

## A Building Philosophy – *Appropriate Solutions*

Sandra and I manufactured and built log houses for over a decade. Our hope when we started in business was to build for our local market...within a couple of hours drive of our facility. Ten years later we were competing with other North American companies that were selling into our local area. Our dream of working and living locally quickly met the reality of a globalized market place and to survive as a small company we had to find a niche and join the global marketplace ourselves. Soon we were exporting our products throughout the world; mostly within the United States, occasionally as far away as Japan. This evolution was not a conscious choice; as a small business we did what was necessary to pay our bills.

The globalized nature of business today extends from the manufacturing process through to home building. Rules and regulations enacted for more urban areas were often applied to rural environments without careful thought to their impact. In the last 10 years we have seen increased regulation governing septic systems, water wells, engineering of building plans, building by-laws and construction warranties to name just a few. Increased regulation arises from a desire to build safe, standardized homes. Unintended consequences include increased cost, reliance on professionals and experts and increasing adherence to a building code that stifles innovative thinking and appropriate solutions. By attempting to protect ourselves from poor building practices we have limited our ability to explore different solutions.

In a world of rising energy costs, aging infrastructure and increasing housing costs, our ability to try different solutions to existing problems is critical. A simple tweaking of existing building codes is no longer enough. Perhaps the solution is not to try and make our energy intensive building methods more efficient, but to re-evaluate their effectiveness altogether. Close to 40 percent of the electricity consumed in North America is used to maintain a livable temperature in the buildings we live and work in. Our building practices have linked high energy consumption to our basic need for shelter. Re-evaluating our building practices is crucial to reducing energy consumption.

Appropriate solutions are usually simple, less costly and use less energy in construction and on-going operation. These solutions, often tailored to specific communities or locales, do not always meet the rigid requirements of today's building codes. A home heated with passive solar energy will not consistently maintain a temperature exceeding 22 degrees Celsius as required in Canadian building codes, but it can maintain an acceptable temperature ranging from 17 to 25 degrees. Wearing a sweater occasionally in a passively heated home is a reasonable trade-off to reliance on expensive centralized heat. The time has come for national building codes to reflect this.

This series of manuals reflects our experiments with appropriate solutions. We hope you learn from our mistakes and successes.

## Introduction

When we were handed the book, *Rocket Mass Heaters, Super-efficient Woodstoves You Can Build* (Ianto Evans. and Leslie Jackson) by Brandy Gallagher of [OUR Ecovillage](#) in November 2009, we only had an inkling that Chris might design one for our own home in the North Thompson Valley of British Columbia.

He had been investigating these heaters on and off for several years so it seemed like fate when Brandy gave him the book to him following our short, impromptu talk about [our earthship](#) at the B.C. intentional community. It must have been the “You Can Build” part of the title that tipped the scales in favour of this stove a year later!

Chris had recently been investigating wood gasification as a method for heating and electrical power generation for our earthship, a sustainable home built from used tires and pop cans. Such was his interest that he entered and won a contest for \$800 in gasifier parts from [Victory Gasworks](#) in Washington in July 2010. By September the parts still hadn't shipped. Leaves were beginning to change colour and the inevitable cold weather was fast approaching. Our tire house was closed up but we realized to work in comfort over the winter we needed a heating solution.

We both read *Rocket Mass Heaters*, but it didn't answer all our questions. So, the search for more information began. We began bookmarking internet sites and technical documents and we began to source potential materials, like fire bricks and barrels. Chris discovered an internet forum on the [Proboards site](#) where he was able to post preliminary designs, ask questions and receive answers from other stove builders.

When we approached our regional district about building a rocket mass heater we were unsurprised they wanted engineered drawings. Much like our house—one of the first fully permitted and engineered earthships in the province—rocket mass heaters are not all that common in our neck of the woods.

A set of engineered plans necessitated a level of research that went a bit beyond a normal fireplace. Chris' thoroughness kicked up to high level and some nights found us gazing glassy-eyed at technical documents for perlite formulas and gas diagrams. The research took weeks. After one particularly long day Chris asked, “Why hasn't somebody put all this information in one place?”

### *Why This Book*

Chris has done a great job of explaining this wonderful heating alternative on our blog site for the many people who follow it. For the small percentage who want to go beyond looking...to building...this book is for you. It represents months of research, practical application, writing, and a fair amount of swearing, an activity necessary to good design and implementation as well as good writing.

We like to think our manual is like a dummies' guide to building a 8" Rocket Mass Heater (as described in Ianto Evan's book), detailing step-by-step our efforts to build our own! We recommend reading his book, for the gestalt of rocket mass heaters, as we do not have the experience or background he brings to this subject.

## Biographies

### *Chris Newton, P.Eng*

In 2008 Chris talked Sandra into setting aside plans for a log home in favour of a house made of tires and pop cans. It is a testament to his persuasiveness and her faith in him that they closed their log home business in Darfield, B.C. and began designing and implementing their dream of building an earthship and to one day prove that a family with three children could live sustainably with modern comforts.

After selling their home, paying off the little debt they had, and moving the family into their 600 square foot renovated office, which Sandra named "The Nutshell", Chris and Sandra began the process of planning their future home.

Chris started life in the city, one of four brothers in Hudson, Quebec, and lived his teenage years in Branford, Connecticut. He eventually finished high school in Rockcliffe Park, just outside Ottawa, Ontario.

Always mathematically inclined and prone to taking things apart and figuring out what makes them tick, Chris took his scientific calculator and protractor to Toronto to study Applied Science at University of Toronto's School of Engineering.

Chris spent some time doing safety analysis with Ontario Hydro, moving on to software design for a consulting firm working at the Toronto Stock Exchange and other financial institutions. Chris was part way through a Masters of Engineering in Sustainable Energy when he left Toronto to assist in re-building his parents' business in Vermont following an industrial fire.

Chris and Sandra moved to San Francisco in 1997 for a change of pace and to see something more of North America. Although he loved cycling around the city year-round, Chris finally confirmed that software design wasn't his passion.

In 1998, after having talked Chris into starting a family, Sandra then persuaded him into moving back to her hometown of Barriere, B.C. where they gradually took over much of the lumber remanufacturing business her father had been involved in, including log homes. After more than a decade of running North River Log Homes in Darfield, Chris had the tire epiphany.

Always a questioner of consumerism, waste, technology and environmental policy, Chris found his practical calling while building a sustainable house.

## ROCKET MASS HEATERS

Until recently Chris was a literacy tutor in a children's program in Barriere, and is now the lead teacher for his own children, who learn at home. The family school "room" is often full of discussions about world economy, computer programming and sustainability. Regrettably, Justin Bieber's name is sometimes mentioned.

### *Sandra Burkholder*

After living in a 600 square foot renovated office, euphemistically called "The Nutshell" for the past three years, Sandra is ready to finish the earthship and move in.

For the past 10 years Sandra has worked alongside Chris running North River Log Homes and raising three children, Katie, Stephen and Helen. Notching logs went hand in hand with changing diapers but didn't seem to have much to do with her Bachelor of Journalism degree from Carleton University, or her PR training at Ryerson University.

Sandra started in PR at Victoria General Hospital in Halifax where she met Chris, who was working for the summer for the National Research Council. After a year flying back and forth to Toronto, Sandra cut down on the expenses and moved to the Big Smoke (Toronto) in 1990 to join Chris as he finished his Engineering degree. She worked for various companies, including Scotia-McLeod and Toronto General Hospital, as well as several PR agencies with clients in the health care and pharmaceutical industries.

A move to San Francisco in 1997 was short-lived but did produce the only U.S.-born member of either of their two families. Chris and Sandra's daughter, Katie, was six weeks old when they moved back to Canada to Sandra's hometown in British Columbia.

Sandra and Chris' decision to close their business led to some interesting practical and theoretical applications of frugality, prompting Sandra to experiment with lots of DIY projects, such as family haircuts, proving that practice really does make perfect. Thrift store excursions produced remarkable results on the finances as well as on the environment. Food preservation and bread making have been rekindled activities since closing the business and ramping up house construction.

Sandra is a volunteer leader with her children's 4-H club and an in-school mentor and business coach for the international organization, Jr. Achievement. She has recently begun consulting again as a freelance bookkeeper and writer.

## Disclaimers

Our rocket mass heater closely follows the design in Evans' book, *Rocket Mass Heaters*, for an 8" diameter stovepipe because we wanted to build from a practically proven design. This heater, and the 6" model, have been built and tested by a number of people in a variety of settings.

There is a lot of discussion about building larger units or modifying existing designs. Chris strongly believes that experimentation leads to innovation ... but he is also cautious. Scaling up or modifying a working design can have unintended consequences like reduced efficiency, personal injury or the stove simply not working as expected. Have a very clear idea of the potential consequences when you modify the design.

What follows is our design and construction experience. It is not meant to fit neatly into every situation, nor is it meant to address every local regulatory environment. (You get to argue with your own building inspector!) The plans in this book are not stamped or approved for a building permit and are meant only for information and guidance.

This book is about how we built a rocket mass heater in our particular part of British Columbia, in our own house, within the regulatory framework we encountered. We've written it to inform, educate, reduce research time and above all, to demystify the process. Any singed eyebrows or marital discord are your fault.

Any time you light the stove described in this book (or any stove for that matter) make sure your work area is well ventilated. Carbon monoxide (a product of wood combustion) is odorless and can injure or kill you, so make sure you have a good CO monitor in place.

Smoke detectors are required in your home even if you don't have a stove and fire extinguishers are a good idea too.

***The plans included with this book are for general information only and do not constitute any advice or recommendation (professional or otherwise). The design of a site-constructed masonry heater is dependant on site conditions and the applicable regulatory environment. You should not rely upon the information or materials in these plans for making, or refraining from making, any specific design decisions.***

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***Just sayin'.***