SOLARES
ARCHITECTURE

***REPORTS* ON ENVIRONMENTALLY INTEGRATED HOMES**

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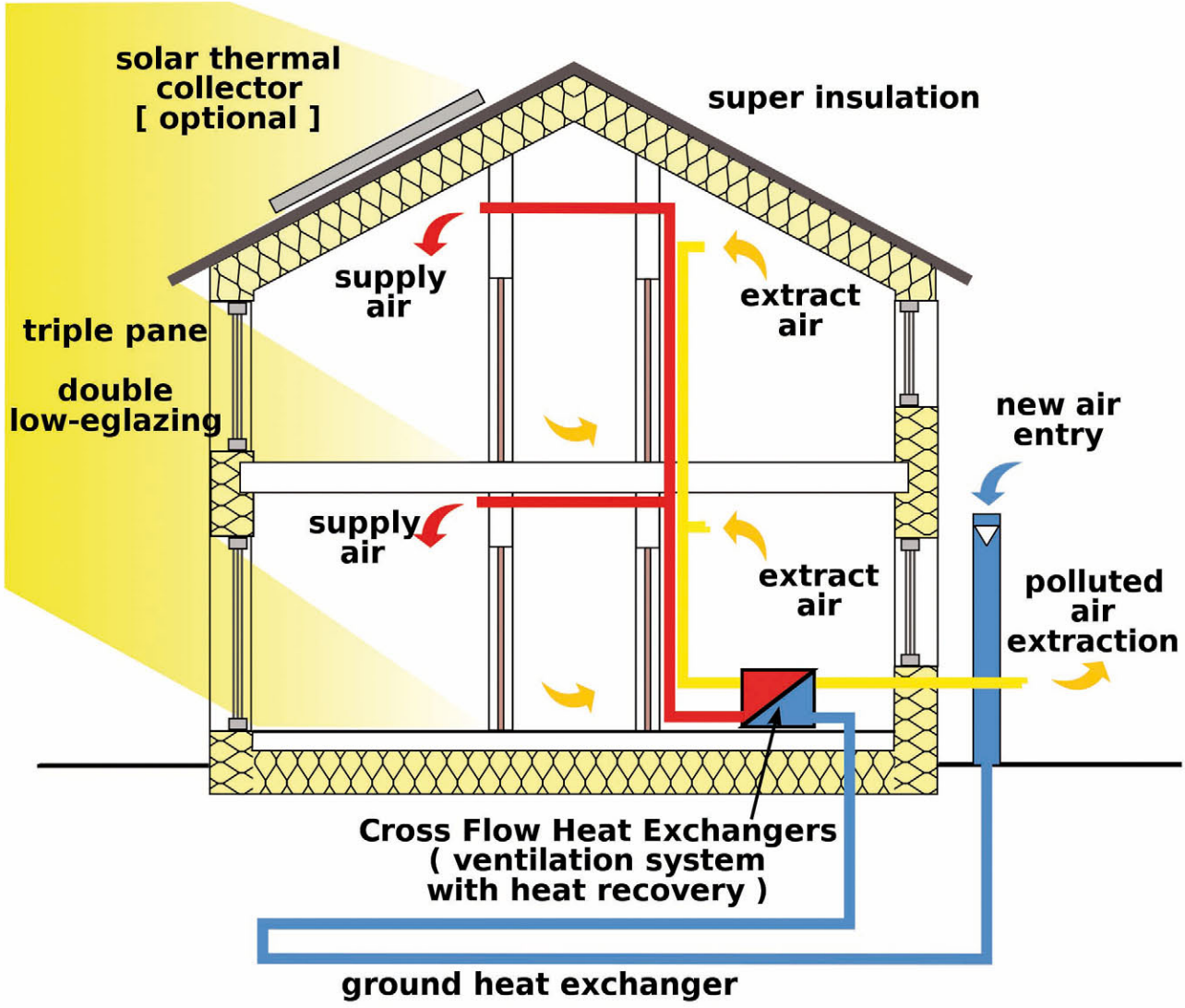
I'm happy to announce that I recently received the Passive House Designer certification from the Passivhaus Institut in Darmstadt Germany. Passive House is the world's most rigorous standard for energy efficient construction and has, in recent years, developed into an international movement. With this certification Solares joins a very small group: there are nine certified designers / consultants in Canada , three of which are architects.

At its core, Passive House is a design methodology and third party certification system resulting in homes and buildings that consume 90% less energy than conventional ones. The system combines high performance building enclosures with passive solar design strategies to create cost effective, comfortable, energy efficient buildings. It has been effectively applied to more than 20,000 projects worldwide, ranging from single family homes to very large commercial and institutional buildings. We at Solares have been working within this methodology since I completed the training course in 2010. In 2011 I wrote the Passive House Designer Examination and passed on my second attempt. It was one of the more difficult exams I've ever written, and I learned a great deal. Unfortunately I did not receive my certificate until just a few weeks ago, apparently due to a bureaucratic error.

The name Passive House can be misleading as it is often confused with passive solar design, which is different. The premise of Passive House is simple: build a very airtight, highly insulated building and then heat it passively, using the sun and waste heat produced by appliances and occupants. In addition, minimize or eliminate the need for cooling, through shading and passive ventilation. This is achieved by properly designing the building's form, siting and orientation and using high performance insulation, windows and ventilation. The results are impressive: in the central European climate, where the rating system is most prevalent, a conventional heating system is not required in a typical 1,500 square foot Passive House. Instead, the home can be heated with a supplementary heater the size of a hair dryer located in the ventilation system.



Conceptual Passive House Diagram. Passivhaus Institute

The system was developed in the early 1990's in Germany by a pair of physicists, tasked with developing a building standard for a state housing program. They researched North American super insulated homes built the 1970's, eventually settling on the Saskatchewan House as a precedent, because its performance had been well documented over the years. Based on their findings they developed a methodology to design very energy efficient and affordable homes, culminating in the construction of four townhouses in 1990. Shortly thereafter the Passivhaus rating system was codified, an energy modelling software (PHPP) was developed and the Passivhaus Institut was founded in Germany. By 2000, the system had spread around the world having been rebranded as Passive House outside of Central Europe. Since then it has grown into an international movement, with local and international organizations, conferences and a community of specialised building component suppliers sprouting up.

Examples of Passive House certified homes in Germany. Passivhaus

The beauty, and difficulty of the system, is that there are only 4 criteria to meet for certification*: heating load, energy used on site; airtightness and occasions of overheating. While the system is adjusted by building area, it is not adjusted for climate. The latter makes it very difficult to meet the standard in Canada as we have a significantly colder climate than central Europe. To achieve Passive House certification in Toronto requires far greater levels of insulation (more than double that required by code) than it would in Germany. In addition, high levels of planning and workmanship are required to meet the airtightness standard. Lastly some specialty products, like super high performance windows and heat recovery ventilators are a necessity.

While it is certainly a lofty goal, Passive House provides an excellent framework to work within and to measure degrees of success. For a more colourful description of the system, follow the link below to watch this award winning American Documentary, Passive Passion.

http://www.foursevenfive.com/index.php?main_page=page&id=30&chapter=1

To read further about Passive House, see the following links:

http://en.wikipedia.org/wiki/Passive_house

http://www.passiv.de/en/index.html

http://www.passivebuildings.ca/

http://www.passivehouse.us/passiveHouse/PHIUSHome.html

* For those of you who need to see numbers, here are the performance characteristics that must be met to achieve passive house certification

Airtight building shell = 0.6 ACH @ 50 pascal pressure, measured by blower-door test.

Annual heat requirement = 15 kWh/m2/year (4.75 kBtu/sf/yr)

Primary Energy = 120 kWh/m2/year (38.1 kBtu/sf/yr)

In addition, the following are recommendations, varying with climate:

Window u-value = 0.8 W/m2/K

Ventilation system with heat recovery with = 75% efficiency with low electric consumption @ 0.45 Wh/m3

Thermal Bridge Free Construction = 0.01 W/mK