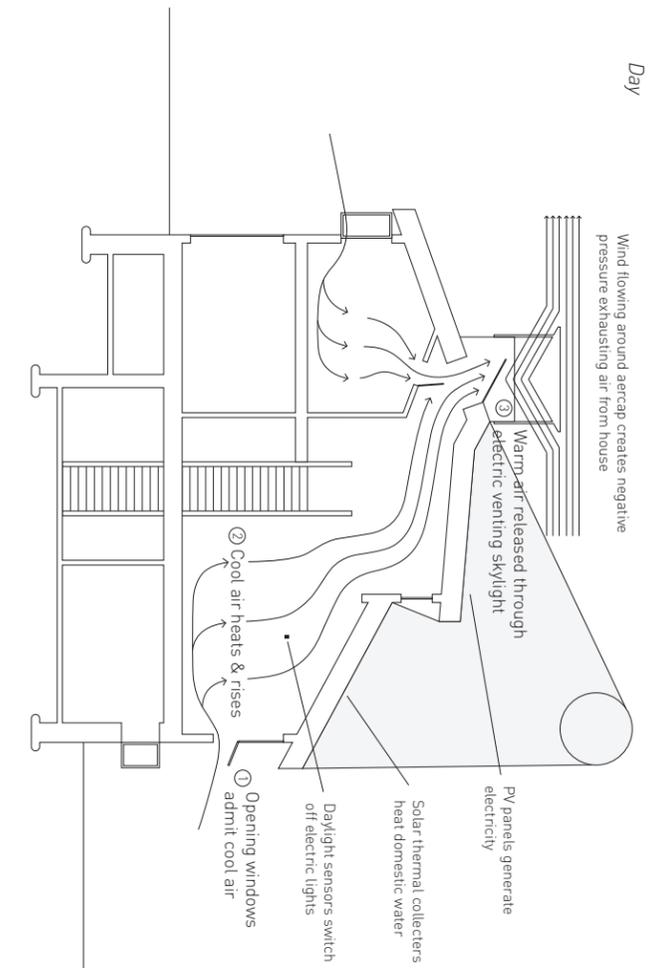
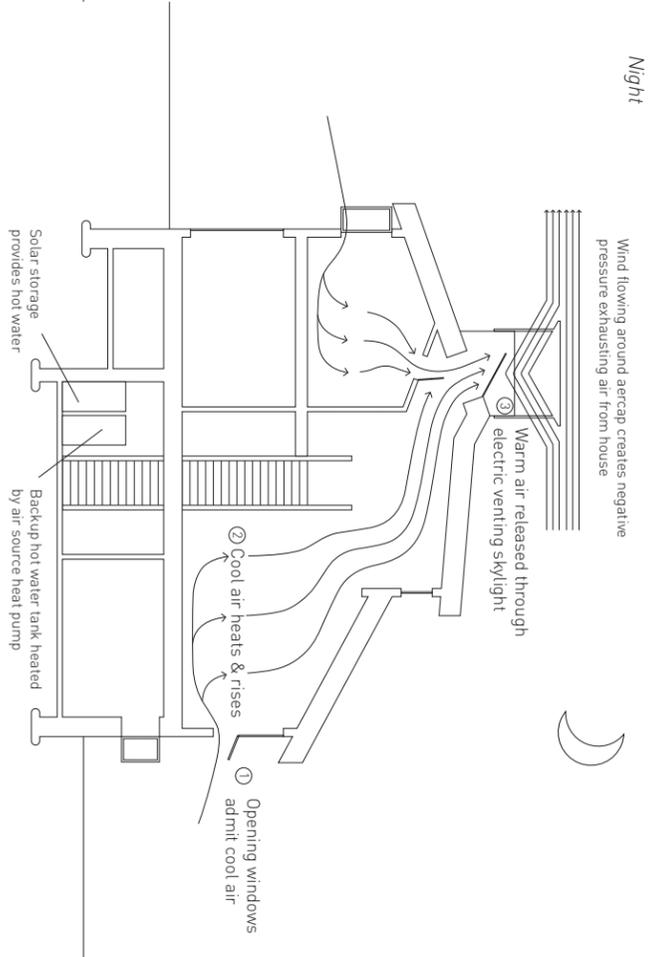


Day



Night



The Harmony House EQUilibrium™ Project



Harmony House is a next generation green building that uses a mixture of proven & leading edge technologies to provide a resource efficient, healthy, zero-energy home.

The building envelope is super-insulated & airtight & incorporates fiberglass frame triple glazed windows to minimize space heating loads. Space heating is provided by a combination of solar heat gain through south facing windows & a high efficiency air source heat pump. Water heating is provided by a solar water heater backup by a high efficiency air source heat pump. A high efficiency heat recovery ventilator with dedicated supply & exhaust ductwork & a pre-filter is used to minimize ventilation energy losses & to help ensure high indoor air quality & thermal comfort. High efficiency appliances is used to minimize electrical power demand.

Lighting is provided by a mixture of day lighting & high efficiency electrical lighting controlled by daylight sensors & motion detector controls. Cooling is supplied, as required, through a combination of wind- & stack driven air-flow cooling & night-time free cooling. All electrical energy consumption on an annual basis is provided through a grid connected 110 m² (1187 ft²) photovoltaic array.

The home is resource efficient through the use of advanced framing, engineered wood products & products made from renewable & recycled materials. Water conservation is achieved through the use of water-conserving plumbing fixtures & appliances, high efficiency irrigation & rain water harvesting. A healthy indoor environment is provided through the use of low chemical off gassing interior finishes & the filtration of ventilation & recirculation air.

Construction of the project is documented in a series of videos which can be found at sustainabilitytelevision.com.

EQUilibrium™ Housing Initiative

Harmony House is a winning entry in the Canada Mortgage & Housing Corporation (CMHC) EQUilibrium™ Sustainable Housing Demonstration Initiative -- a national initiative to design, build & demonstrate sustainable homes throughout Canada. For more information & the Harmony House project overview visit: cmhc.ca

Sponsors

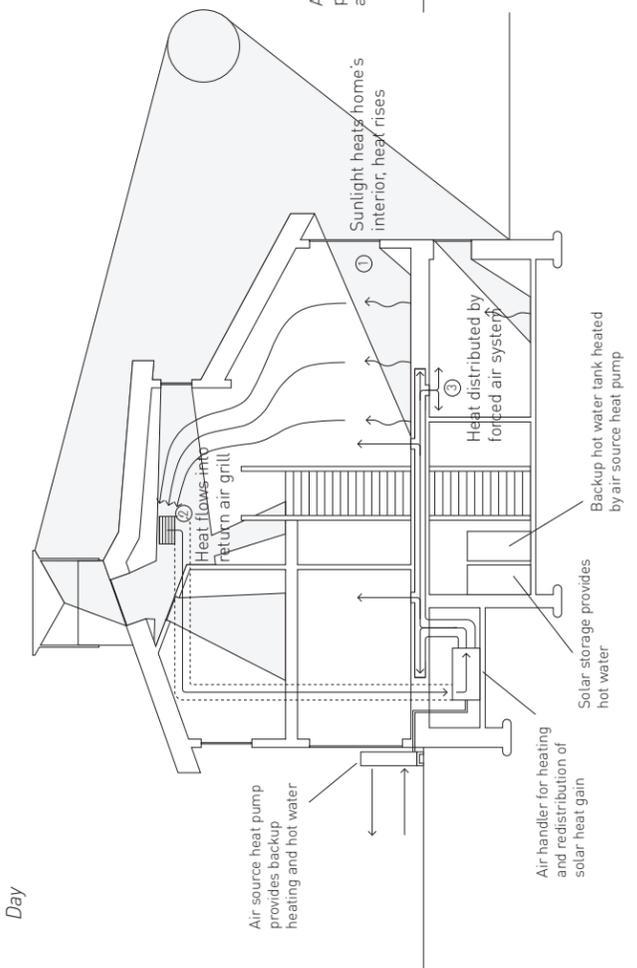
- BC Hydro Power Smart
- Benjamin Moore & Co. Ltd.
- Canada Green Building Council
- Cascadia Windows & Doors Ltd.
- CR Flooring Ltd.
- Day 4 Energy Inc.
- Dick's Lumber and Building Supplies Ltd.
- Dow Building Solutions
- DuPont Building Innovations
- Dynamic Metal Solutions Inc.
- E3 Eco Group Inc.
- Eaton
- Echoflex Solutions Inc.
- Eneready Products Ltd.
- Fab-Form Industries Ltd.
- Forbo Flooring Systems Canada
- Four Seasons Insulation Ltd.
- Greater Vancouver Home Builders Association
- Gutterglove Canada Ltd.
- Icynene Inc.
- Interstyle Ceramics & Glass Ltd.
- Kohler Canada Ltd.
- Litecontrol
- Matrix Design Ltd.
- Mitsubishi Electric Sales Canada Inc.
- Mitsubishi Motor Sales of Canada
- Modern Finishes
- National Door & Hardware / Lynden Doors
- OEL Painting Ltd.
- Orca Security Plus
- Pacific Rim Cabinets Ltd.
- Panasonic Canada Inc.
- Philips Canlyte Inc.
- Premier Plastics Inc.
- Quad-Lock Building Systems Ltd.
- Recollective Consulting
- Samsung Canada Ltd.
- Solid Wood Products Ltd.
- Superior Gass Installations Ltd.
- Szolyd Development Corp.
- Thermo Dynamics Ltd.
- Travelers Canada
- Velux Canada inc.
- Verve Living Systems

For links to the products used in this project, please visit harmony-house.ca/sponsors

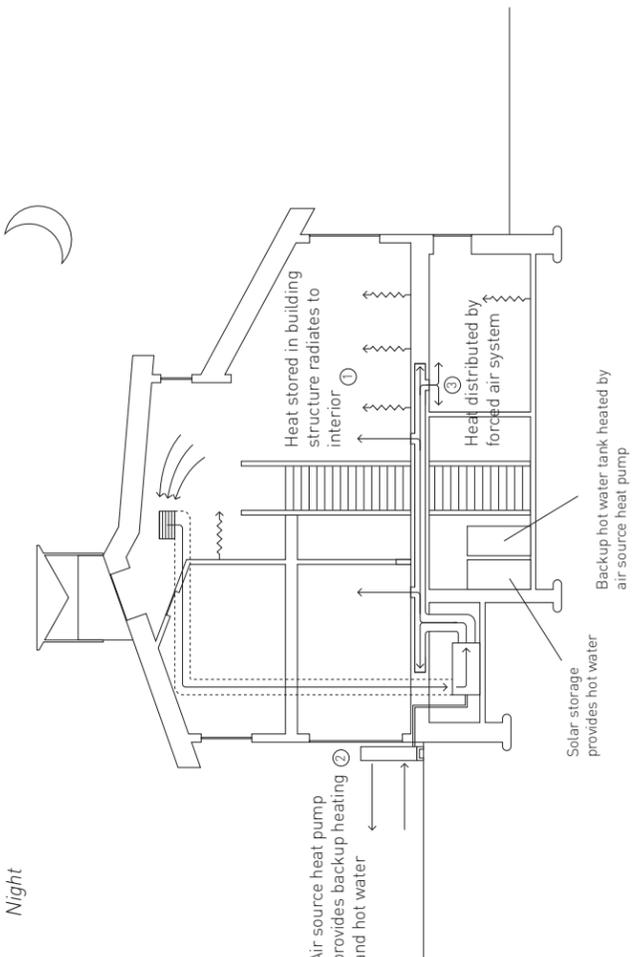
- Designer, Energy Analyst & Green Building Consultant**
Habitat Design + Consulting
- Builder**
Insightful Healthy Homes
- Interior Designer**
Teva Design
- Lighting Designer**
Quantum Lighting

- Structural Engineer**
K. Ito & Associates
- Landscape Architect**
Blue + Green Design Studio
- Building Envelope Engineer**
JRS Engineering
- Video Documenter**
Sustainability Television

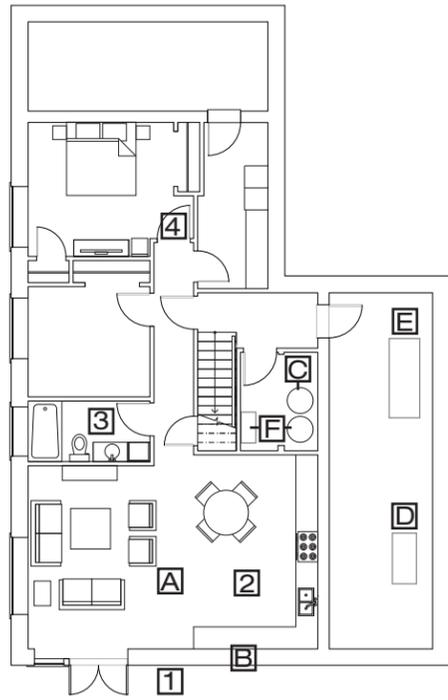
Day



Night



Basement Floor



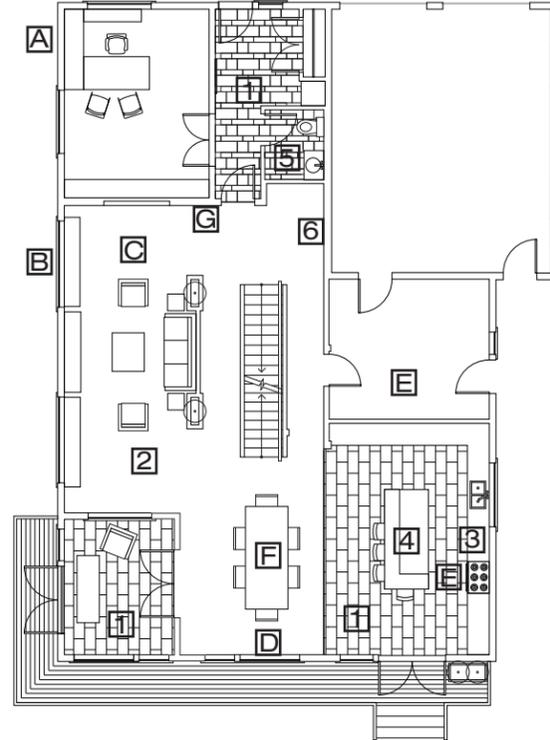
Environmental Features

- 1) Fab-Form Monopour fabric footing: Minimizes concrete volume, ensures a stronger footing, eliminates ground water movement into footing, prevents concrete liquids from entering ground water & minimizes construction waste.
- 2) Marmoleum flooring: Linseed oil based linoleum made from renewable resource, natural bacteriostatic action reduces bacterial growth.
- 3) Kohler water efficient plumbing fixtures: Reduces quantity of city water required for toilets & washing.
- 4) Lynden doors: Interior doors made from locally sourced Douglas Fir contain no added urea formaldehyde (NAUF) cores, factory clear coat finished with Ultra Violet cured transparent urethane that releases no VOCs.

Energy Features

- A) Dow SM non ozone depleting foam board insulation: RSI 3.5 (R20) insulation minimizes heat losses through basement & crawl space floor slabs.
- B) Quad-Lock insulated concrete form foundation walls: RSI 7.9 (R45) basement & crawl space walls minimize heat losses through foundation walls while also providing a stay in place forming system that minimizes waste.
- C) Thermo Dynamics solar domestic water heating system tank: 302 liter (80 gallon) storage tank heated by 6 m² (64 ft²) of solar collector providing 60% of hot water requirements.
- D) Eneerady products heat recovery ventilator: High efficiency central heat recovery ventilator exhausts kitchens, laundry rooms & bathrooms while supplying filtered outdoor air to all other rooms. Heat is transferred from the exhaust air stream into supply air stream minimizing heat loss. HRV controlled by proportioning humidity controller.
- E) Mitsubishi Zuba high efficiency air source heat pump central forced air heating system: Heat is extracted from outdoor air & upgraded for space heating. For every watt of energy used by this system, about 3 watts of heat is produced.
- F) Mitsubishi Zuba Hydra-dan high efficiency air source heat pump water heating system: Heat is extracted from outdoor air & upgraded for water heating. For every watt of energy used by this system about 3 watts of heat is produced. Provides backup for solar water heater.

Main Floor



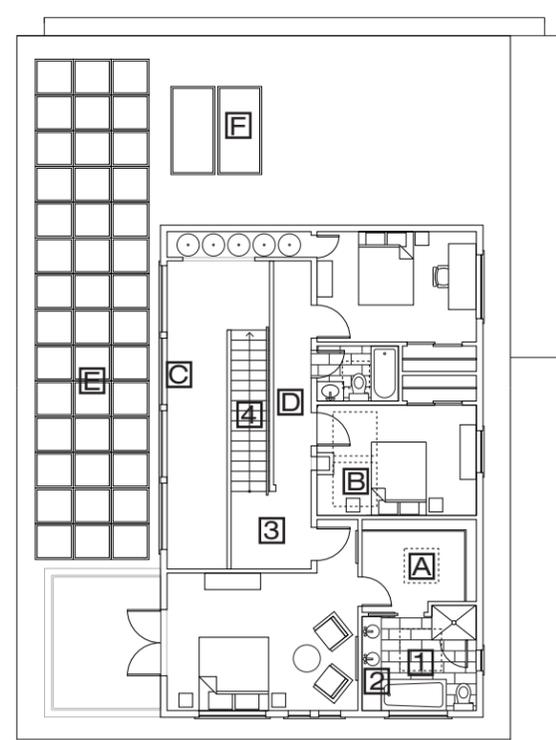
Environmental Features

- 1) Interstyle earthen glass floor tiles: Recycled glass powder & locally sourced clay tile.
- 2) Solid Wood Pro fir flooring: Recovered & refinished Douglas Fir tongue & groove flooring pre finished with hard wax oil
- 3) Pacific Rim cabinets: kitchen cabinets utilize engineered wood veneer finished & non-chemical off gassing plywood & particle board carcasses.
- 4) Szolyd precast concrete counter tops: Precast concrete counter tops utilize recycled glass aggregate.
- 5) Kohler water efficient plumbing fixtures: Reduces quantity of city water required in kitchen & bathrooms.
- 6) Benjamin Moore no VOC Paints: Paint will not release volatile organic compounds contributing to higher indoor air quality.

Energy Features

- A) High performance RSI 6.8 (R38.5) exterior walls: 38 mm x 140 mm (2x6) advanced framed walls with 610mm (24") stud spacing, cavity insulation consisting of Dow Thermax™ isocyanurate foam board insulation, Panasonic vacuum insulation & Icynene LD-R-50 castor bean oil based spray insulation & air barrier.
- B) Cascadia windows & doors: High efficiency windows & glass doors utilize triple glazing, 2 low E coatings, argon gas fill, insulated spacer bars & insulated fiberglass frame to provide a composite RSI (R) Value of 1 (6).
- C) Passive solar heating: Sunlight passing through south facing windows heats home interior, part of heat stored in building structure & later released. Provides 20% of annual heating.
- D) Tall windows & glass doors: Provide deep daylight penetration.
- E) Samsung high efficiency appliances: All appliances meet or are more efficient than Energy Star standard.
- F) Power Smart™ high efficiency electrical lighting: Lighting design to compliment day lighting. Fluorescent & LED lighting controlled by daylight sensors & motion detectors with manual override to ensure lighting is only provided when required.
- G) Echoflex & Verve wireless lighting controls & sensors: On/off, day lighting, occupancy & master green switches. Complete freedom of switch placement.

Top Floor



Environmental Features

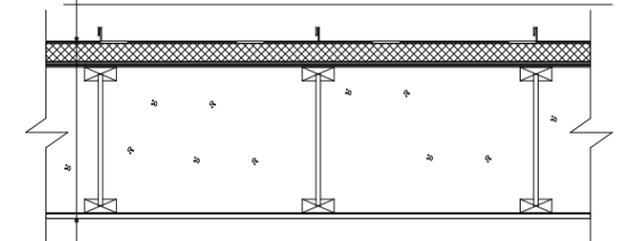
- 1) Kohler water efficient plumbing fixtures: Reduces quantity of city water required for toilets & washing.
- 2) Interstyle Icestix Mosaic tile: Recycled glass tile used for vanity & bath tub back splash.
- 3) Solid Wood Pro fir flooring: Recovered & refinished Douglas Fir tongue & groove flooring pre finished with hard wax oil
- 4) Douglas Fir stairs made from 80 year old recovered wood

Energy Features

- A) Velux High efficient skylights: High performance north facing skylights admit daylight while minimizing heat losses.
- B) Velux high efficiency electrically operated opening skylights: High performance skylights admit daylight while minimizing heat losses, skylights open as part of homes natural cooling system.
- C) High clerestory windows: Provide deep daylight penetration & passive solar heating.
- D) Highly insulated RSI 10.6 (R60) ceiling: Ceiling consists of 610mm (16") Deep wood I joists filed with Icynene LD-R-50 castor bean oil based spray foam insulation & air barrier, 50mm (2") of DOW Thermax™ isocyanurate foam board insulation is placed over the roof sheathing.
- E) Day4 Energy PV arrays: Consisting of 66 photovoltaic panels rated at 14.8 kW peak predicted to produce 16,345 kWh/yr.
- F) Solar water heater: Thermo Dynamic solar domestic water heating collectors, working fluid pumped through collectors & tank heat exchanger by PV powered DC pump. Will supply 50-60% of hot water requirement per year

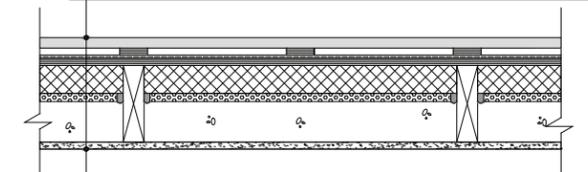
Roof

- Standing seam metal roof
- Dupont RoofLiner roofing underlayment
- 50mm (2") Dow Thermax foil faced isocyanurate foam board
- Vapour permeable self adhering membrane
- 16mm (5/8") plywood roof sheathing
- 406mm (16") deep wood I joists at 610mm (24") O.C.
- Icynene LD-R-50 castor bean oil based spray foam insulation and air barrier
- Vapour barrier paint
- 16mm (5/8") drywall
- Benjamin Moore Natura no VOC paint



Exterior Wall

- Wood fiber reinforced cement lapped siding painted with Benjamin Moore Regal Select exterior latex paint
- 13mm (1/2") thick preservative treated vertical plywood strapping forming rainscreen cavity
- Dupont Tyvek commercial wrap weather resistant barrier
- 13mm (1/2") thick plywood wall sheathing
- 38mm x 140mm (2x6) studs at 610mm (24") O.C.
- 50mm (2") thick Dow Thermax isocyanurate foam board
- Panasonic 15mm (0.59") vacuum insulation panel
- Icynene LD-R-50 spray foam insulation and air barrier
- 13mm (1/2") drywall with Benjamin Moore Natura no VOC paint



Foundation

