ducing 300,000 kilowatt hours of power annually—about one eighth of Bolton Valley's total energy needs and an amount equivalent to the electricity consumed by 40 to

However the Wind Turbine is just one of the many ways the resort stay conscious about its environmental footprint and the impact skiers and riders can have on nature's playground.

"We are constantly looking for new ways to be more energy efficient," said George B. Potter, President of Bolton Valley. "Using wind power as an energy source is just one of those ways. But simple initiatives like using safe snowmelt on sidewalks, our recycling stations throughout the resort and our environmental towel program in the hotel go a

long way, too, and those types of programs help to get our guests involved. Collectively we can all make a big environmental impact to save energy and resources."

BOLTON VALLEY, Vt. (Winter 2010-2011)—At Bolton Valley

Resort, green is the new white. The resort, located just 30

National Ski Areas Association's 2010 Silver Eagle Award

for Excellence in Energy Conservation/Clean Energy. Bol-

ton Valley became only the nation's second ski area, and

Vermont's first, to install its own wind turbine last season.

The 121-foot-tall Northwind 100 Wind Turbine is now pro-

>> Cont'd on p. 22 >

# Creating energy awareness & understanding... IMAGINE... No Fossil Fuels... to Heat Your Home.....

**IMAGINE IF** – by Steven & Meagan Roy

Imagine if every home was powered by the sun. Imagine if there was no need for fossil fuels or combustion appliances to heat a home and provide the electricity. Imagine being conscious of your consumption of energy, without sacrificing the comforts of home.

Now imagine that all the technology available to us today could provide us the tools to reach this goal. You don't really need to imagine it, because it is possible, and more accessible than you might believe.

Our path to a zero-

energy home began well over two years ago, when we asked ourselves what we

wanted in our next home. We knew from the beginning that a sprawling house was neither necessary nor preferable for us.

Instead, we wanted a modestly-sized house that would have a minimal impact

Our ideas slowly developed as we nar-

right kind of neighborfrom the beginning, appeared to give us what we desired in a

small, village concept.

Issue 5 · November 5, 2010 · www.greenenergytimes.org 802.439.6675

YES YOU CAN! ... BE ENERGY INDEPENDENT!

on the environment.

rowed our search for a building lot in the



local and sustainable agriculture and a >> Cont'd on p. 23 > 10.4.'10 Interview By Nancy Rae Mallery

#### Ferrisburgh -VT' 's Largest Solar Farm

Pomerleau is arguably among the most respected names in Vermont real estate. Now, the Pomerleau name is about to become synonymous with green real estate development - Ernie Pomerleau is going solar!

On a small piece of land along the Rte. 7 corridor south of Ferrisberg, Pomerleau has broken

ground on the largest solar development in Vermont - just over 1 megawatt of installed capacity!

And Ernie is proud to remind anyone that "looking down on the project, the solar arrays are designed in the shape of the State of Vermont." But the happenstance of project's design identity with

the Green Mtn State does not stop there. Pomerleau worked actively to include the participation of Vermont companies

VT Real Estate Developer

in project from foundation to finish (in real estate terms). Leigh Seddon VP of Engineering for Alteris Renewables Inc.

designed the project from his studio in Montpelier.

Ernie searched for local suppliers for every

aspect of the ground-mounted structure that holds the panels. All the labor is local. And the site will feature a visitor center. Ernie proudly exclaims, "Visitors can look at the panels. See them, touch them, and learn!"

Although a professional developer, Pomerleau learned a great deal over the >> Cont'd on p. 3 >

### **A Solar Installer Takes Stock**

#### November 1984\*

"Ed Butler's career has come full circle, but only after he became one of the most experienced solar contractors in the United States.

Ed Butler, president of Sunrise Solar Services, has been in the installation business for eight years\*. He started as a plumber, moving through the

ranks of apprentice training, getting his journeyman's and then his master plumbing license. He also worked as a commercial roofer for two years. It was a natural transition into active solar system installation, where he found a challenge in using traditional skills in a new field.

In the beginning, his work was a mix of mostly plumbing and a little solar. But by 1978 he was doing all solar, in the boom when "most of the states had better



incentives than they have now."

#### White House Installation:

In April 1979, Sunrise Solar Services was one of 3 companies to install a 32 panel solar hot water system on the roof of the West Wing of the White House in Washington, DC. The array was designed to meet about 75% of the annual domestic hot water demand. The 32 collectors heated 600-gallons of water in three 200-gallon storage tanks piped in series. >> Cont'd on p. 6 >

CONTENTS

**EDITORS' PAGE, SUBSCRIPTIONS ... 2 SOLAR PV......** 5 SOLAR HOT WATER ..... 7 **TRANSPORTATION......8,9** WIND ......11 INCENTIVES ..... 12 HYDRO...... 13

GEOTHERMAL.....14 CONSTRUCTION + ..... 16-17,19,28 SUSTAINABLE HOMES.....23-26 LOCAL BUSINESSES ..... 22 THERMAL STORAGE......27 HEATING......29 BIOMASS......30

NEWS, CLUES & REVIEWS......31 INGREDIENT OF THE MONTH...... 33 TRANSITION, DIY COLUMN...... 36 BIO-CHAR......37 PERMACULTURE......37 RESOURCES, CLASSIFIEDS...... 38 THE GREEN LIFE ......39

45 Vermont households.

#### **GREEN ENERGY TIMES (G.E.T.)**

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#### ABOUT G.E.T.

Green Energy Times is powered by 100% solar, off-grid with a 3.8 kW PV system. We live and know that Energy Independence is indeed possible - with clean, sustainable renewable energy.

Our mission is to promote Energy Awareness and Understanding. We must save our planet. Think Solar, Wind, Hydro... and energy reduction! Believe in this earth! < Solar works! . . . anywhere! under the sun! >

G.E.T. is published quarterly, Feb. 5, May 4, Aug. 5 & Nov. 5, by NRM Advertising Company. It is free and availble throughout 85% of VT & 45% of NH: the Upper Valley-St.J.down to Brattleboro,Windsor-Ludlow, Barre-Montpelier-Burlington, Stowe, Mooretown-Waitsfield, Morrisville, Hardwick, Danville, NEK, Grand Isle, Woodstock-Rutland-Bennington; NH: Woodsville-Hanover-W. Leb.-Plainfield, Enfield-Claremont, Keene-Concord-Plymouth-Laconia, Littleton, & towns in between...

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G.E.T. wants to thank everyone who has submitted articles or helped in any way to make this all a reality. We want to also thank our advertisers & ask that you support them. Say that you saw them in *Green Energy Times*. Now let's all G.E.T. moving ahead towards a clean, renewable future - one where our children & grandchildren will be able to breathe & grow, live & love on this beautiful planet where we live. Thank you for reading G.E.T. Send your comments & suggestions to: info@greenenergytimes.org.

We want to hear what you are doing to make a difference! Together we all can make the difference! Peace!

Green Energy Times invites your thoughts, suggestions and ideas. We want to hear what YOU (or someone you know) are doing to help to reduce our dependence on Fossil Fuels.

Your example may be the one that helps. Share them with us!
Next Issue of G.E.T. is Feb. 5, 2011.
Feature: "How Sustainable are:
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#### Letters to the Editor

Catherine Horne, Austin, TX

Hello! I was recently in VT and read about the Putney School's new Field House- was this the article in your magazine?? If so, I would like to order 12 copies of the paper it was in to supply to our school board in Texas. It has some great ideas that we could benefit from. Thanks!

Aug. 12, 2010

...And it matches very well your commentary in the last edition! That was a really excellent issue BTW. ...you also might be interested to know that next week All Earth Renewables installs an AllSun Tracker on my land. I am so excited.

George Plumb, VSP (Vermonters for a Sustainable Population), Executive Director)

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# Let's G.E.T. this straight Green Energy Times is NOT Just another

pubication

**Qur Mission:** Green Energy Times is a grassroots publication whose goal is to effect change by moving into an energy independent future. With imminent urgency, we must take action towards the challenges of climate change, by lowering our carbon emissions, and doing this, aggressively. We must all work together to find and implement the solutions to the climate & energy crisis!

As Ban Ki Moon, Secretary General of the United Nations, stated to 350.org: "It's time for us to roll up our sleeves and get to work on building the clean energy future that will generate economic opportunity and provide a better, safer, healthier world for our children."

We are dedicated to educating the public about how to take the steps we all need to take, in order to incorporate energy independence, reduce our energy usage and lessen our carbon footprint on this planet - to build a socially responsible, clean future, not only for our children, but for generations to come.

The articles in our publication are provided to us after a very well thought out & sought out process. Our intentions are to educate our readers about the options that are available in order to encourage a move towards energy independence. We gather our content from socially conscious businesses that you can trust. We ask them to provide

Aug. 12, 2010

Nancy Rae -

I have picked up the current issue. (several copies, actually, to distribute among our senior leadership) It looks great! It really is packed full!

Congratulations on the issue.

Thanks for featuring us,

Chris Chris Graff, National Life Group

Aug 17, 2010

Nancy,

Hi, I got a copy of your paper at this years Energy Fair at Lyndon State. I enjoyed this much more than other types of publications I also checked out... GET seemed much more focused and realistic. On your website it says that GET is available in Littleton. Where?

Thanks, Matt Michaud





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Green Energy Times wants to hear about your experiences! If there is ever something you wish that we would cover, please let us know: info@greenenergytimes.org.

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#### <Cont'd from p.1 FERRISBURGH SOLAR FARM

many months required to develop a solar project. He learned about the FIT and SPEED programs, Power Purchase Agreements, energy-related environmental review and . . . yes, about the difficulties of financing solar.

Ernie can cite the project's energy and financial performance from memory, but that did not help him at the bank.

Pomerleau's initial financing for the project was declined. But TDBank immediately started working with VEDA and USDA Rural Development. "It was a long, hard process - esp. with FERC and TAX Incentives issues..."

Pomerleau squarely faced the financing challenge. He believes that this challenge speaks to the core of our nation's economic security: "Are the economics there? Perhaps not on pure economics.

Ernie considers the real economics of solar about "jobs" and "energy independence" for Vermont and the nation. "there is one thing we all agree on - that the U.S. needs to get off foreign oil. We all agree this is good!"

Ernie's commitment to the economics of solar goes beyond cost and financing. Pomerleau served as Chair of the Governor's Commission on Climate Change. "I do not debate Climate Change. I don't have to!" He is setting the example!

Pomerleau utilized the new state feedin tariff to make the project financially viable. But even that did not come without a challenge. After receiving news of the award, the State threated to reduce or eliminate project subsidies. Interview by Nancy Rae Mallery 10.4.'10

Ernie went into action to preserve the economic viability of this project . . . and the future of solar energy development in Vermont.

The project is scheduled to go live on December15th. Ernie is excited about a plan to celebrate the success of this project. "When the solar system is switched on, we first plan to light up a christmas tree on the site!"

At his point I asked if he would be using LED's? He answered: "Do they make them for christmas trees?" I said "Yes, and that I use them" He wondered where he could find them. Hopefully this will be accomplished locally, as well, from a developing company in Randolph, VT.

When you drive by the Ferrisberg project this winter, with its blue panels reflecting the Vermont sky, yet allow for clear skies at night - think of "Pomerleau the Solar Developer." For Ernie's development efforts remind us all that solar power is clearly tied to the long-term viability of our local economy and energy independence.



The four folks that made this happen from left to right is Ernie Pomerleau, Tracey Schoonmaker. Steve Ploesser and Brian Waxler

# David Blittersdorf's VIEW FROM THE TOP STATEWIDE SOLAR INCENTIVES



We need equality in statewide solar in centives. Vermont has 21 different electric utilities, some

with coverage areas of a single town. Central Vermont Power Service is the largest overall by geographic area. Green Mountain Power is the only Vermont utility offering a solar production incentive. It's SolarGMP program pays customers an additional 6¢/kWh generated by net-metered solar. If your normal electric rate is13¢/kWh, GMP will credit you 19¢/kWh your solar device generates.

GMP's incentive program is a model for other utilities to follow, a win-win, it benefits the installation owner and helps reduce the utility's need to buy costly out-of-state electricity on the open market during the sunny summer months, when power demand peaks. The problem is that the SolarGMP program is only open to GMP customers.



#### Ferrisburgh Solar Farm Technical Info

Annual Average Output 1,250,000 kWh

Nameplate DC Rating 1.040 kW

Interconnecting Utility

Green Mountain Power -25 yr. power production contract with VEPI (SPEED Program)

Module - Suntech 275-watt

Quantity - 3,784 modules

**Mounting** - Schletter, Inc FS System (fixed rack tilted at 30 degrees)

<u>Inverters</u> - Advanced Energy Industries, Solaron 500 kW inverter (2)

Data Acquisition - Draker Labs, Burlington, VT - Sentalis Monitoring System

### Engineering, Procurement & Construction - Alteris Renewables, Inc.

Project Manager - Jay Myrto, Alteris

 $\underline{\textit{CPG}}$  issued on August 3, 2010

Construction Schedule
COMPLETION! DEC 2010

Vermont needs a statewide solar energy production incentive program administered by the state's various utilities. Production incentives encourage the proper siting of systems and reward owners who choose reliable systems that produce as promised, which in turn helps the renewable energy market overall.

To date, my company AllEarth Renewables has installed 1MW of net metering systems in VT, 280 of our AllSun Trackers among more than 200 customers. As a direct result of the SolarGMP incentive, 80% of AER's customers are in GMP territory. For the same reason, VPIRG's new Solar Communities campaign concentrates only on towns within GMP territory, customers there have an extra reason to go solar. GMP customers have an advantage that isn't available to customers of other VT utilities.

Some may be concerned that if Vermont utilities adopt standard production incentives for solar, they will raise rates. Any such rate changes would be minimal. Right now, AllEarth Renewables leads the state in installed net-metered solar electric systems; our systems alone count for half of GMP's "10,000 Solar Panels in 1,000 Days" initiative launched in 2008. For GMP ratepayers supporting the SolarGMP 6¢/kWh incentive, this has resulted in a cost of only 14¢/GMP ratepayer/mo., or an extra \$1.68/yr on each GMP ratepayer's bill, less than the cost of one fancy cup of coffee per year. According to a statewide survey conducted for Renewable Energy Vermont in 2006, more than 83% of Vermonters want to see more renewable energy sources in VT rather than fossil fuels like oil, coal and gas. I bet VT ratepayers are willing to finance the development of in-state renewable energy for such minimal amounts, and I'd argue that planning for our state's future energy security is well worth a few more cents per month.

I encourage Vermonters to contact their legislators and utilities to call for production-based solar incentives for net-metered installations. This tangible economic catalyst would benefit individuals with solar installations, the utilities, and the state's energy future. The cost to ratepayers is small considering what individuals, utilities and the community gain. Ramping up local renewables is essential for the coming post-peak-oil energy economy, when fossil fuel prices will become more volatile and energy costs will increase. We need practical ways of helping Vermont homeowners and businesses to take the step toward solar as soon as possible.

David Blittersdorf is the President/CEO of AllEarth Renewables in Williston, VT, specializing in the design, manufacture & installation of grid-connected wind and solar renewable energy systems. He is also the founder of NRG Systems in Hinesburg, VT.

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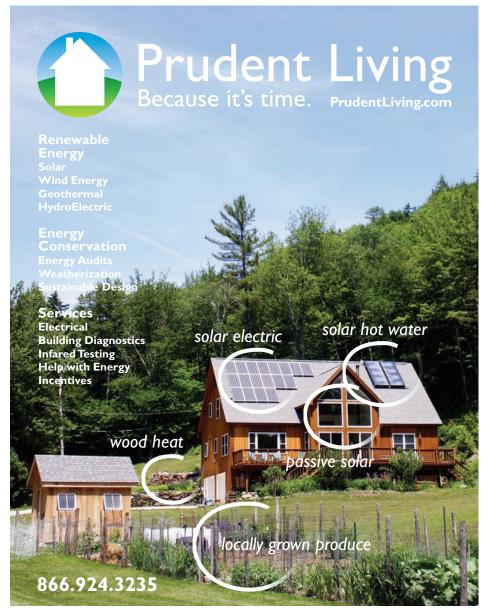


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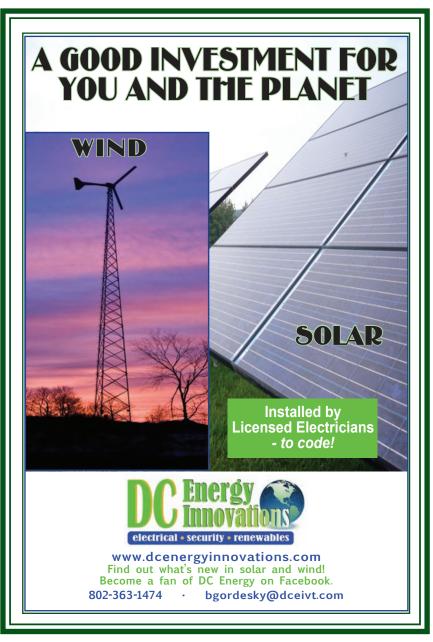
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# SOLAR PV... PV FUNDAMENTALS

System Disconnects

Metering

### **OFF-GRID SOLAR ELECTRIC BASICS:**

Despite the long, dark winter, Vermont has an average of 4.2 sun-hrs/day—more than Germany, a country with 30-40% of its energy produced by solar. Solar power is a very feasible option for homeowners in Vermont. A family can easily and comfortably power a home with the sun! In rural Vermont, remotely located homes and camps can have electricity because a well-designed and maintained off-grid solar electric system provides the needed power.

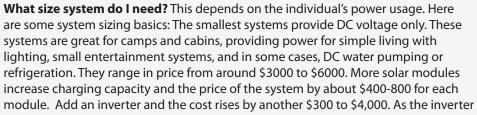
**iving "off-grid" is a lifestyle choice.** It takes planning, commitment, and active engagement from the homeowner. The rewards of off-grid living are significant: self-sufficiency and energy independence. Installing a renewable energy system contributes to a brighter future for everyone because one's impact on the environment is considerably reduced.

**Energy efficiency.** It is *essential* that every electrical load in an off-grid home be considered. If less power is consumed, there will be significant savings in system costs. Consider that for every \$1 invested in efficiency, ~ \$4 will be saved in system expense. Therefore, cooking, heating, lighting, water pumping, & major appliances must all be carefully considered & chosen. However, off-grid systems are very capable of providing every comfort & convenience of a "standard" home. The household "necessities" are at the discretion of the homeowners & their budgets.

**Off-grid solar system components.** The components in an off-grid system can be understood easily when divided into three groups.

recharged completely at least once a week.

- Charging: consists of the solar array and generator. The array size determines the amount of power that can be generated. It's size is based on one's average energy consumption over the period of a year. The generator makes up for any production deficits. Vermont has exceptional sun part of the year while being sun-starved during late fall/early winter. The generator evens out charging capacity, preventing investment in
  - an oversized array. **Storage**: this is the battery bank. The batteries contain the reserve power. Batteries must be
- Balance of System: the remaining components are the inverter, charge controller, and
  metering components. The inverter changes the DC power produced by the array into AC
  power for household loads. The charge controller regulates power from the PV array to
  efficiently charge the battery bank. Metering provides system information, allowing the
  homeowner to monitor loads, charging, and the condition of the battery bank.



price increases, so does the component's capabilities. Many inverters include battery chargers that work with the generator as it backs up the solar array as the source of power. A built-in transfer switch allows the AC circuits to run off the generator while the batteries are charging. Larger systems provide many or all of the conveniences of a standard, grid-tied home and range in price from \$13,000 to \$35,000. Systems may be much larger, thereby capable of producing, converting, and storing more power. The equation is simple: more watts = more dollars invested!

#### Careful design and homeowner engagement equals a successful

**system.** A quality installation specifically matches the needs of the customer and includes:

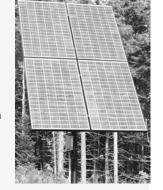
- The right size solar array with proper mounting.
- Wiring, fuses, & breakers specified for both safety & system efficiency.
- A battery bank, of the correct type and size, installed safely.
- Inverters, charge controllers, and other components chosen for seamless operation and maximum performance.

#### Incentives are available for off-grid installations.

A 30% federal tax credit is available to the off-grid user to help lower

costs. This is 30% of the total system price, applicable to components & labor for installed systems. (Note: This is a credit against what you owe in taxes. It is not a write-off to lower your taxable income.) Also, renewable energy components are sold without sales tax in VT.

With careful planning, an off-grid solar electric system can be a great solution for your energy needs whether you have a camp and need a few lights, or a home with a need for modern conveniences.

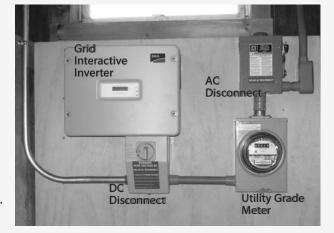


#### 

### Grid interconnected solar generation

systems are widely considered to be the most efficient form of small-scale, photovoltaic power. These are solar electric systems in which power is generated at the home site, used by the homeowners, and then any excess power generated is sent into the grid, reducing the homeowner's electric bill.

Grid-tie systems are designed to offset a portion



of the average annual energy consumed at a home or business. Investment in a solar system is proportional to the amount of energy one wishes to produce to offset utility costs. Systems will range in cost, and the final price is based on the size of the system and how the solar array is mounted. An array can be mounted on either the roof, the ground, or on a pole.

Generally speaking, 1000 watts of solar array capacity will produce around 1050 kilowatt hours of power per year. A 3000 W system will produce around 3150 kWh/yr. If 6300 kWh/yr are consumed, this system would offset 50% of the power used. One's investment is proportional to power generation with a slight decrease in price per watt as the system size increases.

**The Grid-tie system.** A grid-tie system has only a few components. It is made up of:

- Solar modules: The solar array is composed of solar modules (panels), and they produce DC (direct current) power. They are built to produce at least 80% of their rated power production in 25 years.
- Metering: A utility-grad meter is installed so that the homeowner can track the amount of
  electricity produced and fed into the grid.

• **Inverter:** The inverter changes the DC power produced by the array into AC power for household loads. Power is controlled and back-fed by the inverter into a standard household service panel.

**Incentives** to install grid-tied systems are available from the state and federal government. An installation by a "Solar Partner" is required for grid-tied system owners to receive the state managed incentive. The amount of the incentive is determined by the size of the solar array installed. The incentives fluctuate based on funding availability. The best source for current information on incentives is www. dsire.org (Database of State Incentives for Renewables and Efficiency).

The second incentive available to install a PV system is a 30% federal income tax credit. Note that this is a credit toward taxes owed and not an income deduction. This tax credit can be rolled over for use in future tax years. Additional details are available from the IRS, from tax preparation services, or refer to IRS Form 5695. The last financial incentive is from the state which exempts renewable energy purchases from the state sales tax.

The lasting financial benefit available once purchase and installation incentives are realized is net metering. The power generated by a grid-tie system is utilized by the home or business, but any excess power is fed back into the utility grid. This results in the electric meter either slowing down or spinning backward in proportion to the amount of energy generated and consumed. The utility customer then receives a credit at the retail electric rate for the amount of power produced and fed back into the grid.

A grid-tie solar electric system is rewarding both financially and environmentally! When investing in PV, the home or business owner locks in their electricity rate resulting in a great long term investment while also providing much needed clean and renewable energy to the community.

This page kindly provided by Solartech, owned by Rich & Donna Nicol, Sutton, VT. info@solartechvt.com. 802.535.6191 \*\*



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#### A Silar Installer Takes Stock «Cont'd from Front Page <

The system functioned for several years until removed during a later administration and panels were put into storage. Currently, two of those original panels are on display, one at the Jimmy Carter Museum in Georgia, and the other at the American History Museum at the Smithsonian.

As published in "Solar Age" magazine, in November, 1984, Ed Butler, now from Randolph, VT and owner of Sunrise Solar had the opportunity to really put his expertise to the ultimate test.

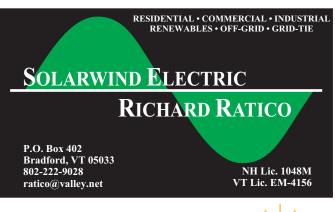
"Ed Butler helped install the domestic hot water system on the West Wing of the White House", and has kindly offerred to share his memories in pictures with Green Energy Times and you!

This is especially interesting,

since the White House is doing it again - after much urging from many who have visited the White House, such as our own Bill McKibben, who founded 350.org. We also heard rumor that Jeff and Dori Wolfe, owners of groSolar in White River Junction, VT previously visited the White House to encourage the re-installation of solar, in an effort to raise energy awareness and understanding to our country.

The news of the O'Bama's going solar is a fine example that could really set the path towards energy independence.

We want to thank Ed Butler and his wife Cindy for their kind generousity of sharing some of their incredible memories with us. We are proud to not only have you as local residents of Vermont, but also as a Solar Hot Water Installer, with many years of experience. We hope that many of our readers will choose to give Ed a call to install some Solar Hot Water on YOUR roof! **802-728-6510** Enjoy the photos! 🔆



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#### **COMPONENTS OF SOLAR SYSTEM:**

**Expansion Tank** absorbs thermal expansion as the anti-freeze is heated, to prevent over-pressurizing.

**Pressure Relief Valve** protects the system from extreme over-pressurizing

Pump Station contains a built-in circulating pump (typically a 3-speed pump); built-in check valve to prevent heated fluid from gravity flowing & cooling the tank when the system is off; built-in flow meter allows the homeowner to monitor the flow rate; built-in temp gauges.

**Differential Control** operates the system, turns the circulating pump on when temperature difference is ~15° warmer at the panels than the tank & continues to operate until the panel & tank temp are within 5° of each other.

Thermostatic Mixing Valve prevents the water from becoming too hot at faucet, mixing hot & cold water coming from tank to prevent scalding.

**Indirect Water Heater/Storage Tank** contains

a heat exchanger. As heated antifreeze circulates through the coil, cold water at the bottom of the tank is heated & rises to the top of the tank, where it is stored for use.

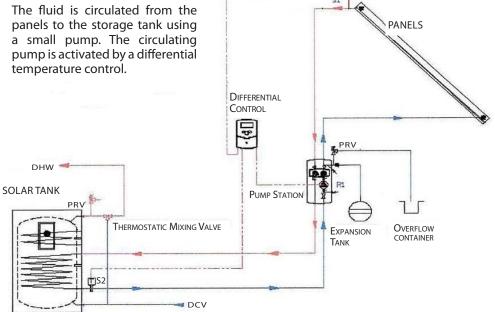




# **SOLAR HOT WATER**

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temperature control.



- When the temperature at the solar collectors is approximately 15° higher than that of the bottom of the storage tank, the pump turns on and fluid circulates from the collectors to the storage tank.
- In the bottom of the indirect water heater (or storage tank) is a coil made of copper, steel or stainless steel known as a heat exchanger.
- As the transfer fluid enters the coil, the water surrounding it begins to heat and rise to the top of the tank.
- When the tank temperature is within 5° of the collector temperature, the pump shuts off.
- A differential control with temperature display allows the homeowner to monitor the operation of the system throughout the day.

In a closed-loop system, the panels heat the fluid rather than using fossil fuel.

Many Thanks to Ed & Cindy Butler, Sunrise Solar Services, for their generousity and help with this SHW Page. In memory of Ed's 94 year old Mother, who passed while he was helping with this article...



For best results, the panels should be mounted on a south-facing location, within 30° of true south.

The Solar Collectors use copper flat plate technology which consists of copper tube passages, a copper absorber plate with a black coating, and a low iron tempered glass cover. The black coating allows the panel to more efficiently absorb the sun's energy. As the copper absorber heats, the heat transfer fluid (typically antifreeze in the northeast) flows through the passages behind the plate and also heats up.









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# TRANSPORTATION

# COMMUTING IN THE UPPER VALLEY

By Jen Phipps

When it comes to commuting in the upper valley it is all about options & planning ahead. There are many options for getting around in the Connecticut River Valley, many of which allow for bicycles & are Handicap Accessible. Discounts are available for students & seniors. Contact the agency to view schedules & fares. Whether getting around town, commuting or planning a day trip leave the driving to someone else, enjoy the ride & help save our planet (it will also probably cost less than using your own vehicle). There are services for commuters, tourist, & shoppers. It is time to consider & try something different & plan on using these services for your daily routine.

Don't forget about the train & carpooling, for which there are many ways to connect to them. Park n Ride lots are there to use. Keep 'em full!

<u>Stage Coach</u> provides commutes from Randolph & D'mth, shopping trips & the Randolph Village Maxi Taxi. *Trips to Shaws, Randolph Ctr. & Mobile Acres, w/in the village are pd for by Shaws.* http://www.stagecoach-rides.org (800) 427-3553

Rural Community Transportation Inc. serves St. Johnsbury. <a href="http://www.riderct.org">http://www.riderct.org</a>
Advance Transit will get you around Lebanon, Hanover & Dartmouth (802) 295-1824

<a href="http://www.advancetransit.com/">http://www.advancetransit.com/</a>

<u>City Express</u> services Keene <a href="http://www.hcsservices.org/services/transportation/cityExpress.php">http://www.hcsservices.org/services/transportation/cityExpress.php</a>
<a href="http://www.citaride.org">Chittenden County Transportation Authority</a> is Burlington's bus service with links to Montpelier, Middlebury & commuter route to Milton. <a href="http://www.cctaride.org">http://www.cctaride.org</a></a>

<u>Marble Valley Regional Transit</u> provides transportation around Rutland with connectors to Killington a Manchester & Poultney & a commuter from Rutland to bellows falls. Service is free on Saturday for most of the City routes (Check for details). <a href="https://www.thebus.com/">https://www.thebus.com/</a>

CT River Transit provides services in & around Bellows Falls & Springfield. <a href="http://www.crtransit.org">http://www.crtransit.org</a>
Green Mountain Transit Agency
Provides local service in Barre, Montpelier, Grand Isle, Stowe & Lamoille connecting with commuter services. <a href="http://gmtaride.org">http://gmtaride.org</a>

<u>Green Mountain Railroad</u> has day trip specials available from White River, the Champlain Valley , Bellows Falls & Rutland <a href="http://www.rails-vt.com/">http://www.rails-vt.com/</a>

<u>Dartmouth Coach</u> (800) 637-0123 <u>http://www.dartmouthcoach.com/</u>

Amtrak http://www.amtrak.com (800) 872-7245 Long distance train service. Offers discounts for AAA membership & student advantage card

 $\frac{\textbf{Greyhound/Vermont Transit}}{\text{http://www.greyhound.com/HOME/en/NewBuses.aspx}} Greyhound.com/HOME/en/NewBuses.aspx}$ 

<u>Cape Air</u> connects Lebanon & Rutland to New York & Boston. <u>http://capeair.com</u>

<u>Lake Champlain Ferries</u> http://www.ferries.com/ Transportation between NY & VT via Lake Champlain

**Go Vermont** provides support for carpoolers <u>www.connectingcommuters.org</u>

<u>Upper Valley RideShare</u> provides support for carpoolers. <a href="http://www.uppervalleyrideshare.com">http://www.uppervalleyrideshare.com</a>
The ultimate website for getting around in VT & NH are created by the state agency of transportation. <a href="http://www.aot.state.vt.us/links.htm">http://www.nh.gov/dot/nhrideshare/links.htm</a>

### ME & my SMART Car

By Matthew Doszkocs

**rented one** back in 1998 for a road trip from Holland to Germany.

They had just come out that week and so I thought I'd give it a try... I was surprised at how roomy it was on the inside and how much fun it was to drive.

Since then I have always wanted one, so when they arrived in the U.S. about 10 yrs later and my trusty Subaru Forester had recently died, I looked into buying a Smart.

With gas milage of ~ 41mpg on the highway, its little 3 cylinder, rear-mounted gas-powered engine is pretty efficient. They are sold in the U.S. at Smart Centers and through Mercedes dealerships. *Mercedes is the producer of the Smart*.

I bought mine on Ebay - found a great deal on a pre-owned convertible model with very low miles.

It performs extremely well in crash tests because of the sturdy cage it's constructed around, and handles really well, getting up to 90 mph on the highway. *I love my Smart!* 



Some other cool features include a passenger seat that folds completely forward so I can actually lie down and sleep in my car, if need be, parking in tight spaces and it fits perpendicularly to sidewalks - its length actually equals the width of most SUV's.

I think my favorite part about owning a Smart Car is that it has given me the opportunity to meet and talk to a lot of interesting people who are curious about the car and like to ask me about it.

Here is the wiki page link with more background on the story of how it was developed, etc.: <a href="http://en.wikipedia.org/wiki/Smart">http://en.wikipedia.org/wiki/Smart</a> (automobile).

# 'VERMONTER' HIGH-SPEED RAIL PROJECT

October 1, 2010 By Christopher Park

The train is valuable to Vermont's economy and environment, but it needs to be competitive, which this work will ensure. Not only does that benefit Vermonters, but it brings us the economic benefit of making it easier for folks from points south to come visit us (remember 55% of New Yorkers have no car).

The train is a lovely way to travel to NY and elsewhere in the Northeast, but it should be faster. This work will take 27 minutes off the schedule in VT. Projects in MA and CT were also funded that should make the train faster by a total of almost an hour and a half.

Even at its current not fast enough pace, the train is popular. Ridership this summer spiked more than 40%. Although it takes longer than driving, your time is your own: you can work or rest, and you will arrive relaxed.

Another reason ridership is up is that on-time performance in the last few years has been excellent, thanks to the good performance of the New England Central Railroad, over which the train runs for much of its route.

Bridge and crossing work will begin in October, said Vermont Agency of Transportation spokesman John Zicconi in the Burlington Free Press. Track upgrades will get underway in the spring.

"Our proposal was to complete all the work in two years, and we anticipate no problems in meeting that schedule," he said.

In January, when the grant was first announced, Zicconi predicted that improvements to the Vermonter line would create 411 jobs, 363 of which would be in construction.

There is one thing lacking now: a connection to Montreal. The logic of that is obvious when looking at a map of the Vermonter's route, which ends just south of the border in St. Albans – stopping short of serving the 5 million Quebecers who could use it to come to VT.

The border is the challenge that keeps the train from Montreal, but its solvable. The Vermont Rail Action Network applauds the work our delegation has done to work with homeland security on making this extension possible.

The ideal solution for the border would have US and Canadian border agents ride the train and do their work while enroute. As this seems to be impossible, the next best solution is to have a secure area in the Montreal train station, just like an airport.

The Federal Railroad Administration's press release states: "Amtrak's Vermonter service is an integral transportation link between Washington, D.C., NYC, CT, MA and VT. Within the limits of this project approximately 80,000 people traveled on the Vermonter in 2009, and more than 80,000 thus far in 2010 with the service showing an average 16.2% increase in ridership.

"The number of passengers riding the Vermonter has been growing steadily," saidVTGovernorJimDouglas."This project will put people to work constructing the improvements necessary to shorten the length of time it takes the train to travel through the state, which in turn will make our Amtrak service an even more attractive option for busy travelers."

http://www.railvermont.org/news.html

# Idling Tool Kit for VT & NH

The Sierra Club chapters of Vermont, New Hampshire, and the Upper Valley have joined together to fund the development of a comprehensive Idling Awareness & Reduction Tool Kit available at http://www.idlingtoolkit.com/

This informational effort is intended to promote energy conservation by vehicle drivers and town staffs that drive vehicles. The tool kit is based on existing idling programs including an actual Idling Awareness Campaign that was conducted in Hanover, NH starting in September 2006. More than 200 local energy committees and towns in Vermont and New Hampshire will be introduced to the Idling Tool Kit blog as a means to orchestrate their own efforts to educate residents and businesses about idling using fact-based and detailed methods.

The Tool Kit includes materials to target local residents, schools, town employees, and businesses. In Hanover, signage was displayed on town property, residents received info cards via vehicle registration

mailings, stickers were created and distributed, bookmarks were distributed to school kids, a flyer was created and sent to businesses through local chambers of commerce, school projects were developed by students, and the media was used to inform people about idling.

Roger Lohr of RB Lohr & Company applied for and received a grant from the Sierra Club chapters to produce the idling tool kit. Lohr commented, "If one million people in NH and VT, idle only one minute per day, the total amount of time needlessly idling is about 16,660 hours of idling per day. If we can encourage people to refrain from idling only one minute, it would save about 8,300 gallons of fuel and about 160,000 pounds or 80 tons of carbon emissions PER DAY."

RB Lohr & Company, is a project management firm in Hanover, NH joined with ME-Priestley: Digital & Graphic Design, located in Bradford, VT to create the Idling Awareness & Reduction Tool Kit in the blog so that others can easily access it via the Internet.

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By Todd Tyson

ince my friendship with Friedrich the Greasecar started 4 years ago, I have had a lot of explaining to do. Friedrich (named after a past mechanic - Fred) is my 1977 Mercedes Benz 240 D (a diesel engine is essential) converted to run on filtered waste vegetable oil (WVO or grease).

The environmental economic benefits of this greasy transition are immeasurable based on the omnipresent threat of global warming coupled with fuel prices destined to climb to \$4-\$5 per gallon and beyond in the near future.

Over the years many, questions have come my way regarding WVO conversion mostly focused on vehicle selection, sourcing, fitration, reliability, cost and the philosophical tenets of greener transportation.

Grease conversions can be expedited with any diesel powered vehicle including cars, trucks, vans, schoolbuses and tractors. The most common vehicles for conversion are older Merceds-Benz's, the whole line of VW TDI's, Dodge trucks and a few John Deere tractors.

I am currently working with a local school that is hoping to purchase a 15 passenger schoolbus for conversion as

part of an alternative fuels course that was taught there last semester.

#### Got Grease?:

Before any potential "grease monkey" takes the plunge into running on WVO, they should be certain that they have secured a reliable source of fuel.

Many local restaurants (including the big chains) cook a whole mess of things in vegetable oil, mostly in fryolators, from French fries to seafood to chicken wings. My most local source has a weekly "Wing Night" (never had one myself) and usually produces 12-15 gals of WVO a week... plenty for my driving habits. When approaching a potential source, one should be right upfront about the use of this waste resource and make assurances about the reliability of routine pick-up. By forming a solid "business" relationship

early on, there's a strong likelihood that your source will remain loyal to you even when someone else (commercial or private) stops in and offers \$ for their WVO.

Obviously, the quality of the WVO is very important in deciding whether it is worth picking up and filtering. One should steer clear of establishments that use shortening, lard or vegetable oils that are hydrogenated or heavy on trans-fats. I would advise asking politely to see the carboad sleeve that the jugs ("cubies")

> are delivered in. Also, be very careful that the vendor does not place any water or other material in the WVO jugs when they drain their fryolators. Water is anathema to the grease community and adds more time during the filtering process.

Filtering the WVO can be good greasy fun or a messy nightmare depending on your "filtering space", patience and degree of "anality". For this article, I will just touch on the system that I use here at

the Collective. My space is an unheated 12'x20' portion of a shop that is equipped with a 100 gallon stainless steel heated holding tank, a diesel vaccuum transfer pump and a 1 micron filter housing coupled to a long outflow hose.

The incoming cubies are allowed to settle for several days before being carefully poured through a kitchen strainer into the holding tank. This 100 gals is allowed to settle again before drawing

> off the bottom 2-3gals where any residual water may have collected. At this point, I activate the heating element for several hours to bring the temp. up to between 100-115°. temperature will allow the grease to become quite fluid and more

rapidly pass through the pump and the filtration bag. Once the pump switch is thrown, I can filter the 100 gal. in about 30 min. With sourcing from several other grease monkey collectors, the Collective provides 200-300gals of fuel to the local area per month.

Next Issue: Grease transit's reliability, related costs and role in a greener local community.

Todd Tyson lives in Tunbridge, VT and is the CGO (Chief Grease Operator) of Tunbridge Grease Collective. He can be reached at folkbloke@hotmail.com





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# One Small Revolution in Bicycle Delivery

ne Revolution, Vermont Bikes at Work, began bike delivery, pick-up, and advertising services last June in Burlington, Winooski, Colchester and

Shelburne

More than a typical courier service, One Revolution is upping the cargo load to transport CSA shares, catered meals & more to residents and workers across Burlington & surrounding towns.

The company is operated by Mark Bromley, a 56-year-

old architect, and a four-person crew including his son Sam and daughter Anna. The business has quickly formed partnerships with a number of local businesses including the Intervale Food Hub, Seventh Generation, Jericho Settlers Farm, and many local restaurants and bakeries.

It's riders provide not only sameday package delivery, but also deliver Community Supported Agriculture(CSA) shares, catered meals from local bakeries and restaurants, and provide compost/ recycling pick-up. The business even provides furniture and appliance moving services having recently moved an entire apartment of furniture across town by

Mark and his crew is especially looking forward to holiday deliveries of meals, gifts, packages, Christmas trees, and just about anything! The business recently outfitted all their delivery bicycles with studded tires in preparation for winter delivery.

The bikes used by One Revolution are capable of hauling up to 300 pounds



each. The business has also developed a vented enclosure for their flat bed trailers offering full protection of fragile cargo and produce. Selling advertising space is part of the company's business model and all cargo bikes can accommodate business specific graphic signage.

Their contract with the Intervale for summer CSA share delivery alone is calculated to save about 132.3 gallons of gasoline. The emissions avoided are equivalent to:

- emissions from 2.4 barrels of oil consumed
- electricity used for 0.128 homes for a year
- carbon sequestered from 27 tree seedlings grown for 10 years

One Revolution looks like a promising business venture, powered by people, working closely with local businesses. See website at www.OneVT.com. 🛟

with Howie Michaelson of Sun Catcher

This is the third, abbreviated edition of Solar Uncertainty. Again, if you have solar questions you'd like to have answered, for inclusion in future editions! please submit them to: questions@suncatchervt.com

#### 1. WHAT IS "EQUALIZING" MY BATTERIES? HOW OFTEN SHOULD I EQUALIZE MY BATTERIES?

Equalizing batteries is a process used to rejuvenate flooded Lead-Acid batteries by charging them at a higher than typical voltage for a longer than time. This introduces an extra boost of energy into the BATTERIES "charge/ discharge" cycling regiment. The extra energy is used to "desulfate" the lead plates of the hardened Lead Sulfate that normally builds up due to incomplete charge cycles and batteries left in a lower State of Charge (SOC) for extended periods. If the sulfate is left on the plates, over time the batteries develop a diminished storage/discharge capacity (the sulfate creates a "protective" layer between the Lead and the Acid, preventing the chemical reaction necessary for electricity production and storage).

How often one should equalize their battery bank is dependent on how sulfated the batteries are, which can be determined through Specific Gravity readings (see last issue) taken over time. This is more complicated than I will attempt to explain here, but the average equalizing timetable for off-grid systems might be one time every 3-4 months. This can be done more or less frequently.

As far as batteries for "on-grid," these are often "No Maintenance" batteries, being held in "Float" service much of their life. Basically, these batteries should not be subjected to an equalize charge.

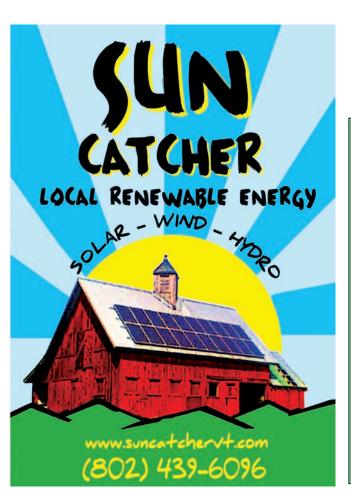
#### CAN I USE SOLAR ELECTRIC PANELS TO HEAT MY HOUSE? MAKE HOT WATER? RUN MY TOAST-**ER? SHOULD !?** Yes. Yes. Yes. Probably not.

Anything that requires electricity to run can be run on power made from Solar Electric panels. However, using electricity to create heat is an inherently resource intensive – not to mention expensive – practice. Converting the Sun's energy to electricity is still a fairly inefficient process, although we are getting better at it all the time. If heat is what we are after, it is much more efficient to use the Sun's available energy directly as heat (using Solar Hot Water collectors) instead of changing it to electricity and then using it in a "resistive load" appliance (like space heaters or electric hot water tanks).

Using electricity to heat is expensive compared to most other fuels you might use to accomplish the same thing. And one would need an enormous Solar Electric array in order to produce enough electricity for significant heating loads. On the other hand, if you want to make a piece of toast 1-2 times per day, or dry your hair with a hairy drier every now and then, by all means go for it - the amount of power of you will consume in those short usages will be negligible.

#### **IN FUTURE ISSUES OF G.E.T.:**

- Are Halogen lights better than compact fluorescent lights for energy efficiency? What about LED lights?
  - How often should I charge my batteries in my off-grid house? My grid-tied house with battery back-up?
- My Solar Hot Water system does not seem to work as well in the winter as the summer
  - does this mean that my solar electric system doesn't work as well then, too?
- Can I install a grid-tied Solar Electric system myself? How about a Solar Thermal system? 🛟



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### **Batteries and Battery Syster**

"Some things are art and some things are science; with batteries it's a little of both." By H. Paul Berlejung

he "off-grid landscape" is littered with broken hearts & broken dreams. Too little thought, too little planning, too little money - too little reality come together to form what people love to call a perfect storm for disaster. Hopefully, this brief overview & following articles in the series will help avoid disasters when it comes to flooded deep cycle batteries used in off grid, renewable

Living off-grid in the Northeast Kingdom of VT, we've learned a lot about living with photovoltaic panels, battery banks, composting toilets & just being off-grid.

Battery system sizing. The system is based upon your daily usage in terms of amp-hours: ie: if a radio uses 1 Ahr & you have it on 8 hrs/day, you'll need 8Ah of battery storage to run the radio on batteries alone. Reduction in use & conservation kick in here. If you plan to move off-grid you'll have to decide what to live with & what you'll have to live without. Before moving off the grid, we went through our entire house, writing down amps, watts, hrs of usage, to base our decision on.

Determine the # of days of autonomy - no sun days that your batteries will need to supply electricity. Battery banks are usually designed for 3 days without being recharged. At that point it's time to recharge them with power from the sun, water, wind, or generator. You never, ever, want your batteries to completely lose their charge!

Learn how far down to let the batteries discharge. The shallower the discharge, the longer the batteries will last - recommended discharge can be anywhere from 25% to 80%. Stick with what your battery manufacturer recommends. This depth of discharge means that a battery bank that will be discharged to 50% will have to be larger than if discharged only 25%, but your investment

Most renewable energy systems are built around 6 volt batteries of two kinds. "T-105 types" are rated to discharge about 220 amps over 20 hrs, while larger "L-16 types" are rated at 390 amps for 20 hrs. Inexpensive batteries, car, "marine" & inexpensive "golf cart" batteries simply aren't made for off

grid use. T-105s cost less, so if you have to learn the hard way about living with batteries, they'll save you money, and are 50# lighter than the larger ones.

Your electrical system is 12, 24 or 48 volts. Calculate the number of batteries you'll need, the number in parallel & in series - the fewer the battery connections the better: fewer possible points of problems or failures. Multiple battery strings neither charge nor discharge equally.

It's best to consult a local alternative energy specialist for your on or offgrid needs.

H. Paul Berlejung specializes in PV & solar domestic hot water system designs, consultation,&energy-relatedgrantwriting at Green Works Solar Store in Groton, VT. 802-584-4977 or hpaulberlejung@juno. com. In future articles Berlejung will cover battery charging, maintenance & other topics to keep your batteries in tip top condition. 🛟

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# Wountainto

### Mountaintop Views A privilege for Hikers?

by Nancy Rae Mallery Sept., 2010

ave you ever walked and climbed for hours with aching legs and feet ... just so that you can see the view from the top of a mountain? When you catch the first glimpse of miles and miles of forests - no matter what season - it is something that takes your breath away and leaves an imprint on your soul... Your aches suddenly disappear.

I love Vermont! It's the best place to live! Vermont fulfills my love and need to hike, backpack, hit the slopes, x-c ski, snowshoe... and the ability to do so many of the outdoor activities that I am fortunate enough to be physically able of.

The love of nature arose thanks to my father's love of the outdoors. He is now 84 years old and has survived two open-oeart surgeries. His legs hurt -he can barely walk half

of a block. When he comes to visit - it saddens me that we can no longer share the exhilaration and joy of sitting atop the summit of a mountain. I so wish he could experience that joy just one more time.

I asked myself, isn't there some way to share this beauty with the those who can't make the climb? Why is this grounding 'peak' experience left only to those who are physically capable? You see - there is a way to change all of this, and it's a two-fer, but first you need some background.

We are now facing the most challenging time of humanity with our energy future. "I think everyone agrees that we need to become independent from foreign oil"...

As David Blittersdorf and I agree, "Vermont's energy needs can be met with renewable energy... with a lot of effort and changes." Those changes include installing Solar Panels, Wind Turbines and Small Hydro, as well as learning how to reduce our energy consumption.

These technologies are not just practical, they can also be beautiful, functional works of art that produce energy from nature - without emissions, without blowing the tops off mountains, without leaking dangerous contaminants or spewing billions of gallons of oil into our oceans...

I sometimes wonder, when I look at the electric emission lines that are strewn across every valley, road, mountain tops and rivers... and the 'ugly' power stations that most don't even seem to notice - we have become used to seeing them. They may indeed be ugly - but necessary, so that we can all enjoy the many, many creature comforts that we are accustomed to. I wonder if they balked at the thought of having to look at those power stations when electricity first came to VT? They were probably elated at the prospect for an easier life because of the new technology...

And yet I hear of resistance to seeing solar panels (!?!) - in someone's own yard... which I don't understand. I have three poles of solar panels in my lawn and am proud of it. I absolutely love looking at them. Even Better: everyone who comes to visit is in awe of them. They're beautiful AND they produce ALL of my energy needs and then some! I can't even begin to use all of the energy that they could produce. We have a backup generator, but it rarely kick in. We typically use 65 gallons of propane/ yr! This is what renewable energy can do - I know! I live with it! Isn't this a great way to reduce our carbon emissions & become energy independent? This is progress!

Similarly, I hear some resistance to wind farms - yet, I intentionally choose to drive on Rt 9 between Brattleboro and Bennington... just so that I can



see the Searsburg wind generators. It is an incredible sight - those graceful turbines spinning amid the tree-covered mountains... it IS ok for them to be there! I see progress... I see a need being met - a safe alternative to such a dangerous threat to our state. And - I still see plenty of mountains covered with trees.

Now why am I telling you this? Because there is another way to look at renewables When done right, the benefits far outweigh any negative things you might think will happen. I am a hiker - one of the privileged. Maybe we could share this privilege with those that are not able to see the scenery that a wild mountain top offers.

When wind farms are installed, an access road is needed to get the equipment to the site where the turbines will be erected. Think about it - these roads could actually allow underprivileged, elderly, handicapped... or even us when we are older and perhaps unable to hike any longer. We could drive to the top and enjoy a picnic with our grandchildren - share it with our aging parents... Accessible views could bring more tourism (and its money) to Vermont's economy.

Look at MT Washington and it's famous auto road! Not only will others be able to experience the exhilaration and grounding that only a high mountaintop can offer, but also get to see the gracefulness of a wind turbine in action - and realize that it is worthwhile for our energy needs to be met in a way that sustains our future on a cleaner planet.

### **CVPS & GMP - Wind Contracts**

Oct. 21, 2010

ontinuing efforts to ensure a clean, low-carbon energy supply, Central Vermont Public Service (NYSE-CV) and Green Mountain Power have signed con-tracts to purchase additional wind power from a New Hampshire wind project.

"Vermonters have clearly stated their desire for clean, low-emission, renewable energy if it can be obtained at an affor-dable cost. This contract meets all of those criteria," CVPS President Bob Young & GMP President Mary Powell said in a joint statement.

CVPS's contract, its third recent wind contract, is for 20 percent of the output of Noble Environmental Power's planned 99-megawatt Granite Reliable Power Windpark in Coos County, N.H., for 15 years starting in November 2012. CVPS had previously executed a contract for 30.3 percent of the output of the Granite Reliable project in February, and plans to execute another, subject to approval by the Vermont Public Service Board, for two-thirds of the output of Iberdrola Renewables' planned Deerfield Wind Project in Readsboro and Searsburg, Vt. The Vermont Public Service Board approved the first Granite Reliable contract earlier this year, and the Deerfield contract is currently under review.

Green Mountain Power's contract is for seven percent of the Granite Reliable project for 20 years, starting in November 2012. GMP previously executed a contract for 25 percent of the output in February. GMP has a longstanding commitment to wind. It owns and operates the six-megawatt Searsburg wind plant and is proposing to build up to 63 megawatts of wind in Lowell, VT.

"Our customers have long enjoyed arguably the cleanest power supply in the nation, and these contracts will help us retain a very clean portfolio," Young and Powell said. "These new contracts are very competitive with other wind offerings we've seen in the marketplace. That's especially important given the increasing cost pressures local utilities face for the bills for regional transmission improvements and system upgrades to maintain and improve

New England's reliability in the coming years."

To protect negotiating position in on-going talks with other power suppliers, the utilities did not disclose the price, though regulators will fully vet the contract proposals.

The utilities have been crafting new power portfolios in anticipation of the end of major contracts with Hydro-Quebec and Vermont Yankee, which supply roughly two-thirds of the power needed to serve customers. CVPS and GMP recently signed a major new contract with Hydro-Quebec and announced several other efforts to replenish their portfolios.

"We continue to examine the market and look for opportunities to diversify our power portfolio while honoring our legacy of environmentally based power choices," the utilities said. "While new renewable sources are more expensive than our existing non-renewable power sources, these contracts are the most attractive options for meeting Vermont's goal of using new renewable power to meet 5 percent and 20 percent of customer demand by 2013 and 2017, respectively. Today's contracts, in particular, represent a solid value for customers."

Young and Powell said that among the factors considered when adding to the companies' portfolio are Vermont's renewable power content goals, price and price stability, fuel diversity, environmental attributes, reliability and the public preferences that were determined through the state's public outreach process.



CVPS, Vermont's largest electric utility, serves more than 159,000 customers across VT. The company is recognized by Forbes as one of the most trustworthy companies in America.



GMP serves more than 95,000 VT customers and was recently named a finalist in the Platts Global Energy Awards for green energy initiatives

Contact: Steve Costello, CVPS, (802) 747-5427; Dorothy Schnure, GMP, (802) 655-8418



Yellow Brick, LLC 802-865-2333 Williston, Vermont

### WIND POWER - READY FOR MAINSTREAM USA

With the lowest cost kWh installed in class is it time to look at wind power as an alternative or an addition to solar? With the introduction of Honeywell's WT 6500 gearless wind turbine, wind power is ready for mainstream USA.

Blade tip power system and breakthrough technology - starts producing power at 2mph winds and remains operational until 45 mph winds makes an operational span that allows more people to leverage wind as an energy source.

The Honeywell WT 6500 made by WindTronics is gearless, the innovative Blade Tip Power System removes the central gearbox allowing the turbine to collect power at the tips of the blades through a series of magnets and staters that are located in the outer ring and on the blade tips. By eliminating the mechanical resistance and drag the Honeywell WT 6500 creates significant power at low wind speeds without the typical noise and vibration associated with traditional wind turbines.

Yellow Brick, LLC of Williston has installed one of the first Honeywell Wind turbines in the United States in Burlington. The turbine is located at the Spot Restaurant on Shelburne Street and people are encouraged to check it out.

12

#### NCENTIVES

#### **VT STATE INCENTIVES**

Rebates for any combination of the following. Can combine rebates from multiple technlogies. \$25k lifetime cap on rebates. See: http://bit.ly/VTIncentives

#### **ELECTRICAL (Solar PV, Wind, Hydro)**

- 1) Grid-connected, not off-grid.
- 2) New system: must include all equipment for functional, independent system.
- 3) Inverters must be UL 1741 listed, or listed by equivalent national rating organization.
- Must comply with requirements of applicable portions of VT Public Service Board Rule 5.100.

**Small Wind.** \$6k for 1st 2 kW + \$1.60/watt:

1) Upgrades: turbines w/at least 1 kW rated output.

#### Solar Electric (PV), \$1.50/watt rebate:

- 1) Upgrades: modules w/at least 1 kW rated output.
- 2) PV modules must be UL 1703 listed.

#### Micro-Hydro, \$3.50/3 ft-gal/min drop:

- 1) Must comply w/state & federal hydro laws.
- Upgrades: may include equipment to improve generating and water handling, permitted changes to intakes, penstock, or raceways that increase energy output.

#### **HEAT & HOT WATER (Solar)**

#### Solar Hot Water Systems, \$1.50/100 BTU:

- Must be complete systems capable of serving domestic hot water loads.
- 2) Solar collectors must have an OG-100 output rating from (SRCC) or equivalent.
- Upgrades: new collectors: at least 15 kBtu/day.
- Swimming pool heaters are ineligible.

#### **NH STATE INCENTIVES**

For information, see: http://bit.ly/NHIncentives

#### **ELECTRICAL (Solar PV, Wind, Hydro)**

Solar Electric, \$3/watt up to \$6k or 50% of project cost, whichever is lower:

PROGRAM FULL, no more applications accepted. Funding for 2011 may not be sufficient to cover applications already in pipeline.

#### **HEAT & HOT WATER (Solar, Geothermal, Wood Pellet)**

Geothermal Heat Pumps, \$800/ton up to 5 tons; \$500 duct bonus. (- \$350 inspection fee):

1) Up to \$4,000 on low temperature, hybrid, geothermal heat pumps and heat pump water heaters.

Solar Hot Water, up to \$1500:

PROGRAM FULL, no more applications accepted.

Wood Pellet Boiler or Furnace, 30% of installed system up to \$6k:

- 1) Thermal efficiency rating of 85% or greater
- 2) Particulate emissions 0.32 lb/MMBtu heat output.

MANY requirements. See http://bit.ly/ **NHpelletReqs** 

#### **OTHER**

Some towns provide tax exemptions for renewables: http://bit.ly/NHtownRenewablesTaxBreaks

#### FEDERAL PERSONAL TAX CREDIT for:

Solar Water Heat, Photovoltaics, Wind, Fuel Cells, Geothermal Heat Pumps, Other Solar Electric Technologies.

See: http://bit.ly/FedTaxCredits

#### What is it?

Credit applied to taxes owed (dollar for dollar reduction in taxes), up to 30% of cost of system. If you owe less than your credit, remaining credit can carry over to the next year's taxes.

#### **ELECTRICAL (Solar PV, Wind, Hydro)**

#### Solar Electric (PV) Systems:

- Placed in service before 1/1/2009: \$2,000 maximum credit.
- Placed in service after 12/31/2008: no max.

#### **Wind Turbines:**

- 1) Placed in service before 1/1/2009: \$4,000 maximum credit.
- Placed in service after 12/31/2008: no max.

#### **Fuel Cells:**

1) Fuel cells: \$500 per 0.5 kW.

#### **HEAT & HOT WATER (Solar, Geothermal)**

#### **Geothermal Heat Pumps:**

- 1) Placed in service in 2008: \$2,000.
- 2) Placed in service after 12/31/2008: no max.

#### **Solar Hot Water Heaters:**

- Placed in service before 1/1/2009: \$2,000 maximum credit.
- Placed in service after 12/31/2008: no max.

# Traditional Oil Distributor Embraces the Future

Bv Mr. A

emember the days of"cheap" oil, we all knew it as the primary fuel source? For most of us, it was the only fuel source. We cooked with it, we heated our water and air with it and it transported us at our convenience. Well, "these times they are a changin". Inexpensive fossil fuel is a thing of the past. We need to use every alternative that we can.

In this great country of ours, we have been privileged with inexpensive fossil fuels. By comparison, Europe and other countries have had the burden of expensive fossil fuels for a long time. This burden spawned the early development and implementation of a variety of alternative energies. Government subsidies and incentives have ushered these countries closer to alternative and sustainable fuel sources.

We started a similar effort about 40 years ago but we dropped the ball. In the last 10 years, availability and cost has ignited resurgence in the development and implementation of alternative fuel sorces. This effort is now supported by federal, state and utility incentives.

Until recently, the alternative energies, solar, wind, hydro, and bio-mass were offered only by specialized individuals. Now, a new and growing awareness

among oil distributors see that fossil fuels are not the only answer. One such company is HB Plumbing and Heating, now HB Energy Solutions of Springfield, VT. Owners Tom Hernon and Doug Bellows have seen the writing on the wall and have initiated a new department within their company. Focus is on renewable energy systems.

The hearth division sells, installs and services wood & pellet stoves. With these appliances, customers can also purchase renewable fuel sources in the form of pellets, bio-logs and bio-bricks. Brian Hernon heads up that division with many years of experience under his belt. The solar side of renewable energy is managed by longtime solar integrator Mitch Sidd. Sidd brings his many years of experience with solar hot water & photovoltaic's to HB Energy Solutions.

Don't be surprised if your oil/propane dealer offers you a solar system to offset your fossil fuel use. This new player should be encouraged and not dismissed as an opportunist. These diversified companies are able to offer a variety of energy solutions. It is a natural evolution towards sustainability that we all have to embrace.



We are your Complete **Energy Solutions Company** 

**SOLAR HOT WATER PHOTOVOLTAICS BIO-MASS • BIO-DIESEL OIL • PROPANE** 

One Stop for all your Energy Needs!

SALES, INSTALLATION AND SERVICE IN THE FOLLOWING AREAS: <mark>SOLAR • FUEL OIL • PROPANE</mark> **PLUMBING • ELECTRICAL WOOD STOVES • PELLET STOVES** 

132 Bridge St. Springfield VT

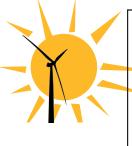
#### ARE YOU POURING \$65\* DOWN THE DRAIN EVERY MONTH?



Take advantage of up to \$2,500 in incentives when you complete energy efficiency improvements through a certified Home Performance with ENERGY STAR® contractor. Visit efficiencyvermont.com/homeperformance

Efficiency Vermont

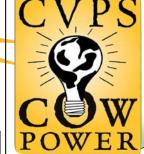




Renewable

Vermont

Energy



#### WITH COW POWER, ENERGY HAPPENS, **BUT IT CAN'T HAPPEN WITHOUT YOU!**

 ${\sf CVPS}\ {\sf Cow}\ {\sf Power}^{{\sf IM}}\ {\sf provides}\ {\sf a}\ {\sf new}\ {\sf income}\ {\sf stream}$ to local farmers, reduces water-quality impacts of farming, reduces greenhouse gases and manure odors, and creates clean, renewable energy. But without customers, we can't help Vermont farms become Cow Power farms.

If you're interested in supporting local farmers like CVPS is, visit ilovecowpowericom

In the last four years, the Agency of Natural Resources has received about 70 inquiries

about possible hydroelectric projects. Most don't get beyond the conceptual stage, but several are working their way through the design and regulatory proc-

ess. Of those, eight have actually applied for their state

authorizations. The Agency has

authorized six projects with a

total capacity of about 4 MW,

most of that at three larger

projects. The applicant for one

project is collecting additional

information requested by FERC,

and another state application

was withdrawn because the

developer is still finalizing the

project design.

# **HYDRO**

How Do I Get Permits for My Hydroelectric Project?

**Many people interested** in developing renewable energy projects find the regulations and process for permitting a hydroelectric project pretty daunting. We'll try here to clear up some of the confusion.

It's often pointed out that the regulatory process for hydropower is unlike that for solar, wind or any other renewables. That's true, but it's for a good reason. Unlike solar and wind, hydropower uses public waters, a public trust resource that belongs to all of the people. State and federal natural resource agencies have a mandate and obligation to ensure those resources are protected not only for the present, but for future generations as well.

State and federal laws and regulations can be pretty confusing, but it is possible to summarize the main points in simple terms

Any project that is connected to the grid will likely require a permit from the Federal Energy Regulatory Commission (FERC). The type of FERC permit will depend on the type of project. A project up to 5 MW may qualify for an exemption from licensing if it is located at an existing dam or natural feature and meets other criteria. Projects that add a turbine to an existing water supply or wastewater line may qualify for a conduit exemption. Larger projects, including any project located at a new dam or a federal dam, requires a license. It is important to remember that an exemption is a permit issued with conditions.

**The Federal Clean Water Act** requires the state in which the project is located to issue a water quality certification (often called a "401," from the relevant section of the act) before a federal license or permit can be issued. For projects regulated by FERC, the water quality certification is the only "permit" issued by the state. It is intended to ensure that the project complies with Vermont Water Quality Standards, which are rules adopted by the Vermont Water Resources Panel to protect and restore the water quality of Vermont's lakes, rivers and streams. The goal is to protect wildlife and aquatic life, habitat, aesthetics and recreation, among other uses.

A permit from the U.S. Army Corps of Engineers could be required for any project that involves fill in a waterway, including constructing a dam or powerhouse. Since this is a federal permit, it also requires a water quality certification, but the certification issued by the state for the FERC license or exemption meets that requirement. In other words, it is only necessary to get a single water quality certification even if two federal permits are needed.



The dam and unit at Woodside Hydro on the Gihon River in Hyde Park -120 kW plant, operating since the mid-1980s. It operates under a FERC exemption, and sells energy through VEPP.

Photo credits: Brian T. Fitzaerald. Vermont ANR. Water Quality Division. Waterbury. VT 802.241.3468 http://www.ytwaterauality.org

The discussion thus far applies to gridconnected projects. Projects that are offgrid will not require authorization from FERC. However, they must meet Vermont Water Quality Standards and they may need both state stream alteration and Corps of Engineers permits.

### So, what is the best way to work through the regulatory process?

A good first step would be to learn more about the process through research on the FERC, ANR and Corps of Engineers websites (see links below). To begin the state review process, submit an initial project review information package as described on ANR's website. For more information about ANR's initial project reviews, contact Shayne Jaquith (shayne. jaquith@state.vt.us or 802.241.4456).

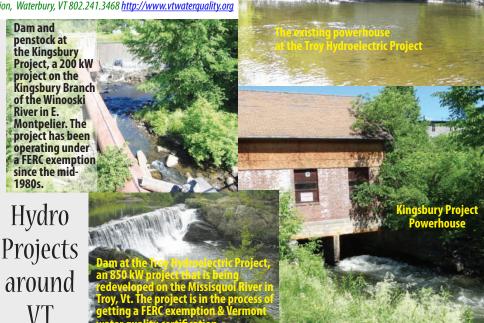
ANR highly recommends engaging a pro-fessional engineer with hydropower experience before the project is too far along. Designing infrastructure in streams and rivers that will provide reliable generation over the long term, with stand the adverse conditions experienced in Vermont's rivers and meet Water Quality Standards is a complicated task, even at small projects. A good engineer can help you assess the hydroelectric potential of the site, identify the issues that are likely to arise during the regulatory process, evaluate project economics and provide assistance as you design and build the project.

#### Resources

**FERC:** www.ferc.gov/industries/ hydropower/gen-info/licensing/smalllow-impact.asp

**ANR:** www.vtwaterquality.org/rivers/htm/rv\_hydropower.htm

**Corps of Engineers:** www.nae.usace. army.mil/reg/index.htm



UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION
Small Hydropower Development in the United States Docket No. AD09-9-000
NOTICE OF SMALL/LOW-IMPACT HYDROPOWER WEBINAR

The Federal Energy Regulatory Commission will host a Small/Low-Impact Hydropower Webinar on **November 10, 2010, from 12:00 noon to 1:00 p.m. Eastern Time.** 

- The webinar will be open to the public and advance registration is required.
- The purpose of this webinar is to introduce the new Small/Low-Impact Hydropower Program website and walk participants through all phases of the licensing and exemption processes using the website. Specifically, the webinar will provide the opportunity for participants to learn about the small hydropower licensing process, find out how to get more information and assistance from FERC, and ask questions.

**To register** for this webinar, please go to <a href="https://www.ferc.gov/whats-new/registration/hydro-form-11-10-10.asp">hydro-form-11-10-10.asp</a>. Space is limited to the first 98 reservations. Once registered, you will receive a confirmation email containing information about joining the webinar a few days prior to the start of the webinar.

**For more information** about this webinar, please contact Shana Murray at (202) 502-8333 or <a href="mailto:shana.murray@ferc.gov">shana.murray@ferc.gov</a>.

Kimberly D. Bose, Secretary.

-1

# EOTHERM

pen Loop / VSWC type of geothermal supply is the best in the Northeast for both performance economy and ecology.

Vertical Standing Water Column (VSWC) geothermal systems use natures best heat transfer fluid: well water. Well water at below the effect of our winter frost, more than 15' down, has a constant temperature. This is continually being heated by earth's central core furnace (7800'F) to around 50'F, yr-round.

We pump this earth heated water to our homes and businesses with a common water well pump. In the last few years the use of Variable Frequency Drives (VFD's)

for well water have shown some significant savings on even the pumping energy costs. In the geothermal Heating & Cooling System (HVAC) we also pump this through a unit that looks like a furnace.

When Heating, this water gives up 10 BTU / # in a water heat exchanger, dropping it's temperature from our Earth's 50'F to 40'F, then returning it to the well, or the well and the earth, responsibly to let the earth reheat it again. This is totally environmentally benign, producing no pollution of

The key to the high efficiencies these system achieve is that from 75-80% of the total energy going into the home or building just came from this heat transfer with the earth heated well water.

That is how we can have geothermal heating and cooling systems that are 360-430 % efficient. In effect, since they don't burn any fossil fuel, their total operating cost is the electricity they use to convert this 50'F earth heated water to usable Heat and Cooling for our use.

So, literally for every \$1.00 we spend on electricity for this conversion process we get \$3.60 - \$4.30 of Heat or Cooling!!

When Cooling, this 50'F well water absorbs 10 BTU / # in a water heat exchanger, raising it's temperature to 60'F, then returning it to the well, or the well and the earth, responsibly to let the earth re-cool it again. This is totally environmentally benign, producing no pollution of any kind also. And it is also about half the operating cost of the best conventional central air conditioning system. Nothing else is added to the well water, or taken from it.

For our part of the country Geothermal will save the most energy & money, when compared to the energy consumed for Heating & Cooling.

The average % of energy consumption of most households is:

- Electricity 5-10%
- Domestic Hot Water 15-20%
- Heating and Cooling 60-70%

Federal Tax Credit: 30% Residential and 10% Commercial for the total cost of an installation, with no limit for installing or converting to geothermal / renewable energy.

Since a drilled water well would also become your "permanent fuel tank", any work with it or your submersible well pump would also be included.

Installations include new construction and retrofit, that meet both AHRI and Energy Star Guidelines.

For a predominantly heating mode, such as homes and light commercial buildings in the Northeast, the most important factor is COP and heat output. Those units, like the Comfort Air HRV, with their reciprocating compressors develop much more "heat of compression", and as a result much more output in the heating mode.

The trade off is that the HRV does not deliver as high an EER in cooling, also from the use of the same reciprocating compressor. However, when our average winter requires 2200-2600 hrs of run time for heat, vs. our average summer only needing 400-500 hours of cooling it's easy to make the right choice.

With our very low compressor head pressures in the Northeast there is literally no waste " super-heat". It is a waste of time and money in the north. Heat output and COP is what we need here.

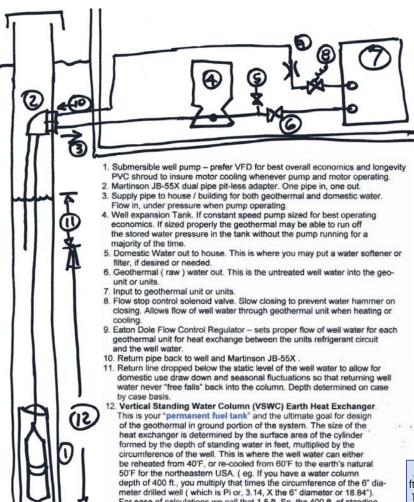
Today's geothermal warm/cool air systems can even be zoned to make areas with different characteristics have different control points. Good examples of these are bedrooms vs. living rooms, or the second floor of a home vs. the main floor.

A properly designed and installed geothermal warm/ cool air system will deliver 3.5 - 4 air changes/hr., moving the conditioned air through every space that needs it every 15 minutes. This is for heating, cooling, dehumidifying, humidifying, or airpurification.

STANDING COLUMN WELL SYSTEM: In this application, a 6" diam. standing column of ground water is used as the heat source. The column is cased with pipe down to bedrock. Temperate water is pumped from the bottom of the column and piped directly to the building. Upon leaving the building, the water is pumped back into the top of the column. Although this application does not rely on a pumpable supply of ground water, **there must be sufficient** ground water present to maintain the

**standing column of water.** The depth of the column depends on system load and design.

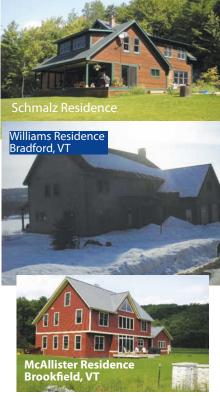
#### **Vertical Standing Water Column 100% Return Flow Diagram**



For ease of calculations we call that 1.5 ft. So, the 400 ft. of stat water X 1.5 ft. = 600 sq.ft. of heat exchange between the steel or high density bedrock and the well water.

No water is ever "consumed" in a VSWC geothermal installation

### **GEOTHERMAL HOMES**



Testimnial: Stan and Chris DiStefano - 12,000 sq.

park, VT. Since 2003... two homes - very happy with both the ecological saving and economics, utilizing VSWC technology. Even down to -26° their systems operate flawlessly.

Beginning January 1st, 2010 no one in the USA will be allowed to make new equipment utilizing the old standard R-22 refrigerant. The new R-410a refrigerant will be mandated. There have been some efficiency improvements, with the average unit having COP's of 3.8-4.3 (380-430% efficient). Of course any previous installations with R-22 equipment can be supported and maintained for their operational lifetime.

All equipments operating with Open Loop / VSWC technology in our area have a constant input source, the earth's temperature of 50'F. As a result operating, outputs are fixed in both heating and cooling. In Heat Pump technology that means that the EER = SEER, and the COP = SCOP. The S standing for "seasonal".



All information kindly submitted by Harold E. Rist II, SMART-ENERGY. Queensbury, NY 518-744-8220 Harold Rist has over 35 yrs of experience with Geothermal! "For over 35 yrs now I have had a goal: to free the USA of our need for foreign oil and gas.'

ft. home, 22 yrs ago, and 9,000 sf offices, 5 yrs ago. <u>Testimnial:</u> George & Georgina Bloom - Hyde Total utilities for this 9,000 sf building for one full yr: Gas: \$3800; Electric: \$3500=\$7,300, or 81¢/sf. Compared to any other commercial building, it will "blow their doors off"!

### INVESTMENTS, ETCETERA

# So you'd like to invest in renewable energy?

As a financial advisor specializing in socially responsible in-vestments, it comes as no surprise that I am constantly asked about investments in renewable energy companies – their stocks and bonds. What surprised me at first is the number of people who propose to put all or a significant portion of their savings into this single sector.

While we are firm believers in alternative energy, and our Wells, VT office is powered by the sun (see August issue of Green Energy Times), we are also die-hard believers in the value of diversification and asset allocation and therefore strongly advise clients not to put all their eggs into one alternative energy basket.

When it comes to concentrating your money in renewable energy investments – or any one investment sector – I'm reminded of the Greek legend of Icarus, who fell to his death when he ignored his father's warning not to fly too close to the sun as they attempted to escape their captors with wings made of wax. I've seen similar meltdowns in portfolios concentrated too much in renewable energy stocks.

The fact is many renewable energy companies are high-tech start-ups with limited income & mountains of debt. A comparison would be with the Internet stocks of the "dot.com" era of the late 90's. While this boom created some huge winners in the

end, Amazon, eBay, Google, etc., hundreds of companies didn't survive, costing investors millions

The scenario with today's solar & renewable energy stocks is similar. In general, I believe the industry's time in the sun has come. But, flooded with too many competitors, including gov't-sponsored firms in countries like China and Germany, determining who will be the eventual winners is simply guesswork. The roller coaster performance of many renewable energy stocks over the past decade is ample evidence of this.

### So what's an investor to do? In a word: diversify.

First, in general you want to diversify your investments among different sized companies – large, mid-sized and small. You also want to invest both here and abroad. Within these categories, you should spread your money along different industries: healthcare, energy, manufacturing, technology, finance, etc. And finally, within each of these industries, you should divide your money among a dozen or more companies.

Sounds complex, but two trusted financial vehicles make it easy to spread your money around: mutual funds and exchange traded funds

A mutual fund is a company that pools together money from many people and

invests it in stocks, bonds or other assets. The combined holdings of stocks, bonds or other assets the fund owns are known as its portfolio. Each investor in the fund owns shares

in the fund. Mutual fund shares are traded at the end of each day.

An exchange-traded fund is a different type of fund that tracks an index of stocks, but they can be bought and sold any time during the day like a single company stock, unlike mutual funds. Because they are easier and less expensive to set up than mutual funds, exchange traded funds can get very targeted in their specialty, which makes them attractive for renewable energy sector investing.

Both vehicles offer the advantage of wide diversification and professional portfolio management. And now many mutual funds and ETFs are available in the area of renewable investing, offering you the ability to target specialized sectors such as solar, wind, clean tech, smart grid, and clean transportation both here and abroad, with the advantage

# Align your investments with your values

with the nation's largest socially responsible Investment Advisor network — now in Vermont.



Todd Walker, Financial Advisor 3738 Lamb Hill Rd., Wells, VT 05774 802.325.2200 • twalker@fwg.com www.PAMVermont.com

Securities offered through Financial West Group, Member FINRA/SIPC. PAM is the socially responsible investment division of FWG. Office of Supervisory Jurisdiction: 167 Exeter Rd, Newfields, NH 03856

of diversifying your money amongst a dozen leading, well-researched renewable energy companies with one purchase, rather than picking just a few companies on your own.

The list of available alternative energy mutual funds and exchange traded funds is too long to list here, but please send me an e-mail and I'd be happy to forward a list to you.

Todd Walker is a Financial Advisor Representative offering securities through Financial West Group (FWG), Member FINRA/SIPC. He can be reached at 802-325-2200, HYPERLINK "mailto:twalker@fwg.com" twalker@fwg.com or HYPERLINK "http://www.pamvermont.com/" www.PAMVermont.com. The PAM Network is the socially responsible division of FWG. Office of Supervisory Jurisdiction: 167 Exeter Rd., Newfields, NH 03856.

## RENT VS. BUY Photovoltaic Electricity & Common Infrastructure

By Tom Evslin I

**n Vermont** as in most other places in the US, net metering is available to those who install "alternative" power sources including solar photovoltaic. The sound bite for net metering is that your energy source "runs your electric meter backwards".

We have no intention of disconnecting from the power grid. If we did, we'd have to buy a huge bank of batteries and still probably wouldn't have enough electricity for our very electric life style during gloomy winter days. With net metering the grid takes the economic place of the batteries. When the sun shines, we pump power into the grid and build up a (financial) credit. When we consume power, we run up a bill like anyone else but we can use our credit to pay it. In Vermont, the credits last twelve months: if you generate more power than you use over a rolling twelve month period, that power is a "contribution" to the grid. You don't get paid for it.

Technical note: You don't really use your own electrons with net metering (just in case you can tell one electron from another). You sell all the power you produce to the grid; you buy all the power you use from the grid. In fact, if the grid goes down, you have no way to use the power you're generating because you have nothing to buffer between fluctuating supply and fluctuating demand. The grid's your battery. We have a propane generator installed for grid outages.

As in the other examples in this series of posts, we're buying capital equipment –

photovoltaic cells and all that goes with them – to reduce or eliminate the rent we pay for other people's generating facilities. But this buy rather than rent decision would be even more impractical than it already is if the common infrastructure of the electric grid and the other power sources tied to it were not in place just as personal cars would be impractical if there weren't a common infrastructure of roads.

The economics of this project aren't good even with relatively high electric prices where we live (over \$.20/kwh and rising), a rebate from the State of Vermont, a small federal tax credit, and the right to sell power back to the utility at the same retail rate we buy it (not a good deal for the utility). We justify it the same way we do our garden or our sailboat – it's something we want to do. And we'd rather buy than rent. We do look forward to helping (in a tiny, tiny way) to reduce the amount of oil that the US imports from unfriendly and unstable places and, if global warming does turn out to accelerated by CO2 production, then we'll have helped environmentally in a token way.

To be accurate, in our case the fossil-fuel savings is pretty indirect and reduction in imported oil even more of a stretch. The majority of Vermont's power comes from a combination of the Vermont Yankee nuclear power plant and HydroQuebec. During peak period, some of our power comes from natural gas generators and some from wherever the big grid gets it. But, in theory at least, the power we're generating makes more of Vermont's clean power available somewhere else which is not so clean and green.

Another social benefit is that small power sources help reduce the need for building more big ones – the kind no one likes to live next to. Moreover more decentralized generating capability means less dependence on long distance transmission lines and a somewhat more catastrophe and terror proof infrastructure.

Back to the main point: our ability to buy our power generation rather than rent it is dependant on existing common infrastructure. We couldn't do it on our own without either hugely greater expense or a big change in life style. http://blog.tomevslin.com/2007/09/rent-vs-buy-the.html

8 Easy Electric Saving Strategies			
Strategy	Up front cost	Savings per year	
(1) Use space heaters to heat only the rooms you're in, (rather than a central system that heats the whole house), and turning off the heat when you're not home.	\$80	\$1023	
(2) Use ceiling fans instead of the air conditioner	\$100 if you don't already have ceiling fans	\$438	
(3) Turn off lights you're not using	\$0	\$274	
(4) Use a clothesline or a laundry rack instead of a dryer	\$20	\$196	
(5) Sleep your computer when you're not using it	\$0	\$178	
(6) Wash laundry in cold water instead of hot or warm	none	\$152	
(7) Turn off a single 100-watt light bulb, from running constantly	\$0	\$131	
(8) Replace ten 60-watt light bulbs with compact fluorescent type	\$32	\$123	
Total	\$232 once	\$2515 every year	

### Want Some of Your Green

Back

by Tim Cardwell C.G.R.\C.G.P. Green Mountain Skylights & Solar <u>tim@gmskylights.com</u>

With the local economy in what seems to be an indefinite holding pattern, let's face it - replacing the boiler on your heating system or adding solar electric panels can require a significant chunk of cash which is often only paid back over many years and sometimes decades. And, I agree it is not a very attractive situation for most of us just trying to pay the bills and feed the family. But, there are some easy green initiatives that the average Joe can do that will pay big dividends almost immediately. I am not talking about a couple of bucks either; I am talking about thousands of dollars a year and in some cases improving your lifestyle at the same time.

First let's talk electric, replacing just one 100W incandescent bulb with a bulb of equal light output, (25Wt fluorescent), will save about \$40/yr or \$3.32/month. Well if the bulb cost around \$2.50, paid for in the first few weeks. After that it becomes pure savings back in your pocket. The chart above lays out several more money saving opportunities that most every homeowner can do without drastically changing their lifestyle. Savings add up quickly-to the extent of \$209.58/month. Turning off the TV when not in use could save even more!

Going green can improve your lifestyle. >> Cont'd on P. 35 >

# writer constance carlson builds ECO-FRIENDLY BARN to Put Down ROOTS



We've evolved into a nomadic society - oftentimes more because we have to be mobile to fulfill job and career choices than because we really want to. At least that's what my husband and I thought after relocating fulltime to northern Dutchess County six years ago. Something was missing, that would tie

us to this part of the country we'd grown to love. And for us that meant a harn

Historically, barns have connected people to their land. Cultures and communities have built their livelihoods and around lifestyles them, especially in agriculture. Barns have also assumed more social and professional functions as well, from guest and residential quarters, dance and pool halls and restaurants, to studios, workshops, and garages.

For us, a barn would provide some muchneeded room for equipment and vehicles, as well as a more private living and working space for our teenage son, who was branching out.

The 2,800 sf building allowed us to make one half of the building into a two-bay garage with a second-floor space that our son could use for his quarters. The barn also had to have a classic, rugged exterior and complement our dis-tinctly contempor-ary home. And... we wanted our barn to be eco-friendly.

Geobarn's tradit-ional post-and-beam

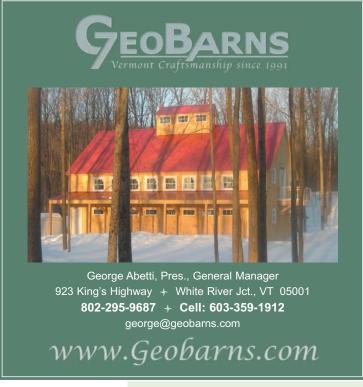


barn styling was just what we wanted - clean and crisp, us-ing diagonal framing, which eliminates the need for plywood and sheathing. This technique cuts lumber requirements by 15% and with lumber certified by the Forest Stewardship Council and other "green" lumber products, such as EnviroSafe Plus pressure treated lumber for decking. Local materials were used whenever possible.

GeoBarns insisted that the design includes free-span buttress arched trusses to provide support, transom windows, pine shiplap siding, metal roofing, a cupola, cantilevered decks and porches, along with the diagonal framing and use of green materials - all for \$25/sf. George Abetti encourages owners to participate in construction - labor being deducted from the barn costs.

We kept details in their most elemental form, keeping things simple. Here are pics of our barn raising and what conscious construction techniques accomplished for us. 🗳

Our finished barn:



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need to make insulation from a five state area, they encourage our local community to recycle with GreenFiber.

Our paper recycling program will provide the location with a recycling bin and service it with no cost to the customer. The organization is paid for the paper they recycle, and uses the proceeds received for anything from the Parent Teacher Association to sponsoring missionaries, to donating it to local charities.

The plant in Hagaman, NY which services the Albany Capital District area works

### NSTRUCT

ome people have dreams. Others live their dreams.

The Roy family had a dream: a normal house that didn't cost zillions of dollars to build, in a family-friendly neighborhood, that was so efficient there'd be no heating or cooling bills ... in Vermont.

They may not have known it at the time, but by putting energy planning at the very beginning of the process, they made their dream possible. In their research, they learned about John Unger Murphy of Murphy's Cell Tech in St. Johnsbury, John has been in the zero energy buildings (ZEBs) industry since before there was an industry. Based on his experience, he has a simple

The single most important element of achieving ZEB at the lowest cost is the integrated planning, design and engineering, while maintaining the desired functions of the home

Why? Because if zero energy is a priority from the beginning, you don't have to make up for poor efficiency and other design flaws later by buying more (or larger) equipment, or by retrofitting a technology into your home in a way that doesn't take full advantage of the technology's benefits.

Another benefit of energy planning: if the energy features you want would cost extra, you can change other features of the home before they're built, creating savings to offset the cost of the energy features.

Zero Energy designs do the following:

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- · Significantly decrease water use and water heating with efficient appliances and waste heat recovery
- · Design a solar-integrated heating, cooling, and distribution system to match need, while using as little energy as possible for distribution
- · Design heating, hot water, and electrical solar collection systems once the heating/cooling and electrical needs are cut: you don't buy more than you need

When done right, you get a home that meets your needs:

#### Annual Ownership Cost = Cost of **Mortgage + Cost of Energy Purchases**

When designing, Murphy runs this calculation twice: once as if the house were built with standard construction techniques (meeting minimum codes), and once as if it were built with zero energy techniques.

When the calculations were done, the Roy's determined they could have their dream by shaving a few feet off the house. What they gained was a home in which they won't have to worry about electric rates or heating fuel prices rising, that is comfortable year round, and is located in the perfect place for their family. When the mortgage is paid, the phrase "own your home, free and clear" will have a whole new meaning.

For more information about the Roy home, see page one in this issue of Green Energy Times or <a href="http://bit.ly/RoyHome">http://bit.ly/RoyHome</a>

# Going Green, Going Local! GreenFiber is stopping the paper trail!

in a 70 mile radius to collect recycled fiber from schools, churches and businesses who want to make a difference in their communities. The insulation produced in Hagaman insulates not only homes in the Capital District, but is also shipped around the world.

Good recycling habits are best learned at a young age, and when the habits are taught at school, before long they will continue to the home, and carried on for a lifetime. To encourage these good habits GreenFiber has a special interest in getting schools to participate in the recycling program. Over 200 schools are already being a leader for recycling in their community using GreenFiber's

Community Paper Recycling Program! Schools produce large amounts of paper on a regular basis, which would otherwise be thrown out, so why not recycle it? But more importantly, GreenFiber believes in developing a connection with the individual student and recycling. Being environmentally responsible is a lesson taught through education, actions, examples and rewards. GreenFiber's hope is that these efforts will carry on for generations.

By making their product out of 85% recycled material at zero waste plants. Green-Fiber is working toward a sustainable goal of a zero carbon foot print every day.

GreenFiber's sustainability mission is the quest to leave the world better than we found it by conserving natural resources, fostering healthy work environments and communities, & create economic growth.

For every ton of paper that GreenFiber and their community partners recycle it saves 17 trees from being cut down, 3.3 cubic yards of space in a landfill and 4000 Kilowatts of energy. From saving trees, saving energy, and reducing landfill space; GreenFiber is doing its part to make a better environment for tomorrow's generations

The GreenFiber Community Paper Recycling Program is one of the most efficient recycling programs possible for paper products. The recycled paper goes directly from the GreenFiber bin to the insulation that will keep your home warm and cozy on a local level. When you put your paper into a GreenFiber bin, you know every bit of it is being reused in the most environmentally friendly way. Recycle today and insulate your home tomorrow!



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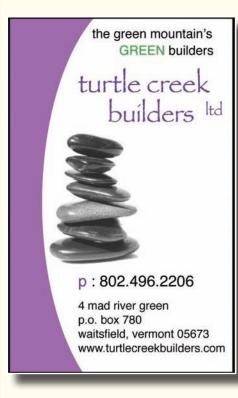




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18

# Pledge Sustainability George Plumb Goes Solar

Vermont residents and seasonal residents now have the opportunity to take the most bold and powerful sustainable living pledge that can be found on Google. It is unique in that it covers the entire state of Vermont, has ten very important items, and people can view the names and town/city residence of those who have taken the pledge. Vermont is the first state to have such a pledge.

The very first item on the list is, "If a homeowner I will install a solar electrical generating system and/or a solar hot water system." George Plumb, who lives in Washington, and is the initiator of the pledge says that, "In developing the ten points I debated in my own mind what should be the first and last items on

George Plumb of Washington, Vermont, gestures to his AllSun Tracker, within sight of his high-gas-mileage vehicle and one of his three vegetable gardens. Homegrown produce, renewable energy and fossil fuel conservation are key parts of Plumb's newly launched online pledge for sustainable living.



the pledge. However, it didn't take me long to realize that the easiest and most significant thing that almost every owner could do to reduce their ecological footprint is to install some type of solar system. Most of us are fortunate enough to own homes where a roof mounted system could be installed and many of us even have a large enough lot to install either a fixed or rotating ground system."

As part of his pledge to live more sustainably he recently installed, a grid-connected AllSun Tracker solar photovoltaic system. Although the system has only been in place since 9/27 - very cloudy and rainy weeks, it has already generated 437 kilo watt hours of electricity. George states, "It is such a joy to be working in the garden and to look over and see the sun shining down on the panels and know that we are now generating most of our own electricity and not depending on environmentally  $destructive \, sources. I \, regret \, that \, I \, didn't \, do$ this years ago, but solar is now much more of a realistic possibility for Vermonters. The average price of solar with tax credits and rebates from the state is just half of what it was two years ago. Since I'm 73, I have now arranged to purchase all the electricity I'm ever going to use in my lifetime, and I received a fixed price for it - I'm hedging the future cost by buying it up front, and this helps me as a retiree. So there is a practical side, but also in my heart I know installing renewable energy at my house was the right thing to do.

I also believe that in taking the pledge it forces me to stretch myself a little and it publicly demonstrates to others my personal commitment to try to live

a more sustainable life style. Even as sustainably as I try to live if everyone on the earth lived the way I do it would take more than three earths to support us all. I urge all who are concerned about the environment to take the pledge themselves. It will not only be good for the environment it will also be good for Vermont businesses."

David Blittersdorf, President/CEO of AllEarth Renewables and one of the early signers of the pledge, states, "It is critical at this point in history that we individually and collectively pledge to ourselves and our neighbors that we are going to work to live more sustainably. Global climate disruption is occurring much more quickly than some scientists have predicted, and the results are going

to be much more severe.

We are also running out of cheap fossil fuels. If we don't make major changes in our lifestyles soon, our children and grandchildren are going to suffer the consequences of droughts, food shortages, and massive migration. With just a little extra effort, we can make a difference."

More than 200 Vermonters have already taken the pledge, including noted author, educator and environ-mentalist Bill McKibben of www.350.org.

Other signatories include directors of organizations, business owners, corporate executives, environmental leaders, farmers, clergy, political leaders, college faculty and students, journalists, radio hosts and many everyday Vermonters. To see who has pledged, learn more details about the pledge, and take the pledge yourself, go to www.vspop.org.

George Plumb is the volunteer executive director of Vermonters for a Sustainable Population, a unique and a leading grass roots environmental organization.. 🛟

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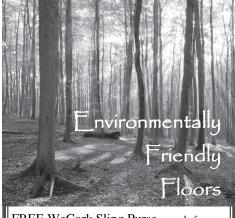
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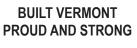
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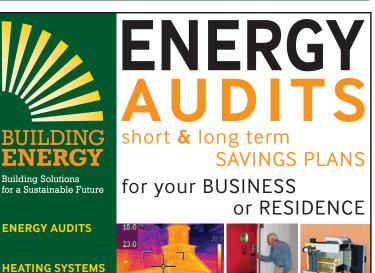


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# NDOWS the art of replacement...or not!

**'e all can imagine** that life without windows in our homes would be boring, unhealthy and impractical, right? How else would you be able to view the wonders of our Green Mountains or the pastoral settings that are around every corner of Vermont?

Window selection and placement are important factors in the efficient performance of a home, too few or improperly placed windows can negate the possibility of developing a natural pattern of non-mechanical air movement. Too many or "high glass to wall ratio" as the experts call it can be a tremendous heat loss for even a high performance home.

The selection of widows is an emerging science and is subject to a lot of green washing, that's where manufacturer's claim their product is green and will save you a lot of energy if you install them with questionable proof of that claim.

This article is intended to be the first of two articles that offers you some basic facts and personal thoughts based on my training in green methodologies and experience in rehabilitating Vermont's aging housing stock.

First off let's discuss benchmarks to look for in purchasing either new or replacement windows: Look for the Energy Star label; it is your assurance that you are getting a quality, efficient product. Windows should have a U value (reciprocal of the R value) between 2.5 and 2.75, the lower the

Where a window is being placed should determine the appropriate glaze; that is to say that a glaze for a south facing window is different from one that faces east.

One is trying to capture the solar gain the

By Ken Welch: Home Performance Analyst other's role is to reduce the heat through the window.

There are 2 basic types of windows, one for new construction, and the other for replacement.

The frame of each is distinct and don't purchase new window to replace an old one unless you want to create a lot of work for yourself.

Windows come in many sizes, shapes and styles and materials of construction, my thoughts on each:

Wood windows are classic, come with all kinds of glazes and wood is a decent insulating material (R 4).

The down side is routine maintenance but" there ain't nothing like the real thing..."

Vinyl is a common window used and its major appeal is low price and public acceptance as a standard (green washing).

The real cost is that Vinyl(PVC) is an environmentally nasty product that relies exclusively on Petro chemicals, exposes the factory workers to a number of proven carcinogens, does not weather well in the north county and ultimately ends up in our landfills because they don't perform per manufacturer's claims...not a big fan of vinyl.

My personal favorite is a foam filled fiberglass unit that is a little more expensive than vinyl but blows vinyl out of the water when it comes to value. It is true that fiberglass is a petrochemical composite but has none of the carcinogens as ingredients, is structurally as strong as metal, is not subject to brittleness and the failures of vinyl from temperature and sunlight.

Tired of high heating costs or a drafty house?



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The follow up to this article will look at the alternatives that are available to window replacement that can make your home more efficient at a fraction of the cost...until then.

Ken Welch is a Green Project Manager at NeighborWorks of Western Vermont (NWWVT). NWWVT is a Rutland based nonprofit housing organization with several opportunities for homeowners to improve the energy efficiency of their homes-regardless of income, thanks in part of funding from the US Department of Energy. To find out more please contact NWWVT at 438-2303 ext. 210 20

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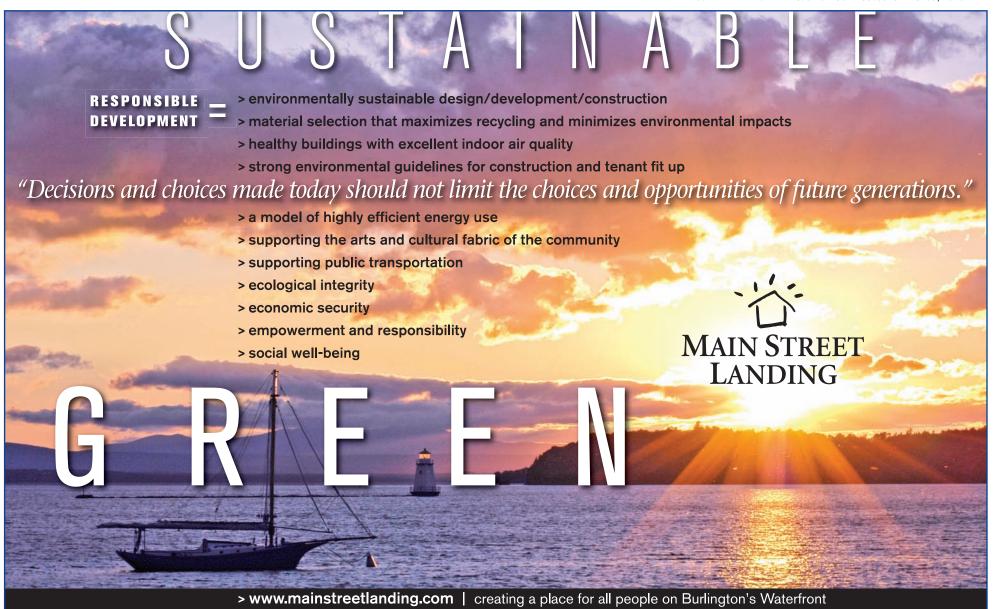
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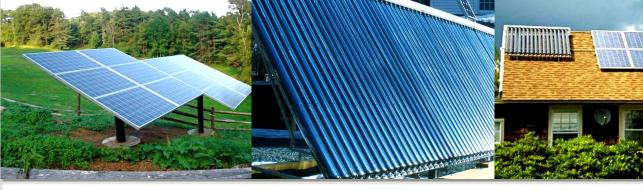
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Resort Reduces Its Environmental Footprint **Bolton Valley** 

#### Cont'd from p. 1

Bolton Valley again this year will partner with the Energy Co-op of Vermont, using the two installed Magnum Countryside pellet stoves to keep the lodge warmer, all while reducing fossil fuel consumption. The stoves burn LG Granules, a premium quality wood pellet manufactured in Quebec.

Bolton's snowmaking system also

benefits from green initiatives with the use of energy efficient HKD snowguns and SMI fan guns to reduce diesel and electric power consumption.

Bolton Valley Resort is Vermont's most convenient and affordable big mountain skiing. Less than 10 minutes from I-89 and less than 30 minutes from Burlington, the family-friendly mountain offers skiers and riders of all abilities three mountain peaks with 71 trails and 6 lifts, plus 3 terrain parks including the Burton Progression Park.

Approximately 100km of high elevation Nordic terrain, a complete Sports Center and Indoor Amusement Center and Vermont's only top-to-bottom night skiing and riding are just a few of the extras available to quests. All-inclusive, true ski-toyour-door lodging packages from \$79/person/night. For more information visit HYPER-LINK "http://www. boltonvalley.com" www.boltonval-<u>ley.com</u> or call 877-9BOLTON 🛟





hen most people enter a grocery store they are simply focused on their shopping list. What they might overlook is how much energy the store uses, or the initiatives in place to reduce consumption of energy. Here at City Market, a natural and conventional foods cooperative in the heart of Burlington, we are working on setting the example for high energy consumers in the community by supporting Solar power, LED lights, and other energy reducing initiatives throughout the store..

City market was constructed in 2001 with energy efficiency in mind, but as technology advanced, so too has the definition of :"efficiency". Constant investments and upgrades are needed to remain on the cutting edge. The initial design installed

# City Market and Sustainability

mostly high efficiency T8 fluorescent tubes. The ductwork is designed to pull cool air

off the floor along with refrigerated air that might spill out of cases and helps with cooling in the summer and replace it with warm air in the winter. Domestic hot water is pumped through hot refrigeration lines reclaiming heat energy

that would have been lost. The water is heated up to 90 degrees and the main hot water tank uses less energy to heat water throughout the building.

Since technology has changed so much and energy efficiency rebates are on the rise, City market has been able to take advantage of this on a large scale, placing a 31.28 KW solar array on our roof in March of 2010. Since installation the solar panels have produced 27.7 megawatts.. City Market received a grant for \$53,000 from the Clean

Energy Development Fund (CEDF) and also took advantage of the Federal Tax Credit

which reduced capital investment another \$40.204

Most recently our efforts have been working with Leading Edge Design Group on LED retrofits throughout the store to save thousands of dollars a year all

while reducing our carbon footprint and our bottom line. We are currently testing out some new to the market LED high bay lighting. Other potential LED projects include the possibility of Parking lot lights, theater lights, and reach in freezer lights which if replaced would provide a combined savings of over 100,000 kwh annually.

Supporting local businesses and carrying over 1200 local products also allows us to reduce our carbon footprint through reduced delivery and transport. Beyond our walls we

### LOCAL BUSINESSES



Reducing your carbon footprint, fighting climate change and saving energy



**Green Mountain Coffee Roasters** has a long history of trying to reduce its energy use. In 1986 we installed our first heat exchanger on our roaster. From that point on, we have continued to look for feasible ways to reduce energy consumption. We added heat exchangers to our generators in 1999 and took our first carbon footprint inventory in 2002. We collaborated with Cool Air Clean Planet to track our carbon footprint and in 2003 began offsetting our footprint in addition to reducing it.

In 2007, we switched our Waterbury fleet to biodiesel, further reducing our footprint. We replaced lighting fixtures in our Waterbury plant to high output fluorescents, reducing energy consumption by almost half. Next, we installed multi-day, auto set back thermostats in all our buildings. Motion sensors in public use areas assured "lights out" when no one was around., We revamped the computer room in our distribution center to use outside air for cooling in the winter and to divert the warm air it generated into the distribution center, rather than venting it outside. A state of the art compressed air system at our Essex plant reduced pressure and increased flow, resulting in less consumption and an estimated savings of 200,000 KWh/yr.

In FY'09, we introduced Changing Climate Change, an enterprise-wide initiative aimed at fighting climate change. The initiative's approach: operational initiatives designed to reduce our carbon footprint, incentives for employees to reduce their personal carbon footprints, \$800,000 in grant funding to support nonprofits working on climate change, & renewable energy certificate purchases to offset the estimated carbon emissions we are unable to eliminate. A

partnership with the Vermont Clean Energy Development fund and Green Mountain Power Corp. saw a 100,100W solar array installed on our distribution center. This demonstration project produces about half the power the building needs. The output of the 572 panels is displayed continuously here.

We presented ouremployees with a rebate program encouraging replacing household appliances & fixtures with energy efficient, Energy Star compliant ones. We offered a 50% rebate, capped at \$1,000/employee.

The Changing Climate Change grant program identified several non-profits working in this important field. We awarded grants to

> The International Center for Tropical Agriculture & Catholic **Relief Services** for their work fighting threats to coffee-growing

communities:

England Transportation Institute and the University of VT Transportation Research Center Building for their work on transportation-related emissions; Ceres for its efforts at building political will around the issue; & the Nt'l Parks Conservation Assoc. for empowering individual action.

As we continue to pursue our effort to mitigate our carbon footprint, we will continue to collaborate with Native Energy for over 50% of the Greensburg Kansas Wind Farm renewable energy credits over the next 3yrs. This amazing story of how a town can be devastated by a tornado and come back as one of the greenest towns in America is a vivid illustration of how business can be a powerful force for positive change by supporting renewable energy projects 🗘

#### ~ Support Local ~

are fortunate to have like minded distributors whose focus is on efficient transportation. **United Natural** Foods (UNFI), our largest distributor has joined with the EPA to reduce their Carbon footprint through



their Smartway Transportation Partnership which reduced Co2 emissions in 2007 by 15,000 tons. UNFI has also installed solar panels on their Connecticut and Rhode Island distribution centers.

Next time you visit us here at City Market you have more to check out than just your groceries., we have a kiosk located next to the customer service desk that displays the amount of electricity our solar panels are producing. And with a little bit of luck our LED lighting may be in place providing you with an excellent shopping experience all while following sustainable practices. 🛟



#### < Cont'd from p.1 IMAGINE IF...

With the neighborhood selected, we delved deeper into the design of our home.

Achieving our goals meant developing a plan that had proper solar orientation, an excellent thermal envelope, very efficient windows and designing an energy production system that would eliminate the need to purchase fuel. We worked closely with John Unger Murphy of Murphy's CellTech and his team of experts to develop several of these details in a reasonable and cost effective manner to make this a system that would be feasible for us and repeatable for others.

We selected a wall system that is very simple to build and provides an R-value of 40 by using cellulose insulation, a product that is more than 80% recycled newspaper. The heating system is a group



SIMPLE R-40 WALL SYSTEM - ALL SEAMS SEALED

of evacuated tube solar collectors that will store the heat in a large, heavily insulated tank built by a local company called Thermal Storage Solutions. The heat distribution system is carefully designed to take advantage of the solar storage so that it can provide all of the domestic hot water and heating needs for the house. A photovoltaic array is also placed on the roof and sized to accommodate our expected electricity needs.

MURPHY'S

ELL-TECH



THERMAL STORAGE TANK (TSS) GOING IN!

What makes this house special in my mind is that it really isn't that special after all. It is a traditional style home that, with the exception of the solar panels on the roof, looks just like any other home could. It is designed to work on any lot with the appropriate solar orientation and can be duplicated and standardized, even on small village lots like the one we chose. This is where it gets exciting for us. The developers of South Village have embraced our dream and would like to see this concept of a production zero energy house become a reality. So, imagine if every home was powered by

...maybe this isn't as far away as you think after all. We can change the way



THE HOUSE AS OF OCT. 27TH, 2010

we build without making big sacrifices. It is the right thing to do, and we want to prove it. 🛟

ONE STOP

ZERO ENERGY BUILDING

# NET-METERING - The Best Electric Energy Storage System Ever Invented

**ike all projects,** this one has been a monumental learning experience for me and could never gotten to this point of completion without the help of many friends, especially the three listed below: Andy DiMario, Excavating contactor Mark DiMario, Plumbing & heating contractor Steve Werner, General construction contractor

The combined construction expenses for a near mile driveway to access the property, compounded by the fact that the property was "land-locked" and the hard won deeded access prohibited over-head power.

The necessity to be off-grid was financial, not by choice.

I can't count the times I have heard people say, "How great it must be, to live off-grid. This is the driving force that I have agreed to write this article ... to inform and educated these people, yourself, that they are confusing .. being "off-grid" with "grid-tied energy independence".

Living off-grid is NOT inexpensive or easy. WHY ... it all boils down to storage.

Making both heat and electricity is fairly easy, plug in a PV panel, start a generator or throw a piece of wood in a boiler and before you know it, you've got heat and power. But what if, one can't get a fire going or its been cloudy for the past 3 days the batteries are depleted and one's generator won't start.

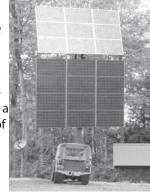
I feel the electricity storage attribute of our "Net-Metering" policies we have in place at this time, are generally over looked and/or not truly appreciated. Generally only thinking, if I put up some PV panels, I can make my own power and if lucky also get a check from the power company.

This storage system is not only FREE, its unlimited in volume/amount power it can store and is maintenance free. Being off-grid, one must store electric power on-site in some technology to be available every night and during low output

(energy S

days.

Batteries are most commonly used, which are expensive, generally require a fair amount of maintenance and sadly have a finite amount of



storage, which one finds extremely annoying when one's panels are shutdown in the middle of the day by the systems charge controller (due to the fact that the storage batteries are FULL), where an on-grid system will continue stock piling the electricity till nightfall for future use.

The design goal for my heating and power system was to provide dependable heat and electric power with minimal daily input and monitoring.



Below are the specifications of my house and the heating and power systems supporting it:

**House:** Insulated panel covered post and beam 1,800 s.f. living space, built on top of a 2,200 s.f. shop built into a hill

Power Generation: 4.2kW of PV panels and supplemented by a 15kW Perkins diesel generator

Heat Generation: HS Tarm wood boiler backed up by a Triangle Tube propane boiler which is also backed up by 3 nonelectric propane heaters. Both the wood and propane boiler distribute heat by a radiant floor system

Power Storage: Primary: 24V/2 200 Ah lead acid batteries. Secondary: 580 gal. of compressed air

Heat Storage: Primary: 1,000 gal. of insulated pressured water. Secondary: 120



cu. yds. of concrete. 🛟



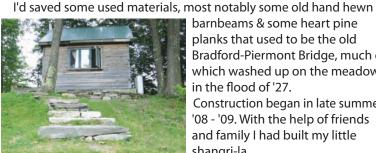






by C. Freeman Robie freemanrobie@gmail.com

fflicted with a relentless bout of wanderlust that lasted for years, had lived the mantra, 'where I lay my head is home,' until I became frustrated with the difficulty of returning to the upper valley, homeless. I made a proposal to my father that I build a small 16 x 16 ft. cabin on a section of the family farm, figuring the cost of building the cabin would be slightly greater than the money spent on renting a house for a single yr.



barnbeams & some heart pine planks that used to be the old Bradford-Piermont Bridge, much of which washed up on the meadow in the flood of '27.

Construction began in late summer '08 - '09. With the help of friends and family I had built my little shangri-la.

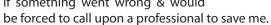
The timber frame cabin sits on 6, 2-ton concrete waste blocks to avoid disturbing the root systems of the grove of oaks surrounding the site. I used both new and recovered materials in construction. A partially enclosed wrap around deck overlooks a brook. The high ceiling combined with windows on all four sides & an additional window on the southern gable end give light to the room, making it feel deceptively spacious. I found a propane fridge, a salvaged gas cookstove, and I was cookin'.

I turned my attention to my electrical needs. After excessive and painful delib-eration and long hrs of confounding research that led

nowhere I chose a 24 volt solar system? If I had to do it over again, I'll make it a 12, so I could charge it up with my truck if need be. But, my

solar set-up has performed stellar for a year now, and supplies all of my meager energy needs.

I bought all of the components separately and installed them myself, for fear I would become lost if something went wrong & would



For the finishing touches, a woodshed was built from an unused pole-barn. I needed a root cellar; I began to dig. I needed an outhouse; and I dug some more. But I really was diggin' all this digging - there was light at the end of the tunnel. Something that had only been in my imagination was now a reality - a place to lay my head and a large step



toward taking control of my total energy usage. Thoughts of energyless perennial food storage are definitely comforting when sitting in my outhouse at -20° below 0. When I come inside to a warm woodstove, and turn on a light, it all feels a little bit closer to the type of security money can't buy.

Here is our announced story about this self-made Solar expert that - out of pocket - has made an incredible lifestyle & dream a reality. He sets an example for those that think they can't afford to go solar! DIY Solar is a definite option. Charlie's story will amaze you!

harlie Hall's home & business on an open hilltop off Rt 25 in W. Top-sham at first just seems eccentric. It's a nice-looking house that is extremely sustainable. From the blueberry bushes to the 3 ground-mounted solar arrays, the largest one perched atop a pole at a crazy angle, to the 'Barrel Man', a 15' man, fashioned mostly out of plastic barrels of diverse sizes & shapes, with a face painted on one barrel & cylindrical arms & legs that light up at night, drawing power stored from a 1970s-vintage solar unit on the hill behind him (which is composed of round cells rather than square). It's safe to say there's no other place like this in VT.



totaled 0. In fact, he earned credits in May for 22 kWh of excess power that his home net-metering system had generated & fed back

Charlie Hall has been generating his own power for decades! "The future belongs to those who prepare for it," he told Carol Levin, of the Solar Association of VT, in 1984, & he seeks to inspire others who believe self-sufficiency is gradually becoming a key to survival His "Homestead

Research Center," is always changing, refining, & thinking of new ways to maximize value from the sun's rays that fall on his wellexposed, southfacing hillside.

into the grid.

Hoping to set an example, he's not shy about trumpeting his success. Charlie is so proud of his electric bills that he often posts them at the W. Topsham Post Office. Charlie's dedication to independent power generation is one of 56 members involved with WEC's net-metering, the highest percentage of netmetering applications of any utility in VT. Charlie enrolled in net-metering in 2008, more than 25 yrs after beginning home generation, using small wind turbines at first; he turned to solar power systems a little later.

The shape of the house, which Charlie designed, as an alternative energy pioneer. Charlie grew up on this hilltop property that his parents bought in 1926. He went back to school in his mid-40s & earned an AS Degree in alternative energy from CCV, continued studies though Goddard College's adult-degree



program, & in 1976 helped form the VT Solar Research Group with other Goddard students.

The house he designed for himself & his family, completed in 1980 - is an attractive trapezoidal shape. The front, southfacing wall, is less wide than the rear wall, which allows the two side walls to angle in and capture more sunlight - the southeastern wall in the morning, and the southwestern wall in the evening. Both walls are adorned with solar panels. As Charlie puts it, with this configuration his house is "wrapped in sunlight." The front wall does not have solar panels below the roofline but has large windows for passive solar gain into the living room. & the real trick

is the sloping rooftop, which features a large window area exposed to the sky.

Inside the house, that window is covered by louvers (the living room has a cathedral ceiling), which can be cranked open from the floor. The light then pours upon a series of 10 transparent 60 gal. columns of colored water, mounted on a balcony at the second-story level. By day, the columns cool the house, if needed, & by night their stored thermal energy emanates warmth. The pastel colors provide soothing lines of light, visible from virtually everywhere in the

There's another trick to this front wall. The yard slopes toward a grassy swale, which Charlie says fills up with snow in the wintertime. The sun gleaming off the snow provides additional light for his solar systems to capture. He uses a similar trick out back. In the grassy area upslope from the house, where the 3 groundmounted

house (because of the home's interior design).

solar arrays stick out of the tall grass, one of those arrays is hinged at the top so it can be set at various angles, including, if Charlie judges it most advantageous, toward the house below to capture the reflection of sun off his metal roof. (The hinges also allow for this large panel to be dropped to a vertical position so he can easily clear off the snow & get better use of it

during the winter.)

Charlie seems to leave no stone unturned in his quest to capture & store energy. "God gave us the sun in the sky, & we should be using it," he declares. "It's all that we need."

#### Oct. 25, 2010 Update:

Charlie is at it again! He is upgrading to ten 230 watts panels which increases the system by 2300 watts. The new system more than doubles to 4348 watts. The ten new panels are going to be stationed separately at a 45° angle, facing south-southwest at 6°, to get more afternoon sun. 🗘



# White River Junction Solar Powered Condo

By Shasta Small, ReKnew Energy Systems

ften times people living in shared spaces, rental homes, or condominiums feel they have no place in the

sustainability world.

If you don't have a "permanent" dwelling, or don't pay for your utilities, there is not much incentive to reduce your own footprint or invest in improving someone else's home.

But Dan Fraser, of Dan & Whit's in Norwich, VT, who owns a condo unit in White River Junction, VT is not making any excuses. He is not limiting his efforts in sustainability.

Dan's condominium is fairly new, but he still made the investment to replace all the doors & windows to reduce his propane heating demand. Dan stocked the condo with energy efficient appliances and low flow shower heads. He even landscaped to deliberately increase cooling in the summer.

Almost all of this work required approval by the condominium association board, but the next logical step, renewable energy, was not even allowed in the development until just last year when H.446 passed. Vermont's House Bill 446, the feed-in tariff law for



BARRE TOWN, Vt. – Central Vermont Community Land Trust (CVCLT) has converted a dilapidated foreclosed property in Barre Town into a sustainable new home with low operating costs, thanks to funding from an innovative federal program.

The Vermont Housing Finance Agency (VHFA) joined forces with CVCLT in January 2009 to acquire the run-down property for \$23,500. The property, on a 1.3-acre lot on Short St. had initially listed for \$64,900, but the price kept dropping when potential buyers discovered the failed septic system, asbestos, and other issues that meant the house needed to be torn down.

The neighborhood, however, was "on its way up" with adjacent neighbors having done a lot of work on their homes, said Norm Benoit, CVCLT's rehab specialist with 40 yrs' experience in home building & design.

Using Benoit's design and guidance, builder Kevin Perrault of Graniteville, completed work this fall on the new 1,176 sq. ft. house for about \$124/sq.ft. plus land costs. The house was framed with two exterior walls built 12" apart and then filled with dense-packed cellulose for an R-49 value. Eighteen inches of loose fill gave the attic an R-60 value, with the four-inch concrete slab underneath the house having an R-10 value.

The two-bedroom, open-concept, light-filled home includes a stove & refrigerator, microwave, washer-dryer, dishwasher, radiant floor heating & new septic system. The home also includes a Heat Recovery Ventilation System, a high efficiency condensing boiler and hot water on demand, all of which helped earn the house a 5-star energy

renewable energy included a "clothesline law" whereby community associations cannot ban clotheslines (considered an "energy device") or solar energy systems.

Dan quickly installed a clothes line to reduce electric dryer demand. Then he realized that the best state solar rebates and federal tax credits are available right now which makes it the best time to invest in

solar. ReKnew Energy Systems of South Royalton, VT installed a 1.845 kW system on the roof of Dan's

condominium. This small system is enough to cover nearly all of his electricity needs, and he can monitor the energy production online daily.

Dan is paying it forward by encourag-ing his condo association to install solar on their pool house and by working with ReKnew again to install solar PV at Dan & Whit's in Norwich. (Dan also drives a hybrid vehicle.)

So for all of you putting time into getting approval for every energy improvement, or dealing with paperwork delays, or waiting patiently to get your rebates, keep up the good work because living sustainably is a favor to the world.

rating from Efficiency Vermont. The home was built low for easy accessibility with two concrete porches that won't need staining.

"We wanted to make the most efficient building possible with the limited budget we had," Benoit said, "the goal being that operating and maintenance costs would be extremely low for the homeowner."

It took 10 months from concept to completion, the end result being a home that feels roomy with small bedrooms situated on each end of the house for privacy and separated by a bathroom and a multi-purpose room that can serve as computer room, family room, dining

room or kids' toy room. When sold, the home will become the 122<sup>nd</sup> "perpetually affordable" home in CVCLT's portfolio, said Chandra Pollard, the director of CVCLT's HomeOwnership Center.

The federal Housing Acquisition & Rehabilitation Program (HARP) will subsidize the sale price with up to \$50,000 in grant money. A final sales price has yet to be determined, but if the home appraises for \$175,000, an income-eligible buyer would need just \$125,000 in financing to purchase the home.

In return for the grant, the buyer must agree to a 75-25 shared-equity arrangement, Pollard said. Under those terms, each time the house is sold in the future, the seller will keep 25% of the appreciation with the remaining 75% being passed on as a discount to the next buyer to perpetuate affordable homeownership.

"This truly is an affordable and sustainable home," Pollard said.

# How Sustainable is Your

### **Fresh Food from Small Spaces**

CHELSEA GREEN Th by R. J. Ruppenthal

The Square inch Gardener's Guide to Year-Round Growing, Fermenting, & Sprouting. Transform balconies and windowsills into productive vegetable gardens,

countertops and storage lockers into commercial-quality sprout and mushroom farms. Living in apartments, you can grow up to 20% or more of your own fresh food using space-saving techniques. A comprehensive "how-to" guide for growing fresh food in the absence of open land. It provides readers with the knowledge and skills necessary to produce their own fresh vegetables, mushrooms, sprouts, and fermented foods as well as to raise bees and chickens—all without reliance on energy-intensive systems like indoor lighting and hydroponics.





# Lyme, New Hampshire, Energy Endergy in a new House

**For 15yrs, John Mudge** occasionally thought about how he might put an addition onto his house in Etna, NH, but he will not be doing that project. In 2004, he had the opportunity to build a new home in Lyme.

Energy efficiency was important in the planning & construction of the new home. The southern exposure of the house-site was perfect for great light & passive solar heat. In addition, the house was built into a hillside, all but eliminating heat loss in the basement with its bedrooms. Between 2004 & 2006 Mudge worked with Lyme architect Don Metz on the design. Estes & Gallup of Lyme began construction in the fall of 2006. A yr later, in Oct. 2007, Mudge moved in.. The 3-bedroom house has a total of 2,037 sf of finished space with four heating zones.

Several factors were important in the energy efficiency of the house. Mudge did not want an open fireplace since so much heat is lost up the chimney with an open fire. Therefore, the design included a hearth and a soapstone woodstove in a central place in the living room. An overhead



fan in the living room quietly pushes the warm air around the entire house. Next was heavy insulation. The high ceiling of the living room was packed with insulation such that it has a rating of R-50. Working with Cota & Cota of WRJ & Bellows Falls, VT, Mudge installed a high efficiency "System 2000" boiler manufactured by Energy Kinetics. The combined efficiency of the

soapstone stove, heavy insulation & a high efficiency furnace has paid off. Only 97gal. of oil were used between Jan-May 2010. Mudge remembers that in the winter 2009–2010 the heat never came on in the living room & kitchen zones, & he figures that most of the oil used was for domestic hot water which comes off of the same burner. That was not much of a heating bill.

In April 2010, Mudge met with ReKnew Energy Systems to discuss the installation of solar

panels on the roof. Different rebates & federal tax credits made this seem the opportune time to proceed with this project. In July 2010, ReKnew Energy completed the installation of six panels manufactured by Siliken Renewable Energy of San Diego, California. This system produces electricity from the sun that is either used in the house or goes back into the grid. It will take time to figure out the exact savings, but based on 2 mos bills, Mudge is estimating annual savings of 25-30% of the electric bill. The August 2010 bill was 46% less than the bill for the comparable period in 2009! Mudge is



always happy on a sunny day & will pause to watch the meter "go backwards" when he walks his dog who also enjoys a sunny day.

Next on the energy list will be a back-up generator for those days when there is no sun, it is cold, & for some reason the power lines are down - perhaps that cloudy day after an ice storm. Every house & project presents different challenges & opportunities for energy efficiencies, & every homeowner will desire different degrees of energy independence. For Mudge, the efficiencies & lower energy costs that he is experiencing are all worthwhile. Would anyone be upset with that bill for 97gallons of oil?

# Making Your Home SOLAR READY

**Studies have shown** that every dollar invested in making your home more en-

ergy efficient reduces the expense and size of a solar system multiple times over. Some of the most significant ways to reduce your electricity use is to evaluate the age of your major appliances. Anything

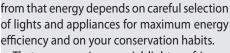


over 10 years of age, should be replaced and investing in Energy Star appliances and installing gas appliances wherever possible (although this increases your gas bill), will further decrease your draw on the grid or your batteries. Weatherizing your home, & if you are in the process of building a home or renovating an existing one, using passive solar techniques and wood heat will help cut down on the use of heating and air conditioning appliances, which are some of the largest draws of electricity.

Rather than making major life-style changes, people can keep most of the advantages electricity offers while consuming only a small percentage of the power others use.

**Here is how:** The amt of power your system

generates depends on the natural energy resources at your location and on how much equipment you install to gather that energy. How much benefit you receive



That means using special lights, refrigerators, and freezers that use about 1/4 as much power. It means using natural gas or propane for major heat production in cooking, water heating, clothes drying, and home heating. Installing extra switches and smart power strips to cut power off phantom electric loads, (that is, things like stereos, TVs, garage door openers & office equipment, all of which consume power even when not in use, can save a considerable amount of energy over time.

Use motion sensor and timer switches for

outdoor lights, whenever possible, and heating systems that distribute heat without pumps or blowers. Cool your home by evaporative methods instead of air conditioning.

By really evaluating and being conscious of your energy use, we learn how to get the most benefit from the fewest kWh.

- Design the whole house (water, heat, power) for low energy use.
- · Carefully select very special low energy lights and appliances.
- · Eliminate energy waste in appliances and from human carelessness.

At Backwoods Solar, most of our employees live in off-grid or grid-connected homes that get some or all of their power from renewable energy methods. We are constantly adding to and improving the efficiencies of our systems to maximize the benefits and cut down on the carbon footprints we have. Through this experimentation we have learned firsthand

> how to maximize the natural sources of energy available

utilize micro-inverters. One of the benefits that it back into the growth of their system. [ref: excerpts from www.backwoodssolar.com]

t was a dark and stormy night. A heavy wet snow blanketed the area. Tree limbs bent, power lines sagged. When the wind rose, it was inevitable: blackness. The whole neighborhood was black, not a glimmer of light anywhere - except at our house! While our refrigerator hummed and the circulator pumps carried heat throughout our house, our lights stayed on, thanks to the 8 batteries powered by our 12 solar panels. My aunt and I looked out our windows and felt both glad that we were warm, cozy and able to run all our systems and also guilty that we had power when our neighbors were in the dark.

Such are the joys of solar power, and the reason why we got our panels: We have no other means of heating our house - no fireplace, no wood stove. Kerosene heaters are too smelly, messy and dirty. Generators are too heavy and require the handling of gasoline, which I don¹t consider very safe. They are also noisy and must be used outside, meaning that I would have had to be outside (in the cold and wet) tending to them. So we never considered a generator.

At first we looked into wind power. But we were quickly disabused of that when we learned that our area is not particularly windy, that the whole system has to be maintained regularly (with a level of expertise that we certainly don¹t have) and that the Public it were to fall, it would be entirely on our own

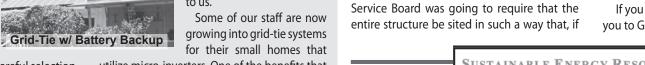
**HOW SUSTAINABLE IS YOUR HOME?** 

property. We don<sup>1</sup>t have that much land. So a windmill was out.

Then we turned to solar power. Why? Why were we interested in a sustainable energy system at all? It all began in the Spring of 2007, when I read Low Carbon Diet: A 30 Day Program to Lose 5000 Pounds, by David Gershon (Empowerment Institute, Woodstock NY, 2006), and learned that we had done nearly everything to save energy: We had our house built with good insulation (R19 in walls, R38 in roof); then we had added storm doors to all the outside doors; had custom-made waffle shades installed on our windows; and had made an insulated door quilt for our French doors. Aside from switching over to a hybrid car (which we just did in August 2010) there was nothing more we could do but take the plunge into some sort of renewable energy for our house.

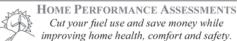
In a nice example of synchronicity, at that very time the Solar Store opened in Waterbury. So it wasn<sup>1</sup>t long before I drove up Route 100 to investigate the process. And the rest, as they say, is history. A very pleasant history, because we love our system. It has been maintenance free, and the whole process of getting it--from start to finish, paperwork and physical work-was taken care of by the experts at the Solar Store. I can¹t say enough good things about the quality of the work, the attention to detail and the superlative service we got from the folks there!

If you are thinking about going solar, I urge you to GO FOR IT! 🛟



micro-inverters have made in the industry is that they allow a homeowner to add to a system over time as their budget allows. Instead of making the expensive investment all at once, a homeowner can start smaller and take the savings they realize on their utility bill & invest

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#### was asked by GET to write an article describing some of the energy efficient features in the home my wife and I built 16 years ago. I will touch on some of the more important issues when thinking about building a house, as well as some things I might do differently next time.

Building Small, Tight & Efficient. One of the most important issues in designing your home is building small, which will help reduce the embedded and as well as ongoing energy use. This was particularly challenging for us with 3 home businesses. After lots of tinkering with the design, we ended up with a 2.000 s.f. home that includes a guest bedroom, which is also my home office for SERG, and a wing that houses my wife's two home businesses and doubles as a spare room for guests and future first floor bedroom, if we can no longer make it up the stairs.

The wall construction is a Larson truss, double-stud wall, allowing for very little thermal bridging and no wiring penetrations through the air barrier, which is on the outside of the inside studs, and 10.5" of insulation. While this is a highly effective wall, it was time consuming to build. Next time I would consider a single 6" wall with 2" of foam on one side.

# Bob Walker 'Walks the Talk'!

We originally installed 2 – 6' layers of fiberglass batts in the attic, after first thoroughly air sealing between the second floor and the attic. I just added 14" of cellulose on top of the fiberglass this fall.

Next time, I would not use any fiberglass in the house as cellulose and foam are much better insulating materials.

Because the house is very tight, we have a mechanical ventilation fan on a timer

with fresh air ducted to active living areas. Since our heat load was going to be small and we were heating with wood, a relatively inexpensive fuel, we decided not to install a heat recovery ventilation system at the time, but I would install that next time.

Sourthern Orientation, Renewables and **Energy Use.** Our house faces south so we get good solar gain through our windows, which were decent at the time, though

there are much better windows available now, like the tripleglazed fiberglass windows by Thermotech. It would not be cost effective for us to upgrade windows at this point, but are weatherizing them instead.

(see article on weatherizing windows, page 36)

Our south-sloping roof holds 3 solar hot water panels and a 12-panel photo voltaic array, which will produce an average of about 210 kWh/month, about what we use, when it is completely installed by the end of Nov.

We will have fun keeping track of our production on the Enphase software that gives real time production as well as lifetime history for each panel.

Our primary heating source is a 2-yr old, efficient, clean-burning wood stove. We typically use about 1.5 cords of wood to heat our home, mostly cut from the woods around our house. Our backup heat is provided by a sealed-combustion Renaii propane heater. We use about 56 gal. of propane a year for the backup heat, cooking and the times that we dry clothes inside, instead of on the line. I also built a thermo-siphon radiant heat collecting panel off the back of our wood stove pipe that provides some hot water in the winter.

In all, we use about 19,000 BTUs/square foot for space and water heat in our home pretty good considering the knowledge we were working with at the time we built. You can see how your home rates at: http://www. uvheat.org/pages/calculator.html

You can learn more about new building & efficiency upgrades on existing buildings from the resources at: http://www.uvheat.org/pages/publications.html. Bob Walker, SERG, Thetford Center, VT 802-785-4126 SERG@ valley.net www.SERG-info.org www.UVHEAT.org 🛟



**Storage and Solar Energy** 

It is our belief that we have changed our

earth through the use of carbon based

fuels. Some facts that are emerging with

We are about to finish the warmest

We now have more weather extremes.

Canada is planning on using the once mythical Northwest Passage from the

Atlantic to Pacific oceans. Russia al-

ready has a northern passage above

Our animals are going extinct with

unprecedented frequency, sea levels

are rising and ocean temperature are

That's quite a list for promoting clean renewable energy and it doesn't even

We must reconsider how we heat our

homes, cool our homes, electrify our

Solar Energy is a gift from above.

More than enough solar energy strikes

our homes, on a yearly basis, to provide

intermittent, it is available in the daytime &

unavailable when we need it most at night

and on cloudy days. It is this intermittency

issue that has prevented us from utilizing

solar thermal in more predominate manner

and it is only logical that we must be capable

of storing larger quantities of energy to

negate the solar intermittency issue in an

effective way and expand our fossil fuel

replacement strategies using renewable

the volume equivalent of as many as 15

to 100, 50 gallon tanks in one storage

unit - storage that is large enough and

insulated well enough to carry heat that is

collected in one time period into another

I'm not talking about two or three 50 gallon preheat tanks. I'm talking about

The problem with solar is that it is

include Peak Oil or rising energy costs.

society and fuel our transportation.

our heat and hot water needs.

increasing frequency are:

decade on record.

Siberia.

Our glaciers are receding.

### **What IS Thermal Storage?**

Thermal Storage is any method of maintaining hot or cold thermal energy over time". We have been storing thermal energy for hundreds of years and familiar examples would be your water heater, thermos, refrigerator, freezer and even the old fashioned ice box.

This article will discuss large capacity thermal storage and its application to the growing renewable energy market and in particular the application to energy sources like solar and biomass. These  $storage\,systems\,are\,produced\,by\,Thermal$ Storage Solutions LLC, a company born in Vermont

#### **How did TSS begin?**

Thermal Storage Solutions (TSS) began after a visit to a close friend's future homesite on the Connecticut River. The discussion I had with my friend was about the high cost of accessing the electrical grid and the possibility of not connecting to the grid and building a self sustaining home instead. It was this discussion that began an eight month quest to develop a thermal storage system for residential size projects that could provide a substantial portion of a home's heating and DHW needs and be cost effective.

Our journey led us to Thermal Energy System Specialists Inc (TESS) and it is with their renowned expertise in thermal energy modeling that we have been able to develop such a system. The expertise of TESS has enabled TSS to develop such a system that can apply solar energy to a storage unit and that stored energy to a structure, with a significant degree of

#### How does TSS work?

The storage unit we will be referring to is the TSS ECX Series storage unit. This 'store' is designed for storage of hot or cold energy and applies extremely well to solar and biomass generated heat. The store is insulated to R-85, has a high temp limit of 200°F, and is fully sealed with no internal replacement parts. Capacities of 750 - 5,000 gallons, can be installed above or below ground and are designed to arrive on site via "Legal Load" trucking. TSS 'storage' has stratification built in and this feature is extremely important for effective solar collection and distribution. Storage units can be purchased separately or with complimentary pump stations and controls.



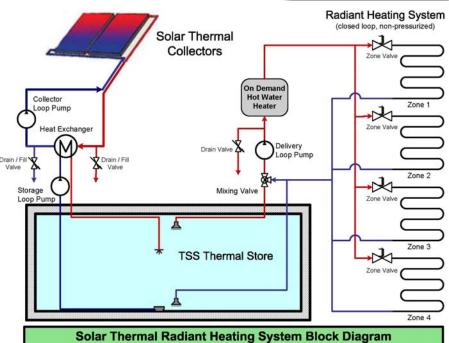
# **ThERmaL Storage SOLUTIONS**

for Renewable **Energy** 

by Ed Whitaker

The core benefits of utilizing TSS thermal storage are a 50% to 80% reduction in operating costs, a lower overall cost of ownership versus the best fossil fuel systems available, security against unpredictable fossil fuel prices and reducing the emissions of harmful Green House Gases





#### Here is How it all Works!

Follow along with the diagram above

Collection: Solar collectors are mounted on the roof or ground and connected to a "pump station" by pipes filled with a glycol mixture (preventing freezing). The fluid is circulated through the collectors, picks up the thermal energy generated at the collector and delivers that energy to the heat exchanger located in the pump station. The storage loop pump draws water from the bottom of the ECX store, circulates it through the heat exchanger in the pump station and delivers the heat into the store. The collection system is designed to collect solar energy whenever it is available.

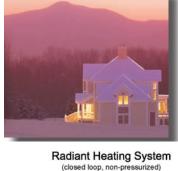
The solar input could be any thermal collector, but TSS recommends evacuated tubes for their ability to collect on marginal days (partially clouded) and their ability to reach higher temperatures <200°F. It is possible to use smaller collector arrays with this interseasonal system. The ECX is also well designed for "drainback" solar collection systems.

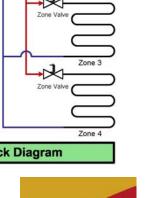
Storage: The storage unit minimizes loss of the collected energy using 12-13" of closed cell urethane foam insulation that completely surrounds the stored energy The insulation levels allow the heat to be collected and used at different times.

**Distribution:** The storage can be connected and applied to any heating system, however it is highly recommended that it be con-nected to a low temperature delivery system. Examples of low tem-perature systems are Radiant, low temperature baseboard, and warm air systems need a larger water coil heat exchanger in the air handler.

In the diagram above, when the building calls for heat, the delivery pump turns on, pulls the water from the store through a temperature mixing valve and then through an on-demand heater just before it goes into the radiant heating system. The heated water is circulated through the radiant system & returned to the bottom of the tank where it waits to be reheated by the collectors. The on-demand heater is used to provide any heat required that is not supplied by the storage system.

**Note:** The DHW preheat tank is not shown in this diagram. The DHW tank would have HX coil inside with the storage piped & pumped through the coil. 🛟











time period for use.

thermal energy.



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**vhfa** 

\*Washington county family of 4 = \$54,080 yearly Orange county family of 4 = \$48,640 yearly Lamoille county family of 4 = \$48,080 yearly



E

...you may be eligible for an affordable loan to address health and safety concerns, make your home accessible, or make handicap modifications. For a short time funds for energy improvements are available and an eligible use of funds.

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"We are very pleased to be working with an organization with the integrity and expertiseof Green Energy Times.

extensive experience, anecdotal evidence, technical modeling and test data from a variety of sources, we always welcome more information to better tell the story of these highly efficient and effective window shades.

We have made many recent President at Gordon's.



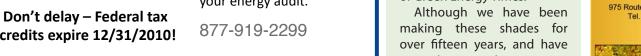
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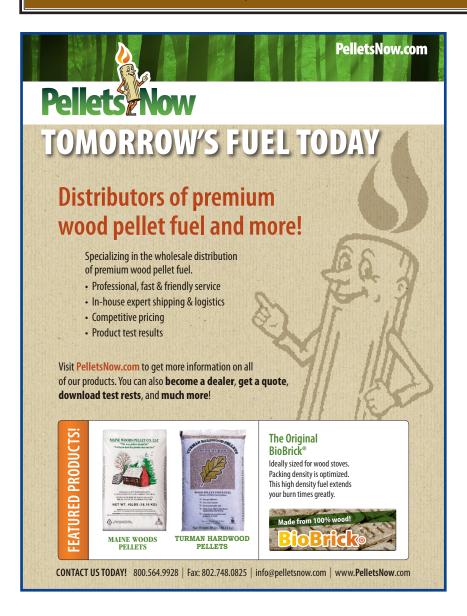
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### Quality Control at it's best! Roywood Masonry Heaters

#### Roywood Masonry Heaters, employs consultant to insure QC of form building.

Since form making must be held to high standards to insure that masonry heater kits go together smoothly & quickly, the design is of the utmost importance. The shop manager has stated that the extra effort to insure exact size & shape of forms used to cast refractory cement parts of these heater kits will make assembly of the masonry heater core kits a breeze. The cost of these heaters, which are very efficient & pollute very little, is reduced because the well designed kits eliminate much labor in construction.

These heaters are a new technology. They have been used for only about four hundred



years in Northern Europe. I have been told that in Finland the new houses most definitely have these heaters because if not included in construction a large tax incentive is lost. Mark Twain wrote a very telling essay about masonry heaters after he had seen them in use in Europe. (His essay can be found online at www.masonryheat.com in the Blog in Archive for December, 2008. If you look, there is also a piece by Ben Franklin & Ben Falk.)





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Local production of the Roywood Masonry Heater Kit means much less money & oil is used to get them to the installation site. Quite often, customers have decided to face these cores with stone from their back yard & this is another way to keep it local. This being said, it has to be admitted that heater construction has been carried out in distant places such as Whittier, NC & Cape Cod. Often these heaters are put into new constructions, straw bale, or generally green houses but it has been found that they heat well in older & even drafty houses. It has also been observed that people wanting a masonry heater often live on the top of a hill at the end of a steep dirt road.

Since masonry heaters use a renewable fuel in a very efficient & non-polluting way, they may be a good answer to decrease our dependency or fossil fuel. *Be Warm.* 

#### Ask The Home Team Efficiency Vermont

#### Can you tell me what a good home energy auditor should do and how I can find one?

**Sure thing**. A qualified auditor will evaluate the whole house and will identify the causes of and solutions for high energy bills, drafty rooms, moisture problems, and more. The auditor will look at the heating system, lighting, appliances, windows, and insulation and will understand how these elements interact with each other to affect your energy use, comfort, health, and safety.

Specifically, the auditor will:

- use a special fan, called a blower door, which fits in an exterior doorway and changes the air pressure in the house so that the tightness of the home is assessed and air leaks can be found and sealed;
- assess the presence and amount of carbon monoxide and gas leaks; and
- help you prioritize recommended, cost-effective energy-saving home improvements.

I suggest contacting a Home Performance with ENERGY STAR® contractor. These independent contractors are certified by the Building Performance Institute to perform energy audits, diagnose building problems such as moisture, mold, and ice dams, and to make recommended home improvements.

Efficiency Vermont offers financial incentives to homeowners for energy-saving improvements completed by these contractors. You can find a list of contractors near you at:

www.efficiencyvermont.com/homeperformance. - Li Ling for The Home Team 🛟

30

# MASS - BIOFUEL

# **National Life**

For National Life Group, this year's shift from oil heat to a new system that burns locally sourced woodchips, with high-tech emissions control, is a "winwin" solution on three vital levels: economic, environmental, and community.

Over 1,000 people work at the Montpelier headquarters of the Fortune 1000 company, whose facility is one of Vermont's largest commercial office building. The new, twin-boiler biomass system will meet 90% of its heating

needs while cutting its yearly use of heating oil from 210,000 to 30,000 gallons.

The economic benefits are clear. Burning woodchips will save enough in fuel costs to repay within 5 to 6 years the company's \$2 million investment in the biomass system.

The environmental impacts also look very positive.

"We were looking for a more sustainable environmental solution," says Tim Shea, second vice president for facilities, purchasing and contracting. "This is going to reduce our carbon footprint by about 45%."

National Life was trucking in #4 heating oil from out of state, Shea explains. Its biomass system will burn woodchips harvested and shipped from managed woodlands about 20 miles away—circulating within Vermont the dollars it spends on heating fuel. It has

also used local contractors to install its underground heating plant and fuelstorage bin.

Biomass systems already heat about 70 buildings around Vermont, including more than 40 schools. National Life is one of the state's first commercial facilities to adopt the technology, which is widely used in northern Europe. To minimize air-quality impacts, National Life chose highly sophisticated emissionscontrol technology: Its state-of-the-art

electrostatic precipitator and exhaust filtration system will remove, on average, 98% of all fine particles from the system's exhaust.

'The main thing is to be as clean as possible," says Tim Shea, shown at left with the biomass system. "We'll be heating approximately 500,000 square feet this winter—and

the emissions will be only that of about 12 wood stoves."

For maximum efficiency, the system will burn woodchips at a very high temperature. What ash remains will be delivered to a local farm to be used as a soil nutrient to spread on fields.

"So it's a closed-loop system, taking from the earth and putting back into the earth," Shea says. "We're trying to be a steward in demonstrating that this can be done—and it can be done efficiently, effectively, and economically."

# Imperative Plan: Strategic by Johanna Miller ENERGY ARTION

Vermont faces unprecedented challenges regarding how it will meet its energy needs. Three interrelated factors are combining to create those challenges:

- · Climate change. Despite the best efforts of the oil and coal industries to obfuscate, climate change is here, its real, and it will change how we arrange our lives and communities.
- · Vermont Yankee. Our reliance on an obsolete and decaying nuclear power plant is soon coming to an end - hopefully with a whimper and not a bang.
- · Peak oil. The concept that world oil production is at or near its peak and will steadily decline for the rest of our lives has gone from the realm of conspiracy theorists to widely accepted fact.

Without a coherent, coordinated energy plan, these difficult challenges are far greater.

In 1998, Vermont had such a plan when the state adopted Fueling Vermont's Future: Vermont Comprehensive Energy Plan and Vermont Greenhouse Gas Action Plan. That forwardlooking (but out-of-date) document helped put into action the policies and programs that established Vermont as a national leader in energy efficiency and set a course toward greater reliance on renewable energy.

Like all good plans, though, it's the implementation that matters, and comprehensive, coordinated strategies for dealing with climate change and Vermont's energy future have been lacking.

Ifwe'veeverneededaplanforaction, now is the time.

Vermonthasmadeimportantprogress, yes. The Vermont Legislature voted to turn away from our aging nuclear plant and,

instead, enact the nation's first statewide feed in tariff program that will soon bring 50MW of renewable energy online. Vermont's 10-year-old energy efficiency utility, Efficiency Vermont, recently got a small and much-needed boost in their budget from the Public Service Board. And at the community level, Vermonters have formed nearly 100 town energy committees. They are mobilizing to help weatherize local homes, put solar panels on schools, create ride-sharing programs, install efficient heating systems in town halls and take hundreds of other small steps that add up to big savings, for individuals, tax payers, and the environment.

Theseandotherimportantinitiatives taking place across Vermont matter a lot. Combined, however, they still fall far short of what is needed to replace dirty, dwindling fossil fuels.



Yes, we face significant challenges regarding our energy future. Done right, though, we can turn those challenges into opportunities. What's needed is a road map to get where we need to go in the quickest, smartest, most efficient way possible.

Vermonthasclearchoicestomakeand action to take to realize a clean, efficient energy future. To get us where we need to go, please join VNRC in advocating for:

- Shutting down Vermont Yankee in 2012, as scheduled.
- · Crafting a strategic state energy and implementation plan.
- · Advancing diverse transportation options.
- · Joining or jumpstarting a town energy committee in your community (with our help!).

For more information or to get involved with these efforts, please visit: www.vnrc.org, www.vecan. **net** or contact Brian Shupe or Johanna Miller 802-223-2328 or bshupe@vnrc.org or jmiller@vnrc. org. 👶



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interested in networking, learning about and helping implement clean-energy solutions. This conference will offer action-oriented workshops, regional energy roundtables, a stellar keynote — Jared Duval, a young energy innovator and democracy champion — and a state-level overview from Vermont's next governor (invited). Don't miss a day of information and inspiration to help Vermont save energy, transition to renewables and reduce the state's greenhouse gas emissions. For more info and to register visit www.vecan.net or



### NEWS, CLUES & REVIEWS

# The Colony - TV Paints a Future Scenario

by Roger Lohr

here is a TV show that peeks at one of the looming issues that many people often ponder & that is...what will our lives be like if Armageddon happens? We often consider future scenarios on Earth & The Colony vividly illustrates a view.

The Colony is a cable television show (*Tues.* 10pm on Discovery with repeat airings) that takes a group of volunteers with differing backgrounds, skills, & personalities to survive & rebuild in a world without electricity, running water, government, or outside communication. Over the course of 10 episodes, the colonists, who include a construction foreman, teacher, carpenter, & auto mechanic, must work to utilize & strengthen their exploration, technology, & survival skills in ways they've never had to before.

The show also features talking head commentary from professionals in homeland security, engineering, psychology, & the medical community, who provide insight into what the future could look like after a biological disaster. Filmed on 10 acres of abandoned neighborhood on Louisiana's Gulf Coast, The Colony's simulated environment had been left decimated by Hurricane Katrina, a naturally occurring disaster zone that was slated to be bulldozed & turned into a public park (remember, you're doing a helluva a job Brownie!). Empty buildings, weedy streets, & the backwoods are all the colonists have to work with as they scavenge essentials for survival from their surroundings.

The colonists face daunting physical & emotional challenges as they attempt to survive in a world void of all the niceties they've ever known, including environmental dangers such as disastrous weather. The colonists respond & must use their skills to protect their lives & supplies. They learn the significance of security after being attacked by hostile outsiders

for food, tools, & medical supplies. They suffer ramifications of their decisions & they experience the indifference of weather & other aspects thrust upon them amidst the dead zone in which they are living. The colonists conceive & deliberate ideas to survive & improve their lives. Watching them succeed or bust makes for interesting TV.

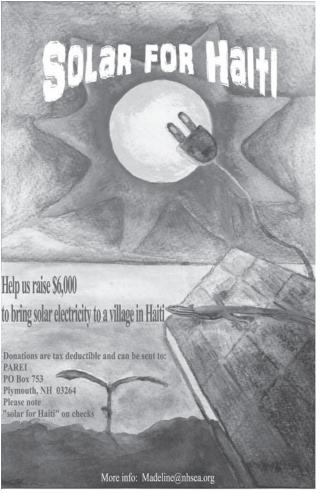
After finding a broken down tractor engine, which needs fuel to be of value, they theorize that they can boil dead maggot-ridden pig carcasses to create fuel from the fat...and it works! Once the tractor engine runs it is hooked up to an alternator (taken from a dilapidated car) to recharge scavenged car batteries that are housed on a wheel chair for portability. And hallelujah they can use power tools & they can install lights in the building they selected as a squatters' abode.

Closet engineers & socialists will get off on this show as the imagination will run wild. The colonists build a smoker to preserve food, a windmill for reliable energy, & improve their security. But the colonists must also deal with nourishment realities such as diminishing food supplies, limited options for protein, food storage, & protecting the little food they have from marauders. Interpersonal relations are also a daily challenge, which is unavoidable for any group of individuals brought together in such circumstances. Sooner or later the group has misunderstandings, disagreements, & confrontations. Some viewers might see this aspect of the show as schmaltz, but to the colonist's daily lives, the social experience weighs as heavy as the survival challenge.

It is impossible to watch The Colony & not think about what would happen in your own neighborhood if it became an armed & gated community after society broke down. Look up the street & wonder about the value of the nurse, chef, bookkeeper, teacher, the neighbor who loves to go fishing ... Who would be the providers & negotiators; who would be the leaders? It is scary & exciting at the same time. \$\mathbf{\textit{G}}\$

### Local Woman takes SOLAR to HAITI!

On October 21st, 2010, Madeline McElaney, from New Hampshire Sustainable Energy



Association in Plymouth, NH told us: "I think I told you last time we talked that I am going to Haiti? I leave on Tuesday for two weeks.

Most of my downtime in the last three months has gone towards raising money to pay for a PV install in a village I will be staying in.

I had a goal of \$6000 and have raised \$4000 to date!

One week from today we are installing a 1800 watt system that will provide electricity for a well pump, some lights, charging stations for laptops, cell phones and cameras, etc.

I am super excited!!"

Madeline is now off to Haiti! And she's bringing some sleeping bags, tents, and a crew of volunteers to help build and install a solar electric system to pump a community's water, provide lights, charge laptops, cell phones, cameras...

The project is one element of a program to create an

eco-village and perform forest restoration in Anse a Pitre, Haiti. The goal is to "bring people together to focus on ecological revival and sustainable living work, to give back to and empower a community in need."

Madeline, her friend Steve, and a group of former Plymouth State College students arrived in Haiti on October 24 and stayed through November 4th. One of the highlights of their trip will be a workshop for locals in Anse a Pitre run by Enersa Haiti. Enersa has a method for taking scrap solar cells, fusing them together, and encasing them in silicone to make working solar panels from materials that would otherwise end up in the scrap heap.

The workshop will result in a solar PV panel that will provide power for up to 30 families! We hope the trip was wildly successful, and can't wait to hear how it went! For more info, see: http://bit.ly/haitireforestation and http://bit.ly/solar4haiti

### Chelsea Green: BOOK REVIEWS

#### **RECOMMENDED READING**

Visit <u>www.chelseagreen.com</u> to order these books or other sustainable books from Chelsea Green Publishing

- Buildings of Earth and Straw, by Bruce King, P.E.
- Confronting Collapse by Michael C. Ruppert
- ENERGY FREE Homes for a Small Planet by Ann V. Edminster.
- Fresh Food from Small Spaces by R. J. Ruppenthal
- Future Scenarios How Communities Can Adapt to
- GAIA'S GARDEN A Guide to Home-Scale Permaculture by Toby Hemenway
   LIVING ABOVE THE STORE -Building a Business That Creates Value, Inspires Change,
  - Restores Land & Community, by Martin Melaver

Peak Oil & Climate Change, by David Holmgren

- Simple Food for the Good Life Random Acts of Cooking and Pithy Quotations, by Helen Nearing
- Small-Scale Grain Raising, 2nd Edition, by Gene Logsdon
- Time's Up! An Uncivilized Solution to a Global Crisis, by Keith Farnish
- The BIOCHAR DEBATE, by James Bruges.
- The Carbon-Free Home, by Rebekah Hren, Stephen Hren.
- The Organic Farmer's Business Handbook, by Richard Wiswall
- The Passive Solar House, by James Kachadorian.
- The Transition Timeline- For a Local, Resilient Future Shaun Chamberlin
- Wind Energy Basics, 2nd edition, by Paul Gipe.



#### **NEW REVIEWS:**

A Solar Buyer's Guide for the Home and Office
- Navigating the Maze of Solar Options, Incentives, and Installers
by Stephen & Rebekah Hren.

Solar Buyer's Guide for the Home and Office from Chelsea Green Publishing takes you on a whirlwind tour of the history of human use of the sun, current technologies for solar heating, hot water, and electricity, and ties it all together with useful information on how to take advantage of this bountiful energy source.

Authors Stephen and Rebekah Hren use their experience building active and passive solar homes to help you navigate the sometimes confusing array of options.

They help you figure out what will work for you, based on your site and your budget.

They walk you through financing, incentives, rebates, and more.

Their list of questions to ask an installer during the site visit is invaluable. And in the end, they provide some handy extras: describing everything from solar clothes dryers to solar irrigation, before moving on to some promising glimpses of new technologies on the horizon. All in all, it's a helpful resource for those beginning the solar energy journey.

This is a great book to keep for reference for someone that is thinking seriously of going Solar, written by a couple that truly walks the talk!

31

#### THOUGHTFUL DIALOGUE ACROSS THE STATE

By Mark A. Boivin

Iternative energy is the inescapable solution to three interrelated A challenges facing this nation.

The first challenge is global warming. The fact that global CO2 levels have increased dramatically during the last 150 yrs of fossil fuel combustion is well established. The threshold that creates climatic catastrophe is unknowable until we have crossed it. The debate is not whether, but when we will reach the tipping point that will make the earth uninhabitable.

The second is whether we have reached peak oil production. For the last 100 years our economy has been functioning on cheap petroleum. While some sources like Saudi oil have a marginal breakeven cost near \$30/barrel other supplies are at \$80/barrel with newer potential supplies far higher in cost. The market prices all oil at the highest marginal cost. Whether we have reached peak energy supply is moot. Oil demand and cost are rising.

The third challenge is the economy. Annually we borrow billions of dollars from China and other foreign sources to buy petroleum. The chart shows that beginning in 1998 expenditures and demand increased exponentially. The aggregate cost of fuel continued to rise until 2008 even as the gallons sold plummeted after 2004.

The recession began in 2004 when fuel costs sucked the equity/liquidity out of the working economy and created an imbalance in the money supply. Money is the lubricant for economic activity and it's loss is the reason that the economic engine seized. The markets collapsed in 2008 when the working economy ran out of money.

Governmental actions have not addressed this issue. Funding the Democratic social agenda failed to stimulate the economy. The Republican mantra that corporate earnings and investment will fuel the recovery is equally wrong. Banks that got TARP money are still collecting more in mortgage payments than they are lending. The big corporations are sitting on mountains of cash created by liquidating labor and inventory. The money supply is stagnant because nobody wants to invest or lend until there are willing and able buyers for the products produced. Main-street America is starving for the cash that high finance hoards.

Local energy will recharge the main-street economy, not just by the jobs it creates but also by the money that it keeps in the local economy. VT purchased 188 million gals of home heating fuel in 2009 at a cost of \$547 million. 80% of this money left the state and 50-60% also left the country thus increasing our





– Calvin Coolidge –

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Producing this energy locally and keeping the money here will jumpstart the state's economy. The same amount of energy can be produced by corn grown on only 38% of VT's 1.2 million acres of farmland. Currently 1.2 million acres return \$700 million to the state's farmers. Using only 38% of the cropland to produce fuel corn will return the equivalent of 78% of the current farm income, or more than double what farms currently earn on the same land. Over 80% of this money will stay instate.

Breaking the chains of energy dependency is the solution to

all three challenges. Utilizing corn, as an alternative energy source, will lower carbon emissions, extend existing petroleum supplies, and will fuel the local economic recovery. It will also keep farmland productive for the future by increasing local farm income. The future of America is neither red nor blue but green.

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# You can actually feel the heat from the summer sun stored in each kernel of corn as it burns! NATURE'S CLEAN HEAT! www.VermontBioFuels.net



### Nature's Clean Burning Alternatives: Grown in Our Fields to Heat Your Home!

Of all the plant based forms of biomass fuel, corn is nature is natural and most efficient solar energy collector. It stores the sunís energy in little golden nuggets, and when burned, it releases that heat when you need it most - at night and throughout the winter. Corn is carbon neutral and more affordable than fossil fuels (which are finite, once the supply is gone - it's gone). Corn is also annually renewable, grown - every year.

We grow our corn locally - in Addison, Vermont; and dry it to 10% - 12% moisture content for optimum heat. To reduce the dust common to other biomass fuels, our corn is cleaned and packaged in easy-to-reuse 40-pound recycled bags.

#### Heat with the Sun for \$250 per ton!

FREE Delivery within Addison and Chittenden counties.

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Office: 802-475-4007 ii FAX: 802-475-2494

e-mail: pboivin@gmavt.net ï web: VermontBioFuels.net

Sales: 5994 Goodrich Corner Road, Addison, VT 05491t ï Plant: 6286 Goodrich Corner Road, Addison, VT 05491



# Ask The Home Team Efficiency Vermont

Q: I like to dry my clothes outside when I can, but good drying days are tougher to find at this time of year. When I hang the washing in the basement, I notice that my dehumidifier runs more. Now I'm wondering which costs me more: Using my electric clothes dryer or running the dehumidifier more. Do you know?

A: Using the dehumidifier will probably cost you more. But operation cost is only part of the story. Introducing moisture into the basement, whether by air-drying clothes, storing green firewood, or starting your garden seedlings down there, puts moisture into the part of your home that typically can least tolerate it. You see, because a basement is cool, moisture - in the form of condensation - can form on surfaces. Condensation in a cool basement has a hard time drying out because heat drives evaporation. Moisture can cause wood rot, paint stains, and other issues, like mold, which can create health problems. While air-drying is the most energy-saving approach, you would do well not to do this in the basement. - Bob for The Home Team

: I've been noticing air conditioners covered in plastic, still in peoples' windows. Does plastic do a good job of keeping winter air out or does it mean higher heat bills? I'd sure like to stop hauling around air conditioners at my house twice a year, but not if it means wasting heating oil.

A: I wish I had news that could mean you'll take this annual chore off your to-do list but it makes solid financial sense to remove air conditioners from windows for the winter. Keeping them in windows year-round can mean exactly what you suspect: Cold outdoor air comes in (and warm indoor air escapes) and you pay for it through higher heating bills. Also, warm escaping air has the potential to condense and freeze inside the unit and potentially damage the machine. You may see wall-mounted units that businesses keep installed all year, where removal isn't an option. In those cases, quilted covers can reduce energy loss and plastic can protect the unit from snow and ice. Thanks for writing in and take care hauling the air conditioner!

Efficiency Vermont offers financial incentives to homeowners for energy-saving improvements completed by these contractors. You can find a list of contractors near you at:

www.efficiencyvermont.com/homeperformance. - Kathleen for The Home Team



### INGREDIENT OF THE MONTH

In this column we will continue to explore Green Chemistry & how it impacts the transition to a more sustainable society. This month's focus is on antimicrobial chemicals.

The word "antimicrobial" is regulated by the FDA. They control the meaning of most of the "anti" words out there: antibacterial, antifungal, anti-inflammatory etc.

The legal definition of anti-microbial is called the "30 second kill rate". This means that 99.99% (they aren't allowed to say 100%) of all critters: fungus, bacteria, mold & virus must be dead within 30 seconds. This is a lot to ask for from a product.

There are several common methods of topical germ killing. The safest (to humans) way is by using alcohol or alcohol/essential oil combinations. If the final product is 64% alcohol we are allowed to make a sanitizing claim.

I like ethanol best for topical use. Isopropyl alcohol is a petroleum product & second best. Rubbing alcohol may contain methyl alcohol, which is a no-no. Read the label!

The germ killing effects of alcohol can be enhanced with essential oils. Thyme works very well here, as do many others. Different essential oils tend to have different areas of competency for critter killing. Some do better on fungus like tea tree & manuka oils. Others, like lavender are more effective on virus colonies.

But wait! Do we really need these disinfecting chemicals? What about good old soap & water?
According to the State of VT Dep't of Health, a food service worker can flip your burger, wipe his butt, wash with soap & water for 30 seconds & serve that burger safely. So what's with the anti-microbial craze?

Soap & water kill or remove most germs within 30 seconds. The "bad" germs like ecoli & staph are especially susceptible to soap & water. Soap & water are all you need 99% of the time. You want to look for something stronger when someone in your household or workplace has an infectious disease you are about to perform open heart surgery

Use alcohol, (not methyl alcohol) to sanitize, disinfect or make antiseptic. All of these words mean the same thing. I disinfect my vessels when I make wine. Restaurants use heat disinfecting dishwashers (if they care) or leave-on disinfectants dispensed through the dish washing machine (if the don't). I use soap & water throughout the day & rarely get sick.

OK – how about antibacterial soap products? Sounds like a winning combination. Enhancing the germ killing effects of soap & water with germ killing chemicals may seem like a good idea on the surface. However, once we look into the anti-germ molecule itself red flags start popping up everywhere. Anti-microbial soap products, & most anything making the 99.99% claim uses Triclosan as the active ingredient. Triclosan is the trade name for polychlorinated phenoxy phenols. Read the words carefully. This is not a breakfast drink. Triclosan is effective at 6 parts/million. Think about it. 6 molecules/ million other molecules & it still kills 99.99% of germs, allegedly with zero side effects to humans

Incredulous? You should be. If something doesn't pass the commonsense test, it is unlikely to be true.

Triclosan is "Agent Orange" with a methyl group. Ever see someone who was overexposed to Agent Orange in 'Nam? I met a guy who's skin actually turned orange & he shook all the time. Oh yeah, he's dead now.

This is like pretending that herbicides are harmless to mammals. Pure propaganda.

I suspect that future generations will look back on this poor deluded civilization & lament, "If only they had studied the chemistry & applied the cautionary principle to everything they created..."

How about Grape Fruit Seed Extract? Sure sounds natural! The most natural thing about GSE is the name. By taking an engineered product & registering a trade name that sounds natural a whole new market opens up!

GSE is recognized as a gram –positive mold inhibitor. Any other bacterialcidal effects are spurious or caused by the addition of broad spectrum anti-microbials like triclosan. I had a long talk with a cosmetic chemical salesguy. He told me his best customer for triclosan was a US based GSE producer. He said he was buying a new car from the commission checks he got from them.

Now who am I supposed to believe? The triclosan sales guy trying to suck up to my business & impress me with his client list, or the website of the accused?

Look, you either pay attention to the molecules or you get ripped off, & maybe sold something that causes your immune system to malfunction or contribute to your cancer load.

Unlike humans, molecules don't lie – they just follow their nature. & so should you! Realize that we are part & parcel of the ecosystem that begat us. We can control the predominance of bacteriological colonies & manipulate our circumastances to increase our health & comfort. The goal is not to live in a sterilized box.

#### Simple germ killers you can make for home use:

70% Isopropyl alcohol in a spray bottle. I leave these in bathrooms throughout my world for disinfecting toilet seats, shaving razors & tooth brushes. Cheap, simple & effective. Add a few drops of essential oils & it smells & works even better.

Add 10% bleach to Liquid Sunshine Spray & Wipe to make a foaming disinfecting cleaner. Use this to kill mold on shower stalls & tile & to disinfect toilets. Bleach is compatable with castile soap based cleaners like Liquid Sunshine. You can save even more money by buying the soap concentrate & making a spray from 10% castile liquid soap or Liquid Sunshine & 10% bleach. Add a little more bleach or soap for heavier duty jobs, but please wear gloves & eye protection!

Make your own hand sanitizer using any 40 proof drinking alcohol (ethanol). Mix with a few drops of essential oils so people don't get the wrong impression when they meet you. Pour into a 4oz sprayer for ease of use & store the rest for refills. Store your sprayer in a zip lock type plastic bag if you are dragging this around in your bag. Bottles can leak over time!

And remember what Grandma said, "A little dirt is good for you".

#### Best Wishes, Soapman.

Larry Plesent is a writer, philosopher, farmer, bookseller and soap maker living & working in the Green Mountains of Vermont.

Learn more at <a href="https://www.vermontsoap.com">www.vermontsoap.com</a> & <a href="https://www.seasonedbooks.com">www.vermontsoap.com</a> & <a href="https://www.seasonedbooks.com">www.vermontsoap.com</a> & <a href="https://www.seasonedbooks.com">www.seasonedbooks.com</a> &

34

#### ALL SoLaR Comes to the Rescue

by Nancy Rae Mallery

Say you were in a classroom - a couple of hands were up waving for your attention, saying "I need help!" Would you help - even though you were extremely busy and knew you might not get paid for your help?

GET was talking to a solar installer from southern NH and was amazed at the following real life story we were told.

Discussing the great weather over the weekend, Steve Reilly of All Solar from Munsonville, NH told us what he did over the weekend. There was a young couple that lives 5 miles in from the paved road. They had just bought a nice piece of land (33 acres) with a cabin where they were living till they were able to build a new house. Steve went to see them to check on their solar situation.

What he found was a disaster - a DIY installation of a solar system that was a dangerous mess! There were loose wires every-



where...
connected
in a way that
unknowingly
left this
couple in
high danger
of a fire. No
fuses, no
disconnects.
An old
antiquated
system they

didn't know how to deal with. They had no money to do it any other way, yet seriously



needed help.... before something terrible happened as a consequence.

What Steve saw and completely understood could happen bothered him so much that he could not sleep knowing the danger this poor young, adventurous couple were in... and winter ahead of them... They were 1.5 miles from a grid connection or source of power.

Struggling with the dangerous situation he witnessed, Steve could not just let this happen. He has installed solar systems for over 30 years and knows solar and electrical in and out. He knew he had the ability to help.

So, pulling together a solar system, he loaded it up, drove over to Guilford, VT, put his vehicle in 4WD to drive up the steep drive way, and spent the weekend installing an \$8000 system, knowing they did not have the money to pay for it.

They were delighted to help rip out all of

#### Green Guru

by Dave Bonta, founder and president of USA Solar Store, author of The New Solar Home, writes for the GET as The Green Guru



#### **BIODIESEL-**

#### Renewable Energy's bastard step-child

Whatever happened to Biodiesel? It seems like just yesterday, I sat in the State House, presenting to our representatives about the opportunity presented by this environmentally friendly fuel.

We actually signed out first purchase order with the State that day and began mixing soy based biodiesel into Vermont's transportation fleet shortly after. Everybody was combing thru the papers, looking for good deals on old Mercedes, VW TDI Jettas and Ford Cummins trucks

Seems like since then, we have heard a spate of negative issues involving Government subsidized corn based biofuels, and somehow poor biodiesel got mixed into the food vs. fuel debate.

the old dangerous wires and tossed them out the door. The young girl would have to start the old generator every time she needed water, and there was only one light bulb in the whole cabin, linked to old sulfated batteries. The light bulb only gave one hour of light. When that went out, they had to use dangerous oil lamps.

Steve said that when they flipped the switch on and a light came on in the dark house, as a result from his solar installation, she smiled and that radiant smile was worth

There was also a \$1.00 fuel production subsidy that got dropped from Biodiesel, and with the ongoing subsidies for petro fuel, biodiesel doesn't have a chance.

So how do we get Biodiesel clear of all this bad press & back to the fuel that Rudolf Diesel himself imagined it could be?
First-food: no debate!

Getting biodiesel done right is about taking it local and keeping it community scale; like they do at State line farm in North Bennington. Farmers can grow canola (rape seed) flax, sunflowers-all sorts of oil for food production- at State Line, they make their own tractor fuel.

A good win/win option would be to grow crops, organically and GMO free, sell this premium oil to food producers, so that the farmer gets top value.

After food use, recycle the product as a premium feedstock before it enters the waste stream. This should be kept as clean and pure as the valuable feedstock it is, (please no cigarette butts) - titration would be easier to manage, and the end product would be a cost effective option to petro diesel.

every ounce of work he had done. Being able to have water without using the generator brought another million dollar smile.

In the end, this leap of faith for Steve turned out just right. Their family was able to pay for the materials.

Green Energy Times would like to recognize Mr. Reilly for his efforts that were above and beyond the call of duty. With the busy life so many of us lead in these trying economic time it is heartwarming to know that good people live and work among us.



The Recharge Mower®, rechargeable riding mower, is environmentally friendly and features a 36v55Ah battery system offering up to 3 hours of performance on a single charge. The simple plug-in Smart Charger can fully regenerate the system overnight at off peak hours using about 4Kw of power. The Recharge Mower® is equipped with a heavy-duty drive motor plus 2 cutting blade motors. Shipped with the unit are both a Grass Catcher attachment along with a Grass Deflector which provides for standard rear discharge of clippings. The system is protected by a two year residential use warranty.

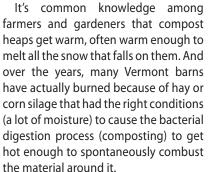


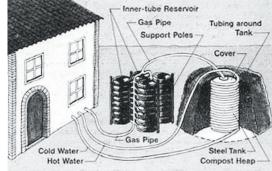
www.RechargeMower.com - for more details and our full length video.

# Shred, Don't Dread! Compost-Based-Heat for Vermont

PART 1

By Gaelan Brown, Energy Optimist





None of this is really news, right? Here's the news: It is possible to heat your house and all your domestic hot water by capturing heat from a composting mound of biomass in your yard, without burning anything. And we actually built a working prototype of a "Pain Mound" at my house last summer, which a year later was still generating 110-plus-degree water from the waterlines we buried inside it. I was able to get more than 500 gallons of 110-degree water per day from this system. We recently re-built our Pain Mound as part of a Yestermorrow

Design/Build School class, in which 8 people got a hands on "how to" experience. And several more Pain Mounds are now in the planning stages around the state, including attempts to heat greenhouses in the winter with this concept.

Like many innovations, this concept is based on old knowledge revived. More than 30 years ago a French farmer named Jean Pain figured out how to generate hot water and methane from a specially designed mound of composting wood shreds. His goal was to build up the soils of his farm with effective composting, but he was also able to power his entire farm and home from the methane (natural gas) and the hot water that he collected as he made his innovative compost out of shredded woody biomass.

All of this energy came without burning anything, using a local, abundant, renewable resource - the byproduct at the end: high-yield, soil-building compost.

The "Jean Pain Method" is a two-part concept. Heat is generated from the aerobic digestion of a specially designed mound of wood shreds (mulch). The heat is collected by passing water through the pipes that are coiled throughout the inside of the mound. There is also a sealed inner-chamber placed in the center of the mound as it is being built, which is then filled with a compostslurry, sealed and then used to generate methane-gas.

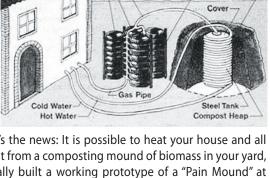
The heat from the mound creates the ideal conditions for methane production inside the sealed inner barrel. This solves the issue facing biogas digesters in coldwinter climates because the mound of compost provides the steady heat environment needed for the bacteria to produce methane without a lot of energy needed to keep the digester warm.

Jean Pain pumped the methane out of the inner barrel through a tube in the top, and compressed and stored it to be used later. He and his wife, Ida, captured enough natural gas to fuel all of their farm equipment, vehicles, and a generator (the engines having been converted to natural gas), as well as all of their gas for household

Jean kept careful records regarding the amount of fuel it took to harvest and shred all the brush to create each of his mounds. He claimed that his energy-returnon-energy-invested (EROEI) was more than 85 percent, meaning that if he spent the equivalent of 15 gallons of gasoline to run his truck, chainsaws, and chipper to produce the shredded biomass, he would get the energy equivalent of 85 gallons of gasoline as a result (energy from the hot water and the methane).

Aside from achieving energy self-sufficiency, Jean and Ida wrote a book and had a few years of fanfare in Europe

based on the strong crop-yield results achieved with compost made this way. This composting concept defies conventional thinking that compost must be created with a lot of nitrogen-rich material mixed in. He proved that low-nitrogen woody biomass can make exceptional compost when it is fully digested by bacteria in this way. Oh, and by the way, you can heat and power your entire home too. Sadly, in the early 1980s Jean died, cheap oil came back, & like other sustainability solutions of the era, the "Jean Pain Method" seems to have withered on the vine. 🛟













### When to Hire a Weatherization Professional

ost people can do just about anything, as long as they have the time, expertise, and proper tools and equipment. If one or more of these are absent or insufficient then it makes sense to hire someone who has them.

I've outlined some things to consider when deciding if you are up for doing the work

Time. It usually takes longer than you think it will so make sure that you have thought about all of the steps involved in order to complete the project. Give yourself enough time to:

- Plan what you are going to.
- Gather the materials you'll need to complete the job.
- Do the work without feeling too much pressure that you rush.

If you don't have enough time to do everything correctly, the results will be unsatisfactory. You or someone else will have to do it over.

Expertise. Many weatherization tasks are straightforward, but a seemingly simple task may get complicated if you run into something unexpected. Expertise comes in the form of knowing how to do something as well as what to do and when to do it. Weatherization work changes how your home functions (which is why you're doing it) and this change can have unintended consequences such as moisture

problems or back drafting of combustion

There are books and classes available to acquire the knowledge you need to understand how your house works from an energy standpoint and what you can do to make it work better. Another option is to work with a weatherization professional on a consulting basis to guide you through the tasks and verify that the work is being done

Tools and Equipment. Some of the tools are basic and inexpensive. Some of them are complicated and expensive. Many of the tools (hammer, utility knife, screw drivers, pliers, tape measure, hand saws, and caulk guns) we use to do the work are relatively inexpensive. but collectively they add up. Fortunately they can and do get used for many other tasks. Other tools (high quality foam guns and power tools) are more expensive. Our most expensive weatherization tool is our cellulose machine and the trailer we tow it with.

If you decide that you have the time, the expertise, and the necessary tools; go for it! If you feel you don't then it makes sense to hire someone to do some or all of the work vou'd like to have done.

Michael Goetinck is the owner of Snowdog Construction Co. Norwich, VT • 802.649.3605 🛟

#### < Cont'd from p.14 Want Some Green Back?

Any toilet that uses > 1.6 gpf, should be replaced with a low-flow types, that have nowadays been redesigned. Cost: ~\$200 dollars, for a great toilet with a nice slow close seat. Many low flow models can be retro-fitted to Dual-Flush technology for under \$20. Dual-flush uses only 1.0 gal.- 1.6 gal.Payback has many factors: for those with wells & septic's, it makes sense as you pay for the water to be pumped and less water in the septic adds life to the system; if you have water bills it really makes sense payback can be as little as 10 mos. Over the life of the toilet the savings can be over \$1000, all while being more comfortable and doing what is right for the planet.

With the costs of energy increasing almost daily and a very cloudy and uncertain energy future it has come time to: "Green is good for all things, people, planet and our homes". Green Homes and Green Remodeling Projects improve lifestyles, are of higher quality, add value, comfort, and healthier spaces. So if you haven't already done so take that first step and get some green back in your wallet, and if you don't need any extra green do it for the improved lifestyle. Those of you that are already onboard deserve a big thank-you for making the change and embracing green initiatives.

If the budget is still a concern and you're waiting for the big score before making the jump to the green side there is hope. Both VT and NH are slowly moving to take advantage of Federal PACE funding which would allow your local government to loan home owner's money for energy improvements. The money is paid back in the form of a property tax line item paid over 20 yrs. Once up and running this system could save you bundles in energy costs with little or no initial expense all while knowing that your energy savings will more than cover the increased taxes. Make your life a green one, all while putting bucks back in your wallet.

#### < Cont'd from p.37 Green HOME in any Color

treatments! Whether you need privacy or just a light filter, Earthshade roman shades are a great natural option. Made from plant fibers, and not finished with toxic sprays, they are a healthy and attractive way to finish your home, and they are custom made to fit your windows. Hemp liners are available for these to insulate the window, helping to keep it warmer in the winter, and cooler in the summer.

In my opinion, one of the most important items in creating a healthy home is the mattress. A conventional mattress is sprayed with enough fire retardants that it can have a Bunsen burner held underneath it for a certain period of time without catching fire. They are also made from mainly petroleum products that do not breath and will off gas. These make for a stressful sleeping surface. At night your body needs to heal from the daily stresses of life. If it is having to fight off the chemicals from your mattress, it cannot rest properly. An organic mattress made from all natural materials creates a healthier and more comfortable surface to sleep on. Natural wool is used as their fire retardant so they pass the federal regulations, but in a way that is healthier for you and your family. Wool is also naturally anti-dust mite, making it good for people with allergies too. I carry a line that has every size from crib to king.

Remember the final touches in the home are just as important. Organic cotton linens and recycled home décor will be some those details that help create a complete green home. If you are interested in more ideas or help in creating a special place for you and yours, please feel free to drop by my shop at 138 N Main Street in Concord. I am easy to find across from the state Capitol building and am open Tuesday through Sunday. More information at www.YourHomeYourWorld.com

### Trams1410m RESILIENCE IN ENERGY SOURCES

by Carl Etnier

he goal of the Transition Town movement is to move from oil dependence to community resilience. But what do we mean by "resilience" when it comes to energy? Let's look at one important type of energy, electricity.

Resilience is the ability of a system to maintain its basic organization and function in the face of a shock. For example, a four-engine jetliner can keep flying and land safely when one or two of the engines fail. A single-engine plane is less resilient; engine failure forces the pilot to find a place to land immediately, within glide distance.

"Reliability" is related to resilience. The electrical grid is designed with reliability in mind. Utilities and regulators design enough redundancy into the system so that even if major power plants are taken off line for some reason, the electricity demand of the whole region does not exceed the supply.

It doesn't always work out, of course. In the northeastern US and Ontario, fifty million people were suddenly blacked out in August of 2003, some places for over a day. Parts of Quebec were without electricity for weeks after the 1998 ice

Longer-term outages may become more common in New England over the next decade or two, even without an ice storm. Over one third of the electricity in New England is generated from natural gas, which is abundant now, but vulnerable to sudden shortages. After Hurricane Katrina, which wiped out a lot of the US natural gas infrastructure in the Gulf of Mexico, northeastern utilities were bracing for a winter of rolling blackouts. The 2005-2006 winter was mild, however, which meant that less gas than usual was used to heat buildings, and the lights stayed on.

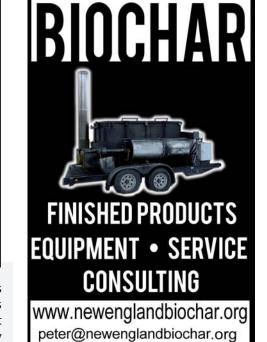
As natural gas supplies in North America wane, it will be harder to keep the regional electrical network running unless it quickly becomes much less dependent on gas. Aggressive investments in efficiency will help; electricity "generated" by efficiency is never vulnerable to supply interruptions. Greater distributed generation from solar, wind, and small hydro is also helpful.

True resilience in electricity goes beyond what mix of electricity comes from the grid. It means living well, or at least getting by, even during a longer outage. That means personal preparation, Going solar is not going to make you rich, but it is good for the environment, will increase the value of your home, and makes us less susceptible to the ever increasing costs of energy.

like a stock of candles or headlamps plus a solar battery charger. It means buildings with appropriate windows, ones that open to provide ventilation if necessary and enough glazing that lighting during the day is adequate.

Resilience is a type of insurance. Systems without insurance can work marvelously-until they don't. Resilient systems are capable of muddling through whatever comes at them.

Carl Etnier is a founding member of Transition Town Montpelier's steering committee and hosts radio shows on WGDR, Plainfield and WDEV, Waterbury on energy, food, and the local economy at the end of the age of oil.



Bob Wells demonstrates the Adam Retort at a training event at the former New Alchemy site in Falmouth MA. June 2010 >>>>



# \*Bob Walker's DIY Window Sealing by SERG's Bob Walker\*

Windows are one of the first things most homeowners think about replacing when deciding they want to weatherize their homes. But replacing windows is very expensive and existing windows can usually be improved to work almost as well as new windows at a fraction of the cost. Here are a few tips and resources you can use to tighten up your windows.

- · Close & latch all windows and storm windows tightly.
- If any of the storm windows do not close tightly, leaving a gap in opposing corners when closed, loosen three sides of the storm window frame from the trim outside, square it up so it closes properly Reattach with caulk & screws.
- Caulk the edges of exterior storm windows to the trim with high quality exterior grade acrylic laytex caulk with silicone make sure not to caulk over the round weep holes at the bottom of the storm panel that drain out
- If you can shake the sash and they rattle, you can tighten the window latches that pull the sash together by removing the inner portion of the closing mechanism, filling old

screw holes with wooden match sticks or slivers of wood, replace the latch, drilling new holes further away from the outer part of the latch so it pulls the two sash tightly together.

• Window sash can be sealed at top, bottom & edges by installing v-shaped weatherstrip. Top and bottom weatherstrip can be installed on the window casing where the top and bottom sash close, with sash in place.

To install side weatherstrip, remove the window stops from one side of the sash, remove the sash, install v-shaped weatherstrip on the window jamb with point of weatherstrip pointing in and replace the sash. If sash is too tight to fit with new weatherstrip, you will need to trim off a very small





amount from one of the sash edges, leaving sash wide enough that they press out against and compress the weatherstrip. Vinyl v-weatherstrip is available from most building supply warehouses. Much longer lasting bronze v-strip is available from

Architectural Resource Center: http://www.aresource.com/cushion.html#start

• If you have old sash with ropes, pulleys & counterweights, remove the inside trim piece covering the counterweight cavity on each side of window.

Cut the counterweight cord and remove the counterweights (make sure sash are latched so they do not drop when removing counterweights).

Remove window stops from one side and remove sash. (This is a good time to install v-shaped weatherstrip at sides - see above.)

Remove cording attached to sash and remove pulleys from window jambs.

If you do not need to retain opening capability of outer/upper sash, reinstall it, temporarily screwing sash in place and caulk at edges.

If you want to keep both sash openable, replace old counterweigh pulleys with "Pullman Window Counterbalance" (available at: 585-334-1350, http://

pullmanbalances.com/) and attach counterweight spring to sash and replace.

Then fill the counterweight cavity with polyisocyanurate foam insulation board, slightly undercut around the outside and air seal edges of foam board with minimal-expanding spray foam.



#### << Cont'd from p. 39 < The Story of Stuff

corporations' pockets while ignoring human rights, environmental responsibility, and social justice. According to Leonard, consumerism and overconsumption are the culprits that need to be reversed but many would call this anti-capitalist perspective "un-American."

Concepts such as voluntary simplicity and downshifting include benefits for part time workers, limits on excessively high compensation, shorter work weeks, and investments in social commons (i.e., libraries, parks, public transportation).

Can It Improve?

Each of the Story's chapters end with solutions, signs of hope, and another way of doing things. Helpful Web sites are often given for updated information. But some of these solutions are years too late and a dollar short while impacting only the tip of the iceberg.

The book closes with the author's outline of a new world vision that includes the subjugation of the individual so that the community self can reign. The solutions range from tariffs on products that are imported from far away and redirecting government subsidies from extractive energy industries toward the development of clean energy options, to ceasing tar sand development, banning mountaintop removal mining, developing a national composting infrastructure, decommercializing our culture, strengthening corporate accountability, and establishing many incentive or punitive taxes.

The Story of Stuff is intriguing but you may find yourself frustrated and hopeless that any of the solutions can ever come to pass. In a world that spent \$1.46 trillion on military investments in 2008, can we redefine progress to incorporate health, social, and ecological impacts as well as GDP? Can we reprioritize time so that is more valuable than stuff? We are confronted with physical limits of the Earth's capacity and Annie Leonard's hope is that we can we can chart a path to alternative systems that exist.

\*Our new DIY (Do It Yourself) column is kindly submitted from Bob Walker, Sustainable Energy Resource Group, Thetford Center, VT. 802-785-4126 • SERG@valley.net • www.SERG-info.org. SERG's newly launched website: www.UVHEAT.org, includes a downloadable Home Energy Savings Information & Resource Guide that provides technical & financial info & resources to help reduce your energy use.

## BIOCHAR BLACK ISthenew GREEN

**By Peter Hirst** 

or thousands of years before the arrival of Europeans, the agriculture of the Amazon Basin thrived on patches of dark earth known in Portuguese as terra preta do Indio. Terra preta was recently discovered to have been created, not by nature but built by the early farmers. These farmers had good reason for their efforts: crops grown in terra preta plots are many times more productive than those grown in the naturally poor soils of the region. The key ingredient of terra preta is charcoal, carbon in its elemental form, which forms ~ 8-10% of the mass of terra preta soils.

Now a growing movement of green entrepreneurs is bringing this key ingred-ient, called biochar, to the US. Several comp-anies throughout the US are developing finished biochar products, production equipment & educational services. In the past year New England Biochar, of Cape Cod, has emerged as the principal company providing these comprehensive services and products in this area. With biochar, these entrepreneurs bring the promise of building good soil from bad, conserving nutrients in already good soil, and producing green energy in a system that is not just carbon neutral, but highly carbonnegative. Two key co-products are renewable energy and direct carbon sequestration.

April 2010 New England Biochar - community biochar production & training session: Shelburne Farms, VT > >>>

#### Biochar is a relatively pure form of charcoal

 elemental carbon, specially prepared for use as a soil amendment. Biochar builds and maintains soil due to physical and chemical properties, notably adsorption, cation exchange capacity, & microporous structure.

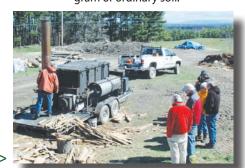
Adsorption is the chemical property

Adsoprtion is the chemical property carbon maintains a slight electrostatic charge that attracts and holds organic compounds and water, much like an activated charcoal filter, far more strongly than ordinary soil components, preserving them in the soil, reducing loss by leaching and evaporation, greatly increasing their concentration & availability to root systems.

**Biochar also enhances cation exchange** capacity, the principal chemical process by which nutrients are transferred from

soil to root systems.

The highly porous microstructure of biochar augments the effects of adsorption and CEC, and provides vastly improved habitat for essential soil microbiology. A single gram of biochar is so porous that it holds ~385 square meters of surface area, as compared with perhaps a single square meter in a gram of ordinary soil.



#### Biochar is made from plant biomass

- usually waste wood products, by pyrolisis, the process of breaking down the chemical structure of the biomass by heat. Since only about 10% of the enrgy content of the wood is required to complete pyrolisis, and 50% is retained in the biochar

itself, up to 40% of the heat content of the wood is available for other purposes, providing renewable energy offsetting other fuels. This energy is captured as process heat directly from the pyrolisis, hot water from cooling processes, and by wood gas, a fuel gas given off in pyrolisis that runs electric generators, conventional internal combustion engines and gas burners. Because biochar is best made from what would otherwise be waste wood materials, the natural scale of its production and distribution is comparable to that of a compost operation: highly distributed local and community-based. In addition to building good soils, biochar also holds the potential for building communites through a new, value-added green industry creating green jobs and recycling local resources. In future issues of GET, we hope to explore in more depth the production and application of biochar, its results on the farm, and its promise for local economies, renewable energy and carbon sequestration.



#### Biochar is Carbon-Negative

Biochar is elemental carbon - pure carbon not in chemical combination - therefore permanently fixed in soil, not taken up & recycled by plants or other organisms. It is carbon that is removed from the carbon cycle and returned to the earth.

Since it is made from organic matter that would have otherwise have decomposed into CO2 and other greenhouse gasses, biochar in the soil represents a net CO2

sequestration: A ton of biochar directly reduces net atmospheric CO2 by about 3 tons.

In addition to direct carbon sequestration, a recent study by Cornell materials and soil scientists, Dr. Kelli Roberts and Dr. Johannes Lehmann calculate that use of biochar displaces and reduces other carbon and energy uses, such as chemical fertilizers, by 3-4 times the amount of direct sequestration, resulting in:

Total CO2 equivalent reduction of over 10 tons/each ton of biochar added to the soil.

Peter Hirst is a principal of New England Biochar, LLC, of Cape Cod, MA. For further information, including biochar products, equipment and education. 650-804-0498 peter@newenglandbiochar.org

# On the Permaculture Path

by Steve Whitman

In the last issue, Mark Krawczyk defined Permaculture for us (Redesigning Culture August 5, 2010), and suggested that it is a universal tool to help navigate our way toward a culture of sustainability. Now we would like to suggest some ways for those of you that are new to Permaculture to learn more and join us on the path. Here in the northeast we have a wonderful online resource called the Northeastern Permaculture Wiki which can be found at: http://northeasternpermaculture. wikispaces.com/. This website includes an events calendar, course listings, a designer's database, and many other resources to aid you in your Permaculture education or design efforts.

As winter approaches many of us find time to attend courses, read, and consider the possibilities of a Permaculture design for our property. Taking a Permaculture Design Course (PDC) is one of the best ways to really jump into Permaculture and get started quickly. In a PDC you will learn about the guiding ethics and principles, the design process, and many other techniques related to design and implementation of Permaculture systems. These courses are offered in many different formats from residential courses that last for two weeks to weekend courses that are offered over many months. What they all have in common is a core curriculum and a minimum of 72 hours of content. Some courses even assist you with a design process focused on your own property.

If you are not ready to take a PDC yet I would suggest you start reading and visiting Permaculture sites in your area. The two volume set Edible Forest Gardens is a place to start for those of you with a basic understanding of Permaculture and a desire to get started on your own land or a community project. These texts provide in-depth guidance on how to begin articulating the goals for your property, and how to start the site analysis process that will lead you toward a plan of your own. Another great resource is the Permaculture Convergence that takes place each July. The 2010 Convergence was in Unity, ME. Watch for an announcement of the 2011 event and the list of workshops on the Northeastern Permaculture Wiki. Regardless of how you decide to proceed have fun and enjoy the ride!

Steve Whitman is a Permaculture educator, planning consultant, and adjunct faculty member at Plymouth State University in NH. His work is focused on creating more resilient communities that care for the earth. Steve is also a founding member of the Plymouth NH Energy Commission, and a Board member of the Plymouth Area Renewable Energy Initiative (PAREI). Find him at www.low-energy-future.com.

# Creating a GREEN HOME in Any Color

Being the owner of a small green home store in Concord, called Your Home, Your World, I get a lot of people coming in with many questions about how to create a healthy living environment. The following are what I think are the most important places to start, and can be applied to any room of your house or work space.

First of all, what is a green home? There are two main areas to consider: how does the product you are using affect your family's health, and how does the product affect the environment?

The first is most people's main concern. Conventional paints, finishes, glues and even bedding and toys can be filled with toxic chemicals that studies suggest lead to developmental and learning problems, as well as asthma, allergies, chemical sensitivities and are bad for the ozone. You want to look for.

When re-painting, or refinishing a room or furniture look for low or zero VOC (volatile organic compounds) paints and finishes. I carry a line of paints called AFM Safecoat that is nontoxic, zero VOC, and durable. This company has been making healthier paints for nearly 30 years, so not only is it better for you, it is high quality. Another option for furniture, especially children's furniture, is to paint it with milk paints. The base of these paints is the milk protein, which creates a very hard surface that is non-toxic. It has a wonderful flat finish as well, and has been used for centuries. I don't recommend wallpapering as it is very difficult to find wallpapers that have non-toxic adhesives and are not vinyl based. Both the adhesive and the vinyl wallpaper can

off-gas and create poor indoor air quality.

For healthier flooring options you are really not limited anymore either. Do you want hard wood? Look for FSC (Forest Stewardship Council) certified sustainably forested hardwoods made with formaldehyde free adhesives. The brand I carry is Eco Timber. Do you want something that feels warmer and softer under foot, but is still durable? Cork floors are a wonderful option for any room, but are especially popular in kitchens. With the easy to install click together system, it is a great DIY project. Cork is a renewable resource, being the bark of a tree that is harvested every 9 years, and the floors I carry are made with a very low formaldehyde content, and the finishes will not off gas. Want carpet? There are two great options. The natural option is Earthweave wool carpets. These are made from unbleached, undyed wool, the adhesive used is from natural rubber, and there are no chemicals applied. They are soft, warm and healthy, and are available as wall-to-wall carpet, or area rugs. If you want more color, another option is FLOR carpet tiles. Theses are nylon carpets, but without the finishing sprays conventional carpets use, they are better for your indoor air quality. These come in square tiles in a variety of colors, textures and patterns that stick to each other with a sticker so you can create your own design and exact size rug you want. It can also be installed as an area rug or wall-to-wall. At the end of FLOR's lifespan, the company takes the tiles back and recycles

Don't forget the window >> Cont'd on P. 35 >

### resources

#### **SOLAR & RENEWABLES LINKS:**

- **Efficiency VT** <u>www.efficiencyVT.com</u>. This is a must go to site for immeasurable amounts of info.
- SEIA/ Solar Energy Industries Association: http://www.seia.org/ The SEIA Tax Manual to answer your solar related tax questions.
- **Dsireusa.com.** www.dsireusa.com. Renewables & Efficiency. Find state, local, utility, & federal incentives for renewable energy & energy efficiency.
- IREC/ Interstate Renewable Energy Council: www.irecusa.org. RE educational info.
- NABCEP/ North American Board of Certified Energy Practitioners: <a href="www.nabcep.org">www.nabcep.org</a>
  This organization that tests & certifies PV system installers. Individuals are Certified, companies are not.
- NESEA/ Northeast Sustainable Energy Association: www.nesea.org. Focused on N.E. US, for consumers & industry- RE & clean building info, events. . .
- NHSEA/ New Hampshire Sustainable Energy Association <u>www.nhsea.org</u>.
- **NYSEIA**/ New York Solar Energy Industries Association: <u>www.nyseia.org</u>.
- RENEWABLE ENERGY VT- www.REVermont.org
- **Clean Power Estimator:** <u>www.consumerener-gycenter.org/renewables/estimator</u>
- The Energy Grid: www.pvwatts.org
- Find Solar: www.findsolar.com
- Energy Star Federal Tax Credits; www.energystar.gov/taxcredits.
- Tax Incentives Assistance Project (TIAP): www.energytaxincentives.org.
- American Solar Energy Society (ASES): www.ases.org.
- Energy Efficiency & Renewable Energy Clearinghouse (EREC): <a href="http://eetd.lbl.gov/newsletter/CBS">http://eetd.lbl.gov/newsletter/CBS</a> NL/nl6/Sources.html.
- Federal Energy Regulatory Commission (FERC): www.ferc.gov.
- National Association of Energy Service Co. (NAESCO): <u>www.naesco.org</u>.
- National Renewable Energy Laboratory (NREL): www.nrel.gov
- Renewable Energy World <u>www.renew</u>

- Energy Efficiency & R/E Clearinghouse (EREC): http://eetd.lbl.gov/newsletter/CBS NL/nl6/Sources.html.
- Federal Energy Regulatory Commission (FERC): <u>www.ferc.gov</u>.
- Solar Living Source Book: www.realgoods.com
- Home Power Magazine <u>www.homepower.com</u>
- Solar Components: <u>www.solar-components.com</u>
- www.backwoodssolar.com Specialty: solar, off-grid.
- NEsolar.com
- http://www.nationalsolarinstitute.com/
- <a href="http://www.vthomeownership.org/">http://www.vthomeownership.org/</a> Low-cost energy loans
- www.energyguide.com Unbiased advice about today's energy choices. Find ways to save, lower your bills & help the earth's environment.
- http://hes.lbl.gov/ Interactive site to help you identify & calculate energy savings opportunities in your home. A lot of great information!
- <a href="http://aceee.org/consumerguide/index.htm">http://aceee.org/consumerguide/index.htm</a> Consumer guide to home energy savings...
- **Hydro** <u>www.communityhydro.biz</u>
- Wind www.earthturbines.com
- http://energyfreegreenhomes.com/
- VT Energy Investment Corporation (VEIC)
   nonprofit organization that issues home energy ratings for new & existing homes. 800-639-6069. www.veic.org/
- http://www.smartpower.org/
- **Greywater info**-www.oasisdesign.net/greywater/
- Weatherization, Energy Star & refrigerator guide <a href="http://www.waptac.org/">http://www.waptac.org/</a>
- http://buildingsdatabook.eren.doe.gov/
- The Office of Energy Efficiency & Renewable Energy (EERE) <a href="http://www.eere.energy.gov/">http://www.eere.energy.gov/</a> develops
- Energy (EERE) <u>http://www.eere.energy.gov/</u> develop: & deploys efficient & clean energy technologies that meet our nation's energy needs.
- **VPIRG** understand the clean energy resources avail able to VT. <a href="http://www.vpirg.org/cleanenergyguide">http://www.vpirg.org/cleanenergyguide</a>
- U.S. Department of Energy (DOE) Energy Efficiency & Renewable Energy: <a href="https://www.eere.energy.gov/consumer.guide">www.eere.energy.gov/consumer.guide</a> to energy efficiency
- TRACK THE STIMULUS MONEY-
- http://www.recovery.gov/Pages/home.aspx
- **Dept. Public Svc. (CEDF)** <u>http://publicservice.VT</u> .gov/energy/ee cleanenergyfund.html

### CLASSIFIED ADS

E-mail to: info@greenenergytimes.org. 50 words/\$20. Due 10.22.10. Call: 802.439.6675

#### ANNOUNCEMENT

"The Clear Mountain Solar store, which was on Washington St. in Claremont is moving to a new location in the Claremont area this spring. Look for more information at the beginning of 2011."

#### THE BARREL MAN

I HAVE ALL types of Food Grade Pails Barrels • Compost Barrels • 275 gallon Totes for sap in stock. Call for appointment. **802-439-5519.** Solar Powered Business is located in W. Topsham, VT.

#### **B**ATTERIES

What's the Best Way to Save? Trojan T-105's in a new black case. \$160 (lower price for multiple purchases) Ask for Alex or Paul: **802-584-4977**.

#### Building School

**DESIGN & BUILD YOUR OWN GREEN HOME!** Yestermorrow Design/Build School in Warren, VT teaches over 150 hands-on courses per year in sustainable building & design, woodworking, & architectural craft. Offering short workshops & certificate programs for people of all ages & experience levels, from novice to professional. **888-496-5541** www.yestermorrow.org.

#### **E**VENTS - NHSEA

**NHSEA Annual Meeting.** Nov. 6, 1-4 pm Free to attend! NH Audubon Society McLane Center in Concord, NH *Jim O'Brien, Director of Conservation NH.* New Hampshire Sustainable Energy Association 603-226-4732 <a href="https://www.nhsea.org">www.nhsea.org</a>

#### EVENTS - SUSTAINABLE RUTLAND

Take the Thanksgiving Localvore Challenge!

Thanksgiving is a time to give thanks for the many gifts & joys that fill our lives. Spend a whole day appreciating our families, friends, neighbors & the many people who make our communities healthy & vibrant.

Those of us fortunate enough to live in the Rutland region have many reasons to be thankful, including the abundance of delicious & healthy locally grown & produced food, much of it available all year long. This Thanksgiving, celebrate in the spirit of the first Thanksgiving feast. Create your meal with foods grown & produced within 100 miles of where you live. Support our local economy, farmers, & landscape. Sponsored by Sustainable Rutland & the Rutland Area Farm & Food Link (RAFFL). More info, including recipes, how to's and suggestions on where to find local ingredients: http://rutlandlocalvore.wordpress.com

#### L.E.D. PEACE SIGN

COMMERCIAL DC GENERATORS, 5.5kw 12/24/48v. Fully Automatic. For serious Solar, Wind, Repeater, Off Grid. Onan/ Cummins. USED: Ex Telephone/Cell, Low hours. LP/NG/Wood Gas, variable speed – quiet, economical. Tested: Driven rain, fire, shotgun, lightning, to -40°F. No line noise, transfer switch or charger vs. AC GENSETS. \$2-3K, NEW=\$12K. Model in production 15 Yrs. 10,000 units in use. Details: <a href="www.sagecliff.com/generators">www.sagecliff.com/generators</a> www.cumminspowerproducts. com/DCgensets/CaseStudies/
Jerry Whiteleather Meredith, NH 603-279-6606 jerryw-1030@yahoo.com

#### HEAT - STOVES

"BIOMASS HEAT SALE" Just in time for the heating season!!! (4) Drolet Eco 35 Pellet stoves: \$1,250; (1) Kuma stove: \$995 (6) Alaska oil stove: \$900; (2) Country Flame wood stoves: \$1,190; (2) Magnum Furnace 6500: \$1,995; Quantity discounts available! Call: 802 226-7700

#### L.E.D. PEACE SIGN

**L.E.D. Powered 13" diameter peace symbol** light. 39 Light-Emitting Diodes create bright white light, using 90% less electricity than incandescent bulbs; never burn out (diodes have no filament); last 100,000 hrs; stay cool to the touch; 13' long A.C.power cord; optional battery-pack available. Visit: <www.donnellycolt.com/catalog/misc.html#700> Call Donnelly/Colt (860) 455-9621. \$23.95 + \$5 Priority Mail or UPS Ground in New England.

#### TAKE THE PLEDGE

Over 200 Vermonters including respected environmental leaders and authors, directors of organizations, business owners, corporate executives, farmers, clergy, political leaders, college faculty and students, journalists, radio hosts, and family teams have taken the pledge! Why not you? Take a look at the names and then take the pledge to live more sustainably at <a href="http://www.vspop.org/htm/VSP-Pledge.htm">http://www.vspop.org/htm/VSP-Pledge.htm</a>

#### Solar Parts

**USED** MX-60 Charge Controller; USED: C-30A Charge Controller; Outback Combiner Box - demo in good shape; NEW: Midnite Solar E-Panel for Outback 48V Inverter; IOTA 15amp Battery Charger for 48V system > 54.2V output; FW250 Flexware 250 Monitoring box system. Call **CV Solar 802.770.8625** 

# Trendy Threads

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#### Wool

Natural Wool **Products:** Pillows, Mattress covers, wool batts for quilt fillers, handspun yarn various colors, custom washing & carding. Large felted wool pieces custom designed by you! Natural lamb & machine washable sheep skins, beginning lessons-wheels spinning provided. havewool@gmail. com 802-353-8656.

Cyan



by Roger Lohr

Author Annie Leonard created the Internet film sensation The Story of Stuff, which has been viewed by 12 million people the world over and now she has put the story in print. The book sheds light on how our obsession with stuff is trashing the planet, our communities, and our health. People who consider themselves sustainability-arians will deem The Story of Stuff a must-read vision for change bible.

The Story of Stuff outlines the stages of our consumptive lives from extraction through production, distribution, consumption, and disposal. Leonard coins some appropriate phrases such as the need for "dematerializing" and taking a check of "body burden levels" (the amount of chemicals in our bodies). Our impotent government needs to demand that producers pay the "externalized costs" for impacts on human health, civil rights, and ecology.

She reveals many uncomfortable facts:

We use 800 million gallons of gas each year to mow lawns. We throw away 150 million cell phones every year. The small amount of gold in an average wedding ring is responsible for 20 tons of hazardous mining waste. 800,000 tons of aluminum cans were landfilled in 2004 in the US alone. And Leonard referenced the toxic danger of aluminum production

# Interiors green Shots!

THE HOME AND LIVING STORE

By Jessica Goldblatt Barber withTeresa Tupaj Wood

**Introducing Interiors Green Shots** - a new column, featuring healthy home & living tips for you, your family, your home & our planet.

If we act locally & think globally, we make our homes, our lives, & our planet a healthier, happier place. Welcome to Interiors Green Shots!

**November:** As the weather turns colder & we begin spending more time indoors, we should also start thinking about the quality of our indoor air. Reducing our exposure to harmful VOCs (Volatile organic compounds) is paramount, & the single best way to do so is to eliminate our use of toxic cleaners. Conventional cleaning products are the #1 contributor to poor indoor air quality.

You can make a dramatic change to your home's indoor air quality by simply choosing safer, non-toxic alternatives. A wealth of wonderful non-toxic cleaning products are readily available at your local health food store, grocery store, and/or online. You can also make your own cleaners from everyday products like vinegar and baking soda.

Change your cleaning product choices, choose natural, untreated fabrics, VOC free paints & finishes when possible, and you and your family will soon be breathing much sweeter and healthier!

**December: Tis the season of GREEN.** We don't mean your shopping budget! This Holiday season, remember to choose environmentally friendly gifts, shop locally, & get creative with beautiful green gift wrapping.

When it comes to choosing gifts, think sustainability, quality over quantity & longevity vs. disposability. Shopping for a foodie? Bamboo & wood tools & utensils, cast iron cookware, quality stainless steel bakeware, or even a subscription to a monthly organic wine club make wonderful gifts. Gifts for the home include scented bees

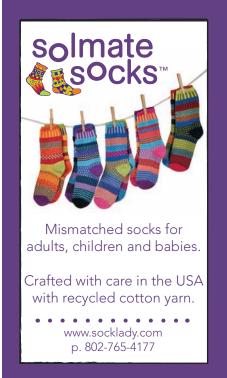


before the bauxite slurry disaster poured into the Danube River and deluged three Hungarian towns killing people and poisoning many more last month.

In the US, we consume 100 billion

cans per year or 340 per person and the peak for recycling aluminum cans occurred in 1992 at 65 percent while today only 45 percent of aluminum are recycled. world Eliminating hunger/malnutrition is estimated to cost \$19 billion while people in the USA and Europe combined spend \$17 billion annually on pet food.

Leonard dishes a double dose of dioxinlaced venom on the international financial institutions such as the World Trade Organization, who lend money to poor countries in order to line mega >> Cont'd on p. 36 >



wax candles, herb starter kits, organic teas or coffees, an air purifying indoor plant, or anything made from the heart. Fashionistas & outdoor enthusiasts alike will appreciate quality garments made from gorgeous (and high performing) natural fibers. Green gift alternatives are everywhere. If you can find them locally, it's all the better for your local economy and our planet!

#### January: Organic Mattresses vs. Conventional.

Considering we spend over a third of our lifetimes in bed, & that sleep is a time for our bodies to heal, renew, & rejuvenate, an organic mattress is one of the best places to significantly make a difference in our overall health. Standard mattresses are constructed of highly flammable petroleum based foams & other artificial materials, soaked & sprayed with an average of 1 1/2# of chemicals, including flame retardants, fungicides, herbicides, & stain guards. Many of these chemicals are known carcinogens. These chemicals off gas over time & we breathe them in while we sleep.

Natural & Organic Mattresses are the fastest growing sector in the mattress industry. Organic mattresses are a wonderful way to get rid of a significant source of our total chemical expose, & they are also highly recommended for offering a superior sleep surface. Buying an organic bed is an investment in your health as well as the health of our planet!

Jessica Goldblatt Barber is the owner of Interiors Green, The Home & Living Store, located on Main Street in Bethlehem NH. Interiors Green carries a full line of eco-friendly, finish-building materials, high quality USA-made organic mattresses, bedding, natural baby goods, furnishings, window treatments, household items & gifts. All products are sustainable, renewable, organic & natural, fairly traded & sourced with regard for humans, animals, & the Earth that sustains us. Visit www.interiorsgreen.com, email info@interiorsgreen.com, 603-616-6499. Interiors Green - helping you create a healthy & beautiful home, one smart choice at a time!

# THE GREEN LIFE





THE HOME AND LIVING STORE

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Avoid the lines at the mall! Shop in downtown Concord on

# **Green Friday**

Friday, November 26

Support your local environmentally-friendly businesses. Enjoy stress-free holiday shopping and refreshments.

Enter to win gift certificates and merchandise from the Green Concord businesses!

Company C | Concord Cooperative Market | Gondwana & Divine Clothing Co. | S&W Sports | Cafe Indigo | Your Home, Your World | Lotions n' Potions | The Works Cafe | GES Solar Store | Real Green Goods | Merrimack County Savings Bank | Grappone Automotive



40



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286 Waits River Rd Bradford, Vermont 800-222-9316 Friday night till 8PM Monday- Saturday 8:30-5:30 closed Sundays