GREEN TECH THE SERIES COLUMN FOR AUGUST 3, 2016
HEADLINE: HOW TO BUILD AN ENERGY EFFICIENT HOME; PART TWO

It's a well-documented fact that, on average, a third of a new home cost is labor and, for an energy efficient home, this can be greater than that. Hence, a lot of these homes are "built by owner" or by the owner acting as their own general contractor. Last week, we outlined suggestions as to how to locate and assemble the shell of the residence. This week, we move inside and cover the first of five elements that every energy efficient home should have. Number one is energy efficiency throughout: windows; HVAC; lighting and appliances.

Windows are, in fact, the weak link in every home envelope and there is a tradeoff between insulation value and natural light. The better windows, within reasonable cost, rarely reach much over R 6-8, with the building walls maybe R30 or higher. Full-spectrum light is important to the human immune system and an element known as seasonal affective disorder (SAD) is well documented in our part of the country. Aragon or low-E windows can reduce full-spectrum natural light by upwards of 40%. This is where the fine balance becomes important. I have been a strong proponent of ceiling light; not skylights, however. We have four of these in the ceilings of our home/spa and the 22 inch ones in the spa are capable of lighting the entrance and the main room on a clear evening. The other one is in our main bathroom, allowing natural light in. This often eliminates the need for turning the light on.

At minimum buy Energy Star windows, triple glazed if the budget permits and the same goes for any of your doors. Better quality windows carry an Energy rating (ER) label. This label allows you to compare "apples for apples" when buying windows. Fixed windows are generally more efficient and, as stated last week, use the south and south-east exposure for your window use, reduce the west side and, if at all possible, no windows on the north exposure. If you have to install on the north side and budget is a consideration, use double glazed on the all sides except the north and use triple glazed here. There are some advanced windows that actually contribute to heating your home; price here is a factor.

Heating systems that are suited for an energy efficient home cover a wide range of installations and prices. Geo-thermal systems have a major long term advantage with respect to operational costs. They are expensive and starting prices at $30,000.00 are not uncommon. They provide heating, air conditioning

and the option for domestic hot water is available for most models. Their difficulty to use in an urban setting is also another stumbling block. There are a number of solar installations, often utilizing thermal solar for a hot water system with a back-up boiler of kind. I have one of these newer boilers. Rated at 95%, they are efficient and we have had no issues for three years now. We don't have the thermal solar back-up, however. The option of hydronic heating ranks right up there for use in an energy efficient home, especially if the home is on a concrete pad. Some weeks ago, I saw a masonry stove installation where they had retrofitted a coil system to the in floor heating. While technical, it was well done and I can see this working really well. Size of home, budget, site location and overall heat loss calculations should be involved when selecting a heating system.

I admit to a bias here. I am not a fan of forced air heating systems. The issue is air quality, as forced air blows dust. Radiant systems utilize the mass of the home; once warm a radiant heated home stays warm. That said, in a home where the air exchange is under 2.5 ACH, (air exchange rate) as evaluated by a blower door test, there should be a mechanical ventilation system. 2.5 ACH is the base line for an Energy Star home that is rated at 80. I have heard the argument about HRV units and yes, they do cost to operate, and yes, they do exhaust conditioned air. However, the overall indoor air quality for the occupants far outweighs this trade-off. Simply put, humans are not healthy in a plastic bag; we need a constant exchange of fresh oxygenated air to survive. Our church, (www.alltechgreenchurch.com) once completed, had a rating of 0.57, one of the tightest homes our energy auditor had ever rated. We have an independently ducted HRV system installed.

One area in new home design and assembly that is often ignored is direct electrical savings from proper lighting controls. While on lighting, Energy Star lighting, not only bulbs of which I support, but use of LED bulbs, should include rated light fixtures and ceiling fans. Motions sensors, light timers and dimmer switches help create your homes ambiance along, with saving electricity. Phantom power is by far one of the most ignored energy losses in our homes today. "Sleep Mode" or "hibernate" does not mean it's off, far from it. Computers, televisions, coffee makers and audio systems are just the start of a long list of electrical phantom power. Plan your home with "All-off Switches" that turn off non-essential lighting, appliances and entertainment equipment. Appliances can use upwards of 25% of your home electrical use; refrigerators were, at one time, the number one "energy hog" in most homes. Energy Star

rated refrigerators, dishwashers and washing machines will make a difference in your monthly hydro bill.

We finish this series next week with the other elements that every energy efficient home should have: water conservation; non-toxic building materials and the long term operation and functions of an energy efficient home.

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