

Achieving Net Zero

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Alouette Homes**

**National Marketing Committee
Canadian Home Builders Association
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Overview

- Who Is Alouette Homes?
- The EQUilibrium™ Initiative
- Alouette's ÉcoTerra™ House
- Why We Participated
- Some Conclusions
- Question Period





Who is Alouette Homes?

- A manufacturer of modular and panelized housing solutions
- Headquartered in the Eastern Townships area of Quebec, with a second production facility in Virginia





Who is Alouette Homes?

- A clientele that ranges from first-time home buyers to buyers of custom, near luxury homes; from direct-to-consumers to large builders and developers



Modular homes

- Large dimension “boxes”
- An advanced level of prefabrication
- Quickly assembled on site
- Expensive to transport over long distances
- Certain design issues that can add costs
- Markets served: Quebec, Ontario and New England (from the Quebec factory), Virginia, West Virginia, North Carolina and South Carolina (from the Virginia factory)



Panelized Homes

- “Flat-pack” concept
- Assembled on-site
- Inexpensive to transport and virtually no design issues
- Markets served: anywhere in the world, but we are actively developing markets in the United Kingdom and France.



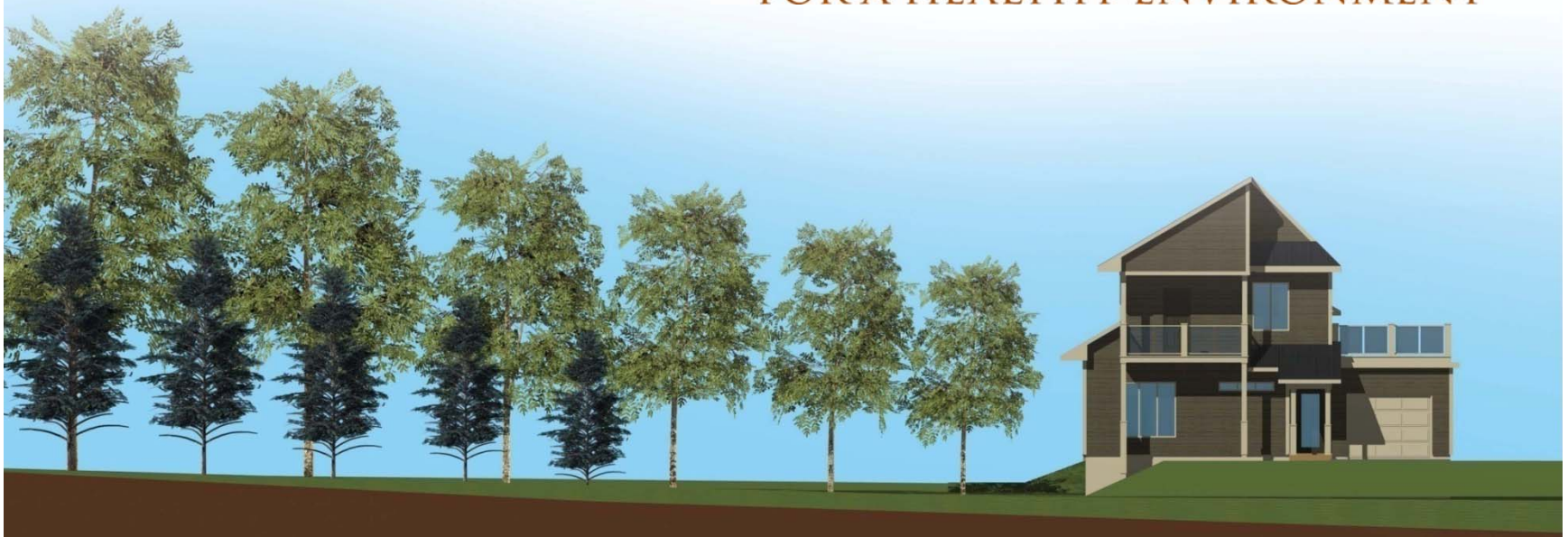
Exports

- Since 1998
- Homes delivered to Chile, Slovakia, Switzerland, Spain, France and the United Kingdom.



Equilibrium

HEALTHY HOUSING
FOR A HEALTHY ENVIRONMENT



What is The EQUilibrium™ Housing Initiative?

- An initiative by CMHC to promote the development, construction and demonstration of net zero energy, healthy homes
- A balanced approach to sustainable residential development
 - The lowest possible net energy usage
 - Affordability
 - Occupant health and comfort
 - Sustainability
- www.cmhc-schl.gc.ca/en/inpr/su/eqho/index.cfm

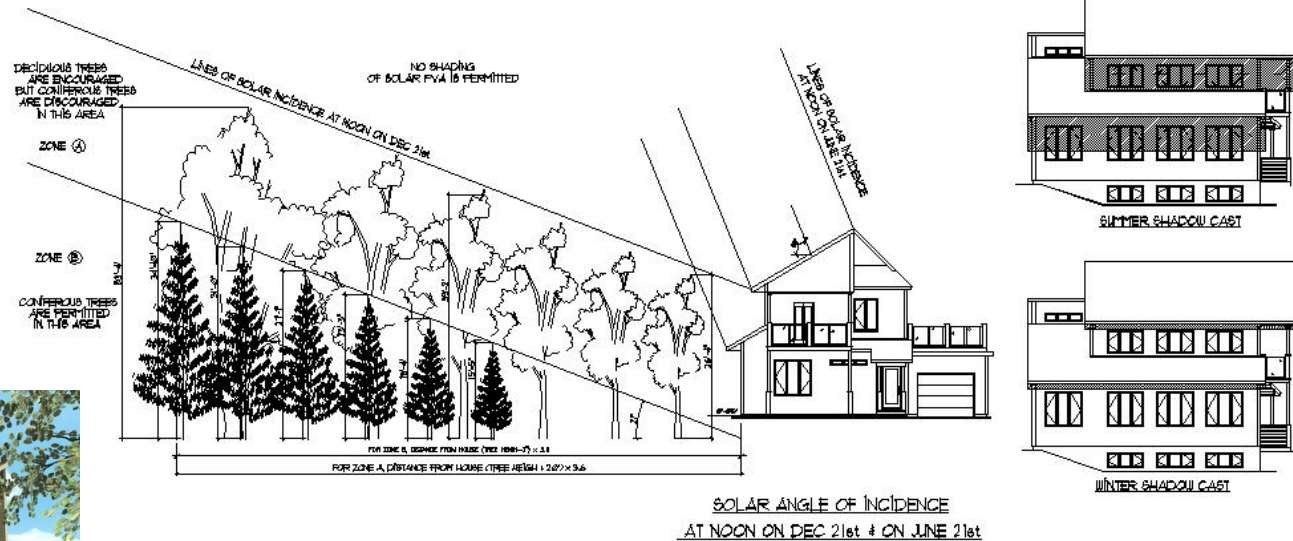


The EQUILIBRIUM™ Approach

- An Integrated Design Process
- An intensive, structured and facilitated collaboration between:
 - Architects and engineers
 - Planners and building authorities
 - Major suppliers and contractors
 - Clients and other stakeholders
- Simulation and modelling of various energy strategies
- Cost/benefit evaluations of various solutions
- A period of demonstration
- Ongoing monitoring while occupied



The Principal Elements

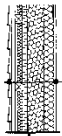


- A highly efficient thermal envelope
- Optimisation of passive solar gains
- Various energy recovery strategies
- Integrated renewable energy systems
- Sustainable building practices
- Occupant health and comfort



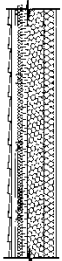
Thermal Envelope

- High performance envelope
- Thermal bridges eliminated
- Triple glazing



WALL

WOOD SIDING NAILS @ MAX. 16" C/C
 VERTICAL BATTENS 1"X3" @ 16" c/c MAX
 1" BASF WALL-TE FOAM INSULATION
 (R-6.1) (AIR-BARRIER)



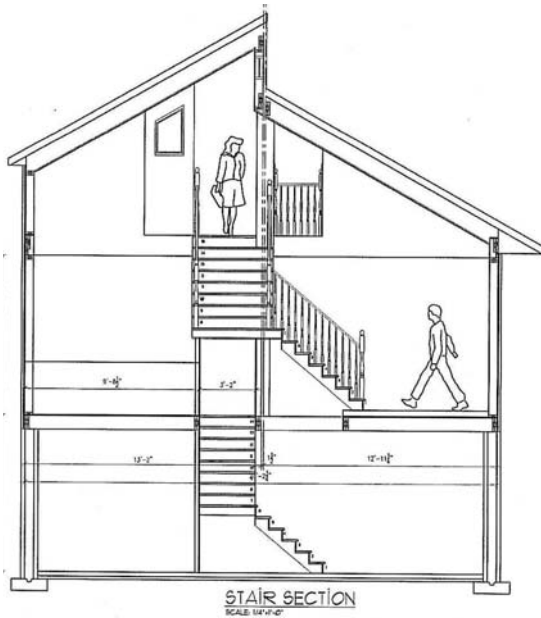
HORIZONTAL BATTENS 2"X2" @ 24" c/c
 1" NEOPOR INSULATION PANEL (R-4)
 2" x 6" @ 24" c/c
 EXTERITE 3 1/2" (R-14)
 WALL-TE V.N. 2" (R-12) (VAPOR-BARRIER)
 1/2" GYPSUM



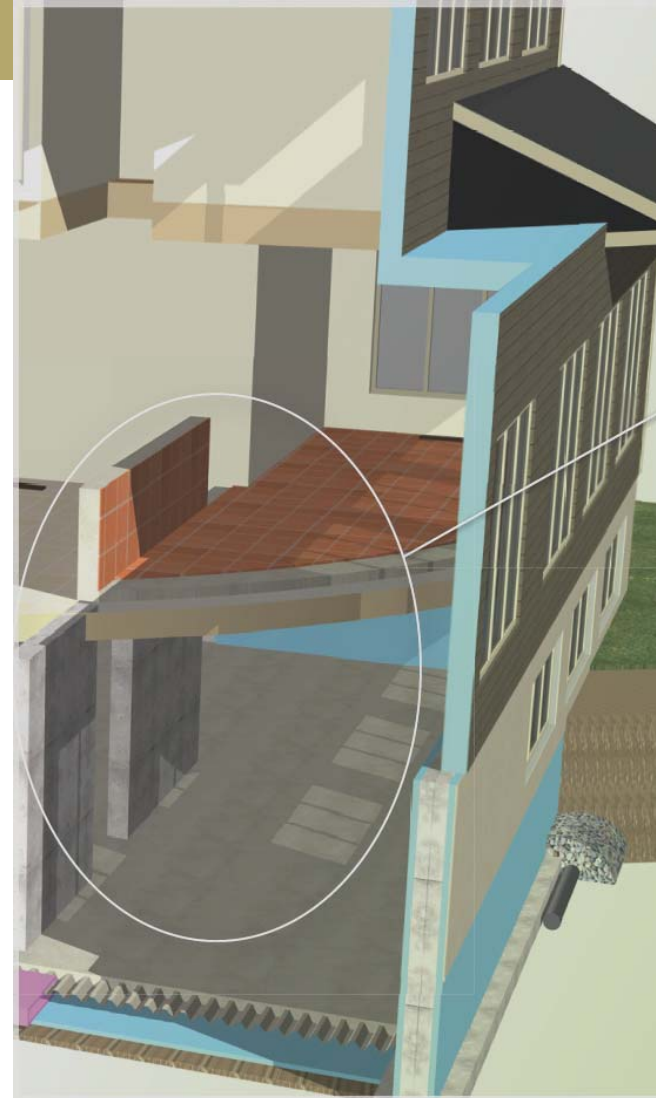
- R-54.2 Ceilings
- R-37.5 Walls
- R-22 Basement Walls
- R-7 Under Slab
- 0.83 AC/H



Passive Solar Optimization

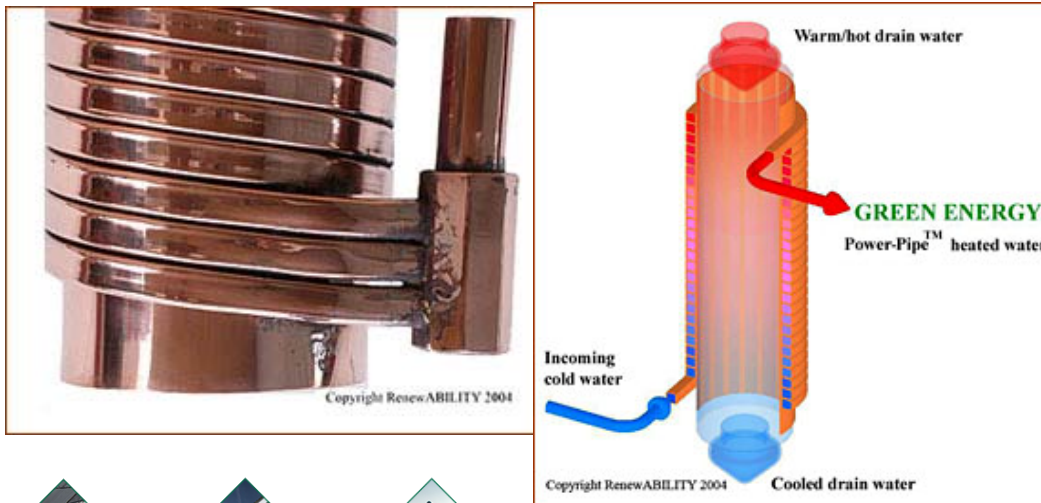


- Open design
- Additional thermal mass
- No cooling required



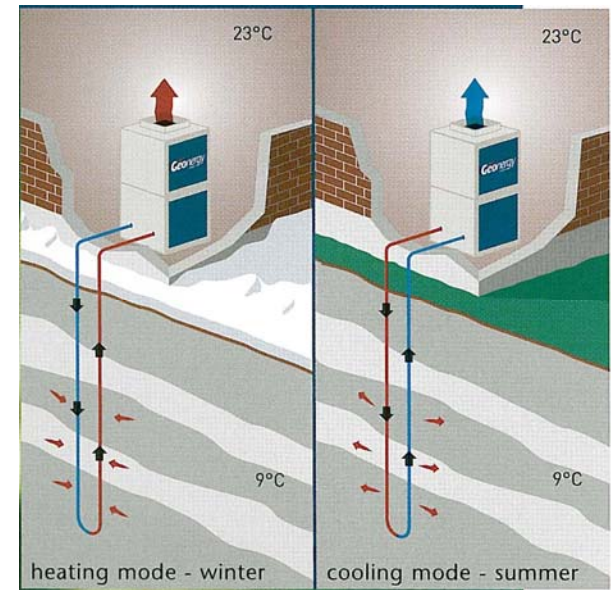
Energy Recovery

- Heat recovery ventilator with ECM motor, controlled by home automation system
- Drain-water heat recovery



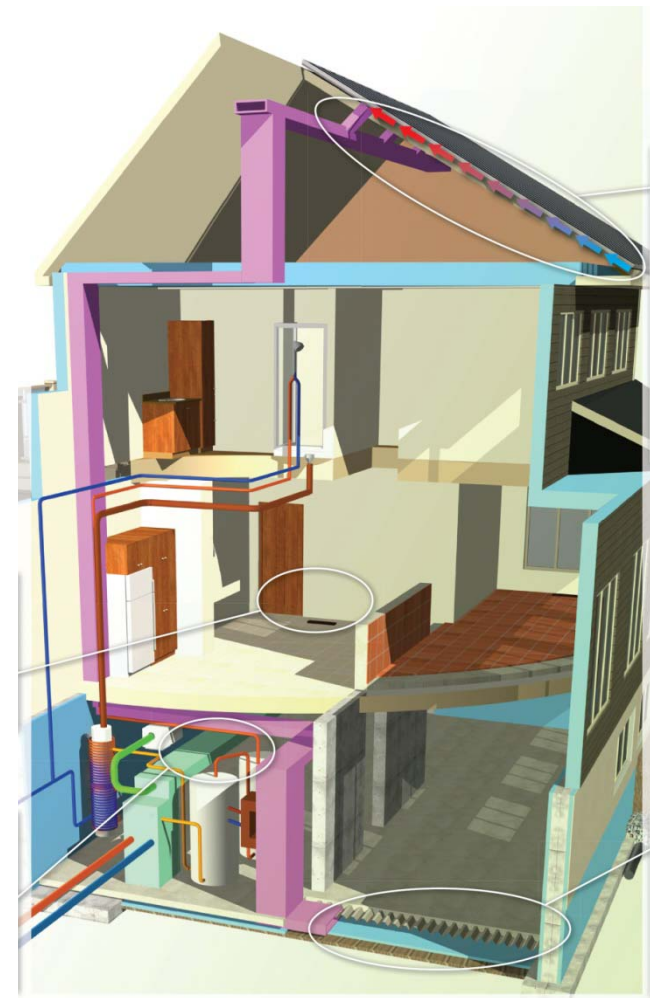
Renewable Energy Sources

- 3 Ton, two-stage, geothermal heat pump
- 3 KW PV array producing 3,420 kWh annually
- Grid connected with net metering



Innovative Features

- Cooling of PV panels / solar thermal “harvesting”
- Integration of various systems through home automation system





Factory Integrated, Modern, Modular Construction Methods

- Six modules, including a technical “pod” in the basement and a PV/Thermal solar roof module



Canada



ÉCOTERRA^{MC}



www.alouettehomes.com

Sustainability

- Wood frame, siding, flooring and cabinetry
- Recycled materials
- Off-site manufactured, modular sections
- More efficient use of materials, extensive recycling
- Environmental covenants at building site
- Self contained water supply and waste water disposal
- Greatly reduced carbon emissions



Healthy House

- Reduced air leakage; balanced, fresh, filtered air to every room
- Uniform temperatures and humidity levels throughout the house
- Natural materials and finishes chosen to minimize indoor air pollution
- Optimization of natural lighting
- Healthy activities just outside the door



Results

- The average house in Quebec consumes approximately 26,000 kWh (with electric heating). Computer modelling indicates that our ÉcoTerra™ house will consume approximately 5,575 kWh.
- Of this amount, PV panels will provide 3,265 kWh, leaving a net energy deficit of approximately 2,310 kWh (Equilibrium contest rules, family of four).
- The home will be displayed until approximately the end of this summer, after which it will be occupied.
- Monitoring will continue for at least one year to determine which energy strategies performed the best, and also to collect data for future modelling and standards development.



Construction costs

- ~ \$350,000 (excluding land)
- ~ \$230 per square foot
- 90K to 110K over the cost of a conventionally built home
 - \$20k - Building envelope
 - \$0k - Passive-solar optimization (orientation, design, etc.)
 - \$5k - Energy recuperation
 - \$5k - Reduced electrical needs (lighting, appliances, phantom loads, etc.)
 - \$5k - Reduced hot water consumption
 - \$5k - Control the cost of ventilation
 - \$60k - Renewable energy (solar PV, solar thermal, geo-thermal, etc.)



Alouette's Reasons for Participating

- To maintain and reinforce Alouette Home's leadership position as a builder of energy efficient and sustainable housing
- An exercise in learning; what are the limitations and opportunities of the technologies available?
- An ongoing effort in the development of products and services that are unique in the marketplace
- The opportunities that exist in delivering new technologies in export markets



Contributors and Collaborators

- Canada Mortgage and Housing Corporation
- La Société d'Habitation du Québec
- Natural Resources Canada,
- Hydro Québec
- Architect
 - Masa Noguchi - PhD, Mackintosh School of Architecture, Glasgow, Scotland
- Engineers:
 - Andreas Athienitis – PhD, Eng, Concordia University
 - Claude Agouri – Eng, Airtechni Inc. Montreal, QC
 - Yves Poissant – PhD, NRCan, CEMTC Varennes
- BASF



Visiting Hours

- Saturdays and Sundays from 11:00 to 16:00
- Mondays from 12:00 to 17:00
- Through the end of summer 2008
- Map available on our web site



LES MAISONS
Alouette
HOMES

Thank You!

