



Better Choices
Better Homes
Better Lives

Eco-Solar Home Tour – 2011

Saturday, June 4, noon to 4pm

Site #2: Pearson-Maraj Heat-and-Power Eco-Duplex

Address: 7615 111 Street, Edmonton

Vik Maraj and Sheryl Pearson

Hosts:

Parking: available on street

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www.mec.ca



www.climatechangecentral.com



www.solaralberta.ca



www.cmhc.ca



A. The future of housing – Stylish, Efficient and Energy Integrated

- One of the first houses in North America to use a “combined heat and power” co-generator to provide the house’s heat and electricity.
- Innovative • Energy Conservative • Healthy • Close to LRT

B. Features

- 5 kW natural gas co-generator produces heat and electricity for both sides of the duplex.
- Ultra high-efficiency house: R-50 walls, R-100 roof, triple- and quadruple-glazed fibreglass windows, three ERVs (enthalpy recovery ventilators that recover heat from air temperature and from air moisture) (EnerGuide rating not known yet, likely over 86)
- Air tight using icynene foam insulation (air tightness not known yet, likely less than 1.0 AC/h)
- Passive solar space heating with high indoor thermal mass
- Future provision for active solar thermal and solar electric systems
- Concrete floors with in-floor heating
- High efficiency LED lighting
- High quality indoor air: no formaldehyde-added cabinets, low volatile organic compound (VOC) paints, ventilation system provides continuous fresh air to each room
- Water efficient: low flow faucets and toilets, ready for grey water recycling
- Rainwater collection: 5600 litre rainwater storage tank, eaves troughs collect rain water off 168 m² metal roof
- ❖ Permaculture landscaping (planting just completed)
- ❖ Multi-generational housing with senior parents living next door
- ❖ Close to low-emission McKernan-Belgravia LRT station



C. Why This House is on the Tour

- To demonstrate a heat and electricity co-generating system.
- To show an ultra-efficient home with expected low utility bills.

(continued on other side)

Note:

Items with a:

"→" symbol are presented on the Tour.

"❖" will not be presented.

"•" are information points.



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(continued from other side)

D. House heating – integrating efficiency, passive solar, and heat and electricity co-generation

- Ultra-high thermal energy efficiency (super insulation, high-performance windows, air-tightness and ERVs) significantly reduce heat energy loss, reduce heat power requirements, and make the house very comfortable in all weather.
- South windows collect solar radiation. Concrete floors convert solar radiation into heat. Concrete mass in the floors stores the solar heat.
- Additional space heat and all the domestic hot water heat is supplied from two 450-litre heat storage tanks heated by the natural gas co-generator. Hot water from the tank is pumped throughout the house through radiant floor heating tubes in the concrete floors.
- The heart of the heat and electricity co-generation system is a 5 kW Yanmar natural gas-fuelled generator located in the garage and connected to the electricity grid. When the heat in the heat storage tank needs to be replenished, the generator turns on and generates heat and electricity. The heat is pumped underground through a super-insulated pipe to the heat storage tank.
- The electricity from the generator is fed into the house and not into the electrical grid at this time. When the house needs more electricity than the generator is supplying then it is purchased from the grid.



E. Why Energy Efficiency and Cogeneration?

- Energy security begins with energy efficiency. The most sustainable energy is energy that is saved. Energy efficiency is a vast, low-cost energy resource.
- The homeowners expect to save a considerable amount of money with the energy efficiency technologies on their house. The expected savings are being determined using computer simulation.
- Co-generation systems are at their peak production and efficiency on cold winter nights. This helps to reduce peak electricity consumption from the electricity grid, though not peak natural gas consumption.
- Conventional central electricity generating plants (whether coal-, natural gas- or nuclear-fuelled) waste 50% to 70% of their fuel energy and dissipate it in the form of heat into the atmosphere. Since co-generation systems, also known as Combined Heat and Power (CHP), supply most of their heat into the house instead of wasting it, they are 1.5 to 2.5 times more efficient at generating electricity than conventional central electricity generating plants.

