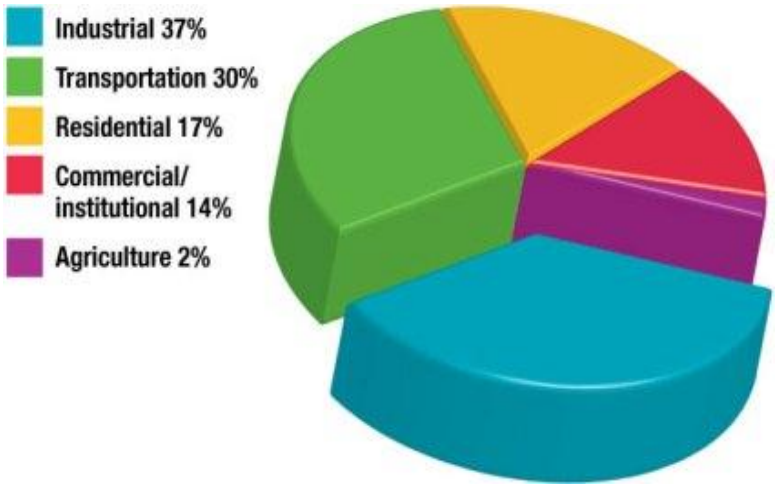
# Canada's Climatic Diversity

**Canada is the 2nd largest country in the world. It extends 4500 km, from 42° N lat (at Pelee Island, Lake Erie) to 83° N (the tip of Ellesmere Island).**

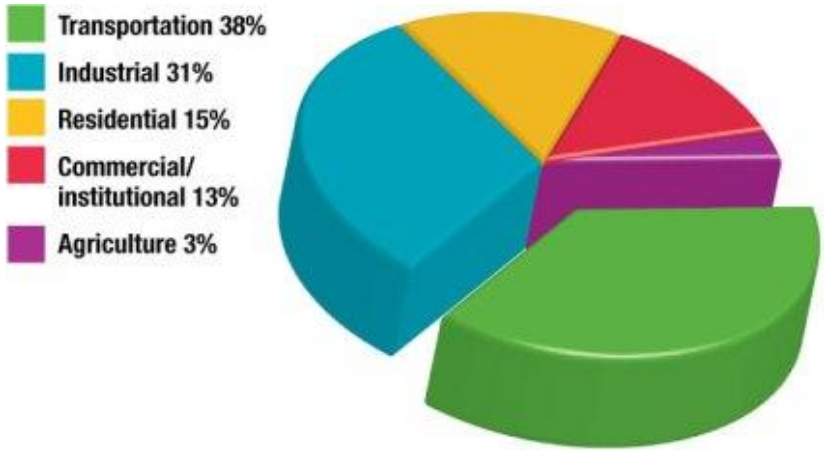
Canada's climate varies wildly, from perma-frost in the north to three distinct regions in the south. In this region the temperature can climb up to 35 degrees Celsius in the summer and descend to -40 degrees Celsius during winter.

# Canada's Energy Profile

**Secondary energy use by sector, 2009**




**GHG emissions by sector, 2009**

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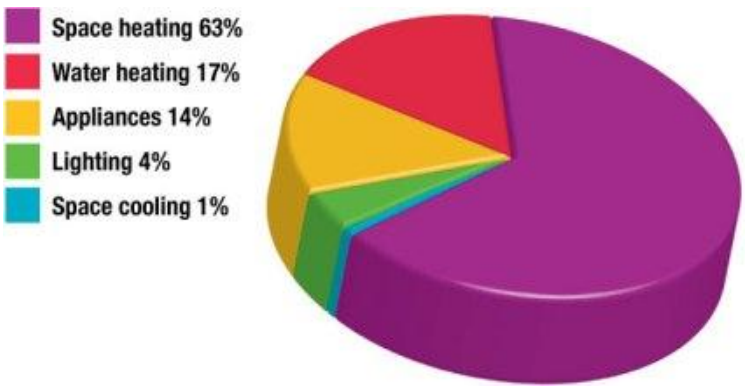
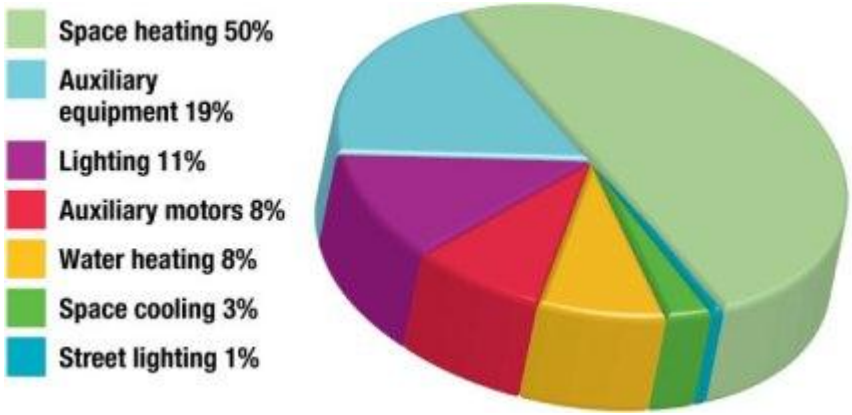
# Canada's Energy Use in the Building Sector (2009)

## Residential sector




## Commercial/institutional sector

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# Canada's Electricity production

| Sources | Provinces and Territories | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fuel** | **Canada** | **NL** | **PE** | **NS** | **NB** | **QC** | **ON** | **MB** | **SK** | **AB** | **BC** | **YT** | **NT** | **NU** |
| | *gigawatt-hours* | | | | | | | | | | | | | |
| Water | **334,251.3** | **38,525.2** | 0 | **892.1** | **2,793.7** | **163,301.5** | 33,404.2 | **33,513.2** | **4,393.0** | 2,141.2 | **54,706.3** | **330.6** | **250.2** | 0 |
| Wind and tides | 2,946.5 | 0 | **39.6** | 177.1 | 0 | 617.4 | 492.9 | 325.1 | 579.5 | 714.4 | 0 | 0.4 | 0 | 0 |
| Coal | 94,334.5 | 0 | 0 | **7,011.3** | **2,914.3** | 0 | 27,931.6 | 388.2 | **12,361.7** | **43,727.2** | 0 | 0 | 0 | 0 |
| Petroleum | 6,894.2 | 1,287.3 | 1.4 | **847.2** | **3,836.9** | 326.4 | 269.5 | 22.0 | 22.2 | 10.0 | 58.6 | 23.7 | 40.2 | **148.9** |
| Natural gas | 37,357.0 | 0 | 0 | **788.2** | **1,843.6** | **4,563.0** | 12,531.7 | 68.8 | **2,921.8** | **12,195.6** | 2,401.5 | 0 | 42.7 | 0 |
| Wood | 1,889.8 | 0 | 3.7 | 134.1 | 0 | 353.5 | 518.1 | 0 | 0 | 335.3 | 545.1 | 0 | 0 | 0 |
| Uranium | 88,190.4 | 0 | 0 | 0 | **4,118.7** | **4,321.6** | 79,750.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 3,779.2 | 0 | 0.02 | 2,487.0 | 776.7 | 199.2 | 216.2 | 0 | 0 | 100.1 | 0 | 0 | 0 | 0 |
| **Total utility generation** | **569,660.3** | **39,812.5** | **44.7** | **12,337.1** | **16,284.0** | **173,682.5** | **155,131.8** | **34,317.4** | **20,278.3** | **59,223.9** | **57,711.5** | **354.7** | **333.2** | **148.9** |
| **% of Canadian total** | **100.0** | **7.0** | **0.0** | **2.2** | **2.9** | **30.5** | **27.2** | **6.0** | **3.6** | **10.4** | **10.1** | **0.1** | **0.1** | **0.1** |

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# Canada's Electricity production

- Canada is the world's second-largest producer of hydroelectricity, which accounted for 58% of all electric generation in 2007. Since 1960, large hydroelectric projects, especially in Quebec, British Columbia, Manitoba and Newfoundland and Labrador, have significantly increased the country's generation capacity. In Ontario, Canadian-designed CANDU nuclear reactors supplied more than half the provincial electricity demand in 2007.

- Canadian homes, offices and factories are large users of electricity. In 2007, Canadian per capita power consumption was among the highest in the world, with an average of 16,995 kilowatt-hours per annum.

# Canada's Context for Heat Pumps

- Impacts depend on:
  - Electricity generation sources
  - Climatic conditions (issue of cold climate)

- Different avenues:
  - Ground source heat pumps for cold climates (heating and cooling)
  - Reversible air source heat pumps with auxiliary heating
  - New cold climate heat pumps (performance in real operating conditions to be proven)

- The need for air conditioning (particularly in Ontario and Québec) favours the adoption of reversible air source heat pumps

# Examples of Provincial Programs

## British Columbia –

### Air Source Heat pump rebates

- BC homeowners can get Government of BC LiveSmart rebates for new heat pumps when they upgrade heating equipment
  - **$1,500 — air-source heat pump** ENERGY STAR central system verified with an AHRI number, with either a new DC variable speed air handler or a new ENERGY STAR furnace with DC variable speed motor
  - **$1,500 — air-source heat pump** Ductless mini-split: one head in main occupied area plus one additional head on a different floor, ENERGY STAR or LiveSmart qualified inverter-based system
  - **$1,000 — air-source heat pump** ENERGY STAR central system added to an existing furnace or added to an existing indoor air handling unit
  - **$1,000 — air-source heat pump** Ductless mini-split: Single head in main occupied area, ENERGY STAR or LiveSmart qualified inverter-based system
  - **$1,000 — air-source heat pump** ENERGY STAR single package system

### Ground source heat pump rebates

- BC homeowners can get LiveSmart BC rebates for new geothermal heat pumps when they replace heating equipment.
- **$2,500 — new heat pump (ground or water-source)**
  CAN/CSA-C448 compliant system – that is certified by the Canadian GeoExchange Coalition
- **$1,000 – replace heat pump (ground or water-source)**
  CAN/CSA-C448 compliant unit – that is certified by the Canadian GeoExchange Coalition

# Examples of Provincial Programs

- **Nova-Scotia** – Financial incentives for housing
  - Registered Performance Plus homes that meet all eligibility criteria are eligible for the following rebates:
  - **Rebates Based on the Final EnerGuide Rating:**
- **Final EnerGuide ScorePerformance Plus Rebate**
  - 83 or 84 $3,000
  - 85, 86 or 87 $5,000
  - 88 or higher $7,000

- **New Brunswick** – Maximum incentive : $6000
  - Rebates under Efficiency NB's Existing Homes Energy Efficiency Upgrades Program include:
    - Boilers, doors, drainwater heat recovery systems, furnaces, **heat pumps,** heat recovery ventilators, insulation, water heaters, windows/skylights

# Examples of Provincial Programs

- **Quebec**
  - Program for accelerating the adoption of high efficiency heat pumps in preparation. The first targeted segment will be new housing.
  - Cold climate air source heat pumps are under consideration

# Ground Source Heat Pumps

- The Canadian GeoExchange Coalition (CGC) acts as the industry catalyst to unite private and public sector stakeholders, and to expand the market for geothermal heat pump technology in Canada. As the nexus of information, training, certification, standards and public awareness, the CGC works to build the necessary infrastructure to foster Canadian industry growth.

- The CGC developed and deployed a market transformation initiative starting in 2006.

- The initiative included the following:

  - Training for industry professional
  - Accreditation for industry professional
  - Certification of residential systems
  - Advise governments and utilities on financial assistance programs
  - Actively involved in government relations to help in ground water regulations
  - Formulate recommendations for codes and standards improvements
  - Prepare and distribute marketing material to industry stakeholders
  - Hold workshops, seminars and conference

# Ground Source Heat Pumps

## Current training programs

Installers' Course (3 days)
Residential Designers' Course (3 days)
Commercial Designers' Course (4 days)
Municipal Inspectors' Course (2 days)
Direct Expansion Installer's Course (2 days)
Interpretation of Geological Data & Information (1 day)
Loop Installation Course (3 days)
Marketing Introduction to Geothermal Heat Pump Technology (4 hours)
Technical Introduction to Geothermal Heat Pump Technology (8 hours)

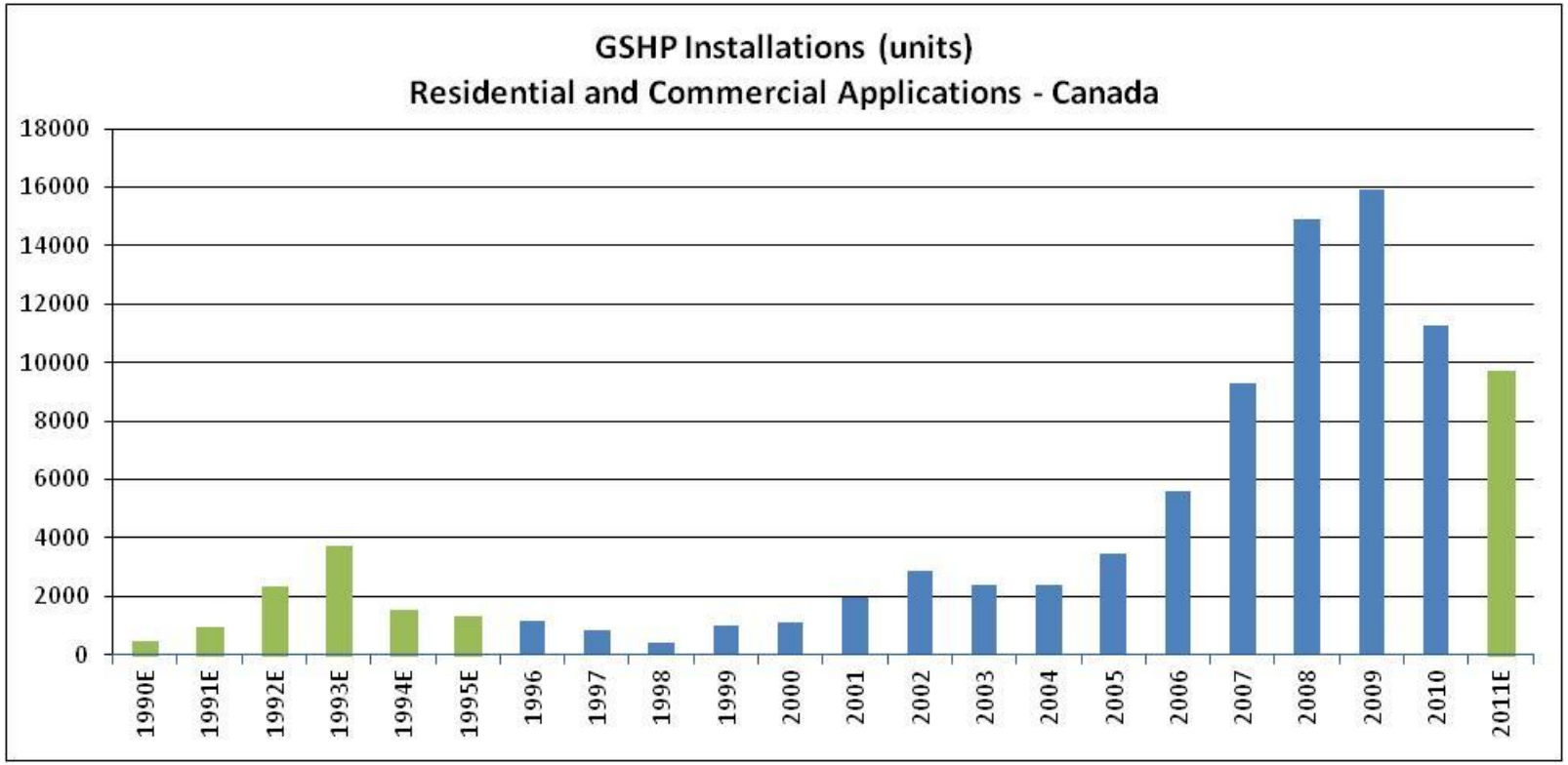
The CGC currently has **professional accreditation** for:

Accredited Installer (water loop systems)
Accredited Installer (direct expansion systems)
Accredited residential and small building system designer
Accredited commercial system designer

## R&D Activities

Tests on grouts and grouting material mixture for thermal conductivity and permeability
Development of design software for residential and small buildings GSHP applications
Development of design software for commercial GSHP applications
Interested in technology integration such as GSHP and solar thermal applications

# Ground Source Heat Pumps

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# Ground Source Heat Pumps

- The CGC is the host organization for the IEA-HPC2014 in Montréal…and celebrating its 10th anniversary in 2012.


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# Thank you !