



Better Choices
Better Homes
Better Lives

Eco-Solar Home Tour – 2010

Saturday, June 5, noon to 4pm

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

Address: 7615 111 Street, Edmonton
Hosts: Vik Maraj and Sheryl Pearson
Parking: available on street

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 • Conservative • Healthy • Multi-generational • Close to LRT

B. Features

- 5 kW natural gas co-generator that produces heat and electricity for both sides of the duplex via two 450-litre heat storage tanks
- 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
- Likely net zero ready – with 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 designed to collect rain water off approximately 168 m² of metal roof area.
- ❖ Permaculture landscaping (planting just completed)
- ❖ Multi-generational housing with senior parents living next door
- ❖ Close to low-emission McKernan-Belgravia LRT station



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Note:
Items with a:
"→" symbol are presented on the Tour.
"❖" will not be presented.
"•" are information points.

C. Why This House is on the Tour

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

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(continued from other side)

D. House heating – integrating efficiency and passive solar heating with on-site natural gas heat and electricity generation

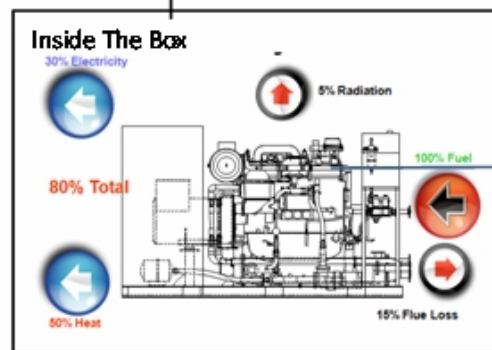
- The house's ultra-high thermal energy efficiency (super insulation, high-performance windows, air-tightness and ERVs) significantly reduce the house heat loss and make the house very comfortable in all weather.
- The south windows collect solar radiation. The concrete floors convert the solar radiation into heat. The concrete mass in the floors stores the solar heat.
- When the house requires space heat or hot water heat, the heat is supplied from two 450-litre heat storage tanks. To heat the house, hot water from the tank is pumped throughout the house through radiant floor heating tubes in the concrete floors.



Electricity from generator fed to house.

Water pipes, to and from house, supply all space and domestic hot water heat.

- The heart of the heat and electricity 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, which would otherwise be wasted, is instead pumped underground through a super-insulated pipe to the heat storage tank.
- If the generator makes more electricity than the household needs it is automatically fed back and sold to the electric grid. In our climate where so much heat is needed, this system is expected to generate more electricity over the year than the household needs to use.



Reciprocating natural gas engine and generator with sophisticated heat capture from exhaust and engine jacket. Extensive controls monitor electrical and thermal demands of the house, modulate engine speed, and communicate via the internet.

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-, gas- or nuclear-fuelled) waste 50% to 70% of the fuel energy and dissipate it as heat into the atmosphere. Cogeneration, also known as Combined Heat and Power (CHP) is 1.5 to 2.5 times more efficient at generating its heat and electricity as the conventional central power plants because the heat is used and not wasted.