ISSUE 08 | WINTER 2014
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BETTER Builder MAGAZINE

the builder's source

Simply the Best

Looking Back and Moving Forward

IN THIS ISSUE

Mini Ducted Hi-Velocity Air Handling System

NEW Optional Prioritizing of Comfort Levels with Energy Savings

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- All mechanical and electrical components are accessible from the front of the unit.
- Heating coil and fan/motor slide out for easy service.
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FEATURE STORY

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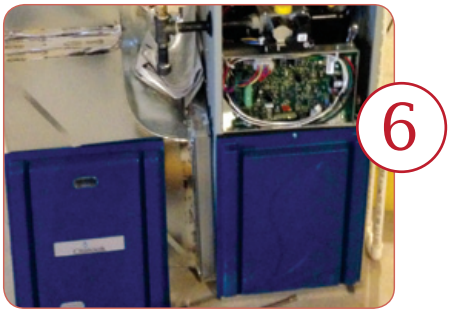

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THIS MAGAZINE BRINGS TOGETHER PREMIUM PRODUCT MANUFACTURERS AND LEADING BUILDERS TO CREATE BETTER, DIFFERENTIATED HOMES AND BUILDINGS THAT USE LESS ENERGY, SAVE WATER AND REDUCE OUR IMPACT ON THE ENVIRONMENT.

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PUBLISHER'S NOTE

Simple is Best

It's hard to believe that almost two years have passed since the first issue of Better Builder. Over this period we have endeavoured to bring our readers *simply the best* articles and content. Can you hear Tina Turner singing? I can, and with her song playing in the back of my mind, I am aware of the fact that when it comes to a lot of things in life, building included, simple is best.

In this issue, Better Builder takes a look back at a number of the innovations, products and builders that were successful in their respective markets. They are identified as the very necessary ingredients to be integrated and executed, for a smooth transition into 2014 all the while keeping in mind the new code to come in 2017.

In the feature story of our most recent issue of Better Builder we unfortunately misspelled the name of the president of Garden Homes. Mr. Ignazio Giardina is not only a craftsman in the time-honoured manner – he came to Canada 45 years ago as a cabinetmaker – but he is meticulous in his approach to every home he builds. Mr. Giardina researches thoroughly before he builds a home, looking for the latest and best materials and methods to make sure the end product is as durable, and as energy efficient as humanly possible. Anything that Mr. Giardina believes can improve the end result is tested first on his own home.

Better Builder, likewise, aims to do its best, providing the latest and best information about sustainable building practices. Sometimes things slip through, but when it's brought to our attention, we appreciate feedback so that we can correct it.

Long time R2000 Builder and friend Steve Tobey takes us back to school on a project that takes old and makes it new. A new build replicates a century-old schoolhouse and meets Energy Star 12.1 and becomes part of Project FutureProof.

Lou Bada looks back at LEED/TAP and two years later a demonstration house is occupied and functioning without any glitches. Lenard Hart reviews 4 demonstration projects of the past and assesses them on their impact. For almost 25 years CSA F280 has been used as a standard to design residential mechanical systems; Gord Cooke outlines the changes in the new revised standards that will result in the best designs for right-sized heating plants and distribution systems. Alex Newman reports on builder/renovator Amedeo Barbini who is transforming a 1950 bungalow into a luxury two-story home that reflects the local value of real estate in Don Mills. Thirty years after the R2000 program has been introduced, Michael Lio reports on designs for Net Zero Housing. Dow Building Solutions is monitoring real-world outcomes behind better built, better performing homes under the TEETH Project. Doug Tarry Homes has achieved a true demonstration of new products in his Optimum Home. Right-sized heating equipment, a sealed air-distribution system, and a monitored basement wall highlight the best examples of how homes can be better built.

JOHN GODDEN

We hope you will agree this issue of Better Builder is *simply the best*.


LOU BADA

The Best Way Forward to 2017

It has been two great years since I began contributing to Better Builder magazine, and as we look back on past topics of discussion, I feel this is a good opportunity to look forward to emerging issues as well.

Looming in the distance are changes to the Ontario Building Code's energy efficiency requirements in 2017. I began almost two years ago by writing about our LEEP/TAP Discovery Home (ERS 83/HERS 44) which, at the time, helped inform us on the current redundancies of SB-12 in the OBC. The exercise was also intended to give us insight into what would be required to achieve the projected energy conservation goals of the next Code cycle. At the time, we utilized just about every off the shelf premium technology at our disposal to meet the expectations of the 2017 code. Technologies such as: upgraded right-sized mechanicals (combination heating system, high efficiency HRV and bathroom fans), renewable systems such as, Drain Water Heat Recovery, building envelope details with insulated sheathing, high density and foam insulation and Zone C windows, improved air barrier detailing, electrical savings with ECM motors and efficient lighting (LED and CFL), water conservation with a re-circulating hot water system and dual flush toilets. It is of import to note that all systems are running well in the Discovery homes we have worked on to date, and our homeowners have not run into any problems…as well they shouldn't, given that these are all proven technologies.

Looking forward, future proofing, in the form of rough-in grey water recycling and solar ready for PV are certainly on the table for serious consideration in discussions concerning sustainable building practices. Further, these systems could have been utilized in the LEEP/TAP home. And, as we've seen, accommodations are being made in the OBC in regards to grey water recycling. However, I believe we are approaching the limit of where off the shelf technologies will give us a reasonable return. Having said that, some wiggle-room still exists by lowering further still air infiltration and increasing mechanical efficiencies. Unfortunately, they will only take us so far.

Re-use and renewable technologies will become more relevant, but not until the technologies have completely matured and are economically viable, especially in cases where freshwater, waste and storm water are concerned. I believe, for the OBC to move forward, a broader perspective will need to be taken in regards to water and its impact on building efficiency, energy consumption and infrastructure.

Finally, there must be a value proposition (and perception) for our customers; affordability is always an issue. This will require people with common sense and goodwill in this industry and in government, working together towards a common goal. Flexibility and innovative thinking in terms of the societal costs and benefits of building more efficient homes will be paramount in the coming years, in contrast to the conventional thinking we've experienced thus far.

LOU BADA IS THE CONSTRUCTION & CONTRACTS MANAGER FOR STARLANE HOMES

LEN HART

Straight from the Hart

BEST DEMONSTRATION PROJECTS OF THE PAST

It has been two years since Better Builder magazine was created, taking the place of its predecessor Sustainable Builder magazine, and I thought this would be an opportune time to review some of the many projects covered over these last few years. Personally, I am grateful for the plethora of projects I have been involved with, and take pride in how the industry has evolved to produce better homes. Unfortunately, many of the challenges we faced still remain unresolved.

For the second issue of Sustainable Builder magazine (summer 2009) we had the three elected heads of the big HBAs on our cover (BILD, Ontario and Canada). All three were green-builders so we titled the issue, Everybody's Green. At the time, we thought that leading positions were being given to green-builders simply because they were green builders. Now it seems as though green-building is more ubiquitous than ever, no longer a badge of distinction, but rather that it is something that everyone should be implementing. The changes to the building code have certainly been a factor, as well as the influence of the market. Back in 2009, the ever insightful Stephen Dupuis talked about the ten green-guys; the few key movers who were behind all the green-projects in the industry. Today, there are literally hundreds of green-professionals; builders, engineers, Energy Star compliance officers, etc.

What it means to be green or sustainable is essentially a contested concept. Like democracy or beauty, the definition is arbitrary and changes as frequently as debates continue as to what should or shouldn't be included. Lately, it seems as though too much has been included, thus diminishing the concept's value. Energy Star has always been a double-edged sword for me. It was the program that got production builders thinking about building above code, but it was clearly a lower level achievement compared to R-2000, LEED Platinum, Net Zero, or Passive House. It should come as no surprise that the Green/Sustainable/Energy Efficient label does not carry the weight it used to. With thousands of homes being built to the current code, getting the Energy Star label was far too easy, mostly because they were enrolled under the old standard.

Consumers expect the Energy Star label to have meaning, and under the new standard it will again. However, the market for more energy efficient homes seems to have hit a plateau despite the fact that climate change and rising energy costs still persist. Perhaps new homes are too far ahead of existing homes when it comes to energy efficiency. For example, I used to live in a LEED Platinum home, rated 85 on the EnerGuide scale. Now, I live in a 1920s full-brick house with some modest insulation upgrades. My utilities bills are triple what they were in the LEED house; from $95 to $315 per month. Yet I live in Bloor West now instead of New Market, and my commute is ten to twenty minutes. Since my commute has shortened, I drive much less and my overall carbon footprint is about the same. For me the question is simple: is it worth the extra monthly utility costs to live where I live? In short, the answer is yes.

Going forward, the challenge seems to be how to get an individual to invest $20,000 or more on a retrofit upgrade that will save them only $150-$200 per month. Despite how far we have come in terms of new technologies and new homes, the old payback problem still exists.

Aside from the Energy Star program, I was lucky enough to have some involvement with four significant Green Projects over the last few years that I would like to reflect upon in retrospect.

Rodeo Fine Homes and the Town of Newmarket – This project arose when the town offered a discount on a large undeveloped piece of land, on the basis that builders would meet the conditions of Platinum rating. Rodeo Fine Homes won the bid to build the subdivision and proposed to meet the standard using the LEED for Homes rating system. The result was 34 comfortable, quiet, highly efficient homes in a quiet part of Newmarket. To get to the LEED Platinum rating there was a large reliance on very advanced technology, which resulted in plenty of maintenance issues, but also significant challenges in finding knowledgeable trades to service the homes.

Ultimately, the project was ahead of its time, especially for the area, where code-built monster homes tend to be the main competition. I bought one, and upon resale, I was unable to recoup any above market pricing for the green upgrades, but still it was by far the best performing home I have ever lived in. From an industry perspective, I am not sure other builders are looking to this model, not even Rodeo is building like this anymore.

NOW House –This was a “Net Zero-inspired” retrofit to a post-war CMHC bungalow. At the design charette there was extensive focus on how to produce an affordable high efficiency retrofit, but sponsorships changed the project to be more about what is possible than what is feasible. A real homeowner got significant benefits that improved his small home’s energy efficiency, but it was not a good template for others. It was too expensive, and for all that money it did not add any square footage.

The retrofit itself seemed to pale in comparison to the well packaged and well promoted retrofits in the road show that followed. In the end the retrofit was dominated by the sponsor’s offerings. It was too much money to spend for an energy retrofit. The promotional road show was successful as a sales tool for some retrofits.

Green Home Makeover – A TRCA neighborhood level initiative, in which a dedicated community resource person promoted energy and water conservation to a community with a contest to give away a home retrofit to one lucky resident. The project addressed the issue of getting home owners to retrofit their homes and served as a demonstration project for the community. However, other than the free makeover winners, nobody else really did any significant retrofit work.

The key partners in this project were local and regional governments, who along with the TRCA were most interested in watershed issues and managing run off. Ultimately that is a tough sell with very little payback. The energy retrofit was added to round out the offerings, but it did not result in much uptake.

The Archetype Sustainable House – A TRCA sponsored design contest aimed at showing the future of home building. Once a design was chosen, the TRCA partnered with BILD to construct the demonstration homes at the Kortright Centre using donated materials and volunteer labour. Two unique and informative demonstration homes now exist and are regularly toured. The partnership between TRCA and BILD was a significant achievement and a major part of Stephen Dupuis' lasting legacy. The home construction process suffered from a lack of resources, despite significant contributions from BILD members, many compromises had to be made and some decisions were based purely on what was available.

The architects who designed the homes were quite new to the industry, so there were some growing pains that were compounded by the volunteer build model. This put a lot of pressure on those actually trying to get the homes built, such as Alex Waters, Larry Brydon, and Fred Serrafero. In the end, the project was a significant achievement that still has relevance and is still toured today, but did it change anything?

Project	Pros	Cons	Learning Grade
Newmarket LEED Platinum	Showcased ground breaking technology, Town was a partner	Too far ahead of the curve, and too much tech for home buyers	A-
NOW House retrofit	Responded to specific homeowner need, promoted widely	Lost its way when sponsors offered more than needed	C+
Green Home Makeover	Community based, addressed energy, water draw and run off	Free upgrade lead to little community uptake, despite all the efforts	C-
Archetype	BILD/TRCA partnership, hundreds of tours, Ryerson monitoring	Redundant showcase systems, unclear how it changed building	B+

All of these projects aimed high and involved much negotiation and compromise, all had multiple strategic collaborations and multi-sector partners (including governments, associations, and sponsors), and all tried to effect change in the way we build and retrofit homes. Each was successful in its own way, but each also gave us a learning opportunity. In looking forward, I hope we see projects that continue to advance green-building. If pressed, I would say the four areas where we should see some real advances are: building envelopes, production quality, smart technology, and deep retrofits… but these are for future issues.

LENARD HART IS THE BUSINESS DEVELOPMENT DIRECTOR AT GREENSAVER A NOT-FOR-PROFIT ENVIRONMENTAL ORGANIZATION FOCUSED ON RESIDENTIAL ENERGY EFFICIENCY AND CONSERVATION PROGRAMS. HE WAS ONE OF THE DEVELOPERS OF THE ENERGY STAR FOR NEW HOMES PROGRAM IN ONTARIO AND THE FORMER PUBLISHING EDITOR OF SUSTAINABLE BUILDER MAGAZINE.

GORD COOKE

Best Approach for Right Sized Mechanical Systems

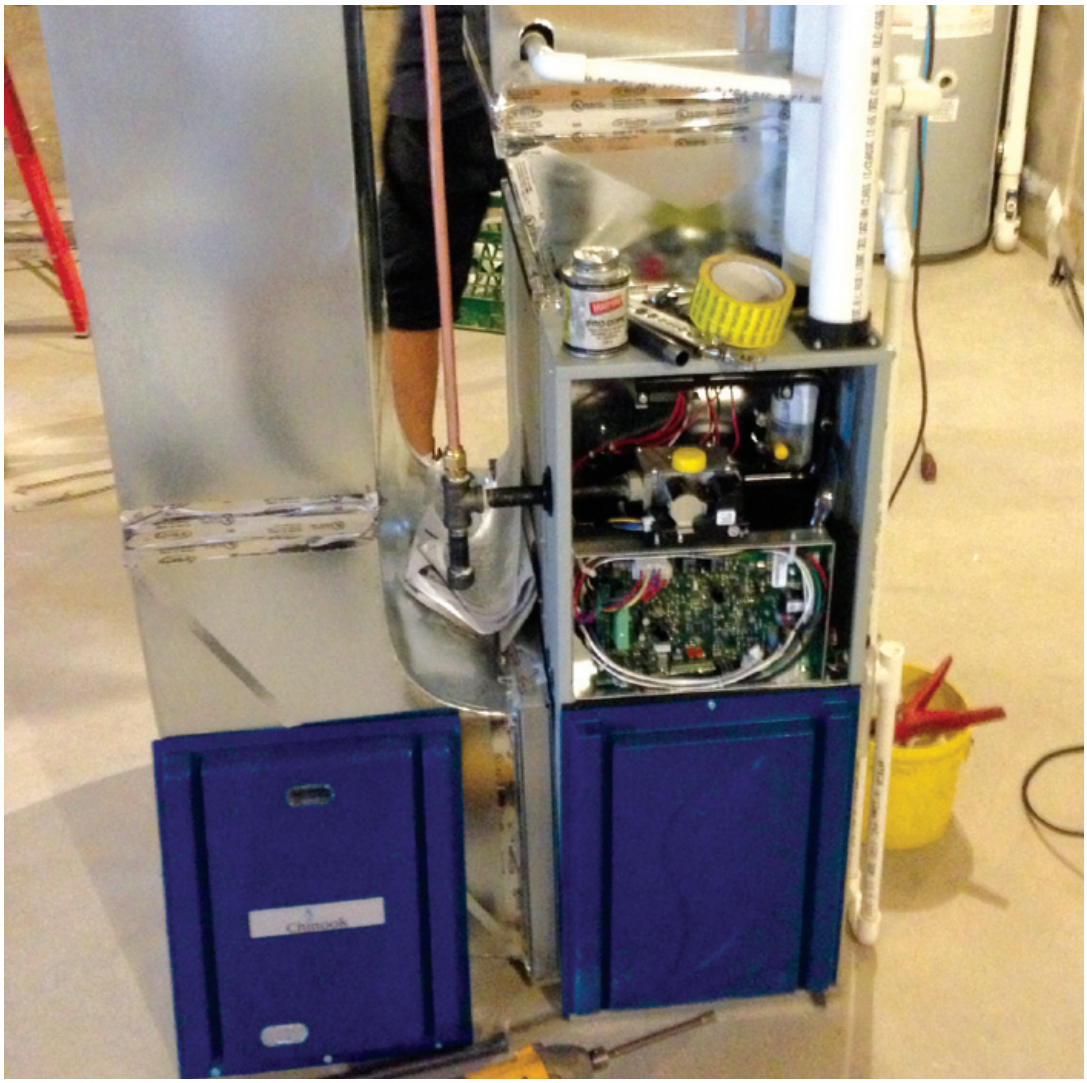
I have been fielding calls recently from manufacturing folks with southern accents asking about changes they have heard about with respect to the need for smaller furnaces in Canada. They are referring of course to the publishing of the new CAN/CSA F280 Standard "Determining the Required Capacity of Residential Space Heating and Cooling Appliances" and the impact it will have on the size of furnaces that will be needed in Canadian homes when the standard is referenced in building codes and adopted as standard practice in the coming months. The US furnace manufactures I am speaking to seem surprised by this "sudden" change, but they shouldn't be. After all the old F280 Standard was written in 1990 and when it was written there were notes in the appendices suggesting the standard needed better ways to handle the emerging trend at that time for tighter homes with more efficient ventilation systems. HVAC designers will know that in the current 1990 CSA F280 these two components, air leakage and ventilation, typically account for as much as 40-50% of the overall design heating load for a home. A short 23 years later, the new standard does indeed address the fact that all new homes are much tighter than the old standard ever anticipating being possible and heat recovery ventilation is now a common component in new homes and in 1990 there was no allowance for this type of device. Combine that with updates to the standard in the way foundation heat loss is modeled and recognition of the new window glazing options now available to builders that optimize both heating and cooling impacts and it should be no surprise at all that a heating and cooling system designed under the new CSA F280 should be significantly smaller than systems designed using the algorithms in the existing standard.

That said, it does take some getting used to when you consider the table below showing the results for a 2 – storey, 2200 square foot home in Newmarket, ON built to current Ontario Building Code requirements, using Package J insulation and mechanical system requirements under the old and new standard.

	Total Heat Loss BTUs/hr	Air leakage component of Heat Loss BTUs/hr	Total Heat Gain BTUs/hr
Current CSA F280	55,425	13,225	31,250
New CSA F280	33,875	4,020	26,150

It means a home that used to get a 70,000 BTU/Hr furnace now needs only a 40,000 BTU/Hr model. Of course, most furnace manufactures do have 40,000 – 50,000 BTU/Hr models. The real issue for manufacturers is the recognition that as many as 50% of homes built in Canada last year were smaller multi-family, attached dwellings that, using the new CSA F280, have design heat losses well below 30,000 BTUs/Hr. As Doug Tarry of Doug Tarry Homes in St. Thomas, ON reported in a previous article, this new sizing validates why many builders are having problems meeting the comfort expectations of their customers. That is, if we were assuming a house needed a 70,000 BTU/Hr furnace on the coldest day of the year and it really it only needs a 40,000 BTU/Hr furnace you can expect issues. It means that the furnace runs just half the time on a cold day and rooms that have higher than average rates of cooling, like a room over a garage, that room is going to be cold. Homeowners think this cold room scenario means the furnace is too small, while the new CSA F280 sizing would confirm the issue is the furnace is too big and thus doesn't run long enough to ensure adequate heat flow to all rooms in the house.

Of course, if homes in Canada need smaller furnaces, you can imagine that homes in milder US climates would also be affected, so why haven't US manufactures seen this issue there? There may be two reasons. First, those milder climates don't result in the high rates of cool down that we experience in cold weather, so while some rooms in a home might be cooler than others, the effect isn't particularly dramatic. Second, zoning of HVAC systems in the US has become much more common than in Canada, primarily to solve summer cooling comfort expectations, but it will help balance winter temperatures as well.



DETTSON *RIGHT SIZED* FURNACE INSTALL AT DOUG TARRY HOMES.

Of great interest, while the US manufacturers will someday respond to this need for smaller furnaces, one Canadian manufacturer has already stepped up. Dettson Industries in Quebec, a long standing excellent boiler manufacturer, has entered the forced air industry at just the right time with a full series of high efficiency, multi-stage furnaces, but most importantly one that has a smaller capacity. In fact, as Doug Tarry reported, they have installed a unit in St. Thomas that has a capacity of just 30,000 BTUs/Hr. It is nice to see Canadian manufactures supporting the initiatives of Canadian builders.

May I suggest that this winter will be a great time for builders and their HVAC contractors and designers to recalibrate their thinking of what constitutes a properly sized furnace. Starting tomorrow, install a thermostat on at least one of your homes that can monitor run times of furnaces. Many commonly available thermostats can do this, like the web-based stat EcoBee. Now you check over this winter just how often the furnaces you are using now are operating during the coldest periods and this will help you accept the reality that smaller furnaces with smaller duct work can improve comfort, save space and perhaps be even just slightly less expensive to install – a great win-win from all your hard work to improve the energy efficiency of your homes.

GORD COOKE IS THE PRESIDENT OF BUILDING KNOWLEDGE CANADA

PANASONIC CANADA AND
BETTER BUILDER STAFF

The Best Way to Ventilate

In the world of bathroom ventilation fans there are a plethora of options available to builders and consumers, but which one to choose? Aside from expelling moisture and odour, the criteria for this decision revolves around three main areas; the products affordability, its energy efficiency and how much noise it produces. Panasonic has striven to meet these additional criteria with their line of bath fans called Whispergreen DC.

Not only is this line of fans 30% less expensive than most other models, its enclosed DC motor ensures a longer life-span (rated for 60 000 hours of continual use) and comes with a six-year warranty.

This line of fans has earned the highest performance rating from the US EPA ENERGY STAR program, the most efficient label, and two of the variable speed models have the distinction of having the highest efficacy rating on the entire list, at 23.3 CFM/W. This level of efficacy far exceeds the ENERGY STAR minimum of 1.4 CFM/W for this CFM flow.

One of the many features that have made these fans the industry performance leaders for the past six years is the built-in Smart-Flow technology that maintains a constant level of airflow over a wide range of static pressures. Each fan has a chip that measures the fan RPM and amperage draw many times per second, and determines if the fan needs to speed up or slow down to maintain the chosen airflow rate. This means that if 50 CFM airflow is chosen, the installer or tester will see 50 CFM (+/-5-10%) over a range of zero static to upwards of 125 Pa. This is not a static setting or single-time commissioning; this technology controls the airflow even with a drastic change in static pressure caused by wind or stack effect or by other fans discharging into the same shaft in a multifamily building. They even maintain that airflow under negative pressure. The fans are constantly sampling and adjusting the speed to maintain the set airflow for the life of the fan.

When the fan is turned off- or the optional motion sensor detects no movement – it will automatically wait a predetermined period of time and then drop back down to the base-line CFM level. This not only saves on energy consumption, but minimizes the amount of noise it produces.

Scott Ingram, a Toronto resident, had the Whispergreen DC installed in his three-bedroom Leaside home just under a year ago and couldn't be more pleased with the result. “We got it for our en suite bathroom on the third floor of our house,” Ingram said. “The thing is so quiet the only way to tell that its on is by the green light on the LCD monitor... Not only does it clear all the moisture and odour from the bathroom within minutes, we even use it when we cook because it clears those odours too, from three floors away!” The product was recommended to him by an industry expert and Ingram says that he would buy it again, and thinks everyone should have one.

Panasonic offers five single speed Whispergreen models, the 50, 80 and 110 CFM fan-only models and two CFL light versions of the 80 and 110 CFM models. Whether it is a commercial, multifamily, or single-family project, these single speed DC fans are a great choice. In one condo project in Hawaii, 950 50 CFM fans were installed in a 37-storey building. The Smart-flow technology of these fans meant that the HVAC contractor provided 50 CFM of exhaust in every unit, no matter what floor and no matter how many were discharging into these very tall fire-rated shafts. The Test and Balance contractor had hardly anything to adjust.

Panasonic

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ENERGY STAR c UL US TESTED/CERTIFIED 2100 Home Ventilating Institute

*Comparison with ENERGY STAR requirement of minimum efficacy level of 1.4 CFM per watt for 10-80 CFM fans and 2.8 CFM per watt for 90-130 CFM fans.

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When it comes to residential home construction, Dow knows that homebuilders and remodelers want to be 100 percent sure that the products and solutions you're using are increasing the comfort, durability, quality and value of the homes you build. Part of our job at Dow Building Solutions is to ensure that we understand the science behind the building and use that knowledge to help YOU create homes that meet or even outperform Ontario's building codes. By helping you outperform codes, we can help you create homes that provide long-term comfort, lower utility bills and durability for your home buyers, an enhanced reputation for you and growing bottom line for your business. Backed by The Dow Chemical Company's 100+ years of experience, we believe in the importance of testing our insulation and air sealing solutions and understand that our testing must extend beyond the lab into where it matters most – the real world.

TWELVE ENERGY EFFICIENT TEST HOMES (TEETH) PROJECT

There is a real-world case study taking place right now in Midland, Michigan. Spearheaded by Dow Building Solutions and Cobblestone Homes of Saginaw, Michigan, the Twelve Energy Efficiency Test Homes (TEETH) Project was several years in the making. The goal of this project is to create the first-ever forum for real-world, real-time measurements that track and capture data of high-performance homes. The project consists of 12 homes, built in Midland, MI, U.S. Climate Zone 5/6 (equivalent to Ontario's <5,000HDD Climate Zone), that are not just test facilities, but homes in which real families live.

The TEETH neighborhood is made up of four different energy performance insulation and air sealing packages and three different floor plans. Each of the four energy performance packages features a different combination of insulation and air sealing improvements, including continuous insulation, closed-cell spray foam insulation and insulating foam sealants*.

ENERGY PERFORMANCE DESIGN PLAN	BUILDING CODE MET
Baseline Performance Minimum Cost HERS 82	Meet 2006 IECC at lowest possible price point
2012 Energy Performance Minimum Cost HERS 57	Meet 2012 IECC at lowest possible price point
2012 Outperformance Home HERS 57	Meet 2012 IECC building science best practices
Beyond Code: Renewable Ready HERS – mid 40s	Exceed 2012 IECC Renewable ready

Home construction was completed in 2011 and the full study launched in fall of 2012 after the last home was occupied.

ENSURING VALIDITY

To ensure the validity of the study, each home was uniformly built to exacting standards designed to mitigate variances, including orientation to the sun and grade. The 12 test homes are comparable in size, floor plan and all other key features with the exception of the insulating and air sealing systems. It is important to note that the families living in the TEETH homes are not aware of which energy performance model home they are living in. This allows for residents to conduct their normal energy consumption habits without awareness of the energy performance of their dwelling, which helps to ensure the data collected is unbiased. With the data collected, we are able to accurately test how building products and systems behave together.

GATHERING DATA

The TEETH Project represents the country's first active subdivision dedicated to the purpose of collecting and analyzing building performance data. Each home has a Data Acquisition Box in its basement to collect information relating to energy consumption, humidity, moisture levels, heat flow, and temperature – all key contributors towards a homes energyefficiency.

YEAR-ONE DATA ANNOUNCED IN FEBRUARY AT 2014 INTERNATIONAL BUILDER'S SHOW IN LAS VEGAS, NV

While the homes were built in 2011, they all weren't fully occupied until the summer of 2012, so our research didn't begin until the winter season of 2012-2013. Now that we are one year into the project we have the first year's data realized. Dow is currently analyzing this data and is scheduled to present our findings in a presentation at the 2014 International Builder's Show, February 4-6 in Las Vegas, NV.

The TEETH Project is just one example of Dow's ongoing commitment to gathering realworld data that allows homebuilders and homeowners to see how building a better performing home benefits both builders and homeowners. Building Outperforming Homes helps you, the builder, differentiate yourself from your competition and grow your business and reputation by offering homeowners long-term comfort, efficiency, savings, and overall home durability. For more information on Dow's TEETH Project and more of our building science real world proof, please visit our website or contact Dave Kelly, (416)460-9876, Senior Building Envelope Specialist for Ontario.

**Although built using US building codes as a reference point, these homes will provide data points showing the value of insulation & air sealing upgrades throughout the United States and Canada*

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MICHAEL LIO AND
CEARA ALLEN

Net Zero Housing Design Simulated – Case Study

Many across North America hope to see homes built to Net Zero standards by 2030. The idea of a Net Zero Energy (NZE) home is that it employs enhanced energy efficiency design strategies to cost effectively reduce energy needs, while meeting those needs with renewable energy technologies.The result is a building that consumes equal to or less energy than it produces on an annual basis.

The federal government, through the ecoENERGY Innovation Initiative (ecoEII), is funding a cross-Canada demonstration project of Net Zero homes in the context of housing production. The project focuses on affordability and market acceptability of Net Zero homes. The project proponent, Owens Corning Canada, is working with five builders in four provinces to build at least 25 Net Zero homes.

To build a Net Zero home, the first efforts focus on conservation by maximizing the envelope and air tightness levels, and by including high performance mechanical systems. Reduction in energy consumption means that lower energy generation technologies are required. Energy efficient technologies are generally much less costly than those that generate energy. It makes little sense to install hundreds of photovoltaic (PV) panels on a leaky and poorly insulated house to achieve a Net Zero balance.

To understand the impacts of energy conservation measures, such as upgrading the envelope or reducing air leakage, the buildABILITY team modelled various scenarios in HOT2000 using the Ontario Archetype house. The goal of the exercise was to see how much the calculated annual energy consumption of the Archetype House could be reduced before renewable technologies were considered. Various levels of insulation were examined for the ceiling, walls, basement walls, and underneath the slab. Several U-values and solar heat gain coefficients (SHGC) were investigated for windows. A number of high performance mechanicals were considered and modelled. The systems that were finally selected are shown in Table 1.

The modelling exercise was intended to see how much the annual energy consumption could possibly be reduced; the simulations did not consider costs.

The NZE homes that will be built for the ecoEII project use the new EnerGuide Rating System for New Homes to measure energy use, and in many cases use the new R-2000 requirements as the jumping off point to achieve Net Zero.

The new R-2000 program includes reduced base loads, electrical base loads are 16 kWh/day, domestic hot water loads are 143 L/day, and the occupant numbers are reduced to two adults and one child. These were incorporated into the buildABILITY modelled scenarios before the upgrades packages were investigated.

The first upgrade to be modelled was for the ceiling. The ceiling insulation was upgraded to two layers of R-40 batt for a total effective R-Value of R68.

The walls were modelled as double stud construction, each with R22 batt, and with exterior insulating sheathing for an effective R-Value of R40. Double wall construction is not popular in tract housing, however it was modelled because of the high R-Values that can be achieved; other alternatives exist to achieve high R-Values.

The basement walls were modelled using a combination of insulating sheathing (2” extruded polystyrene) and R22 batt for an effective R-Value of R27. Extruded polystyrene at 2.5” thickness (R12) was provided under the entire basement slab.

The windows were upgraded to triple glazing with two low ecoatings (e= 0.1), filled with krypton, and modelled with an insulated spacer. This window type represents a U-Value of 0.16 and a SHGC of 0.41.

The air changes per hour (ACH)were reduced to 0.75. This level of air tightness has been demonstrated and achieved using the Owens Corning’s CodeBord Air Barrier System. All five tract builders participating in this ecoEII project will be using the CodeBord Air Barrier System as a standard in their net zero housing designs.

The upgrades to the envelope accounted for an estimated 30% reduction in annual energy consumption.

For the mechanicals, an 88% efficient HRV, a 96% AFUE furnace and a tankless water heater were modelled. A drain water heat recovery unit was modelled using the custom spreadsheet provided to the ecoEII project by Natural Resources Canada. The 120” unit has a 72% efficiency rating.

The upgrades to the mechanical systems accounted for an estimated 20% reduction in annual energy consumption.

In total, both envelope and mechanical system upgrades

resulted in an estimated 50% total reduction in annual energy consumption. The final scenario would require approximately 42,000 MJ of energy annually – a reduction of over 88,000 MJ from the Archetype House.

Of the ten upgrades added to the model, the three upgrades that produced the greatest reductions were the R40 walls (8%), the triple glazed windows (8%), and the improved air tightness to 0.75 ACH (9%). While these are only scenarios, which do not provide information on the cost of these upgrades, and do not represent the final designs from the ecoEII builders, it does provide insights as builders consider the road to Net Zero.

The five builders participating in the ecoEII Net Zero project - Construction Voyer (Laval, Quebec), Mattamy Homes Limited (Calgary, Alberta), Minto Communities (Ottawa, Ontario), Provident Development Inc. (Halifax, Nova Scotia), and Reid's Heritage Homes (Guelph, Ontario) - have been undertaking similar exercises for each of their home designs over the last few months, using their HOT2000 outputs to modify and improve their Net Zero designs. The ecoEII builders each have very different housing forms. Each builder is designing a customized Net Zero package that is tailored to not only the housing forms, but also to the capacity of local trades, the local cost of labour and materials, and the local climate, among many other factors.

Recently, the builders, consultants, and Owens Corning Canada, participated in the Net Zero North American Leadership Summit in Irvine, California. The regional teams presented their implementation plans including their designs,conservation measures, and energy generation strategies. They also presented the current challenges they are dealing with on their road to Net Zero. The presentations were well received by the summit participants, and generated a lively discussion.

Construction of the Net Zero homes is expected to begin in the Spring of 2014, and will be completed by 2016.

Funding for the project is being provided by the federal government's ecoENERGY Innovation Initiative (ecoEII) program, Owens Corning, and in-kind contributions from the building industry. More information about can be found on the project website: http://www.zeroenergy.ca

For more information on the project, please email Candice Luck, candice@buildABILITY.ca.

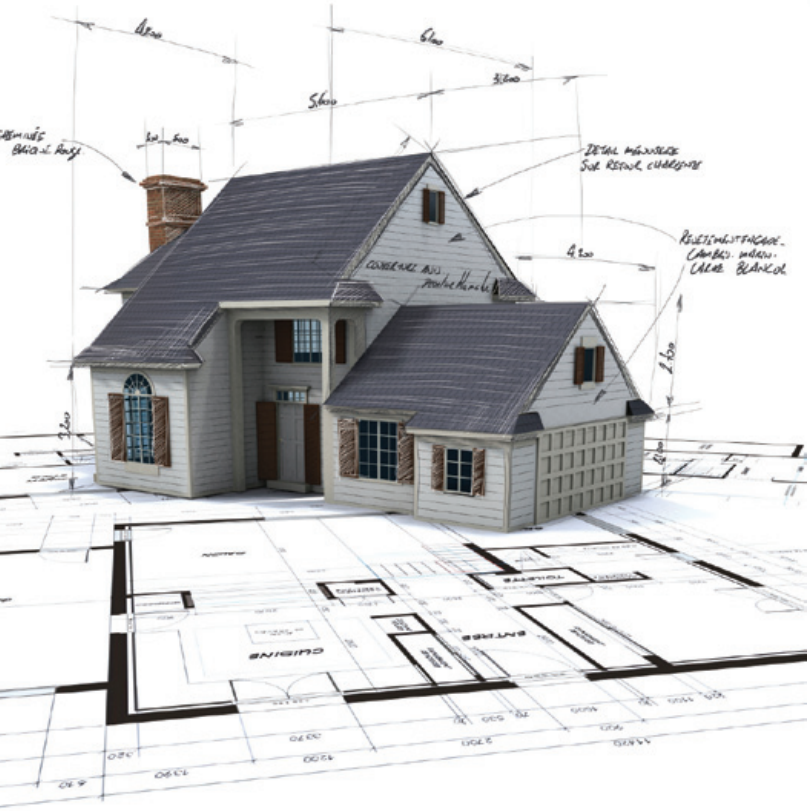
TYPE	UPGRADE	ESTIMATED ANNUAL ENERGY CONSUMPTION (MJ)*	% REDUCTION*
Benchmark	Ontario Archetype House	130,000	
Base Loads	Base Loads: reduced to new R-2000 levels	107,000	20%
Envelope	• Ceiling: R40 batt x 2, gypsum ceiling (=R68) • Walls: brick, air space, CodeBord, double stud with R22 batt x2, gypsum (=R40) • Basement Walls: concrete, CodeBord, R22 batt, gypsum + slab CodeBord (=R27 + R12) • Windows: U0.16 + SHGC 0.41 (triple glazed, 2 low e.1 coatings, 9mm krypton, insulating spacer, picture window, fibreglass frame) • Air Tightness ACH 0.75	66,000	30%
Mechanical	• DHW: tankless water heater EF.94 • DWHR from Spreadsheet • HRV @ 88% • Furnace AFUE @ 96%	42,000	20%

*Numbers are approximations of simulated values

It should be noted that that this is a case study done by buildABILITY; costs were not considered and this modelling is not representative of the final designs of the builders. The ecoEII builders each have different housing forms and customized net zero packages are being designed.

MICHAEL LIO IS PRESIDENT OF BUILDABILITY CORPORATION, MICHAEL@BUILDABILITY.CA
CEARA ALLEN IS MANAGER, TECHNICAL SERVICES, BUILDABILITY CORPORATION

The heart of your home



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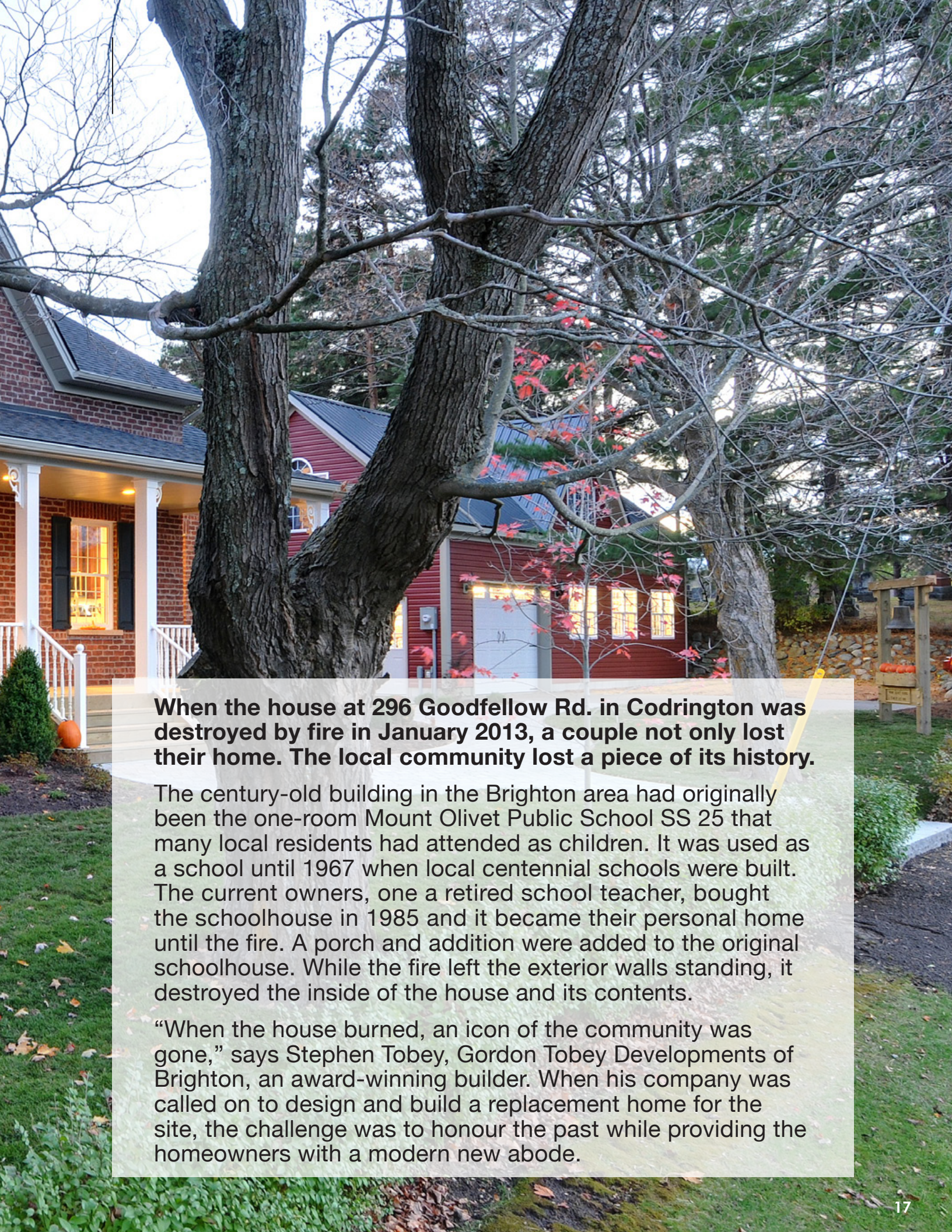
Steve Tobey Takes Us Back to School

BY TRACY HANES



When the house at 296 Goodfellow Rd. in Codrington was destroyed by fire in January 2013, a couple not only lost their home. The local community lost a piece of its history.

The century-old building in the Brighton area had originally been the one-room Mount Olivet Public School SS 25 that many local residents had attended as children. It was used as a school until 1967 when local centennial schools were built. The current owners, one a retired school teacher, bought the schoolhouse in 1985 and it became their personal home until the fire. A porch and addition were added to the original schoolhouse. While the fire left the exterior walls standing, it destroyed the inside of the house and its contents.

“When the house burned, an icon of the community was gone,” says Stephen Tobey, Gordon Tobey Developments of Brighton, an award-winning builder. When his company was called on to design and build a replacement home for the site, the challenge was to honour the past while providing the homeowners with a modern new abode.

"We wanted the new house to pay homage to the style of the old schoolhouse and fit into the local agricultural community," says Tobey. "We decided on a home similar in style to a traditional Ontario farmhouse style. But inside, the homeowners wanted a modern, open-concept layout."

The house, called the Painted Maple, is 2,450 square feet, just slightly larger than the home it replaced. The design accommodates one-floor living for the retiree owners with master bedroom and ensuite on the main floor, with additional two bedrooms and bathroom in the loft above to accommodate their daughter-in-law and grandchild who come for extended stays. The kitchen, dining area and great room combine to form an airy, spacious single open living space. The great room and front entry hall have high ceilings open to the loft cat walk above. The main floor also includes a den/office and a large mud room that is close to the detached garage.

The front of the home features symmetrical proportions, a large covered porch, a steep gable over the front door, gingerbread trim and black shutters. The red brick has Flemish bond detail reminiscent of the red brick from the schoolhouse. The original bell from the school was salvaged and mounted on a structure on a corner at the front of the lot.

The last teacher to teach at the school lives in a farm across the road and remembers ringing the bell at lunchtime for the children, that also served as a signal to local farmers in their fields that it was time to stop work and break for food.

"The property had mature trees, a driveway and pool and we put the new house where the old schoolhouse had been," says Tobey. "But the old schoolhouse didn't have views where views should have been."

Now, low-E argon windows that minimize heat loss in winter and heat gain in summer allow for generous natural light and provide views of the surrounding fields and the pool. The windows are single and double-hung styles chosen for their traditional appearance.

The homeowners had lived with a leaky building envelope and had only a crawlspace with dirt floor under their schoolhouse home. Their energy bills had been steep, so a priority was comfort and energy efficiency for the replacement home. As an R2000 builder, Tobey knew his company could deliver the quality, design and superior energy efficiency the homeowners required. The new home was built to Energy Star standard and well above Code.

Because his company provides a comprehensive energy package to its clients, Tobey says that freed the homeowners from having to make even more choices. "They had to make so many decisions and it can be overwhelming. By using us

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as designers and builders, we can give them the energy package and say ‘this is what you’re getting,' which is a bonus for them.”

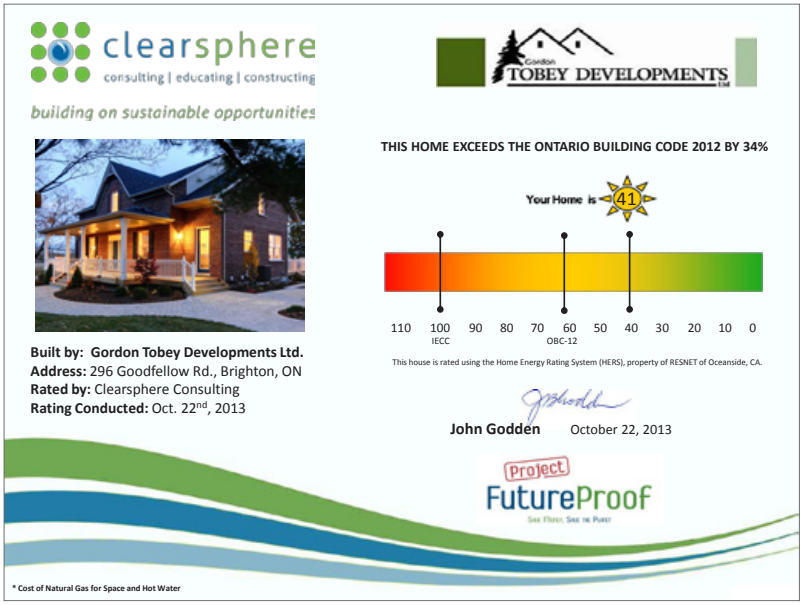
The Painted Maple was not built to R2000 specifications although Tobey Developments has built many homes to those criteria. In January 2014, R2000 buildings will be required to be 50 percent more energy efficient than Code-built ones, with a building envelope 25 percent tighter. The best-in-class standards will address air conditioning, micro-power generation, solar thermal, etc. which will add significant cost for the home buyer.

Tobey is not certain his company will pursue the new R2000 for its homes, though the company will continue to provide the same high level of energy efficiency and quality construction methods as it has been. Tobey’s building his own house to the new R2000 criteria “to see what we think of the whole thing” and to determine whether it will justify the added expense to achieve the stringent new benchmark – and if it’s something customers are willing to pay for.

The Goodfellow Rd. home’s HVAC system includes a high efficiency propane furnace and Energy Recovery Ventilator with DC motors, and a 15 SEER air conditioner to reduce consumption of electricity. All lighting uses Energy Star certified bulbs. The tightly sealed building envelope boasts superior tightness and insulation, windows are low E argon and the basement has under-slab foam insulation. In third party tests, the home achieved a HERS score of 41 and an EnerGuide score of 84.

Hardwood flooring used in the home is FSC certified. The homeowners like the look of natural wood and their furniture is a mix of Mission-style pieces and antique replicas. Materials chosen for the home, in keeping with the charm of the old schoolhouse, include stained wood cabinets, oak flooring, stairs and railings, whitewashed pine kitchen and dining room ceilings, and a propane stove designed to look like a traditional wood-stove. The master ensuite, with all the comforts of a modern bathroom, has a claw-foot tub reminiscent of a traditional cast iron tub.

BUILDER STEVE TOBEY AND PROUD HOMEOWNERS DOUG GOWER AND ALICE ABBOTT



The large kitchen boasts ceiling-height cabinets to provide plenty of storage and is equipped with a built-in recycling centre.

Though the fire was an unexpected and unwelcome event that meant the loss of a beloved heritage building and their possessions, the homeowners can now look to their future. Their new house was completed in October and they are enjoying a space that was specifically designed to accommodate their love for entertaining and the day-to-day living needs of their multi-generational family in warm, comfortable surroundings - without the costly energy bills.

"How much more energy efficient should we build homes?" As a builder one of the most satisfying feelings is to close a new energy certified home with a buyer who feels that they have received real value. Value both in terms of their initial investment and their future energy savings. Being the builder, I specify the extent of energy features installed in the home. Spending Ten to Twenty Thousand Dollars to save a couple Hundred bucks per year will simply leave your buyer/potential buyer feeling cold. Achieving long term value in your home is what we do best. Currently building my own home I want a label that reflects all the energy features that are built in. My projected as-built HERS score is 37 which is 40% better than code.

Stephen Tobey – Builder

TRACY HANES IS A FREELANCE FEATURE WRITER FOR THE LARGEST DAILY NEWSPAPER IN CANADA AND SEVERAL MAGAZINES. WWW.TRACYHANES.

ALEX NEWMAN

The Best Way to Renovate

INTEGRATING THE PAST, PRESENT AND FUTURE

Seeing as custom homebuilder Amedeo Barbini used to play trumpet professionally, it's tempting to draw on musical metaphors to describe his approach to house construction. But by orchestrating every aspect from the green core to the aesthetically pleasing envelope, he is able to create something lasting and beautiful that also appears effortless, like say something you'd experience at Roy Thompson Hall -- or the Rex Hotel if you're a jazz enthusiast.

But enough of the musical metaphors. Now into his fourth decade of custom-home building, Barbini begins each home with intensive research, carefully investigating the mechanics that will produce energy efficiency, excellent interior air quality, and consistent heat and cooling throughout the entire space. He then designs spaces with views to the exterior in mind, and pursues the finishes and materials that will result in a distinct aesthetic.

The home he is just completing was purchased at the end of 2012, a sturdy 1950s brick ranch typical of the homes built in Don Mills, a progressive subdivision development for its day. The neighbourhood's larger than average lots have made it a target for more recent renovators and new home builders looking to build larger than average homes. In this case, the 9200 sq. ft. lot allowed for a 5000 sq. ft. home.

Given city bylaw restrictions though, Barbini had to retain 50% of the existing walls, prompting construction of the new house around the old. This inadvertently served a green purpose – the remaining brick walls provided an additional eight inches of insulation. Where there isn't any masonry, walls consist of 2x6 studs with an R value of 22, covered by half-inch plywood and then two inches of Styrofoam before applying the exterior stucco.

Fortunately, the original footprint was also conducive to the contemporary style Barbini envisioned for the home, by adding four small "wings" that kept them well within the allowable gross floor area, and adding a second storey that is stepped back so as not to overpower the lot.

The handsome façade in charcoal grey Belgian brick – chosen for its precision lines and consistent thickness – and clear 1x6 tongue-in-groove Western Cedar slats, has equally attractive guts that have built-in future proofing qualities. The new HVAC system has been designed to reduce energy use and be a hedge against steadily rising energy costs, but also to create a consistent and comfortable interior air quality.

The original basement was left untouched structurally – no need for digging down since the ceilings were sufficiently high at 7.5 feet – and all Barbini did was tuck the high velocity ductwork inside the ceiling (that's the only way you can do it) to make a clean space without bulkheads. (Note: High velocity ducts are the only ones capable of being tucked inside the ceiling joists.)

The original basement, which doesn't extend under the entire new structure, has a built-in energy reducer in the crawlspace that extends over 1500 sq. ft. At a depth of 30 inches, this crawl space conditions the living space above. If you think about how cold the floor of a room gets above a garage, no matter how much or what kind of insulation is used, you'll get the idea. The crawl space was created with six inches of gravel poured at ground level, then overlaid with an R10 Insultarp insulation blanket followed by two inches of Roxul and topped in plywood to create a floor should anyone need to get into the crawl space.

Stepping back the second storey had another design benefit of allowing for some unique light transfer within the home. All the Glazing area has been placed at the rear of the house to capture the magnificent treed view – with the massive pivoting glass doors off the main floor living room it feels like being in the Muskoka woods. At the front of the house, Barbini has placed the bedrooms – a master suite on the main floor and other bedrooms and baths on the second floor. Each bedroom has wide, short windows positioned close to the ceiling line – these allow plenty of daylight to flood the spaces without compromising privacy. An overhang at the roof line over each of the smaller windows further filters light, cutting back on glare and heat and thus going easier on the HVAC – and thermostats. Large windows tend to register higher or lower temperatures adjacent to the glass, thereby triggering the on and off of air conditioning or heat, leaving the space further

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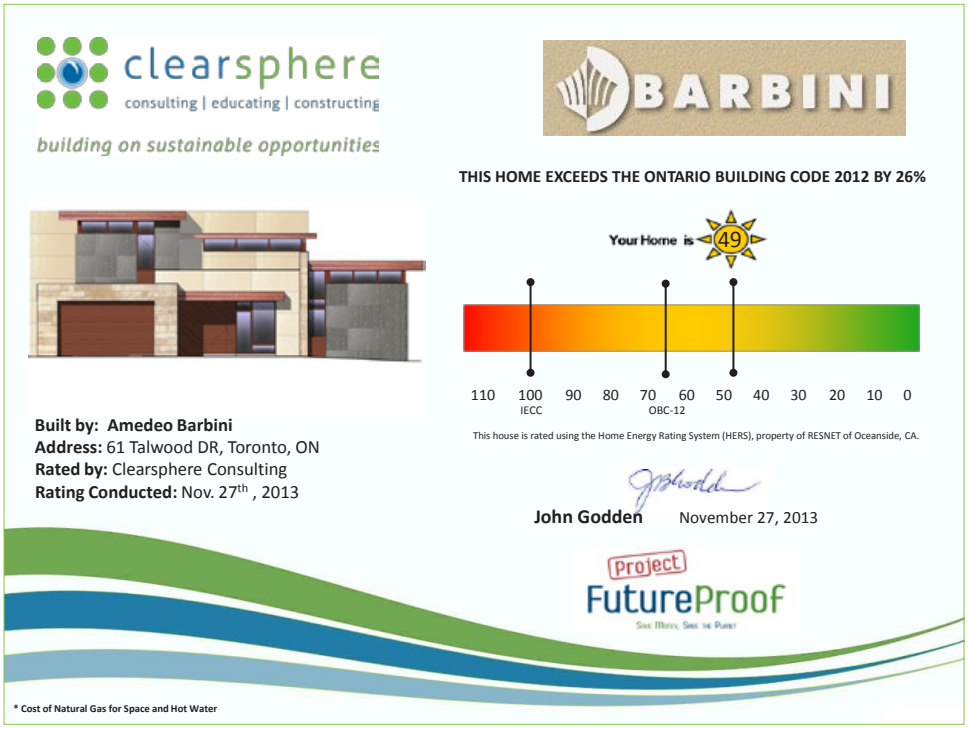
inside the home at the mercy of the fluctuating temperature levels.

All the windows are manufactured by Inline Fiberglass Ltd. They are thin-walled fibreglass windows inserted directly into the walls without exterior moldings or trim, which makes for a cleaner profile and once caulked a tighter seal. The fibreglass guarantees maximum heat retention, losing nothing from the glass to the outdoor air. Barbini also opted for increased volume with 11-foot ceilings on the main floor, except for the ten-feet in the main floor master wing, and nine feet on the second floor. This increases air- flow and visually expands the space.

When it came to running the home's heating and cooling, Barbini opted for a two zone system – with two high velocity Airmax air handlers (because of the home's large volume and footprint) and a condensing boiler, two copper drain water heat recovery (DWHR) pipes and the Flowmax indirect hot water tank which acts like a "battery" for the radiant floor system. Domestic hot water comes from the Flowmax tank, but also stores heat for the radiant floors so that the condensing boiler doesn't have to cycle on and off, which is not a good thing. There's also an energy recovery ventilator for fresh air circulation. This is such serious HVAC equipment that it's been divided between two furnace "rooms" -- two air handlers, DWHR pipes, and the Flowmax water heater in one, and the gas-powered boiler, and orange flex pipes filled with water for the radiant floor heat in the other. With first and second floors in different zones, in terms of HVAC, Barbini was able to direct more air conditioning to the second floor.

"Here's a renovator who believes in the idea of building the value of future proofing into his home, so that on the back end he can differentiate himself," says John Godden, with whom Barbini consulted several times about the HVAC system. "It's a difficult market, because this is not a brand new house, so he's doing all the things he needs to that makes it better than the new build. With the extent he's gone to he will have a HERS score below 50. This score is as good as you can get on new housing without renewables."

The system isn't as complicated as it sounds, but it does require mechanical expertise to install. In one of the many consults Barbini had with Godden and the Clearsphere team, the one mechanical contractor whose name came up repeatedly was Branko Mijatovic (Alpha Comfort and Control http://www.alphacomfortcontrol.com/). "You really need a skilled HVAC contractor who really understands this kind of system," says Godden. "Especially in a project like this, when you have different interior ceiling heights, and you're aiming to create two



different zones in order to future proof against rising energy costs. It's important to have a very good mechanical contractor, who can match equipment to the needs of each individual home."

Also located in the second furnace area are the sump pump and the sewage pump. Because North York is lower than the city's drains by a foot, every house in the area has a sump pump and a sewage pump for better drainage. The sewage pump takes the drain water from the laundry room and basement bathroom, while water from the rest of the house is carried away by the stack.

Honeywell contributed state of the art controllable thermostats to the house. This central control manages, heating, cooling as well as humidification
and central ventilation through a energy recovery ERV. The ERV manages both, humidity in summer and winter, but these are not your usual control panels. Wi-Fi compatible, the controls can be carried remotely into any room in the house so that temperatures can be controlled from anywhere. If the bedroom is too cool, and you only want to raise the temperature there, you can take the remote and increase the heat in that room only, Barbini explains. "This isn't only about being able to control the environment for comfort," he says, "but also about economics. No sense wasting heat in areas you are not using."

The new home, which Barbini expects to market in the spring, is a good example of an integrated design process. That is, in simplest terms,
integrating the design of a beautiful home with the design of its beautiful mechanics, which results in space that is aesthetically pleasing, and comfortable. These future proofing efforts will pay off for the new owners of his home in much lower gas and electricity bills.

Barbini goes to such lengths with materials,
finishes and systems because he wants his houses to last, to be gentle on the environment, and to garner lower heating and cooling bills. Most builders will only go to such lengths when already working for a client with imagination and deep pockets, but Barbini is prepared to gamble that the end user – in this case the buyer of this modern Don Mills home – will recognize its hidden, as well as overt qualities.

ALEX NEWMAN IS A WRITER, EDITOR AND RESEARCHER AT WWW.INTEGRITYCOMMUNICATIONS.CA

HOWARD COHEN AND
BETTER BUILDER STAFF

The Best Way to Insulate Basement Floors

When it comes to reducing energy consumption within the home there are many factors to consider; the most critical of which is insulation. Creating a tight and efficient envelope begins with the systems and products builders use, and given the recent changes to the Ontario Building code, insulation and its importance to the homeowner has never been as significant a topic.

Amvic Building system, a Canadian based insulation manufacturer, has once again raised the bar with its two most recent products; the Silverboard SB35-UC board and PEX Radiant Heat Insulating Panels. Updates to the SB12 building code now mandate that all concrete slabs containing radiant heat piping must have a minimum R10 insulation under the slab; the SB35-UC not only meets this requirement, but also provides vapour, radiant and radon barriers. Silverboard SB35-UC was specifically designed for on or below grade insulation applications. It also offers a flexibility (84 Psi) and load compression toughness (35 Psi) not found in traditional flat-sheet EPS or fibreglass boards, which not only increases job-site efficiency by enabling workers to walk and drive over it, but also minimizes waste.

Peter Voong, of Castle Form Homes, says the Silverboard SB35-UC is an unparalleled product, “When it comes to insulating radiant floor heating - the most efficient method for heating your house - this product is the superior choice for insulation.” In his most recent LEED build Voong used the SB35-UC under the basement slab and walkout, “It was really easy to install...simple and light-weight, a very cost-effective and versatile product.” The reflective laminated surfaces not only reflect radiant energy (keeping heat outdoors during the summer and containing it inside during the winter), it also provides a continual barrier that protects the core from air and moisture for longer life.

Silverboard SB35-UC is available in 4’x8’ sections and can be found at a variety of hardware and home building stores.

The Insulated Radiant PEX panel is another Amvic product that strives to improve upon installation and performance characteristics for Hydronic radiant floor heating systems. While Silverboard is attached to a mesh screen that sits on the piping, PEX panels were designed to create non-contact voids. The combination of expanded polystyrene (EPS) insulation, one of the highest performing, energy efficient insulation materials available today, vacuum moulded to a high impact reinforcing

2 INCH SILVERBOARD R10 INSULATION PLUS A RADIANT BARRIER - THE BEST WAY TO INSULATE

and VB polystyrene film makes for a strong resilient interlocking PEX panel. The reverse tapered, raised nubs form a "mushroom" shape to lock the PEX piping firmly in place once installed - also allowing the panel to accept 3/8" to 1" pipe diameters (more than any other panel on the market). The PEX piping is easily inserted into the panel simply by walking on the tube. Once inserted the pipe will be properly positioned and seated on the panel. The innovative patented design ensures that the tube will be completely surrounded by concrete and not resting on the bottom face of the panel as some competitive products do. This allows for the proper heat distribution of the radiant tubing and more efficient energy transfer.

HOWARD COHEN, DIVERSIFIED INSULATION PRODUCTS MANAGER, AMVIC

DOUG TARRY

The Best New Demo Project

THE OPTIMUM HOME WITH THE OPTIMIZED HVAC SYSTEM

Doug Tarry Homes recently opened our latest model home, the Edenbrook, during the first week of October. Today, as an industry, builders open new model home centres all the time, and while we are always proud to show off our newest creations, there are the rare exceptions when something truly revolutionary is presented to the marketplace.

Such is the case with this Discovery Home built as part of our commitment to the Union Gas Optimum Home Program. Through the Optimum Home Program, we have been able to work closely with a number of building science experts and consultants to help us address some critical next steps in the construction of high-performance homes. In this particular home we are demonstrating two new technological features that will have a significant impact on the building code and how homes are built in the future.

The first is the pilot project we are conducting with Dettson Industries on right sized furnaces. The F280 guidelines, that mechanical designers use to size their equipment, do not properly account for the tighter homes that the current Ontario Building Code and energy programs such as Energy Star are requiring of builders. This, combined with furnace manufacturers not recognizing the need for smaller HVAC equipment, is leading to performance issues in our homes. Issues such as temperature differences and comfort complaints.

An updated F280 will be an alternative option under the new 2012 OBC, starting in January. Using the new F280 will see furnace size requirements drop significantly. Doug Tarry Homes has been working on this sizing issue for several years. What we have found is that under the old F280 a furnace might be sized at 45,000 or even 60,000 BTU's of heat output, but might only need to be 28-30,000 BTU's on the coldest day of the year. The challenge with the new sizing requirements that we should be using is that there are no furnaces available that perform between 12-30,000 BTU's, which is what we need. Regrettably manufacturers seem to be fairly ambivalent to our needs.

This is where Dettson Industries comes into the picture. This Canadian owned furnace manufacturer, based in Quebec, has recognized that there is a need for right sized furnaces. I was put in touch with Marc Chenier from Dettson through our involvement in the Union Gas Optimum Home Program. Back in March I had the opportunity to visit the test lab near Montreal and check out the product they were planning to manufacture.

What I was most impressed about was not only the willingness of the Dettson engineers to listen to our performance concerns but that they understood the need for smaller, right sized, high performance furnaces. After some very positive conversations we agreed to provide Dettson industries with two homes to test their right sized furnaces in.

On October 3rd we had the privilege of unveiling the new Dettson Chinook prototype furnace. The Chinook is fully modulating with an ECM motor and has a BTU output range between 12,000 to 30,000 BTU's, which matches our homes needs. It is currently available for viewing in our Discovery Home in St. Thomas, where we are testing the prototype over the next twelve months. Dettson is projecting that the BTU Chinook will be available in the market by February. Builders who are constructing MURBS will be interested to know that Dettson is also working on a 15,000 BTU furnace they hope to bring to market in the spring.

Of course none of the *right sizing of furnaces project* would have been possible without the understanding and support of our former Chief Building Official, Leon Bach, who understands the performance issues and permitted us to design the system to the new F280 Standard as an alternative compliance solution even though the new Standard does not become an option until January 2014. We are very appreciative of Leon's support and the other building officials involved with our Discovery Home that helped to make this project a reality.

The other pilot project featured in our Discovery Home is a new basement wall system that we call the Optimum Basement Wall. I've previously written about our journey to a better basement wall and our work with ROXUL. My next article will focus on the Optimum Basement Wall.

DOUG TARRY JR., IS THE DIRECTOR OF MARKETING AT DOUG TARRY HOMES IN ST. THOMAS , ONTARIO.

Chinook

WARM AIR GAS FURNACE DESIGNED, ENGINEERED, AND MANUFACTURED IN CANADA FOR HEATING AND COOLING CANADIAN RESIDENCES

- **Ultra compact size, featuring the industry's smallest footprint**
- **Ideally suited to the replacement market**
- **Right-sized for today's tighter homes and new codes**
- **Designed with a gas laboratory and builders' input**
- **Stainless primary and secondary heat exchanger**

Benefits and differentiators

- Stylish exterior; polypropylene (plastic) doors with textured metal cabinet
- Zero-clearance certification for new construction and renovation projects
- Meets the existing replacement market requirements for both cooling and heating
- Designed for the rapidly changing new construction market wich requires smaller capacity appliances due to tighter envelopes
- An excellent central system solution for both the multifamily and single family home markets

Product line features

- Over 95 % AFUE
- Full product line from 15,000 to 120,000 BTU on four platforms;
  - Single stage
  - Dual stage PSC or ECM motor
  - Modulating (from 40 to 100%)
- Innovative & efficient blower design provides quiet operation for comfort as well as energy efficiency
- Natural Gas, for propane kits are available

Product release schedule

Phase I - 75, 105 and 120,000 BTU up-flow configuration; September 2013

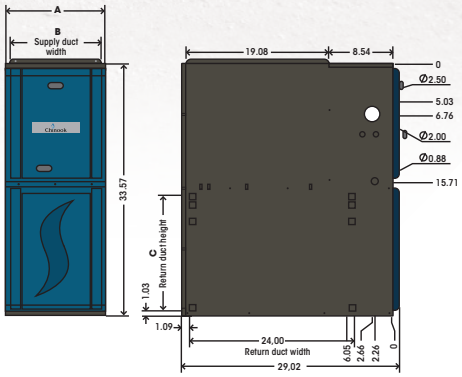
Phase II - 45, 60, 75, 105 and 120,000 BTU multiposition configuration for trailers, mobile homes and temporary housing; December 2013

Phase III - 15 and 30,000 BTU; February 2014

Reliable appliance that offers a safe maintenance environment

- Stainless steel extruded tube heat exchanger; primary (SS T 409) and secondary (AL 29-4C)
- The ID blower has a single position independant of appliance orientation
- Easy access to components for maintenance
- See-through drain trap
- Control board located in the combustion chamber, for easier servicing
- No sharp edges to ensure safe installation

MADE IN CANADA



DIMENSIONS (inches)

Furnace size	A Cabinet width	B Supply duct width	C Return duct width	Filter Size
15 k	13 1/2	12 1/2	12 1/2	13 x 24
30 k	13 1/2	12 1/2	12 1/2	13 x 24
45 k	13 1/2	12 1/2	12 1/2	13 x 24
60 k	15 3/4	14 3/4	14 1/2	15 x 24
75 k	15 3/4	14 3/4	14 1/2	15 x 24
105 k	21	20	16 1/2	17 x 24
120 k	21	20	16 1/2	17 x 24

DIMENSIONS (centimeters)

Furnace size	A Cabinet width	B Supply duct width	C Return duct width	Filter Size
15 K	34,29	31,75	31,75	33,02 x 60,96
30 K	34,29	31,75	31,75	33,02 x 60,96
45 K	34,29	31,75	31,75	33,02 x 60,96
60 K	40	37,46	36,83	38,1 x 60,96
75 K	40	37,46	36,83	38,1 x 60,96
105 K	53,34	50,80	41,91	43,18 x 60,96
120 K	53,34	50,80	41,91	43,18 x 60,96

WEIGHT	75K	105K	120K
lb / kg	114 / 51,7	138 / 62,6	146 / 66,2
ELECTRICAL DATA			
Supply	115 Volts - 60 Hertz - 1 Phase		
Maximum consumption	From 10,53 to 16,19 Amps		
Transformer capacity (24 vac output)	40 VA		

Dettson

www.dettson.ca

NEW!

WELCOME TO STRUCTURAL INSULATION REINVENTED FOR TODAY'S WORLD — AND A SUSTAINABLE TOMORROW.

BP Excel breaks new ground in structural insulation thanks to a membrane that combines air barrier protection, moisture-evacuating breathability, and strength like no other product.

And it's green — made from 98% recycled materials, free of VOCs and ozone-depleting CFCs or HCFCs, and glued together with wheat starch.

For homebuilders looking for innovation and value on an exponential scale: Excel is innovative green design, exceptional thermal insulation and structural strength all in one breathable sheathing that delivers outstanding performance with unparalleled strength.

EXCEL

CLOSE TO HOME

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The ARGILE Project:

BUILDING SCIENCE RESEARCH AT GEORGE BROWN COLLEGE

ARGILE'S vision is to research and develop optimal systems of materials and methods for the retrofitting of existing vintage solid masonry buildings, with the objectives of improving their energy efficiency, durability and occupant health. The International Energy Agency emphasizes the need for better building practices by stating "... existing buildings are responsible for over 40% of the world's total primary energy consumption" (IEA, 2008). It has thus become clear to our research team that increasing the energy efficiency of buildings is a vital step we must take to ensure energy security and environmental damage is minimized for our future generations. Although the aim to investigate the cost/benefit of retrofitting vintage buildings and to establish a link between vintage building retrofits and "sustainability" represents the main focus of ARGILE, there is a need for advanced contractors to push the envelope, set new standards, and surpass the

OPTIMUM BASEMENT WALL - MONITORING ROXUL PERFORMANCE

requirements of the Ontario Building Code for new construction in homes.

The "Optimum Basement Wall" designed by Doug Tarry Custom Homes Ltd. functions to mitigate condensation build up within the basement wall assembly. According to Doug Tarry Jr.: "Consumers today expect their basements to be as usable as their above grade floor space, but the conditions are completely different. We realized that the current building code is leading to far too many basements with mould and moisture issues. The problem is the vapour diffusion in the wall. Clients don't understand that this vapour flow is a natural occurrence and that most basements will have issues with vapour flow that will frequently lead to mould."

The ARGILE research team has partnered with industry leader, ROXUL® and progressive contractor, Doug Tarry Custom Homes Ltd. to study their show home in St. Thomas, ON. Our research aims to verify the field performance of their basement insulation system by utilizing innovative technology to remotely collect data for evaluation. The wall system features the use of CertainTeed's "MemBrain", which replaces the top third of the polyethelyene sheeting used in the assembly. This polyamide-based material has the ability to adapt it's permeability with changing climatic conditions. As relative humidity increases, it's water vapor permeability increases, and during low humidity conditions, it's permeability will decrease to resist water vapor permeability. This provides the potential to dry out condensation that would normally collect behind the polyethylene and lead to mould growth. The use of the ROXUL® Comfortboard IS layer is also critical. Since stone wool is water repellent, it will allow any liquid water that may enter into the assembly to drain down its surface to the footing instead of being wicked into the insulation.

MARC BUCKLEY - RESEARCH WITH GEORGE BROWN

ARGILE Research's in-house team has developed temperature, moisture content, and relative humidity sensors which have been installed at critical points within the wall assembly, as well as in the below grade soil. The data logging systems have been programmed to translate data remotely for analysis. The information captured by the system will be analyzed for a full heating and cooling cycle to assess the durability and performance of the “Optimum Basement Wall”.

THE ARGILE RESEARCH TEAM: P. CHRISTOPHER TIMUSK (PRINCIPAL INVESTIGATOR) | STEFFANIE ADAMS (CO-INVESTIGATOR) | ANDREW FRASER (CO-INVESTIGATOR) ALEXIS RODZIEWICZ (PROJECT MANAGER) | ARIZONA DIXON (STUDENT RESEARCHER)

INTERIOR BASEMENT WALL APPLICATION BY ROXUL®

Achieving an R-20 Basement Wall "IS" Easy with Roxul ComfortBoard™ IS.

- **Prevent Thermal Bridging:** Installing ComfortBoard™ IS against the foundation wall before you frame the studs provides for a continual layer of thermal protection.
- **Non Combustible:** Provides for combined thermal and fire-resistant properties.
- **High Recycled Content:** Made from natural stone and up to 93% recycled material.

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Fire Resistant | Water Repellent | Sound Absorbent | Saves Energy | Made from Stone | Recycled Content

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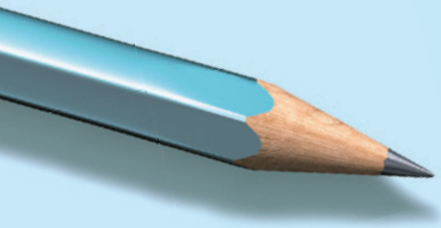
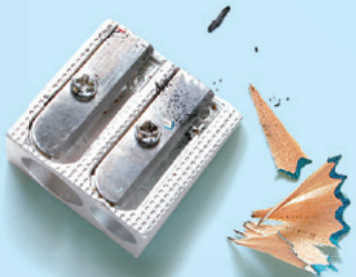
SAVINGS BY DESIGN™

Helping builders design and build more energy efficient homes.

New building codes require new approaches to housing design and energy performance. Enbridge's Savings by Design program is here to help. The program offers free access to design and technical experts, as well as valuable incentives to help design and build more energy efficient homes.

Using our unique and collaborative Integrated Design Process (IDP), we will work with you to identify optimal solutions for improving energy efficiency 25% beyond Ontario Building Code 2012.





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