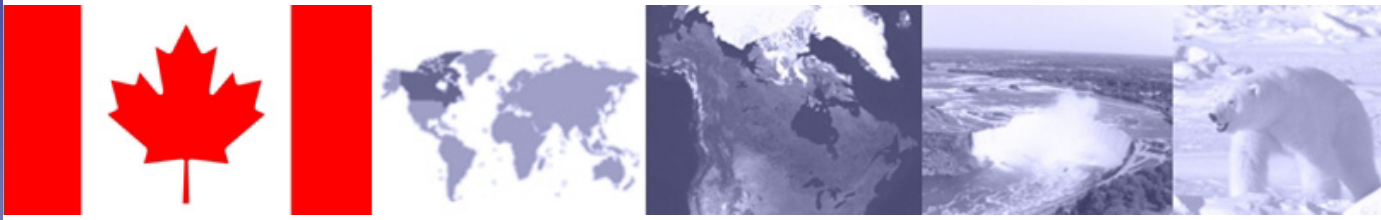


## Economical heating and cooling systems for low energy houses



### Canada

Canada is represented by the **Laboratoire des Technologies de l'Énergie - LTE** (Energy Technologies Laboratory), a division of the Hydro-Québec Research Institute.

**Hydro-Québec** is one of the largest Canadian utilities and one of the largest hydro-electric utilities in North-America.

#### National team leader



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### Canadian national project

Equilibrium™ Housing Pilot and Demonstration Initiative by the Canadian Mortgage and Housing Corporation (CMHC). Equilibrium™ housing follows a Net Zero Energy approach and integrates high-performance, energy-efficient passive solar design and commercially available on-site renewable energy systems such as solar heating, air- and ground-source heat pumps. Equilibrium™ housing also incorporates the principles of occupant health and comfort, affordability, resource conservation and reduced environmental impacts. These significantly reduce greenhouse gas emissions and minimize the detrimental environmental impacts of housing on water, land and air. The goals of the Equilibrium™ housing initiative is to build the capacity of Canada's housing and renewable energy industry sectors to create high-quality housing across the country over the long term and achieve acceptance of low-impact healthy houses and sustainable communities. Twelve demonstration projects have been selected by the Canadian Mortgage and Housing Corporation throughout Canada.



Fig.1 Logo of the Equilibrium™ Housing Initiative of the Canadian Mortgage and Housing Corporation

In the frame of Annex 32 two Equilibrium™ Houses in Eastern Canada are designed, simulated and investigated in field monitoring. The EcoTerra™ House of the Home Building

Company Aloutte Home is a house of prefabricated components, which has been erected in one day in Eastman, Quebec. The building technology incorporates as core components a building integrated PV/thermal (BI-PV/T) and a ground-source heat pump. Furthermore, other innovative technologies are field-tested, e.g. a waste water heat recovery and a hollow floor slab to store the preheated air of the PV thermal system.

The second house, the Alstonvale Net Zero Energy House, is based in Hudson, Quebec, and also incorporates a building integrated PV/Thermal. The concept of a Net Zero energy lifestyle incorporates besides the design of a Net Zero consumption of the house also mobility aspects by integrating the car battery charging into the energy concept and a local food production. Thereby, different aspects of sustainability are integrated in the concept of the house. Core components of the technical building system are two heat pumps for capacity control, a ground loop, a BI-PV/T as heat source and a heat storage. System concepts have been documented in two system concepts sheets and single pilot technology concepts are treated in the final report on prototype systems.

## Canadian links



### Canada Mortgage and housing corporation

Information in English and French at:

 <http://www.cmhc-schl.gc.ca>



### Equilibrium™ Housing Initiative of the Canada Mortgage and housing corporation

Equilibrium™ is a national sustainable housing demonstration initiative, led by Canada Mortgage and Housing Corporation (CMHC). that brings the private and public sectors together to develop homes, and eventually communities that address occupant health and comfort, energy efficiency, renewable energy production, resource conservation, reduced environmental impact and affordability.

More information at :

 <http://www.cmhc-schl.gc.ca/en/inpr/su/eqho/>



**Montréal ZERO**

### Website EcoTerra™ Equilibrium™ House Concept

The EcoTerra™ Equilibrium™ House Concept of the Canadian Home building company Aloutte Homes Ltd. is one of the winning concepts of the Equilibrium Initiative of the CHMC. It is intensively field-monitored within the **Equilibrium Initiative** as a Canadian contribution to Annex 32. The website contains information on the housing concept, the building technology applied.

Website in English



<http://www.maisonalouette.com/english/ecoterra2/>

**Montréal ZERO**

### Website Alstonvale™ Equilibrium™ House Concept

The Alstonvale Net Zero Energy House (ANZEH) Concept of the team led by Sevag Pogharian Design (SPD) is another winning concept of the Equilibrium Initiative of the CHMC. Besides the Net Zero Energy housing the concept also comprises also other sustainability aspects like mobility and local food production gathered to the concept of a Net Zero Energy Lifestyle.

The house was to be intensively field-monitored within the Equilibrium Initiative as a Canadian contribution to Annex 32 before it unfortunately entirely burned down in May 2010. The website contains information on the housing concept and the building technology applied as well as academic papers and presentation about the Alstonvale and Net Zero Energy housing in Canada for download.

Website in English



<http://www.montrealzero.ca>



## **AEE- Agence de l'efficacité énergétique du Québec**

The mission of the AEE is to promote the energy efficiency and to develop new technologies for all energy sources and in all sectors of activity.

The Agency develops and promotes energy efficiency program and ensures their implementation and monitoring.

More information at :

 <http://www.aee.gouv.qc.ca>



## **NOVOCLIMAT**

Building label of Quebec province of Canada for low energy houses based on the Canadian building standard R-2000. Information to the NOVOCLIMAT standard in French at:

 <http://www.aee.gouv.qc.ca/habitation/novoclimat>



## **R-2000 Building Standard**

R-2000 is made-in-Canada home building technology with a worldwide reputation for energy efficiency and environmental responsibility. The R-2000 Standard is a series of technical requirements for new home performance that go way beyond building codes. Every R-2000 home is built and certified to this standard.

Information to the R-2000 standard in English at:

 <http://r2000.chba.ca/>



## **Canadian GeoExchange Coalition**

Members: BC Hydro; Hydro-Quebec; Manitoba Hydro; Milton Hydro; SaskPower and Yukon Energy Corporation Partners: Earth Energy Society; Geothermal Heat Pump Consortium; Natural Resources Canada

Information in English at

 <http://www.geo-exchange.ca/>



## **Canadian Solar Building Research Network (SBRN)**

The Canadian Solar Building Research Network (SBRN) aims at developing the solar-optimized buildings as integrated advanced technological systems that approaches net-zero energy consumption while being cost effective and comfortable.

The SBRN was launched in 2006 by Natural Sciences and Engineering Research Council of Canada. SBRN includes researchers and experts from Canadian universities, Natural Resources Canada, Canada Mortgage and Housing Corporation and Hydro-Québec. The budget of the Network is about C\$6 million, including supports from the Net-Zero Energy Home Coalition and Canadian Solar Industries Association.

More information in English and French at

  <http://www.solarbuildings.ca>



## **Concordia University - Montréal**

Concordia is a large University in Montreal (Quebec), Canada. Their more than 180 undergraduate programs and 70 programs leading to Master's and doctoral degrees are divided into four Faculties, of whom Arts and Science, and Engineering and Computer Science. In 2007, Hydro-Québec donates 8 million C\$ to Concordia University's of Engineering and Computer Science.

Information in English and French at:

 <http://www.concordia.ca/>

## **IEA HPP Annex 32**

IEA HPP Annex 32 is a corporate research project on technical building systems with heat pumps for the application in low energy houses.

The project is accomplished in the Heat Pump Programme (HPP) of the International Energy Agency (IEA).

**Internet:** <http://www.annex32.net>

