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green energy times

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Vermont Renewable Industry Hails Passage of Energy Bill

New statewide solar adder promises to expand net metering throughout Vermont

MONTPELIER, Vermont | May 12, 2011

A bill promoting renewable energy development in Vermont and clean energy jobs won final approval by the Vermont Legislature this session.

Martha Staskus, Chair of the Board of Renewable Energy Vermont (REV), the organization that supported and promoted this legislation says the bill helps keep Vermont on the map as a leader in renewable energy and energy efficiency. "The bill will spur the development of new local renewable energy, produce economic growth, and continue to grow clean jobs."

H.56, The Vermont Energy Act of 2011 continues Vermont's efforts to promote a green economy and energy indepen-

dence. It expands and improves Vermont's successful net metering program which allows Vermont ratepayers to generate their own energy with renewable systems and run their meter backwards when producing excess power. Recognizing the peak power savings of net metered solar, the new bill creates a financial incentive to catalyze more net metered solar by requiring utilities to offer a 20¢ credit to solar net metering customers for the energy they produce.

"The new statewide solar adder gives Vermont homeowners, businesses, nonprofits and municipalities the incentive and ability to produce their own solar energy while recognizing the public benefit of distributed solar energy to

>> Cont'd on p.2 >

the Middlebury So. Village Professional office building

High Performance Building the Result of a Collaborative Process



At the southern gateway to Middlebury, in the Middlebury South Village (MSV) planned development, the recently completed MSV Professional Office Building, is a testament to achieving high energy performance through a collaborative team effort. The team of the developer, Renaissance Development Company, Maclay Architects and Naylor & Breen Builders recently received record setting results on an air sealing test that illuminates the benefits of a detail focused, flexible, team-oriented approach to goal-setting, design and construc-

tion. Blower door test results set records for both the architect and builder as the tightest, commercial building envelope either firm has designed or constructed.

Middlebury South Village (MSV)

is a 31 acre mixed-use, 'smart growth' development. Within this smart growth community, the MSV Professional Office Building, a two story, 17,000 square foot office building, is the new home for departments of the Vermont Agency of Human Services.

The Renaissance Development Company determined early on that the leading goal of the building project was to create an energy efficient and environmentally healthy building. A healthy building, from the perspective of both Renaissance Development Company and Maclay Architects goes beyond mere energy efficiency, and includes efficient

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Innovative Community Powers Itself WITH RENEWABLE ENERGY

AND The City of South Burlington

By Chad Farrel & Dylan Raap

A 150kW solar array currently under construction in South Burlington, Vermont, will soon be generating electricity for an uncommon consortium of users including a farm, a residential community and the City of South Burlington. This net metered solar array is a proof-of-concept project associated with a farm and a community energy venture program being created by Vermont entrepreneur Will Raap and Encore Redevelopment of Burlington, Vermont (encoredevelopment.com). The 528 panels are being installed on a 10-acre organic vegetable farm



Ground Mounted Solar Racks with View of the Adirondack Mountains in the background at South Village, South Burlington, VT

in South Burlington called the Farm at South Village which is a part of South Village Communities LLC (southvillage.

com), a 220 acre conservation development located at the intersection of Spear Street and Allen Road, approximately 10 minutes from downtown Burlington. South Village Communities is currently in Phase 1 of construction, with 20 units expected to be completed by the end of 2011.

The Farm at South Village is at the center of the South Village community in both location and spirit. Now in its third

year of operation, the farm has approximately 5 acres under cultivation, with the remaining land being prepared

for additional vegetable crops, berries, orchards and greenhouses. The Farm at South Village CSA, which is open to

>> Cont'd on p.22 >

Gas prices Rise - so does your lawn! Rechargeable Mowers to the Rescue

With no gas to buy, no emissions, no belts to break, no engine noise, it is not only a pleasure to use an all-electric lawn mower, but good on your pocketbook and the planet. We hope that soon we will no longer hear that hum of a lawn mower engine that permeates our summer's serenity.

Help is not 'on the way' - it is here! We have personally tested four of these on our rough country, VT lawn - a former pasture.

All of the mowers we tried use no gas, oil or have fumes (no fossil fuels), no filters, plugs or belts, and are emissions-free. This means no maintenance except to sharpen the blades. You DO have to plug the battery in to recharge the battery. Clean. Quiet. Simple. Unplug and you're on your way.

We have tried four mowers, in search of the perfect one to replace that polluting, gas sucking, noisy machine. With the price of gas, there might be more bugs breeding in some tall unmowed lawns this summer! Here's the low-down:

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<< CONT'D FROM FRONT COVER
MIDDLEBURY OFFICE BLDG



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ings is only for the first year, if energy prices continue to increase; the savings will only go up.

The high blower door test results at the MSV Professional Office Building were due to several factors, but according to Nick Denardo, superintendent for Naylor & Breen Builders, "The major reason this project was so successful is because of the time that Jeff Glassberg, MSV's owner representative, took to gather all of the project team together and explain what he was trying to accomplish."


The selection and installation of building envelope components are also of utmost importance to ensure that materials perform at their optimum ratings. Window installation is likely the most

>> CONT'D ON P. 31 >>


water use, local materials, and provides a healthy work environment for its occupants. Maclay Architects pushed this goal by providing clear metrics in the specifications and developing design details that helped bring this to reality.

The project specifications set an ambitious original goal for an air sealing target, beyond that required by Vermont Energy Code, and this goal was exceeded by a significant margin. After completion of the building envelope, a final blower door test completed by Efficiency Vermont determined the final air infiltration reading to be 0.06 CFM50/sq. ft. exterior surface area. This reading means that for every square foot of exterior surface area of the building envelope, 0.06 cubic feet per minute of air travels through the envelope when pressurized to 50 pascals. "The goal set out in the design specifications was 0.20 CFM50/sq. ft. exterior surface area, so this result is 2/3rds better than anticipated," according to Bill Maclay from Maclay Architects.

Energy consultant, Sandy LaFlamme, of Efficiency Vermont states that, "This is one of the tightest commercial buildings tested by Efficiency Vermont – and it also achieved Core Performance, a nationally recognized set of high-performing building standards offered through Efficiency Vermont." These results really 'push the envelope.' Sandy LaFlamme also indicates that, "This building will save an estimated \$2,800 annually in propane costs over a 2011 code-minimum air sealed building." And this sav-



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Middlebury South Village Professional Office Building

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Factoids

- ✓ Silicon from just one ton of sand, used in photovoltaic cells, could produce as much electricity as burning 500,000 tons of coal.
- ✓ The amount of recycling in 2007 saved the energy equivalent of 10.7 billion gallons of gasoline and prevented the release of carbon dioxide of approximately 35 million cars.
- ✓ After Ireland created a 15-cent charge per plastic bag in 2002, bag consumption dropped by 90 percent. In 2008, the average person in Ireland used 27 plastic bags, while the average person in Britain used 220. The program has raised millions in revenue.

from SolarFest

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photos: A. Blake Gardner, Oran Moore

MOTOR OIL: *The Other Automotive Fossil Fuel*

By Evan Wisell

When most people think about fossil fuels and vehicles, the first thing that usually comes to mind is gasoline. Everyone knows car and trucks burn gasoline at sometimes frightening rates. But there is another fossil fuel involved with modern automobiles, one that is often overlooked, and that is motor oil.

Motor oil plays an important role in any vehicle's engine. It lubricates critical parts, which not only keeps your car or truck on the road longer, but also allows your engine to operate at a higher efficiency, giving you better gas mileage and reducing your carbon footprint. Even hybrid vehicles require an engine lubricant like motor oil to function.

An educated consumer has many options when it comes to engine lubricants. Conventional motor oil, while certainly the most affordable on the shelf, is hardly the most energy or environmentally friendly choice. Conventional motor oil is petroleum based, meaning it was pulled from the ground and then put through an elaborate refining process. The extraction and refinement involved in turning crude oil into motor oil uses a tremendous amount of energy and generates a good deal of air pollution.

Synthetic motor oils, like Mobil One, are a better option. As opposed to making motor oil from the conventional petroleum base, true synthetic oil base stocks are artificially created. Synthetic motor oils are not derived from fossil fuels, take less energy to produce, and regularly out-perform traditional, petroleum-based motor oils in industry tests. Synthetic motor oil generally lasts longer in your engine, maintains better viscosity in extreme temperatures and allows your engine to run at a higher efficiency than conventional motor oil. It may cost a little more, but a synthetic motor oil is decidedly better for both your car and our planet.

Re-refined motor oil is another good option. Most consumers don't realize that conventional, petroleum-based motor oil is 100% recyclable. Motor oil can get dirty, but it never wears out. Used motor oil can be re-refined and turned back into a product suitable for providing quality engine lubrication. Re-refining is energy efficient; less energy is required to produce a gallon of re-refined base stock than to produce a gallon of base stock from crude oil.

Re-refined motor oil also creates a closed-circuit of fossil fuel usage as we are able to infinitely re-use the same organic matter originally pulled from the Earth.

A particularly sad fact is that in the U.S., less than 60% of used motor oil is recycled.

This wasted oil could be used to make re-refined motor oils, but instead it ends up polluting our waterways. Used motor oil can contain hazardous toxins like benzene, lead, zinc and cadmium. One gallon of used motor oil can ruin the taste of one million gallons of drinking water, enough water to supply fifty people for an entire year.

Many do-it-yourself oil changers dispose of their used motor oil the "old-fashioned" way: by burying it in their backyards. This old, improperly-disposed-of oil ends up in our waterways, polluting our environment.

At Oil n' Go, we are dedicated to preserv-

ing a clean, natural environment and increasing our non-fossil fuel energy efficiency. That is why we suggest using synthetic motor oils for all vehicles. We feature the fully synthetic Mobil One for our Supreme Oil Changes, and recommend this option to all of our customers. Not only have we found that the fully synthetic motor oils perform better, but they are unquestionably better for our environment and our dependence on fossil fuels.

Oil n' Go technicians also make sure that 100% of our used motor oil, both petroleum-based and synthetic, are recycled properly. We treat used oil very carefully; making sure that it doesn't spill and is safely collected for re-refinement. At Oil n' Go, you won't see pools of oil collecting on the floors. Every last drop of the oil we drain out of cars ends up going back to the refinery, where it becomes re-refined motor oil to be used again.

If everyone chose either synthetic or re-refined motor oil instead of conventional motor oil, the dwindling supplies of fossil fuels on our planet wouldn't be used to create these important engine lubricants. Conventional motor oil may be the most affordable, but it has higher costs than you might realize.

1. *Managing Used Oil: Advice for Small Businesses*, Publication: EPA530-F-96-004, U.S. Environmental Protection Agency, Nov. 1996.
2. *SynLube, Inc. website*, as of March 2002.
3. *Recycling Used Oil: What Can You Do?* U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response (OS-305), EPA/530-SW-89-039B, June 1989. ♻️

CVPS Update: charging stations

A couple of you have asked today if we are planning any public charging stations for electric vehicles. The answer: We sure are! We have had a team working on it for several months. Since utilities can't legally give away electricity, one of the things we are looking at is how to charge for the use of such a site. I expect we'll be doing something later this year, but we haven't announced anything because we don't know exactly where or when.

We do have two solar-powered charging stations already for our own electric-hybrid vehicles, one complete and one under construction. The first one is directly behind the office building here on Grove Street in Rutland, which has been up and running for several months. The second is under construction in the little parking area at our solar project on Route 7 in Rutland Town. We added one set of new panels over there specifically to charge our vehicles, but the final electrical work isn't quite finished yet. We currently own four hybrid-electric vehicles.

We are also working on communications materials for auto dealers who will sell electric and hybrid-electric vehicles to let them know about time-of-use rates that could be very attractive to EV and HEV owners.

When plans are more finalized, we'll update you.

Steve Costello, (802) 747-5427, CVPS - Recognized by Forbes as One of the Most Trustworthy Companies in America. ♻️

TRANSPORTATION TIME TO RECHARGE YOUR BATTERY

by Roger Lohr

According to a recent story in the Wall Street Journal car-charging stations to serve electric vehicles are set to begin popping up across the nation later this year. Electric cars such as the Nissan Leaf is slated to cost in the mid-twenties after rebates, so the Federal gov't has contracted to have nearly 20,000 locations in 16 metro areas as charging points. These are the places that electric cars can be plugged in to recharge their batteries. Since electric cars can only travel so far on a charge, it will be necessary to charge the batteries while away from home if you go on trips of more than 50-100 miles away from home.

The Department of Energy has established contracts with companies such as ECOTALITY and Coulomb Technologies so that it can learn about successes and avoid pitfalls in the future as chargers are rolled out more broadly. Presently gas stations and national chain stores are being considered but what is not understood is whether people would linger while their vehicle batteries are charged.

At this point, the companies are selling three levels of chargers, including a home charger (120 volts), a commercial charger (240 volts), and a super charger (480 volts). These different levels of chargers will vary in how long it takes to charge the batteries. For

example, in 15 minutes the chargers can provide enough juice for the vehicle to drive another 2 miles, 8 miles, or 50 miles respectively. The super charger valued at \$25-50,000 each will fully charge the batteries within 15 minutes, while in one hour the home charger will recharge less than 10 miles worth and the commercial charger would be good for about 25 miles. You'd expect that people will use electric cars for shorter trips and recharge them over night in their garage. There might be great interest to install 240 volt outlets in the garage (similar to the clothes dryer outlet) so the battery charges faster compared to regular electric outlets

In Israel, a debut test is on-going, whereby the vehicle owner subscribes to a monthly service combined with a distance-based fee. This test includes a battery swapping concept as one idea that will avoid having to wait for the battery to charge. Until batteries are improved to hold a charge longer or the charge can be accomplished quicker, the challenge of recharging will be interesting to watch the impact on electric car sales. One would hope that the cost of battery charging will be lower than the cost of gasoline to cover a month travel needs...but who knows if anyone is testing that concept. ♻️

GMP to Install Public Charging Stations for Electric Cars

Green Mountain Power announced plans to install three public charging stations for electric cars in 2011. The charging stations will use state of the art technology, powered by the sun and is "still nailing down some of the details, but we are expecting to have an announcement in a few weeks and a new mini-web site on charging stations in June, said Dorothy Schnure to Green Energy Times on April 26th, 2011.

"Electric vehicles are part of Vermont's energy future," says Mary Powell, President and CEO of Green Mountain Power. "Transportation currently represents a significant percent of Vermont's carbon emissions and electric vehicles need to be part of a cost-effective strategy to reduce dependence on fossil fuels. These new charging stations will help highlight the environmental benefits of fueling more vehicles with electricity." As part of the project, the company plans to install solar panels to produce renewable energy equal to the amount used by each charging station.

"One of the barriers to switching to all-electric vehicles is the concern about finding

a place to charge up away from home," says Powell. "GMP is installing these charging stations to help jump start the development of the infrastructure needed to make electric vehicles convenient to operate."

The locations of the charging stations will be one in Montpelier and two in Chittenden County. Green Mountain Power is considering populated locations with easy access and high visibility.

Each charging station will have two chargers. The Level One charger will use 110 volt household current, and will be compatible with hybrid vehicles such as the Toyota Prius that have been converted to "plug-in" technology. The Level Two charger will use 220-240 current, and will be compatible with the new electric vehicles entering the market, such as the Chevy Volt and the Nissan Leaf.

About Green Mountain Power. Green Mountain Power (www.greenmountainpower.com) generates, transmits, distributes and sells electricity in the State of Vermont. It serves more than 175,000 people and businesses. ♻️



I'm Sittin' in the Railway Station ~ got a ticket to my destination...

By Christopher Parker

I am writing from Amtrak's Vermonter, the train that will take me to my Washington DC meeting. It's a good thing I'm on the train – I have time to write instead of stare at brakelights. It's good for the earth as well.

Half the greenhouse gasses from Vermont come from transportation. It's similar anywhere in the rural north. If you are serious about global warming, pollution and our environmental (and economic) future, transportation is the next place to examine.

WHAT TO DO?

First, get to know the geography of trains, transit and consider biking. Second, let your legislators know investments in rail, transit and bike infrastructure matters to you.

Vermont has two Amtrak trains that run to New York and major points in the Northeast (but not Boston). The Ethan Allen runs from Rutland, via Albany and the Vermonter runs from Saint Albans to Essex Junction down to White River Junction and south via Brattleboro, Hartford and New Haven. Other stops are Waterbury, Montpelier Junction, Randolph, Windsor, Bellows Falls and Castleton. Another train in New

York is a ferry ride from Burlington.

The train is lovely: nice conductors and peace instead of trying to find a parking place and weave through 4 lanes of crazy high speed traffic. And that's not even getting into the muffler I lost to a Brooklyn pothole the last time I drove . .

To make a reservation, call 1-800-USA-RAIL. They'll mail your ticket unless it's closer than a week – in that case, speak to an agent and make arrangements to



buy it on board from the conductor.

VT has local bus networks in most of the larger towns. In Chittenden County, the CCTA covers the region with busses.

Taking public transit can be a shift in consciousness and a new geography to learn. You must plan your life around it's schedule. For some of us, it can be a good thing to keep to a more intentional

 Ride a Bike!
Take the Bus!
Share a ride.
Carpool!
Ride the Train.
Work from Home

schedule!

Is it worth the trouble? Consider that the train or the bus is already running, so your trip has an environmental footprint of zero! While the average driver generates 5.8 tons of greenhouse gasses.

But why can't we have better trains and transit? This is a political discussion, as public road subsidies have left only the scraps for Amtrak, transit and bikes. Investment is destiny.

Fortunately your voice can help create a more balanced situation. Writing your legislators matters (to find their contacts, go to www.leg.state.vt.us/legdir/findmember3.cfm).

For more about railroads in Vermont, see the Vermont Rail Action Network (www.railvermont.org). And for bikes, the Vermont Bike/Ped Coalition (vtbikeped.org). Please join their mailing lists to learn more - and give donations. They carry the message in Montpelier. ♻️



Spring Events
May 16-20, 2011



May 16-20, 2011

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Statewide Goal - Save 50,000 mi.

Info: www.CommuteGreenNH.org

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COMMUTING IN THE UPPER VALLEY

Stage Coach the public transportation provider for northern Windsor and Orange counties offers environmentally friendly commuter routes along I89 & I91, shopping trips to Randolph, Rutland, and West Lebanon, and operates the Randolph Maxi-Taxi door-to-door bus service. Additionally, Stagecoach arranges rides for the elderly, disabled, and Medicaid recipients, and transports clients to partnering social services programs. <http://www.stagecoach-rides.org> (800) 427-3553

Rural Community Transportation Inc. serves St. Johnsbury. <http://www.riderct.org>

Advance Transit will get you around Lebanon, Hanover & Dartmouth (802) 295-1824
<http://www.advancetransit.com/>

City Express services Keene <http://www.hcsservices.org/services/transportation/cityExpress.php>

Chittenden County Transportation Authority is Burlington's bus service with links to Montpelier, Middlebury & commuter route to Milton. <http://www.cctaride.org>

Marble Valley Regional Transit 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). <http://www.thebus.com/>

CT River Transit provides services in & around Bellows Falls & Springfield. <http://www.cttransit.org>

Green Mountain Transit Agency Provides local service in Barre, Montpelier, Grand Isle, Stowe & Lamoille connecting with commuter services. <http://gmtaride.org>

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

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

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

Greyhound/Vermont Transit Greyhound/Vermont Transit long distance bus services
<http://www.greyhound.com/HOME/en/NewBuses.aspx>

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

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

Go Vermont provides support for carpoolers www.connectingcommuters.org

Upper Valley RideShare provides support for carpoolers. <http://www.uppervalleyrideshare.com>

The ultimate websites for getting around in VT & NH are: <http://www.aot.state.vt.us/links.htm>.
<http://www.nh.gov/dot/nhrideshare/links.htm> ♻️

VERMONT IDLE-FREE FLEETS

Vermont Idle-Free Fleets provides business fleet operators with a toolkit that explains the myths and realities associated with truck idling, the health effects of diesel exhaust, the cost savings achieved by an idling reduction policy, and sample model policies.

The campaign, funded by a grant from the Vermont Department of Environmental Conservation (DEC), also offers PowerPoint presentations and technical support for businesses in Chittenden County and Rutland County. Rutland County has the highest rate of emergency room visits due to asthma. Eliminating unnecessary diesel idling is a win for Vermont businesses, public health and the environment. For more information about the campaign, contact Wayne Michaud at idlefreefleetsvt@lungne.org or call the American Lung Association in Williston at 800-LUNG-USA, Ext. 6860.

Improve our air, improve your profits

The American Lung Association's Vermont Idle-Free Fleets campaign is offering your company a win-win.

As a diesel fleet operator, your company can improve the health of people, including your drivers, save fuel and engine wear-and-tear which together will save you a significant sum of money, as well as cut air pollution and reduce greenhouse gas emissions.

You will learn about the following:

- The Myths and Realities associated with truck idling and how you can significantly reduce the idling of your fleet
- The health impacts of diesel exhaust and how everyone benefits when avoiding unnecessary idling
- The economic impact of reduced idling as demonstrated by companies already adopting model policies such as Green Mountain Coffee Roasters which saves up to \$20,000 annually just by avoiding unnecessary idling.

Are you ready to take the first step in realizing the important benefits you and your company have to gain by implementing an idling reduction policy? If so, Vermont Idle-Free Fleets offers you a comprehensive information toolkit and, at your convenience, an in-person PowerPoint presentation.

For more information, contact Wayne Michaud, Vermont Idle-Free Fleets Coordinator, idlefreefleetsvt@lungne.org

**VERMONT
IDLE-FREE
FLEETS**

Community page - misc stuff...

BES Sustainability Study

We are fifth graders from Bradford, Vermont. We attend the Bradford Elementary school and are in Mr. Drazin's class of sixteen students. This year we have been studying about sustainability.

On Tues. April 5, 2011 our 5th grade class went on a sustainability field trip. On this field trip we went to six places within Bradford. One place we visited was a local resident who lives off the grid. We learned how to make your own electricity using solar panels. We also went to the Colatina, a local Italian restaurant. At the Colatina we learned about composting because they compost. Next we visited a local hydro-dam. We learned how water is converted into energy using a local river. At Farmway, a local store, we learned that 43% of their electricity is powered by their 308 solar panels. At Perry's Appliances, we learned that energy star products use less electricity and can save you money in the long run. Aubuchon's Hardware store was another place that we visited. We did a scavenger hunt on sustainable products you could buy for your home.

We learned many things on this trip. One thing we learned was that using LED lights is more sustainable because they take less energy to run. Another thing that we learned is that a hydro dam has a lot of parts and the parts are very expensive. This trip has changed the way we think about energy. In the future if we have to buy an appliance we would look for energy star appliances. In the future many students hope to be able to generate their own energy. Please do your part to help the environment by teaching your friends and family about sustainability.

A Walk in the Rain

Have you ever taken a walk and seen all the sustainability practices around Bradford?

Bradford Elementary's 5th grade did and we visited a bunch of stores and saw how they were doing their little bit to help the earth. the stores that we went to were: Aubuchon Hardware, Perry's, Colatina Exit (yum!), CVPS dam, Farmway and Nancy Rae Mallery's house. At Aubuchon Hardware we found energy efficient items. At Perry's we saw energy efficient washers, stoves and other appliances. At the Colatina Exit we saw their composting project. At Farmway we saw how they used 43% solar power. At the CVPS Dam we saw how electricity works. At Nancy Mallery's house we saw her solar panels. That is how we spent our day on April 5. Walking downtown in the rain!

- Submitted from Jessica Loefler's 5th Grade Class, Bradford Elementary School

Please do your part to help the environment by teaching your friends & family about sustainability.

B.E.S. Awarded VT Community Garden Network Grant

Bradford Elementary School was awarded a Vermont Community Garden Network grant to expand the gardens at the school and grow more fresh food for the cafeteria. This spring they hope to add 5 new raised bed gardens, totaling over 400 s.f. of garden space. They also plan to have garden workshops for students and community members throughout the summer. More information: jmccracken@beschool.org.



Comprehensive approach & bold community action required for a bright energy future

By Johanna Miller

The world faces significant challenges regarding how a growing, global society will meet its energy needs, and Vermont is no exception. Vermont is dependent on fossil fuels to meet 99 percent of our transportation needs and well over 80 percent to meet our space heating needs, and these energy sources are becoming increasingly costly.

That means we face some very difficult energy choices. Fortunately, Vermonters have been getting active. Over 100 community energy committees are leading the charge, helping to undertake initiatives to reduce energy consumption, save money and transition to renewables, such as:

- Weatherizing the historic community center in Thetford.
- Getting solar on the middle school in Marlboro.
- Group net metering solar among neighbors in Underhill.
- Removing or changing town streetlights to LEDs in Hartford.
- Launching an 'eco driving' drivers education program in Colchester.
- Comprehensively planning in Waitsfield.

These and so many more grassroots-led efforts are paying off.

But there is still much, much more to be done. Strategic, coordinated state-level action is also pivotal to making real, substantive, meaningful change.

Thankfully, the Department of Public Service recently commenced a much-needed update to Vermont's Comprehensive Energy Plan, last formally enacted in 1998.

Their goal? Craft a current, comprehensive and coordinated approach to meeting Vermont's energy needs. It's a goal the state must meet. Without such a guiding framework the challenges before us will be far greater. And without the active participation of Vermonters in identifying and implementing solutions, it will be nearly an impossible task.

Both state leaders and Vermonters seem to recognize these realities. A series of initial public hearings on the plan were recently held, drawing roomfuls of eager energy professionals, key stakeholders & energy committee leaders. Attendees wrangled with hard but vital issues the state must tackle, including:

- Transportation. How do we move Ver-

monsters while significantly curbing our use of the single occupancy vehicle?

- Land Use. How can we build compact, walkable communities where people can easily live, work and play in one location? How can we protect valuable farm and forestland to cultivate local foods and fuel while also ensuring their long-term health?
- Conservation. How can we take full advantage of energy conservation – the largest potential power source that does not cost ratepayers or taxpayers a single penny?
- Efficiency. How do we make the most efficient use out of the electric and thermal energy we are producing so that we need far less of it?
- Renewables. How can we produce and rely on significantly more clean, renewable energy sources?

The comprehensive planning process has historically resulted in innovative solutions. Vermont's previous energy plans helped put into action the policies and programs that established Vermont as a national leader in energy efficiency through the creation of the nation's first energy efficiency utility - Efficiency Vermont.

Ultimate success, however, depends on broad-based, realistic solutions and a meaningful, ongoing public engagement process to not only help craft the plan but to ensure that it is actually implemented.

Vermonters interested in moving the state towards a clean energy future are absolutely pivotal to the process underway. And town energy committees, where leadership on energy is manifesting meaningful results, are key to the ongoing success of the plan - and energy action generally.

Find out more about how Vermonters are innovating at the grassroots on energy in a new publication outlining over three dozen success stories. Find Communities Tackling Vermont's Energy Challenges at www.vnrc.org. To get involved, comment or find out about upcoming public forums, visit the Department of Public Service web site - <http://publicservice.vermont.gov/>.

Johanna Miller is the Energy Program Director at the Vermont Natural Resources Council. Reach her at jmiller@vnrc.org or 802-223-2328 or visit www.vnrc.org.

Hosted by the Southern Windsor County Regional Planning Commission

, in conjunction with the Energy Committee of Springfield, Windsor and Weathersfield, it was a day featuring and discovering "renewable energy" at the recent Home Energy Expo held at the Springfield Technical Center on March 19, 2011.

The expo promoted local programs and products that improve the community by reducing consumption and decreasing overall energy and featured expert discussions, demonstrations and advice on energy efficiency, weatherization programs for homes and businesses, free products and door prizes, hands-on displays and several information sessions about renewable energy systems, lighting options and how to pay for home and business energy products.

Springfield Energy Expo - Great Response

"We were very pleased with the amount of people who turned out for the Energy Expo," Executive Director Tom Kennedy said in a recent interview. "The main objective for us was to make people aware of all the energy efficiency options that are available to them locally, & to also show folks that there are small, inexpensive ways to save energy & money."

"We also wanted to really emphasize the town of Springfield and show what the town has to offer and not just energy efficiency, but also the community spirit. I really feel we accomplished this today."

Many area businesses and organizations participated in the six-hour event including Central Vermont Power Service, the En-

vironmental Protection Agency, the Springfield Farmers Market, the Vermont Energy Information program, the Edgar May Recreation Center and the Connecticut River Transit, just to name a few. The senior class of Springfield High School also participated in the event, raising money for their class trip to Cape Cod by operating a bike-powered smoothie stand.

Also featured during the days' activities were four, educational workshops which discussed a variety of topics including cost-effective energy systems, weatherizing the home or business and living "off the grid".

Other event sponsors included HB Plumbing and Heating, South Face, Net Zero Re-

newable Resources, VT Foam Insulation, Albee Home Energy Consulting, Sun Catcher, Preferred Building Systems and Philips Lightolier. To learn more about the SWCRPC and the recent Home Energy Expo, visit www.swcrpc.org. Joe Milliken is a freelance writer based in Bellows Falls, Vermont. Contact Joe at www.jemwriting.com.



B.E.D. 100% Renewable by 2012

While some utilities around the country are attempting to achieve the “lofty” goal of having 20% renewable electricity in their power portfolio by 2020, Burlington Electric Department, Burlington’s municipally owned utility, plans to be 100% renewable within a few years, with wind, small-scale hydro and biomass being the major components. According to Ken Nolan, BED’s Manager of Power Resources, they are on target to meeting the goal by 2014.

Even while keeping in mind BED’s top goals of reliability and affordability, BED was able to financially justify the 100% renewable goal in the near term through a variety of ways.

Every three years, BED does an Integrated Resource Plan where it must analyze for the Vermont Public Service Board the direction it is heading in, where it plans to get power from, how it will justify the cost, and comparing supply alternatives against potential energy efficiency levels. After a very thorough examination, the Burlington Electric Commission came to the conclusion that moving forward with aggressive energy efficiency and then a complete renewable power portfolio made the most sense.

BED already has contracts in place to meet nearly 80% of its supply needs from renewable resources, and is in the middle of working on several other wind and hydro contracts, which will be signed soon. The McNeil Generating Station (a biomass generator of which BED owns 50%) is also a renewable resource along with being a low carbon emitter due to its sustainable harvesting practices. Unlike coal or other fossil fuels, most of the carbon dioxide that goes up the stack from

Energy Efficiency and Renewable Energy



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sustainably harvested wood is reabsorbed with the re-growth in Vermont forests.

Recently, McNeil was retrofitted with an emissions control unit that greatly reduced the nitrogen oxide emissions from the stack. Once the unit was proved to be working and NOx reductions were quantified, the Renewable Energy Certificates or “RECs” from McNeil were sold into the lucrative Connecticut market. The State of Connecticut mandates that serving retail load in the state have a certain percentage of renewable power in their supply mix. They can either contract directly for the power or they can purchase RECs from another entity. When they purchase the RECs, they basically are purchasing the bragging rights. They then can claim that they have renewable power and BED no longer can make the claim. The added revenue from selling RECs that is coming in is helping

>> Cont'd on p.34 >

Group Net Metering

By Doug Wells, Solar Specialists

Vermont has done a great job at staying on the forefront of renewable energy policy in the United States. The current expansion and refinement of Group Net Metering laws is an example of this progressive vision. Group Net Metering allows increased flexibility for both Homeowners and Businesses that want to invest in renewable energy. Now a larger renewable energy project can be built in an optimal site for harvesting sun, wind, and water. Installing solar in Vermont for the last nine years has taught me the unfortunate lesson that although many homeowners and businesses are motivated to install systems they are often located in sites with extensive shading. Group Net Metering offers a solution and a couple of examples will help illustrate the possibilities. Eight homeowners would like to install solar energy systems at their residences; however, one homeowner has land that provides open exposure to the sunlight. One array is constructed in the best site and the eight investors share the energy production. Or a real estate owner with multiple properties would like to make a green statement, but most of the structures have poor solar sites. Now they can install a Photovoltaic array on a nice South Facing roof space and share the production from this array with other properties. This model provides a way for groups of Vermonters to pro-

duce their own renewable energy, maintain ownership of the investment and encourage a sense of community.

Current legislation will update existing net metering laws to make the process easier. All of the participants must be on the same utility, but now the value of the energy produced will be distributed through existing billing. In the past group net metering has necessitated one manager collecting bills internally and combining them to be credited against renewable production. The new law will make this process easier for investors in a group project. The major hurdle that remains is how to organize investors to harvest all the tax credits available on both state and federal level. Current models include the formation of an LLC or energy COOP. Like all things American a movement that started with idealism has now entered into the realm of formal legal documents and agreements. This is a long way from hippies living off grid in the mountains, but is a necessary reality to the progress of renewable energy. Investors, green minded citizens, lawyers, accountants and local installation companies are now becoming a team for the development of renewable energy projects.

Installation of renewable energy systems directly on homes and businesses is still the easiest and best approach for most renewable energy projects. However, group net metering has amazing potential for projects moving into the future. ☻

Jerry Greenfield's (of Ben & Jerry's) Net Metered Solar

By Liane Allen

How did you learn about net metering?

A friend and I were interested in solar panels. It looked like the best placement would be at my friend's house. So we were going to put both sets of panels at one house and were hoping to work with utility to manage the billing.

Which utility are you with?

VT Electric COOP. We worked through All Earth Renewables of Williston. They worked with the COOP to make it happen.

What about it appealed to you?

Just the location of the panels. Once we decided we wanted the panels to work, it made sense to locate them where they'd be most efficient and effective.

Electrical credits get placed against one place, and the utility applies half to each bill. It's a little extra work for them, but they've been great about it. In VT in general and Electric Coop in particular, it's great how you can just go in and talk to people.

Is the system producing as much as expected?

Haven't kept track.

Which means you probably haven't *had* to keep track. True. (laughs)

Is it a grid tied system? Yes.

Why solar instead of other technology?

At the time tax credits were more favorable for solar, so the ultimate cost was lower.

Is there anything in particular you wish you had known before you started?

No. We understood that it was a new practice in VT, and knew there might be bumps.

Is there anything the legislature could do to make it easier for others in the future?

Continuing the financial incentives and tax credits for the state to encourage people to invest more in renewables and become more independent. This will serve the state well in the long term, financially as well as environmentally.

What's the one piece of advice you would offer others considering a group net metering project, like, say patience?

(laughs) Yes, that and understanding that it's the wave of the future.

In researching for this interview, we also talked with Caleb Elder at All Earth Renewables, the company that installed the system and shepherded it through the group net metering permitting process. He gave us some stats (see side bar) and told us, "Group Net Metering was a good solution for their needs because Ben had a better solar site than Jerry. Without Group Net Metering, Jerry would not have had a good option for installing solar power."

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* based on VT Electric Coop avg. residential rate.
** VT has low electrical generation carbon footprints:
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GROUP NET METERING Makes it EASY to Go Solar MAD RIVER VALLEY'S Community Solar Project

By Gaelan Brown

Group net metering is now much more feasible. Thanks to H.56, it is easier for people to “go solar” even if their property/roof is not friendly to solar panels.

The Mad River Valley Energy Network is the name of the future solar-power (PV) co-op in which people could invest in a portion of a solar-farm that would offset their power bill at their home/office. This rule-change is being supported in the legislature at least partially because of citizen lobbying efforts. Members of the MVRE group have met with Green Mountain Power, state-regulators and legislators to build support for this change.

Local MRV legislator, Adam Greshin has also been very supportive and helpful through this process on multiple fronts.

You can sign up to be notified as this becomes a real opportunity. If the current language in H.56 passes we'll be formally organizing an LLC or a Co-op in which members would invest \$ for a portion of ownership of a community solar project that would be installed on some land being graciously offered by Sugarbush.

This would likely be the most cost-effective way for a home/business-owner to “go solar” because we get efficiencies of scale and group-buying power, but it also means people can be part of the program without necessarily having to invest \$15,000 to \$25,000 for a full-size residential solar system. Anyone on Green Mountain Power, regardless of where they live in Vermont, could be part of this MRVE group solar project. www.MRVE.net ☻

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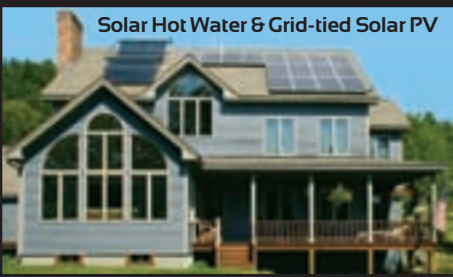


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WHY SOLAR PV

Many good articles have been written in this publication over the last several years which explain solar photovoltaic technology; what it is, how it works and how it interconnects. These articles have also emphasized that solar PV is an important and valuable part of our energy future and that solar is an abundant and effective resource here in New England. There are many compelling reasons for a home or business owner to invest in solar whether those reasons are related to investing in a sustainable future or pursuing a high rate of return on the investment.

PART OF THE SOLUTION

Solar power is a key part of the solution to global warming and peak oil. When you install solar at your home or business you have decentralized the power generation facility; what previously came from Vermont Yankee, Hydro Quebec or gas and coal generation plants, now comes from your roof or yard. When you are putting power back into the grid you are “selling” that power for use by your neighbors; this is a direct reduction in the power capacity necessary for those conventional power plants to produce. That’s a personal choice that has a very direct link to solving global warming and peak oil.

INDEPENDENCE

Many “early adopters” of solar (back in the 1970’s) did so to achieve energy independence. That motivation continues for many today as solar provides a certainty for the availability of electric power at a fixed price. When the solar system includes batteries it provides additional security against the interruption of power and assures complete independence.

THE TIME HAS COME

Since the 1970’s solar technology has evolved. It is now a well established and stable source of electric power generation; typical panel warranties are 25 years at 80% of the original rated power. Solar products are broadly available in the market as are installation and service professionals. Solar PV technology is known for its reliability and low maintenance; PV has no moving parts and a limited number of components. Pricing has dropped considerably, more than 40% in the last 2 years, making the technology more affordable and competitive.

FINANCIAL BENEFITS

Federal Tax Credits and State Incentives are equal to 30% and 15% or more of total project cost, respectively; thus these benefits can reduce project cost by 45% or more. A typical PV investment will provide a rate of return greater than 8% and can exceed 12%. A PV investment compares very favorably to an alternative Wall Street investment (a stock, bond or Certificate of Deposit) as:

A PV investment is in your own home - you are the “investment manager.” You are not sending your money to Wall Street to be managed by and with the promises of a portfolio manager.

The PV investment “return” is only based on your electric savings in your own home. Based on the reliability of PV this is a consistent and predictable return. PV system monitoring consistently validates the forecasted PV electric production.

An 8-12% Return on Investment is an attractive return particularly when compared to investments of equal risk (i.e.: Certificate of Deposit).

PV is an excellent hedge against future utility cost price increases. If utility costs spiral your costs of electricity will be fixed and prepaid.

A WISE CHOICE FOR PV TODAY MAY PROVE TO BE A BRILLIANT INVESTMENT IN THE FUTURE!

Green Energy Times would like to thank Andrew R. Cay, President of Integrated Solar Applications Corporation, who kindly provided this information for our Solar PV page. After much thought and deliberation, he opted to forego the regular illustrations and descriptions because he felt that our readers could benefit more by understanding 'Why Solar PV is so important to make our move into energy independence.

We hope that this serves to help you all in your decision to Go Solar Now!

Here are some residential Solar examples, showing both roof mounted and pole mounted arrays:



2 KW PV array and SHW in Putney, VT.
Two Solar Hot Water Panels (left); Nine Photovoltaic Panels (right)



3.45 KW roof mounted Photovoltaic array located in Putney, VT



41 KW ground mounted Photovoltaic array located in Westminster West, VT.



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Edgar May Health & Recreation Center, Springfield, Vermont
ARC installed 69 solar collectors to heat the pool water.

To Track or Not to Track?

If you're looking into a solar PV system, one of the decisions you have to make is how to mount your panels. There are ground mounts, roof mounts, fixed mounts, adjustable mounts, & trackers. The choice you make will affect the initial cost & the payback of your system, the aesthetics of your home & the use of your yard. Here are some key considerations to help you decide.

Putting the panels on your roof is a great idea if you have limited space in your yard and you want to save it for gardening or recreation. It is often the least expensive option, since concrete footing and underground wiring can be avoided. Look into mounts with an adjustable tilt angle. If you adjust them just seasonally (4x/yr) you'll get a little more power from your panels for free! More importantly, many people complain about snow on their panels in the winter, and if you have adjustable mounts you can adjust them to a steep angle so the snow slides off more easily.

Ground mounts make sense if your house is shaded and you have the room to spare in your yard. Fixed mounts on the ground are just like roof mounts, and the adjustable tilt angle is still a good idea. A tracker that points the panels directly at the sun automatically is worth considering, and will get you a lot more power from the same number of panels. Of course there's an added cost, so it's important to compare pricing with and without a tracker. While today's trackers are reliable, they do have moving parts and controls that can potentially break down and need repair.

Trackers do their best work at sites that have wide open access to the sun and no shading from trees, even in the early morning and late afternoon. Specifically, a fixed mount should have no shading in the 6-hour

window surrounding solar noon (3 hours before and after the time when the sun is highest in the sky). To be effective, a tracker should have a significantly larger window of time when there is no shading. A good site analysis done by an expert with a device called a Solar Pathfinder will tell you what shading issues you may have and if a tracker is worth considering.

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If shading is not a factor, a tracker will add about 30% annually to the output of an array, compared to fixed mounts. For example, a 4kW array on fixed mounts would produce about the same amount of power annually as a 3kW array on a tracker. The question then is cost. Does your savings from having less panels pay for the tracker? One hidden factor here is that the state incentive is determined by the wattage of the array, not the watt-hours produced per year, so this tends to favor fixed arrays. Get quotes, compare prices, & consider all the factors before you make your decision. You want to get the best bang for your solar bucks!

There's no single type of mount that works best for every application. It's important to work with a designer that knows all the different mounting options and is willing to take the time to discuss them with you.

Gary Beckwith partners with Sherwin Electric installing PV systems & is the owner of the Solar Bus, & the Executive Director of S.E.E.D. ♻️

Overview:

There was a time when a "solar system" referred to a star with some accompanying planets.

Then, in the 1970s, during our first major oil shortage, "solar systems" came to mean a system of solar collectors which convert solar energy to "thermal" energy for hot water production.

Currently the term has been co-opted to refer to the new kid on the block, photo-voltaic (PV) panels which convert solar energy to electrical energy.

"Thermal" systems are the preferred first step (assuming an appropriate site) for residential alternative energy installations for several reasons:

1. They are affordable and have an return on investment (roi) of 7-10 yrs versus the 20-25 yrs for a PV system. After rebates, energy credits, etc. they typically represent an out-of-pocket expense of \$4,000 to \$6,000 for an installed system. Not cheap, but still within the reach of a large fraction of home-owners.
2. They are an "evolved" technology. The approximate 80% efficiency of thermal collectors at turning the sun's light into hot water has only small potential for improvement as compared to the 12% conversion rate of collectors.
3. They are very simple, durable and, with modest maintenance, reliable over a long span of time. This is a critical issue when considering roi.

Nut and Bolts

There are a plethora of SDHW systems to choose among. From the water based drain-down, drain-back & batch systems to the glycol based flat-plate, and evacuated-tube systems.

In the northeast, experience limits your options to "active", "glycol-based" systems. "Active" refers to systems that use a pump to circulate the fluid through the plumbing loop that carries the heat from the collector to the storage tank. "Glycol-based" means that this loop is filled with an antifreeze to prevent freezing (the antifreeze is propylene glycol, a nontoxic antifreeze *(found in Twinkies!)*).

Active, glycol-based systems are simple in design: a south facing collector array, a storage tank, and a circulation pump. Pumps are either actuated by a "control module" (simply an ac microprocessor with sensors in both the collector array and the storage tank). When the module registers a significant rise in the collector temp. vs the tank temp., it activates the pump. When this difference becomes minimal it deactivates the pump. The 2nd type utilizes a small PV panel mounted adjacent the collector array. Whenever sunlight strikes this panel it powers a dc circulation pump thus no "control module" is required.

The advantages of the control module system are that: it will only run when there is energy to be gained, it provides readouts on system temperatures, it is easy to diagnose system malfunction, and it has the potential for system cooling. It's disadvantage is that it will not operate during power failures.

The advantage of a PV system is that it provides its own power so will run during a power failure. It's disadvantages are that:

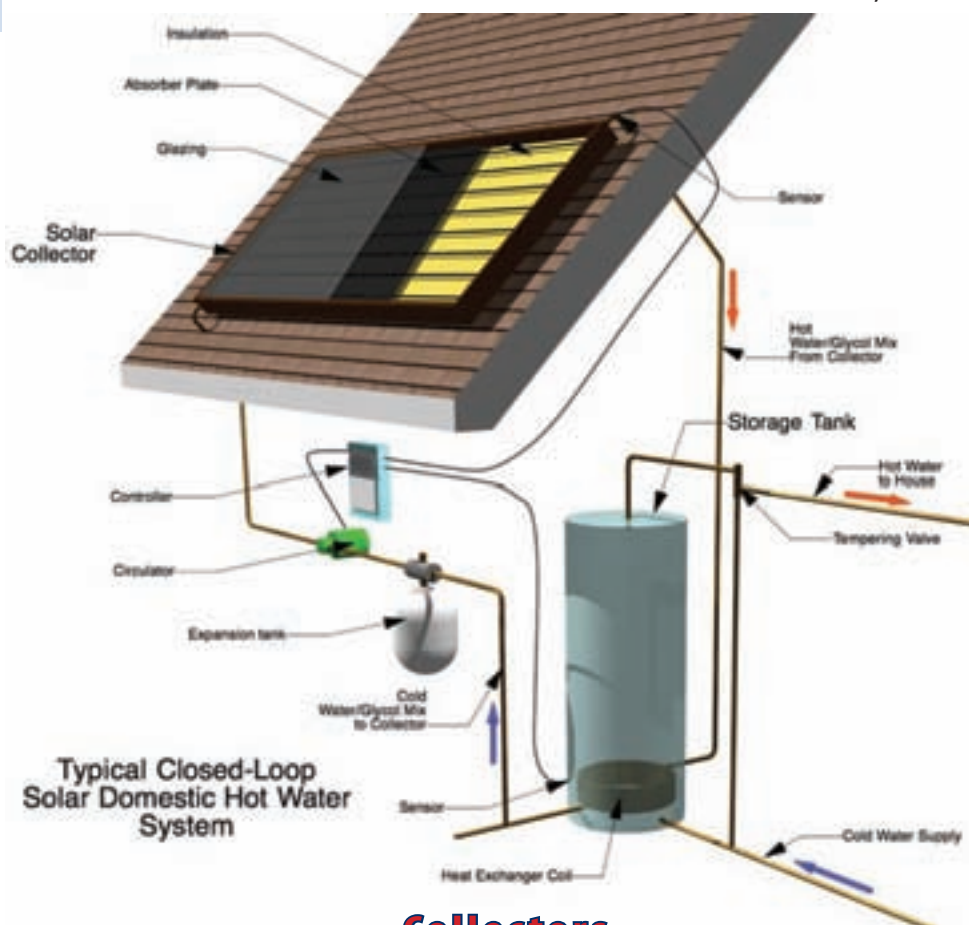
malfunctions can only be easily diagnosed if there is sunlight on its panel, in winter it will operate when the collector fluid is colder than the storage tank, it provides no readouts on system performance, is more expensive & has no potential for system cooling.

System cooling??? Yes !!! The prime cause of system failure is overheating. Overheating is dangerous and significantly shortens the life of the storage tank. Most of these problems are addressed by having the right ratio of collector area to storage tank capacity. Several variables are site shading, orientation and hot water consumption. Flat plate collectors the ratio is roughly 1 s.f. of collector/gal of storage. Evacuated tube collectors 2 btu's/gal. The ability to dump some heat during times of excess allows greater collector to storage ratios which in turn will provide more heat in times of weaker sunlight. Dumping excess heat can be achieved in several manners such as a control module that can be programmed to run at night if the tank gets above its "target" temperature, or running a "tank-bypass-loop" that has the glycol loop bypass the storage tank when temps get too high (usually above 180 F).

A properly installed SDHW should have a minimal life expectancy of 25 yrs and with moderate maintenance last indefinitely.

Storage Tanks

Tanks come in two basic sizes: 80gal. tanks for households of 2-3 people and 120gal. tanks for larger households. The preferred tanks with internal heat exchangers (htx) where the glycol loop gives up its heat in the bottom of the storage tank and the warmed water rises, by convection, to the top. Or an external htx is used, usually with a second pump circulating water from the tank past the circulating glycol in a htx that is outside the storage tank. Tanks, along with the glycol loop must be heavily insulated to minimize heat loss. They also must by law feature a temperature/pressure relief valve and a tempering valve - essential because water in the storage tank can exceed boiling temperatures. The tempering valve mixes cold water with the hot water coming out of the tank, when necessary, to avoid scalding temperatures at the faucet, shower, etc.



Collectors

The type, and claims, of the various collectors manufacturers are numerous. It can be very confusing.

There are two basic types of thermal collectors, flat plate and evacuated pipe heat tube (epht):

FLAT PLATE collectors have been in use for over 60yrs - simple in design and relatively inexpensive. The typical design is a copper absorber plate with an absorbent finish to convert the sun's radiant energy to thermal energy. Through the absorber plate run a series of tubes carrying glycol to transfer the energy to storage. The absorber is housed in an aluminum clad insulated case with a tempered (for strength), low iron (for solar transmissivity) glass top. There are two basic glycol loop configurations in the absorber plates: 1) The traditional manifolded pattern with a 1" manifold at both ends of the absorber plate connected by a series of smaller parallel tubes running across the absorber. 2) An absorber plate without manifold having one continuous loop of small tubing running in a serpentine pattern across the absorber.

Manifolded have better flow rates, are more efficient, and less prone to overheating problems.

Serpentine have lower flow rates and will produce smaller quantities of hotter water.

Siting

An SDHW collector "array" features one or more joined collectors, oriented true south with a 45° tilt, the optimum orientation for year-round performance. Avoid shading issues that seriously compromise collector performance. Underground runs from collector array to house can = serious heat loss in the glycol loop. Roof mounting is often optimum.

The Bottom Line

To reduce your carbon footprint and improve your long-term bottom line, begin by "tightening up" your house with greater insulation and attention to air leaks. Once you've made a diligent effort to stop energy flowing out, it's time to try to capture some of the free energy flowing from the sun. The most cost-effective method for achieving that is Solar Domestic Hot Water. And as a special bonus, you get to enjoy long, hot, guilt-free showers for much of the year.

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SOLAR Q&A

Solar Uncertainty

with Howie Michaelson, Catamount Solar (previously Sun Catcher)

While many of us have lived with solar for years, and many more are just delving in, there are questions and concerns that repeatedly come up around its day-to-day functioning. In this column, Howie will try to answer those questions in a simple clear fashion. Please submit your questions to: questions@suncatchervt.com or info@greenenergytimes.org, for inclusion in future editions!

1. ARE HALOGEN LIGHTS BETTER THAN COMPACT FLUORESCENT LIGHTS FOR ENERGY EFFICIENCY? WHAT ABOUT LED LIGHTS? Halogen lights are a form of high output lights that work very well for spot or task lighting. They provide a good quality, bright light that is good for good definition and seeing detail. However, if you've ever touched a halogen while it was on, you will know that much of the energy used is converted into heat as opposed to light, a problem with the traditional incandescent bulbs we are using less of these days because of inefficient light output. The advantage of halogen lighting is that it is typically brighter and often better lighting than the standard Compact Fluorescent (CF) bulbs on the market, which many people do not like, especially for areas where good definition lighting is desired. They are about twice as efficient as incandescent bulbs and about half as efficient as CF's, however, because of the quality and focused quality of the light, it is often a better energy efficiency choice than CF's for work spaces and reading lighting.

On the other hand LED (Light Emitting Diode) lighting seems to be on the verge of taking over the market. It is extremely efficient lighting (using perhaps 1/10 of the traditional incandescent bulb, and perhaps twice as efficient as CF's (or better) with no mercury content (a problem with disposal of many CF's). The biggest hurdle that LEDs need to get past is the quality of the light (as many early adopters have found) and the high cost, much as was the case in the earlier years of CF's. However, even in the last 12-18 months LED lighting has advanced dramatically and is now quite affordable (with some shopping around), and there are many examples of LEDs producing high quality light. At this point, it is probably well worth the investment for, particularly for "off-gridders," since the still higher cost of LEDs is likely justified by the dramatic energy savings they afford (in an off-grid home, lighting, particularly in the low solar months, ends up being a substantial percentage of the load). By reducing your electrical load, you can spend less money and natural resources investing in the solar energy equipment needed to power your home or business, whether on- or off-grid.

2. CAN I INSTALL A GRID-TIED SOLAR ELECTRIC SYSTEM MYSELF? The short answer is, if you live in a single family home in Vermont you can install a Solar Electric system yourself, but not a Solar Thermal system tied to your Domestic (potable) Hot Water system. However, because of the complexity of sizing, designing, and safely installing a Solar Electric system, it is not recommended as a DIY project. Modern grid-tied Solar Electric systems run high DC voltage, which needs to be handled in very specific ways in order to insure the safety of "life, limb, and property," and should not be attempted by anyone who is not well trained in these types of installations. The equipment used must be UL listed, and installed in compliance with National Electric Code (specifically Article 690, as well as all other pertinent articles). For Solar Thermal systems in Vermont, any plumbing tying into the house water system must be done by a licensed plumber. In addition, in order to qualify for the Vermont State Incentive grant, the installation must be done by an approved Vermont Solar Partner (see <http://www.revermont.org/main/incentives-partnership/partner-info/> for a complete Partner list). New Hampshire does not have an "approved vendor" list in order to qualify for those state incentives.

IN FUTURE ISSUES OF G.E.T.:

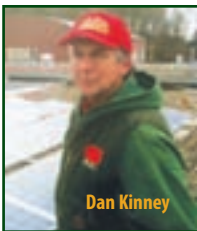
- How often should I charge my batteries in my off-grid house?
What about my grid-tied house with battery back-up?
- My Solar Hot Water system does not seem to work as well in the winter as the summer.
Does this mean that my solar electric system doesn't work as well then, too? ♻️

Three's the Charm

Three Vermont solar specialists have joined forces creating a new company with decades of valuable experience to serve the needs of Vermont /New Hampshire home owners and businesses. Catamount Solar merges the efforts of Sun Catcher, Kinney and Sun Solar Construction, and Triple Play Solar to form a partnership backed by more than 30 years experience in the solar industry. The new company provides consumers with a 100% local, dependable, owner-managed business.

"Our clients definitely benefit from the broad and deep experience that Catamount Solar brings to their projects," noted Howie Michaelson, owner of Sun Catcher. Sun Catcher has been a REV Solar Partner since 2006 and is a NABCEP certified PV installer. Prior to founding Sun Catcher, Mr. Michaelson was a lead installer at groSolar. He has lived off-grid for 15 years and is one of the state's leading off-grid solar experts. Kinney and Sun Solar Construction was founded by Dan Kinney in 2009. Kinney was the first employee at groSolar, and installed hundreds of systems in his 10+ years there. He is also a recognized PV trainer providing installation and safety courses for students at Vermont Technical College and other clients. Triple Play Solar was founded by Kevin McCollister in 2009. Prior to this enterprise, McCollister was Senior Commercial Project Manager at groSolar and Northern Power, and managed the successful installations of large-scale projects totaling more than 2 megawatts.

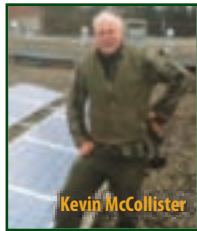
"No matter what type of project – large or small, roof or ground mounted, residential or commercial, the owners of Catamount Solar have done it before and are ready to lend this experience to your unique project circumstances," added Dan Kinney. ♻️



Dan Kinney



Howie Michaelson



Kevin McCollister



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Why Solar Now!

By J. Scott Hansen

For those of us who are wishing for a greener planet, but are uncertain about the economics of solar power, help has arrived. The cost of solar panels has been steadily falling while the incentives have increased significantly, so the time to install solar is now! Let's look at New England in general and a couple of states in particular.

It's time to abandon your concerns about New England being too far north, too cloudy or too cool for efficient use of solar power. When it comes to exploiting its solar resources, Germany has been the most successful. Germany generates over 2% of its electricity with solar, while in New England, wind and solar combined account for under 0.5%. Now consider the fact that Boston is almost 700 miles further south than Berlin and New England's average annual hours of sunshine is almost 60% more than what Germany receives. Also, solar panels do not require full sunshine and operate at about 50% capacity in light, overcast conditions. The cool New England temperatures also help solar efficiency as opposed to desert climates where the heat can reduce solar output by as much as 10%.

The significant advantage that Germany has had over New England is government incentives to install solar systems. In the US, the federal, state and local governments have started to provide meaningful, although somewhat confusing, incentives and the economics of going solar have never been better. In MA*, for example, a typical 5 kilowatt (5 kW or 5,000 watts) system with solar panels guaranteed for 20 years can pay for itself in a little over 5 years and provide free electricity for the balance of its life. In VT, a comparable system should pay for itself in a little over 13yrs. Business and residential solar installations have very similar economics, but the mix of incentives will vary. The following provides an overview of some of the residential incentives that are available.

Federal Tax Credit: The Federal government provides a 30% tax credit for the installed cost of solar systems. Unlike tax deductions, tax credits are a dollar for dollar reduction in the amount of taxes owed by an individual or business.

State Support: State incentives vary significantly and important grant and loan programs can vary by utility district or county within the state. The Database of State Incentives for Renewables & Efficiency <http://www.dsireusa.org> provides the best residential and business information regarding incentives for solar power.

Vermont: Residential solar systems up to 10kW can qualify for the following incentives:

- Vermont's renewable energy rebate program will pay a rebate equal to \$0.75 per installed watt of capacity, up to 10 kW.
- Utility providers will credit back to the customer, at the prevailing kW hour price, excess solar generated electricity that is net metered into the grid.
- Vermont does not have a SREC program.
- Solar and related equipment are exempt from the state's sales tax. Vermont allows municipalities the option of exempting solar from the property taxes.

Economics for Solar in Vermont: A 5 kW solar system purchased for \$32,000 will qualify for a renewable energy rebate of \$3,750 and a federal tax credit of \$8,475; resulting in a net investment of \$19,775. Assuming the system generates 6,000 kW hours annually and that all power is used by the solar operator, if electricity inflation is 6% the system will pay for itself in a little over 13 years.

The heart of the solar argument is that, for so many reasons you have already heard, it is the right thing to do for your planet, your community and your family. The fact that solar adds significantly to your home's value, your electricity is free after a few years and the incentives may never be better (our governments are broke), should just help you to make the right decision to invest in solar now.

Scott Hansen is a financial advisor for renewable energy solutions, a LEED AP, a Licensed Construction Supervisor and may be reached at jscotthansen@earthlink.net. ♻️

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ANAEROBIC DIGESTION AT KEEWAYDIN DAIRY FARM



Stowe, Vermont, is known for its picturesque beauty & year-round tourism activities that range from performing arts to antique car rallies, top-notch skiing & hiking. Situated just outside this New England mecca is the Keewaydin Dairy Farm, owned and operated by Leslie, Claire & Suzi Pike. The site has been under increasing pressure to reduce farm-related manure odors.

Enter Avatar Energy LLC, a renewable-energy company with offices in VT, CA & NV that designs & installs economically viable, state-of-the-art anaerobic digester systems for small to mid-sized dairy farms in the U.S. & Canada. Eliminating these odors was one of many factors in the Pikes' decision to install Avatar's AnD 1B22 anaerobic digester, equipped to handle 22,472 gal. of waste. Currently there are 90 jersey cows producing milk in the Keewaydin main barn, with another 80 dry cows and heifers in a secondary barn. The AnD 1B22 has the ability to handle the bio-waste from roughly 75 mature milking cows, and produces at minimum 4.18cu.ft. of biogas/gal. of waste introduced into the system.

Anaerobic digester systems are unique in that their benefits extend beyond the renewable nature of the energy produced: They have significant positive impact on existing farm manure management practices. Traditionally, digesters have been scaled only for large dairy herds, are in-ground, causing a host of economic and environmental issues. Avatar Energy's digester system uniquely addresses 5 hot-button issues in the industry:

1. modularity (its pre-engineered, scalable and modular design allows for maximum configuration flexibility, providing an easily



- deployable & replicable technology at minimal capital expense while producing heat, power, bedding and fertilizer to the farm);
2. scalability (*hulls can adapt to variable herd sizes*);
 3. above ground (fiberglass hulls resist corrosion from inside, so risk of groundwater contamination is eliminated).
 4. economics (minimal waste, easy to clean and maintain, renewable form of clean energy, increased farm self-sufficiency)
 5. environmental (methane, a potent greenhouse gas, is prevented from entering the atmosphere and is used as fuel, reducing need for other less-clean energy sources)

The Keewaydin project is Avatar's first commercial scale digester demonstration site in the United States. It not only shows the feasibility of a small-scale digester, it also represents a dairy farm's ability to coexist within a small tourist community. The end-result is a more self-sustainable dairy farm that preserves Vermont's agricultural traditions and is compatible with current pressures in developing tourist areas. Digester process flow is as follows:

- Manure is extracted from barn floor and short-term storage receptacle, delivered to preheat tank.
- Manure is preheated in 375-500 gallon batches to 105°F four times per day.
- Manure is fed into digester via hydraulic injector pumps.
- Manure passes through digester in slow plug-flow for 18-21 days, during which time 99% of pathogens and 90% of odors are destroyed. By controlling odor, the system also controls flies and other pests that can plague animal operations.
- Biogas is produced (60% CH₄, 40% CO₂, 1% water vapor, less than 2000ppm H₂S) and utilized to run a combined heat and power generation unit. More than 10kW of electricity are generated continuously.

- Digested manure is processed through a separator (liquids from solids).
- Solids are utilized as bedding replacement; excess are sold off farm.
- Nitrate-rich liquid can be spread on crops, reducing fertilizer costs.
- In order to fund this system, Avatar Energy collaborated with the Pike family to acquire grants on both state & federal levels. Because Avatar's digester system is a modular, non-fixed asset, banks are able to finance it as farm equipment. ♻️



Fukushima Nuclear Reliability and German Wind

German Wind more Stable than Fukushima Reactors

April 14, 2011

By Paul Gipe

Critics of wind energy often charge that wind energy is too "unreliable" to generate a large portion of a nation's electricity and suggest that base load needs "reliable" sources of generation such as nuclear power.

While wind is a "variable" resource, that is, the wind doesn't always blow and when it does it doesn't always blow at the same strength, wind is far more reliable than the critics charge. In fact, wind is fairly predictable on long time horizons, especially from one year to the next. In contrast, nuclear power is "reliable" until it isn't as the units at the Fukushima nuclear power plant so dramatically demonstrate.

The nuclear disaster still unfolding in Japan isn't the first time the Fukushima plants have been in the news. They were at the center of the Tokyo Electric Power (TEPCO) documentation scandal mid decade. Several of the reactors were shut down from 2002 to 2005 for safety inspections as a result of TEPCO's falsification of inspection and repair reports.

The Fukushima 1 plants generated, on average, 30 TWh per year. The key word here is "on average". Despite nuclear power's reputation as reliable base load generation, the Fukushima plants were anything but reliable over the four decades that the plants were in operation. Annual generation was surprisingly erratic or "lumpy" in the jargon of the trade.

Take Unit 6, the most modern unit, for example. In 2004 generation dropped from 4.6 TWh in 2003 to 1.1 TWh, and both were a far cry from the reported generation in 1997 of more than 9 TWh. That's a lot of generation offline for even a big system like that in Japan that requires 1,000 TWh/ year.

Similarly, Unit 5's generation fell from 6.2 TWh in 1999 to 1.6 TWh in 2000.

But not just generation from individual units varied significantly from one-year to the next. Combined generation from Fukushima 1 also fluctuated from one year to the next. The safety shutdown at Fukushima 1 cut generation by 2/3 or nearly 20 TWh from 2002 to 2003. Generation didn't return to normal levels until as late as 2007.

German wind energy generation, on the other hand, has been far more stable from one year to the next than Fukushima

Throughout the last two decades more and more wind generation has been added to the German electrical system. Today, German wind turbines generate as much electricity as the entire Fukushima 1 complex at its peak. (1)

Moreover, it is highly unlikely that an accident at one wind turbine in Germany will affect the more than 20,000 turbines operating across the breadth of the country. The loss of one wind farm with tens or even hundreds of turbines will likewise have little effect on overall wind generation in Germany. And German wind generation is expected to continue growing for the next decade at least.

Unfortunately, all six reactors at Fukushima 1 are down permanently with a loss of 30 TWh per year of generation or nearly 3% of Japan's supply. The loss of generation from the reactors is not the only cost of the disaster. TEPCO's stock has lost 80% of its value since the multi-reactor meltdowns and it is unlikely to survive without a government rescue. TEPCO is a big player in Japan. They account for nearly one-third of the Japanese electricity market.

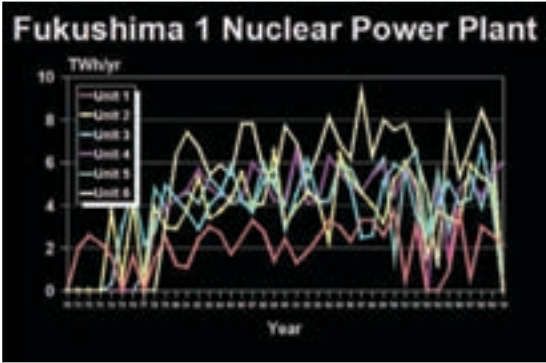
Today it would be hard to imagine any Japanese electric utility "betting the company" on building new nuclear reactors. This is the heart of the debate in Japan. What generation should be added in the short-term to get through today's crisis, and what should be built for the long-term to avoid such dependence on "lumpy" generating resources as nuclear.

(1) Fukushima I Nuclear Power Plant Data: http://en.wikipedia.org/wiki/Fukushima_I_Nuclear_Power_Plant

(2) Clean Energy Stocks to Fill the Nuclear Gap: If the Japanese use less nuclear power, what will take its place? By Tom Konrad http://www.altenergystocks.com/archives/2011/03/clean_energy_stocks_to_fill_the_nuclear_gap_1.html

This Feed-in Tariff News Update By Paul Gipe 661-325-9590

pgipe@igc.org, www.wind-works.org



It is fine to have a negative opinion about commercial wind power, but those that do should also have a better long-term solution to offer in its place. Every wind opponent I have asked has offered unrealistic options that do not address the complexity of the problems. When pressed, the opponents I've talked to all told me they think nuclear power is a better choice than commercial wind.

The nuclear power industry, after decades of relative dormancy, has been working hard to make a comeback. Concerns about climate change and the required reduction in CO2 emissions have given the nuclear lobbyists new hope and sadly Americans seem to be digesting their propaganda.

Yes, the nuclear industry can correctly proclaim their product as currently having low retail costs, lower CO2 emissions than some fossil fuel options, and steady base load power, but those are the only positives the industry can claim. When we buy nuclear power we also pay for the power plants, largely funded by gigantic subsidies that dwarf those given to the renewable energy industry. We taxpayers subsidize uranium fuel enrichment and a huge portion of the decommissioning funds required to dismantle and clean up these plant sites once they reach the end of their relatively short design life cycle. None of these 'true costs' appear as part of our nuclear power retail rates. With a realistic accounting of 'true costs,' wind power can already successfully compete with the electric costs from all traditional fuels, nuclear included.

The present wholesale rate per kilowatt-hour is far from the complete story. We have just begun to pay the one-quarter million year storage fees on the radioactive spent fuel, plus the salaries and facility costs to safely monitor, protect and store this waste material for the next 10,000 generations. These costs alone make nuclear power the most economically illogical energy choice in human history. To choose nuclear power in its present technological state is extremely self-serving and disrespectful to our children's future.

In the 21st-century, we must finally begin to include environmental costs into every energy choice we make. We have scarcely little time to almost completely end our human-made atmospheric carbon loading habit in order to save many of Earth's present ecosystems from severe damage.

Nuclear plants can provide steady base load power, but conservation and well-mixed, designed and managed renewable energy technologies can presently do the same job at lower "true" combined energy and environmental costs. All we need is the public and governmental will to move in this logical direction. Counter to claims from the nuclear

industry, renewable energy systems are not inadequate or insignificant. Technological advances are reducing the unit costs of these systems daily.


The problems of a renewable energy-sourced base load power infrastructure are not greater than past energy systems, just different. The long-term inherent logic of naturally sustainable energy sources has already begun to dominate the direction of world energy development. Disturbingly, the USA is already far behind and our future national economy will someday pay dearly for it.

Unlike nuclear power, with environmental costs possibly approaching infinity, wind energy "fuel" will forever cost zero dollars per unit. This fact, applied using conservation and all renewable energy options, could end the concept of energy cost inflation. The renewable energy industry will soon offer more design and manufacturing jobs than the traditional power industries due to the sheer magnitude of the problem. Renewables like wind power will shed most energy production costs relating to drilling, mining, refining, delivering, storage, processing, waste treatment and the discarding of traditional fuels. In addition, renewable energy systems offer the advantage of being fabricated, installed and operational in a very short period of time with relatively low decommissioning costs that, unlike nuclear energy, need not be funded by the public. Renewables like wind also carry few health, safety, security, accident, terrorist, environmental, inspection, insurance or future pollution tax risks or expenses. Distributed energy sources offer lower power line capacity requirements and better grid stability in the avoidance of brownouts. Nuclear energy will always be provided from expensive centralized plants with long, environmentally disruptive transmission lines due to the fuel security risks. As difficult as it may seem, windfarms should be much more accepted in distributed locations along utility power grids than nuclear plants that are nearly impossible to permit in someone else's "backyard".

Society must immediately awaken to the exciting and presently real possibilities of clean renewable energy systems and conservation logic. Renewables offer all of us a real path to profound prosperity that the overly-optimistic nuclear industry has never been able to bestow. We need to quickly use our ingenuity and limited resources to move away from short-term and unresolved solutions like nuclear power toward long-term, healthy, safe and true wealth-building solutions such as renewable energy, conservation and efficiency increases.

Original by Keith Dewey, Weston, Vermont

Edited by Green Energy Times' staff 5.12.11

Green Energy Times received a lot of calls and great feedback from our Hydro page (pg. 13), in our Feb. 15, 2011 issue. We are pleased to have the author's contact information for you here. For more information: email: info@littlegreenhydro.com. 



Hydro Turbine Project at the Water Treatment Facility

By Garrett kopczynski

In 2007, Governor John Lynch of NH signed the "NH Renewable Energy Act" that required 25 percent of the State's electricity to come from renewable energy by 2025. The City of Keene responded by committing to increasing the use of renewable resources and raising the overall energy efficiency of its municipal energy use.


Interest was generated by the then Mayor Michael Blastos in examining some options the City had for renewable energy, of which one was the use of Keene's naturally occurring water resources. The City is proud today that this initiative led to a successful project in the Hydro Turbine system at the Water Treatment Facility (WTF).

To get this project underway the City set aside some Capital Improvement Project funds to conduct a feasibility study. In 2008 Community Hydro, a Vermont based hydro power company, conducted a study in Keene. This study looked at the hydro power potential at the Ashuelot River dam and the WTF. The Ashuelot River dam did not have a strong case for power generation as determined by this study: it would require a significant investment. Lori Barg, from Community Hydro group believed, though, that the potential for self-sufficient power generation existed at the WTF. The feasibility study showed the payback based on what was known then was 20 years.

In order to help fund the project, the City took advantage of the American Recovery and Reinvestment Act (ARRA) otherwise known as the "stimulus fund." This grant, of which \$270,000 was allocated to the project, helped reduce the payback period significantly. In addition to the grant, the City was also awarded a low interest loan through NH Department of Environmental Services known as the "revolving loan fund." Together these two sources of funding reduced the payback to around 10 years, allowing the project to move forward.

The City contracted Rentricity Inc. to design the turbine system based on the feasibility study's proposals for how a system would work at the WTF. The system functions by relying on the principles of gravity and pressure. By taking excess pressure from the difference in elevations as the water enters the WTF turbines are turned to make electricity. The City took this tried and true technique and adapted it to the existing water treatment facility, building a two-turbine system that generates roughly 55 kW power together. This project reduces the current power needs of the WTF entirely, or mostly. The WTF used 129,000 kW yearly, but now an excess is expected with around \$30,000 annually in expected revenue and offset electric costs.

This project harnesses wasted pressure and creates clean power; and does it without any impact to the environment. In addition the project has the following benefits:

The City didn't build a new dam; the same dam built in 1931 to use as a water supply is utilized;
The City is not taking any additional water out of the environment – the amount of water that is put through the turbines is driven by the drinking water demand of the residents of Keene;
The City is not wasting or polluting the water. After it turns the turbines, the water continues to pass through to the filter units where it is cleaned and becomes drinking water for the City's residents.
The City offsets approximately 315 tons of carbon dioxide, almost 2 tons of nitrogen oxide gases, & a ton of sulfur oxide emissions as a result of the project. 



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There were two primary pieces of energy legislation this past legislative session. The bills were H.56, an 'omnibus' energy bill that, among many elements, focused largely on expanding opportunities for moving small-scale solar projects forward in Vermont and H.155, a bill to make strategic changes to the clean energy financing program, often referred to as PACE.

The House passed both bills decisively in April and, in late-session action in the Senate, the two bills were merged into one - H.56. In the waning days of the session the full Senate overwhelming passed the bill, the House concurred with the Senate's changes and the bill moved to the Governor's desk for signature, where Governor Shumlin was eager to sign into law.

While not as ambitious as many clean energy advocates would hope, H.56 - called the Vermont Energy Act of 2011 - takes a solid step forward on expanding opportunities for efficiency and renewables. H.56:

- Expands opportunities for net metering.** Despite significant interest in siting small-scale solar and wind projects in Vermont, the current limit on net-metering projects could halt these developments. To address this, H.56:
- Raises the amount of net metering gen-

eration allowed from the current 2% cap to 4% of utilities' peak energy demands.

- Raises the size cap on net-metered systems from 250 kW to 500 kW.

This provision will make the decentralized generation of homegrown energy in Vermont more viable for Vermonters.

- *Creates a financial incentive to catalyze more net-metered solar.*

The bill establishes a small benefit (up to 20¢ per kWh) that would be paid by utilities to solar and net metering customers for the energy they produce.

This will help make solar energy more affordable and viable for Vermonters.

- *Provides necessary bridge funding for the Clean Energy Development Fund.*

While many iterations of a funding stream for this small-scale renewable energy development program were considered this year, ultimately, at the urging of the Shumlin administration, they were all shelved for a solution that will essentially use existing funds instead of creating a new fee (as had been proposed).

Modeled on current federal law, the provision would allow the 23 businesses offered a solar tax credit to take a 50% discount on the value of those credits in return for receiving an upfront, one-time grant in lieu of the credit (once projects are up and running). With \$8.5 million

committed to 93 projects, its anticipated this approach will raise between \$2.7 million and \$3 million of those funds to support other CEDF-approved renewable energy projects - at no additional cost to Vermonters.

The CEDF is pivotal to growing a decentralized, homegrown renewable energy economy in Vermont.

Makes changes to Vermont's "Property Assessed Clean Energy" program. Action by federal mortgage backers Fannie Mae and Freddie Mac essentially halted many promising PACE programs across the nation dead in their tracks over the past year - including in Vermont. To address Fannie and Freddie's concerns and to provide Vermont municipalities more surety, H.56 makes some strategic fixes to Vermont's existing legislation, including:

- Making the PACE assessment on a home secondary to the mortgage.
- Creating two mandatory 'loan loss reserve funds;' One paid for by participants and one, a statewide loan loss reserve fund, administered by the State Treasurer, paid for by Regional Greenhouse Gas Inventory funds of up to \$1 million dollars. Together, these funds should provide the safety net municipalities and lenders seek.
- Tapping Vermont's energy efficiency utilities - Efficiency Vermont and the Bur-

lington Electric Department - to provide administrative support to municipalities who seek it, if they choose.

- Limiting the program to residential customers only, not commercial properties.

While it's unfortunate this program is no longer be available to commercial parties, it's possible that it could be expanded fairly easily to include commercial customers down the road.

Includes a 'bill-back' provision that would allow the state to recoup legal fees it incurs in defending itself against in litigation. This kind of "bill-back" authority is common in other types of litigation involving utility companies, but it also opens the door for the state to charge Entergy Corporation for the legal fees the state incurs as it fights the lawsuit the company filed against Vermont last month.

These are some of the core elements of the 2011 legislative session's energy legislation. Lawmakers pointed to the need to wait for the state's update to its Comprehensive Energy Plan — due to be completed by October 15 this year - before embarking on more ambitious energy action.

For more information about H.56, please contact Johanna Miller, Energy Program Director at the Vermont Natural Resources Council at 802-223-2328 ext. 112 or email jmiller@vnrc.org. ♻️

INCENTIVES

INCENTIVES

INCENTIVES

VT STATE INCENTIVES

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

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.
- 4) Must comply with requirements of applicable portions of VT Public Service Board Rule 5.100.
- 5) Larger than 10kW apply for special permission.

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

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

Solar Electric (PV), 75¢/watt rebate, 20¢/watt feed-in:

- 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.
- 2) 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 up to 200kBTU:

- 1) 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.
- 3) Upgrades: new collectors: at least 15 kBtu/day.
- 4) Swimming pool heaters are **ineligible**.

NH STATE INCENTIVES

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

ELECTRICAL (Solar PV, Wind, Hydro)

Residential Renewables (Solar PV, Wind)
(No NH Funding until July 2011, at earliest)

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

Geothermal Heat Pumps, \$800/ton up to 5 tons; \$500 duct bonus. (- \$350 inspection fee). Limited funding, 1st come, 1st served:

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

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

Local Incentives

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

Solar Hot Water, Solar PV, and Wind education only
See <http://bit.ly/NHAltEforEd>

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:

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

Wind Turbines:

- 1) Placed in service before 1/1/2009: \$4,000 maximum credit.
- 2) 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:

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

How Sustainable is YOUR Community?

Ferrisburgh Going Renewable with New Town Energy Committee

This new Town Energy Committee began in the summer of 2010 when the selectboard appointed Bob McNary to represent Ferrisburgh. The stated goal of the new group is to make home energy conservation audits available to the local townspeople and to assist residents with funding applications needed to implement home energy conservation measures.

The Ferrisburgh Energy Committee meets the second Monday of every month at 6:30 at the Town Clerk's office. Everyone is welcome to attend. If you would like to become a member of the Energy Committee, be in a support position, come to a meeting or contact Bob McNary, Ferrisburgh Energy Coordinator.

COMMITTEE PROGRESS TO DATE INCLUDES:

The 1st Green Energy Fair

Co-sponsored with Ferrisburgh Central School last October. This successful event drew over 300 attend-ees and showcased dozens of hands-on energy related projects for youngsters. Many local private vendors were also on hand to display solar hot water systems, photovoltaic arrays, foam insulation products and energy efficiency demonstrations and information for the adults.

Working to Raise Funds

To replace the commercial refrigeration unit at the Ferrisburgh Central School Kitchen. The existing system is almost 40 years old, inefficient and so old that it's impossible to find replacement parts. Through a combination of grants and private sponsors and rebates, the committee has already raised 25% of the funds that will be needed to replace this unit with a new Energy Star rated unit.

"Rain Barrel" Workshop

May 22nd. The committee will be hosting. \$20 fee for materials. Participants will create their own rain barrel system, which they can complete and take home that day. Laura Killian, a UVM Water Resource educator, will give a short presentation and then lead this workshop. Along with all the tools and supplies needed to create your rain barrel, permanent markers will be provided for creative decorating, so bring your stickers and your artistic ideas. This promises to be a fun and productive family event. Pre-registration is requested. Call Bob McNary, Ferrisburgh Energy Coordinator for further information.

"Solar Initiative" Program

June, 2011 The committee is scheduled to have a representative from VPIRG come to town to speak about the "Solar Initiative" program. ♻️

Ferrisburgh, VT

Local Energy Committee Success Story

Ferrisburgh Energy Committee helps local resident install a new home-based Wind Turbine Energy System

The idea of installing a wind turbine has always appealed to us, yet the process was mysterious and daunting. Who do you call, how do you know it will generate enough power to pay for itself, how much does it cost, what permits are required, etc.? We had lots of questions and very few answers. I contacted NRG Systems 3 years ago and expressed our interest to be a test site, but nothing came of it. (I recently learned that small-scale residential wind generation is not their primary market).

When I learned of the Ferrisburgh Energy Committee, I thought they might be resource for impartial information, and so they were. At last October's Town Energy Fair at the Ferrisburgh Central School, I had occasion to examine the Bergey Turbine installed at the school and meet Tom Halnon, owner of Vermont Green Energy Systems, who had installed it. Tom was very helpful and answered the majority of my questions.

I was further directed to the Ferrisburgh Central School web site where a link is established to view historic production data from their wind turbine. After a detailed review of the data, I was left with a decision to make. *Would installing a wind turbine make financial sense for us?* This was not a simple yes/no question. Not only was the initial out of pocket cost substantial, but how much could we save from our bill each month, and how long would it take to recover our out of pocket expenses?

To begin, I must explain how net-metering works. Our turbine is connected to the grid. When the wind blows, any surplus power we generate is fed back into the grid. When there is no wind, or when we are using more than we are generating, we draw power back from the grid. The grid acts like a power "savings account" with a 12-month look back. Surplus power fed into the grid by a winter gale can be recovered for our use during a July calm. The power is not actually stored; it merely changes the aggregate demand on the generators feeding the grid. Any surplus power at the end of the 12-month look back is forfeit. So, the most we can save, is the amount we use! We CANNOT sell surplus power!

The questions we had to answer were: how much power do we actually use, how much does that power cost to purchase, and above all, how much can we reasonably expect to generate? The first two answers were to be found in a detailed examination of our monthly electric bills. In an average

month we used close to 1000 Kilowatt Hours (KWH) and paid about 14¢/kWh for that power, so our total monthly savings could be about \$140.00. Please note, we still pay a basic monthly service charge as well as for a security light (about \$23/month), so our bill will never be zero.

To determine how much power we could expect to generate there were several options. The most accurate and conservative would have been to erect a monitoring station and collect a year's worth of data, like an NRG Systems would do. A much simpler way was to examine a commercially available wind forecast survey. We compared data from that survey with the actual results from the Ferrisburgh school turbine located 3 miles away, and found a strong correlation.

The data suggested we could expect 900-1100 kWh/month from a turbine similar to the one at the school. I backed this up with what I call the "flag test"! At the time we purchased our home in Ferrisburgh, it was called Fox Meadow Farm. As I was replacing our American flag for the second time in two years, I got to thinking about the wear and tear our flag had experienced, and suddenly realized, a first quality American flag does not get severely frayed on the fly edge in one year unless there is a lot of sustained wind. I even suggested to my wife we should name the farm "Windy Acres", and the idea of a wind turbine really began to make sense to us.

Once the decision to purchase a turbine was made, the question of which turbine, and from whom loomed over us. I must admit I was so impressed by the Bergey turbine offered by Vermont Green Energy Systems I looked no further. The turbine is not only made in the USA, but the tower was fabricated right here in Vermont! What's not to like about that! We signed a contract with Tom with a completion date of prior to end of last year. Tom completed all the paperwork and obtained the permits. From that standpoint, it was completely painless for us. There were a few weather related delays, but all in all, we stayed close to the original schedule.

Our turbine began generating power early in January and thus far is exceeding our expectations with lots of power "banked". Our output is consistently 10-15% greater than that of the Ferrisburgh School turbine, (an outcome anticipated by the forecast I might add), and has exceeded our usage for the first 3 months of year by about 15% as well.

Ralph Shepard's Wind Turbine



PART B

BEAURACRATIC details! Our decision to buy was greatly influenced by two incentive programs: • 30% of the purchase price can be claimed as a Federal Income Tax Credit, secondly, the VT Small Scale Renewable Energy Incentive Program, as described below, will pay \$1.25/installed watt. Before committing to buy, we received a letter of commitment from the program, reserving funds for our project. Nothing contained in the application prepared us for the Red Tape to follow.

We assumed complying with the stated requirements would suffice. Nowhere was there mention of a review by the Vermont Department of Historic Preservation. Our turbine did not affect any structure over 50 years of age, but the approval and release of our incentive funds had been delayed well over 2 months - because we *potentially* disturbed archaeological ground features! *We could have built a new house or barn, run a water line, plow the fields, paved the drive, or planted trees without any historic review, but because this is a Federal and State Government subsidized incentive program, we needed Historic Preservation approval before the promised funds could be released.* With \$16,000 at stake, you can imagine our concern. Verbal approval was received recently. As I write, the funds are supposedly being processed for release.

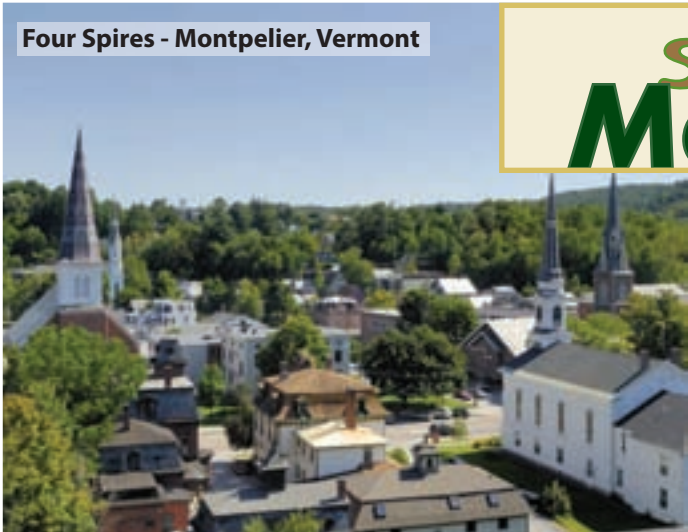
- Ralph Shepard, Ferrisburgh, VT ♻️



The Ferrisburgh Solar Farm Team!
Left to right: Ernie Pomerleau, Tracey Schoonmaker, Steve Ploesser and Brian Waxler

Significant snowfall is a major challenge for a ground-mounted PV system in VT. The design of the Ferrisburgh Solar Farm allows snow to slide off the modules, but does not tilt them so steeply that shadows pose a problem (30°). It also allows for snow to accumulate on the ground (48" clearance.) The array was put to the test during the winter of '10-'11. The modules were covered with snow and ice within weeks of operation, but as planned for, they cleared off when the sun came out. Despite record snowfalls, the system is right on target for producing the estimated annual energy for the year! ♻️

Four Spires - Montpelier, Vermont



sustainable Montpelier, VT

OUR STATE CAPITOL

Community Profile:

- **Population:** approximately 8,000
- Montpelier, the nation's smallest capitol, is a center for government, commerce, industry, services, and entertainment.

North Street - Montpelier, VT



OVERVIEW:

- Montpelier has committed to reduce the greenhouse gas emissions and fossil fuel consumption of the city, its citizens, and its businesses by 80% by 2030.
- One of the key steps the city is taking to reach this goal is the construction of a state-of-the-art district heating facility. The project would be developed in partnership with state government and provide heat to the Montpelier State Building Complex and to the core district of the Montpelier community. The project would be powered by locally sourced, renewable, and sustainably harvested wood chips. Exploration of a combined heat and power plant and a district heating system began in the early 1990s with several technical reports evaluating the technical feasibility of district heat in the Montpelier. The project has advanced and the work guided with strong involvement of community members. Many experts in the energy field have had leadership roles and been very involved over the years as well.
- Funding for the project feasibility studies came through \$25,000 and \$75,000 grants from the Clean Energy Development Fund, as well as through a bond re-vote by the city of Montpelier for \$250,000.
- Funding for the implementation of the project is coming from a variety of sources including state and local governments, but the funding that has caused the most excitement is \$8 million dollars from the U.S. Department of Energy, as part of the American Recovery and Reinvestment Act.

OUTCOMES:

- The project will be developed in phases, with the initial phase to supply heat to a complex of state buildings, including the State House, the Montpelier High School, Elementary School, City Hall, Fire Station and Police Station. Subsequent phases would reach out to other state and municipal buildings. There is also an interest in serving businesses and residences in the downtown core and pairing the project with the clean energy financing program called PACE (Property Assessed Clean Energy).
- The initial phase of the project will displace over 300,000 gallons of fuel oil with locally sourced, renewable, and sustainably harvested wood chips. This will prevent nearly \$1 million annually from leaving the Vermont economy for distant fossil fuel. Now the fuel will be acquired locally and The Montpelier Community Renewable Energy Project the money will remain in the local economy.
- A district heat system is more efficient and has fewer emissions than many small, dispersed sources of heat. In Montpelier's case, this will result in reducing health-threatening emissions by replacing many older boilers with a single, new, well-controlled highly efficient central boiler.
- The project will support local jobs in the forest products industry and related activities, while supporting the development of an important infrastructure that will enable other similar projects to succeed.

KEYS TO SUCCESS

LESSONS LEARNED:

- The energy advisory committee for the project, consisting of many dedicated energy experts over the years, has been imperative in working to make this project a reality.
- Having a strong and diverse group of innovative and enthusiastic partners is crucial. This project a partnership between the city of Montpelier and Vermont state government, with strong support from the community and the Legislature.
- This project was first envisioned in 1990 as a district-wide combined heat and power facility. Projects of this magnitude can take many years to implement and are subject to changing tech-

nical, economic and political realities.

- There are many technical and economic considerations in developing a district energy project. Identification of the facilities to be served, the routing of the underground heat distribution piping, whether or not to include the generation of electricity. All these considerations require rigorous technical, economic and policy review before a thoughtful final decision can be made. If successful, the benefits of district heating should be stable and predictable heating prices on into the future and knowing that monies spent on heating are supporting the local economy directly.

Contact: Gwendolyn Hallsmith, City Planner,
802-223-9506 ghallsmith@montpelier-vt.org.
www.montpelier-vt.org/group/99.html

Pipeline Map - Montpelier, VT



www.vbc-vt.org



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Solar:	HVAC:	
Domestic Hot Water Systems	Complete System Design & Installation	
Space Heating Systems	Oil & Propane Boilers, Furnaces & Hot Water Heaters	
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Enjoy up to 40% energy savings with a Rinnai tankless water heater. That's because Rinnai's are designed to be highly efficient and only heat water when it's needed.

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The system is anticipated to be commissioned during the final week of May and a ribbon cutting event is planned for the project on May 25, 2011



Encore Redevelopment is a project development and project management company with a focus on 21st century solutions to underutilized property:

- to create harmony between the natural & built environments that fosters sustainable growth by creating opportunities for infill development & the generation of clean, renewable sources of energy.
- represents environmental leadership, to foster job creation & revenue generation in the rapidly developing restoration & green energy economies.

PANELS:

528 Suntech 280 Watt Solar PV Modules

INVERTERS:

16 Sunny Boy 8000 Watts
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MOUNTING

Schletter PV Ground Mounted Racking System

DATA ACQUISITION

Draker Laboratories

EXPECTED OUTPUT

~ 170,000 kWh

GHG AVOIDED

~ 32,000 lbs CO₂/ yr
based on estimated GMP rate including T+D loss



< Cont'd from Front Cover

the local community as well as to South Village residents, offers members weekly shares of the farm's produce. The CSA has grown steadily from 30 members in its first year of operation to 80 members in 2011. A pick-your-own herb and cutting garden, laying hens and beehives are some of the other amenities provided by the Farm. By clustering the housing into a compact village footprint, more than 70% of the land at South Village has been forever conserved for agriculture, wildlife and recreation. With 165 acres of open space, residents are able to enjoy 180° views of the Green Mountains, Lake Champlain, and the Adirondacks.

A residential development that connects homeowners to the food they eat – and now to the electrical power they consume – is a model whose time has come. Local, regional and national interest in South Village is at an all-time high, with recent articles appearing in local media, Vermont Life and the New York Times. When the carbon-free electricity begins flowing in early June, it will power the entire infrastructure associated with the Farm at South Village, including greenhouse ventilation, lights, heat, irrigation pumps, refrigeration and cooling for a future farm store. A portion will also power all of the streetlights and sewer pumps for the South Village community while the rest of the electricity produced by the Farm at South Village solar array will be used by the City of South Burlington to power essential infrastructure including stoplights and sewer pump systems.

For Will Raap, South Village has provided an opportunity to connect his background in urban planning with his long-time commitment to land conservation, local food production and renewable energy. He has played a leading role in the South Village development, the Farm at South Village, and now in the on-site solar project.

"Our first energy crisis in the 1970's was a wake up call that the pattern of sprawling suburban developments far from jobs with long commute times and consuming valuable farmland was not sustainable. Village-style developments closer to commercial centers that preserve open space and can produce food and energy for residents is just plain smart."



Farm at South Village Solar Array
South Burlington, Vermont

Aerial View
Looking Northeast
Over Spear Street



U.S. Map, Aerial View, 2010

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Farm at South Village Solar Array
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Aerial View
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Over Spear Street



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Farm at South Village Solar Array
South Burlington, Vermont

Aerial View
Looking Northeast
Over Spear Street



U.S. Map, Aerial View, 2010

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Farm at South Village Solar Array
South Burlington, Vermont

Aerial View
Looking Northeast
Over Spear Street



U.S. Map, Aerial View, 2010

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Farm at South Village Solar Array
South Burlington, Vermont

Aerial View
Looking Northeast
Over Spear Street



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Net Zero Homebuilding at South Village So. Burlington, Vt.

Net Zero: a home that produces as much energy as it will use during the course of a year.

A new Net Zero home has recently been completed at South Village Community in S. Burlington, VT. The home has many unique features leading with two of the most important; its Net Zero energy story and its looks!

This home has the appeal of a traditional Vermont Farmstead home complete with bay windows, covered front porch, back deck, traditional looking windows and a gabled roof. Passing by, it looks in character like every other home in the neighborhood except for the added solar equipment on the south facing rooftop. Solar photovoltaic panels and thermal evacuated tube collectors are mounted on the south facing roof elevation, integral to the home's energy system. Less obvious is the thermal storage tank located in the basement.

Manufactured by Thermal Storage Solutions® of Vermont, this 8'H x 11'L x 8'W tank encased in foam stores hot water for the home's domestic hot water use and heating. The home uses a combination of radiant flooring and low temperature baseboard to meet the homes heating needs using just 90 degree water, thus optimizing the thermal storage. Software has been installed to monitor the solar production and the home's use.

The home was built by Sterling Construction of S. Burlington, VT, both VT's HBRA Builder of the year and VT's premier Green Builder. Collin Frisbie, co-owner of the company with his father Bart, both teaches green building and builds homes green, efficient, precise and economically.



South Village introduces a new series of Home Designs;

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Town Home Plans starting at : \$ 298,900

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Open House Thurs - Sunday 12-4:00 pm



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The home's Architect, Steve Roy, VP of Wiemann Lamphere Architects of Colchester, VT designed the home for his family. He and his wife Meg wanted to set a new standard in homebuilding and design, hoping their enthusiasm for Net Zero energy consciousness will spread. The idea that a typical looking house can serve the family's needs without the use of any fossil fuel and in the long term will cost less than the typical house is something that people should be more aware of. A overwhelmingly successful Open House to "take a look at the Net Zero construction" on 10-10-10 proves they are on their way.



The Roy Net Zero Home in South Village

The Roy Net Zero home costs about \$25/sf more to build than an average home after incentives, but will easily save that in energy costs in the coming years. The extra costs include all solar items required beyond a typical heating system, the home's insulation, window and air sealing upgrades. All of these are key elements to achieving Net Zero by reducing the energy use of the home and then providing enough energy production to account for the use. The Roy's have already received a combined heating and electricity "bill" which was a credit of \$3.73 for the month of March.

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Look for Part II "Thermal Storage Applications" in the near future in Green Energy Times!



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SOUTH VILLAGE ITSELF IS:

- A conservation community designed to accommodate 334 homes in a variety of styles, including single family homes, townhomes & condominiums on over 200 acres.
- Over 150 acres will remain conserved open land with the homes clustered into villages, surrounding an organic farm that currently supports a 70 member CSA, growing towards 160.
- The Farm, in 2011, is erecting a 150KW Solar Meadow Array to support the farm's energy consumption on site with more to spare and share.
- Residents volunteer to feed chickens & collect eggs to share.
- One resident keeps bee hives.
- The conserved land, the natural beauty of the Green Mountains and Adirondacks of New York visible across Lake Champlain, make South Village an ideal place to live and play, visit neighbors, and share with family and friends.
- The community focuses on natural land management for storm water & wetland management, involving organic cultivation of native plant species for land restoration.
- Gentle recreational use of the natural surroundings is encouraged by a walking path & trails.
- South Village is a neighborhood that focuses on the ideals of sustainability, through resource management & community. ♻️

Enfield Couple Deserves a Big hand!

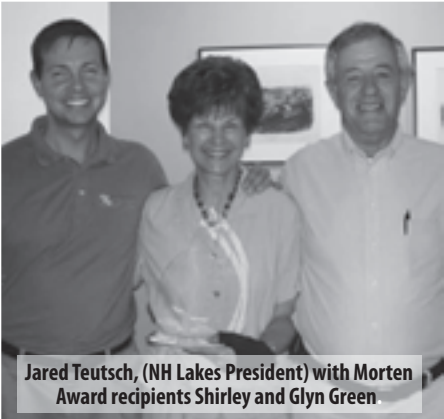
By Andrea Green

I GREW UP living at my family's cottage on Crystal Lake in Enfield, NH, during the summers. I was lucky, waking up early to build sand castles and staying up late by the campfire roasting marshmallows. The rest of the time was spent in the lake, swimming, boating, etc. I never worried about my wardrobe; all I needed was my bathing suit. And my parents never worried about me, our neighborhood was a family, always looking out for one another.

We took after-dinner walks, picking up trash off the road. We helped neighbors building docks. We gathered every July for a lake picnic, for residents to get to know each other better. But, now that I'm grown up, it's the "always looking out for one another" part that has a lasting impression. It's more than watching out for the neighbors' kids, and it's bigger than a picnic. It's community. And, it's about the future.

Crystal Lake has been touched by two very special people: my parents, Glyn and Shirley Green. Not only have the Greens actively promoted the Crystal Lake Improvement Association (CLIA) to the residents of the Lake and the surrounding town of Enfield, but my parents have spear-headed several programs to preserve the environmental future of Crystal Lake.

For as long as I can remember, every Sunday, my Dad has ventured out on the party barge, rain or shine, to gather water samples as a volunteer for the UNH Lay Lakes Monitoring Program, which measures the health of the lake. Both my parents helped establish the NH Lakes Association's Lake Host™ program on Crystal Lake, keeping it free from exotic aquatic plants like milfoil, since the program's inception in 2002. They have also both volunteered as NH Department of Environmental Services' Weed Watchers program, surveying sections of the lake every summer for infestations of exotic plants. In addition to organizing the CLIA picnic ev-



Jared Teutsch, (NH Lakes President) with Morten Award recipients Shirley and Glyn Green

ery summer, over 10 years ago the Greens created and continue to publish the CLIA Newsletter for the entire lake watershed. By continuing to educate the people living in Crystal Lake's watershed, the cause has continued to grow. There is an annual clean up day for the entire watershed, organized by the Greens, and the attendance for the cleanup and the picnic grows every year.

As tireless lake stewards, my parents have volunteered thousands of hours toward the improvement of not only Crystal Lake, but all NH Lakes, including my mom's 10 year tenure as a dedicated member of the Board of Directors of the NH Lakes Association, including Chair of the Education committee.

Last summer, I was honored to be present at the NH Lakes Association's annual meeting, where my parents, Glyn and Shirley Green were awarded the prestigious John F. Morten Memorial Award. This award was created in 2002, in honor of the late John F. Morten, in recognition of his lifelong work to protect New Hampshire's lakes and ponds.

I know I was lucky to spend my summers on beautiful Crystal Lake. But I think Crystal Lake is pretty lucky to have my parents. Glyn and Shirley Green have spent their lives looking out, not only for the neighbors' kids and their community, but for the future of our beloved Crystal Lake. ♻️

NEWS, CLUES & REVIEWS

Down to the Wire

by David W. Orr

At NESEA BE11 in Boston, one begins to truly appreciate the person that David Orr is. He questions if it is the right thing for him to hop in a plane to travel back and forth to help others understand what we are facing and how we can confront 'climate collapse'. He understands his own carbon footprint and knows he has to do his part, as well.

Not only was he the keynote speaker, but also part of a panel discussion about our climate issues at hand. His engaging words are worth listening to or reading. If he is speaking locally, make sure to attend the lecture.

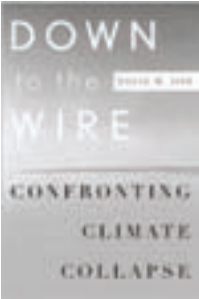
David Orr presents with optimistic hope for our future, in spite of the urgency to take action. As stated by Stephen H. Schneider, Stanford University, Down to the Wire discusses the causes and the solutions to our mounting 'long emergency and that good governance, not just technological solutions, will all have to be part of the mix if we are to save the planet in time.'

Due to our refusal to live within natural

limits, we now face a long emergency of rising temperatures, rising sea-levels, and a host of other related problems that will increasingly under-mine human civilization.

Climate destabilization, to which we are already committed will change everything. With the imminent situation we find in front of us now, the 'roadmap to a livable future' is exactly what we need. The information is informative and full of fresh and deeply intuitive understandings. The realistic way that the author subscribes to, with his belief and hope for humanity, is inspiring and not full of doom. We are confronting a difficult path that we must follow if we are to emerge on the other side successfully. David Orr presents a call to action. This is a highly recommend book to read and share with everyone.

- Review by Nancy R. Mallery ♻️





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RECOMMENDED READING

Visit www.chelseagreen.com 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.
- **A Solar Buyer's Guide for the Home and Office** - by Stephen & Rebekah Hren.

Chelsea Green: BOOK REVIEWS



NEW REVIEWS:

Chanterelle Dreams, Amanita Nightmares by Greg A. Marley

The Love, Lore, and Mystique of Mushrooms. The title truly describes the enticement of a wonderfully healthy, nutritious option that grows wild nearly everywhere.

We found this book not only to be a good read, but also extremely educational, to equip the reader with the tools and tips that are extremely important for the foraging and cultivation of this wild wonder.

Marley "explores the risks of the infamous poisonous mushrooms, explaining how to avoid them and their functions in the past as well as the promises for clinical uses in the future.

As a forager myself, I found the pictures clear and organized, showing the well-known 'choice' varieties that are generally much safer options to make as a beginner. The clarity of the poisonous fungi pictures are invaluable information for comparison, along with excellent descriptions. The book includes numerous recipes and preparation methods that tempt one further.

As we all transition into a sustainable future, this book, along with other wild edible information and skills will be something that may become the norm and the mystery taken out of this invitation into the fungal realm. It is infectious, encouraging and a pleasure to read. ♻️

BIOCHAR BONANZA:

BioChar at Shelburne Farms

Workshop at Shelburne Farms explores many ways Biochar can benefit environment

"I got interested in biochar because it links agriculture, energy and the environment in a very compelling way." Marshall Webb, Forest Manager and leader of alternative energy projects at Shelburne Farms has been interested in biochar for several years, and has been finding ways to produce it, use it and tell the world about it.

Shelburne Farms is a 1,400 acre working farm, environmental education center and national historic landmark on the shores of Lake Champlain in Shelburne, Vermont. The mission of the historic estate is to cultivate a conservation ethic for a sustainable future. Marshall says, "I could see how the farm could take advantage of all the benefits of biochar (carbon negative energy, water filtration, improved soil fertility, etc.) and use each step of the process to initiate a discussion about a sustainable future."

Several times in the past two years, Marshall has led demonstrations of the magic of producing biochar and its many applications for groups ranging from farm staff and college students to workshop participants, motivated by curiosity or the desire to make their own biochar.

Last year in early April, Peter Hirst and Bob Wells, biochar gurus from Cape Cod came to Shelburne Farms to give a demonstration of the exciting new carbon sequestering technology using their Adam Retort pyrolyzer. Hosts for the day were Marshall and Jock Gill of the Northeast Biochar Association, and the audience included students from the University of

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.

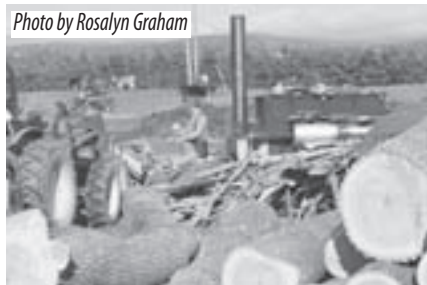


Photo by Rosalyn Graham
A large scale biochar cooker from Cape Cod demonstrated by Peter Hirst & Bob Wells, biochar gurus from Cape Cod, during a biochar program at Shelburne Farms in the spring of 2010.

Vermont Soil Science program. Peter and Bob also demonstrated a smaller version of the "cooker", a top-lit up-draft stove that could produce biochar for small scale operations, giving everyone a chance to see, feel and even taste the pure carbon product of their process.

On April 30 this year, Jock Gill and Marshall Webb led a day-long Biochar Bonanza workshop with a different objective. The 10 Bonanza participants learned about the benefits of biochar and they also learned how to make small gasifier stoves called iCans. Under Jock's guidance, they made the mini stoves which produce heat and a handful of biochar with each burn.

Made from recycled cans using a hammer and nails to make holes, these little cans (in this case 19 oz. soup cans) can produce a surprising amount of heat with hardly any smoke from less than a cup of wood pellets. All the participants are planning on using their new gasifiers to make biochar for experimentation in their gardens. Biochar mixed one to one with compost has been proven to increase crop yields.

Jock asks, "What can I do with one can? I can make a stove; I can cook a meal; I can make biochar; I can be carbon negative; and I can start to change the world. That's why I call these stoves iCans."

And what's next for biochar on Shelburne Farms. Marshall says, "Last year we hired New England Biochar to make one ton of biochar out of sawmill scraps and with the help of a UVM soil science class we've made in-ditch filters to see how much we can reduce phosphorus and E.coli in storm water. This year will mark the first experiments in the market garden using biochar to augment the soil in the seven-acre garden where vegetables, fruit and herbs are grown for the Inn and Farmers Markets."

He is also looking to the future. He says, "I'm hoping to see a biochar production facility at the dairy producing enough energy to more than displace 6,000 gal. of propane annually and make one ton of biochar per week for use on our own fields and for sale." ♻️



Photo by Marshall Webb
Participants in the April 30 Biochar Bonanza workshop watch as their newly constructed icans transform wood pellets into biochar.



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Revolution Compost

Food Scrap pick-up and Compost delivery by Bicycle



One Revolution, Vermont Bikes at Work, originally profiled last year in Green Energy Times, has begun a new service in the Burlington and surrounding communities providing pick-up of compostable items from residences and offices by bicycle. The new service is called Revolution Compost and it's had a great start locally.

For a one-time start-up fee, Revolution Compost provides customers with a 6-1/2 gallon tote, and optional compostable bags. The tote can be securely latched and is suitable for outdoor storage.

Each week, or every other week if customers choose, Revolution Compost riders come by with cargo bicycles and trailer in tow, and transfer food waste from the totes to their bikes and containers. Totes remain with customers and are wiped clean with every pick-up. Rates are \$8.00 for weekly pickup and \$10.00 for pick-ups happening every other week. Owner Mark Bromley hopes to expand into pickup from office break rooms and kitchens. Rates are negotiable for larger volumes.

As a return on their investment of scraps customers receive free a 5 gal. bag of Intervale Organic Compost delivered for every 30 gal. of scraps picked up.

Materials collected comply with the

current standard list as provided by Chittenden Solid Waste and are brought to CSWD drop sites.

With the recent relocation of the Intervale Compost operation and closing of the collection site at the Intervale, Revolution Compost presents a convenient alternative to car or truck delivery to other drop sites.

The collection zone currently covers downtown Burlington, South Burlington, the "Sisters" neighborhood, and a good chunk of Winooski. A service zone map is available at their website. Bromley welcomes inquiries about additional areas and hopes to expand with the demand.

Revolution Compost is a new venture of One Revolution. Since last June One Revolution has cycled collectively over 15,000 miles and weekly delivers 1-1/2 to 2 tons of CSA products for the Intervale Food Hub to offices and schools, in addition to regular same-day delivery and catering delivery.

Riders rode every week this last winter with studded tires and Bromley feels that their reliability is proven having met all schedules during a particularly tough winter.

Learn more at www.OneVT.com or they can be reached at revolutioncompost@gmail.com Or 1-877-4BIKEVT ♻️



RECHARGEABLE MOWERS *Cont'd from p.37 >*

The Hustler Zeon™ Zero-Turn Mower. John Deere is in trouble! With enough juice to mow over an acre on a single charge, it is made of steel vs. molded plastic. It is one tough machine. We really put it to the test on the roughest stuff I could find. It even has a wheelie feature so it cannot flip over backwards on a steep hill. It works (*don't ask!*) The roll bar is foldable and the 42" wide side discharge mulching make for a quick inexpensive operating machine. Dual electric transmissions for true zero turning maneuverability works like a charm. The 4 marine deep cycle batteries are the same that many folks use to store power from solar (*Trojan T-105's, known to take a lot of charging & discharging*). At 6 mph, this is no toy - its a real work horse.

I WANT one. It sells for around \$5,000. So, there you have it. The Batteries are over 95% recyclable. Very inexpensive to operate - electricity is cheaper and prices fluctuate less. We hope that you consider all of this and do one more thing to help yourself and the planet. ♻️

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Lakeview Inn: A CASE STUDY



mendations to improve the thermal envelope of the Inn and drastically reduce heating costs were to: air seal and insulate the basement and crawl spaces, air seal and insulate the floor below the three season porch and walk in cooler, air seal and insulate the accessible second floor framework, and upgrade to a more efficient heating system.

The Donnelly's chose to have the recommended insulation and air sealing work completed by Building

Scott and Cathy Donnelly, proprietors of Lakeview Inn Greensboro, VT were concerned about energy use and cost, frozen pipes, and maintaining guests comfort at their Inn. They contacted Building Energy for a commercial energy audit to receive a diagnosis on air infiltrations issues, evaluate their overall energy use, and learn about optimal heating options for their historically registered Inn originally built in 1872.

Scott Gardner and Brent Mellen of Building Energy performed the energy audit. They determined that there were many areas that could be improved in the 9,500 sq.ft, intermittently occupied building, which was consuming approximately 2,760 gals of fuel oil annually. The primary recom-

Energy. The Lakeview Inn reduced their air leakage by a whopping 23% and their projected fuel consumption by nearly 20%. Building Energy submitted the project to Efficiency Vermont's Building Performance Incentive program. The project qualified for an incentive that reduced the cost of the insulation and air sealing measures by 17%. The Donnelly's also hired Benoure Plumbing and Heating to replace their older oil boilers with a new high efficiency propane unit. The combination of air sealing measures and boiler replacement enabled glycol to be removed from the baseboard hot water system. It is estimated that the boiler upgrade and elimination of glycol will result in an additional 20% reduction in heating fuel consumption.





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Now the Donnelly's are able to operate the Inn more efficiently while providing guests attending meetings, weddings, & retreats at the Inn with superior comfort & cleaner air.

More Info: Building Energy <http://www.buildingenergyvt.com/>
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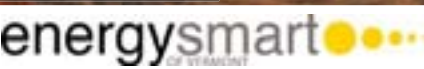
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Passiv Haus to Our Haus

By Stephen M. Frey, AIA - LEED AP



Habitat House image courtesy of Alriti Architects

Recently there's been a lot of press paid to Passiv Haus projects. Over the last decade in Europe more than 15,000 buildings whether new construction or renovations have been built to these standards. Stateside it's called Passive House and is supported by a national non-profit PHIUS, the Passive House Institute-US.

The Better Buildings by Design Conference (BBBD11) held February in Burlington, showcased a wide variety of super low energy use projects including Passive House projects. There we learned first-hand Passive House can be applied to all kinds of buildings and scaled up on a community level. However, is the Passive House movement accessible, affordable and adaptable to the mainstream here in the U.S. and furthers goals of energy independence?

Disruptive Innovation?

Passive House dramatically shifts the conversation about energy use in residential and commercial design. Building to this standard can reduce energy use up to 80-90% of typical model code designed buildings. As compared to the US-GBC's LEED rating system Passive House offers a more direct path to a radical decrease of energy use and carbon emissions. By upping the performance ante, Passive House is now a disruptive innovation force impacting established design standards such as those offered by the USGBC and Building Science Corporation (BSC).

BBBD11 debates centered on best ways to achieve low energy usage and low resource impact goals, how low is too low in building insulation levels, and air-tightness and performance levels? Most there thankfully shared the big picture sketched by Bill McKibben in his recent book "Eaarth" published last year; "how can we help soften the hard landing for coming generations?"

There I found hope and passion with ample Vermont and Northeastern conference examples. I found it in a Passive House renovation of an early modern Connecticut home designed by Ken Levenson Architects (KLA); a Habitat for Humanity Passive Home in Charlotte, Vermont designed by J.B. Clancy of Albert,

Righter & Tittmann Architects (ALRITI), Inc. who collaborated with Peter Schneider from Vermont Energy Investment Corporation (VEIC) and Preferred Building Systems (PBS) out of Claremont, NH.

The first was a high end home renovation of a Bauhaus inspired concrete home, the second a cutting edge Passive House meeting head-on the problem of the mass market factory produced home.

The Passive House Standard

A Passive House building (from the Passive House Institute-US website), is an "extremely well-insulated, practically airtight primarily heated by passive solar gain and internal gains from people, electrical equipment and small energy sources when needed...(with) avoidance of heat gain through shading and window orientation helping to limit cooling loads."

Super-insulation recommendations for cold climate Passive House projects range from R50-90 for roofs, R40-60 for walls and R30-50 for sub-slab insulation. Windows are R7-10. Such buildings have extremely air-tight construction requirements needing to meet or be below 0.6 ACH@50CFM. High efficiency heat recovery ventilator systems provide ample fresh air supply—with less reliance on radiant-slab space heating and other heat or cooling delivery methods, as per the BSC Insight white paper 025.

In his comparison between the Passive House and other more typical low en-



Wall Section courtesy of Alriti Architects & PBS

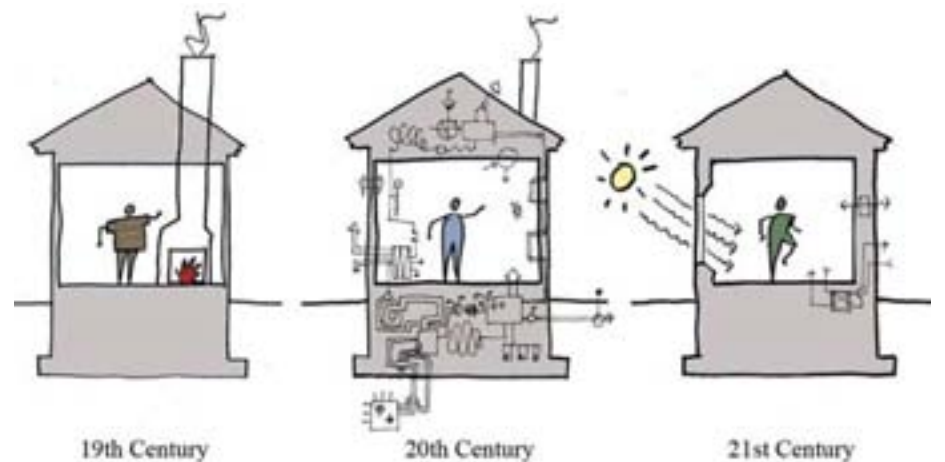


Image Courtesy of Alriti Architects

"Moving Towards Simplicity"

ergy homes touted by BSC, John Straube writes such houses "consume 40-60% more energy than Passive House but are more cost effective". (Cost-effective refers to initial costs to build and the return on investment over the long-term.)

They follow the BSC R5/10/20/40/60 enclosure insulation recommendations: R5 for triple glazed low-e windows, R10 sub slab insulation with R20 in conditioned spaces in basements, R40 above-grade walls and R60 for roofs. Like Passive House, air-sealing is stringent at 3 ACH@50 Pa with some homes able to come in at half of that with additional detailing care.

In either, the very low air-sealing rates require building simpler shapes and forms. Expressive and unusual building shapes, such as dormers and protrusions, bends and unusual building angles complicate air-sealing detailing and increase costs. This pushes designers to be more creative while working with simpler building forms.

Another challenge is the need to limit window area in ratio to wall area. For Passive House it's not uncommon to have 9% on south facade and 1-3% window to wall ratios on others, thus limiting daylight into spaces and lessening views out. For other low-energy homes, Andy Shapiro of Energy Balance, Inc., a Vermont based energy consultant recommends planning for 10-15% window to wall area on the south, while keeping other facades as minimal as possible to function-specific glazing.



Photo courtesy of Alriti Architects

Marc Rosenbaum, a certified Passive House trainer and energy consultant with the South Mountain Company, in his "How Low Can You Go" talk, praised the Passive House system as a way of getting architects, engineers, and builders to learn how to design better, high performing, sustainable homes and structures. He emphasized the power of the excitement and learning he's watched transform professionals and the communities when working with the Passive House Standard.

Kohta Ueno of BSC reframed the question, "How Low Can You Go," in his part of the presentation asking "What is the best choice of use of resources on a global scale, saying "those last few inches of added insulation levels and low-air sealing rates, reach a place of diminishing return and a much longer payback."

Whether one or the other, how can we afford not to adopt ever increasing higher performance standards? Through intensive efforts such as those shown at BBBD 2011 we can dramatically reduce our energy consumption and lessen greenhouse gas production today. With oil over \$100 per barrel again how can we afford not to push our comfort level with the status quo?

Self-Evolving Design?

However, even with our actions, will markets shift quickly enough to make a difference over the next generation? Or do we legislate and require adoption of more stringent design standards locally and nationally? Or can we incentivize the market or both? Bill Reed said in his keynote at BBBD11, these systems can "self-evolve" and so can we.

J.B. Clancy, architect for the Habitat modular house in Charlotte, VT, mentioned some freely available resources such as the iPHA created Passipedia and the Passive House Alliance which speak to this openness. For me, It's all about finding balance and sowing hope for the future through dedicated action today.

As Peter Schneider from VEIC a partner on the Habitat House said, "Their goal is to see the Passive House concept applied on a community scale. As an outcome of the Habitat For Humanity Project you can even buy a Passive House Modular home design right now from Preferred Building Systems in NH. That's moving the market!" Taking a cue from this, what would happen if over the next ten years 100,000 buildings were built, renovated or added on to with these ever higher standards here in the U.S.? Now that's a goal to aspire to!

About the author: Stephen M. Frey, AIA - LEED AP is owner at **arocordisdesign**, Montpelier, VT. They practice high performance workplace and residential design, cultivating inspiring sustainable places and spaces. For more more contact steve@arocordis-design.com or visit www.arocordis.com.

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WARD SMYTHE

Energy Leaders Turtle Creek Builders

By Liane Allen

Ward Smyth isn't your typical builder. He started his first building business at the age of 14, when he built a playroom in his Mom's basement - and the neighbors liked his work.

"My neighbor said 'I like your play room, want to make one for us?' So I put my tools in my little red wagon and pulled it over to her house. I gave her a list of lumber to get, then we brought in the electrician and plumber. Then their neighbor said the same thing...."

After a few of these routine projects, Ward got daring:

"I wanted to build swimming pool in Mom's yard. I was going to dig the hole, but Mom decided it would be better if we brought in an excavator. So I did a bunch of research on how to build one, I staked it all out, the guy came in and dug the hole, and all the neighbors were like, 'Gwen, aren't you worried he's going to wreck your house?' I got struck by lightning that summer, working in the pool w/rebar, about to climb out, I got hit. I made it through but was knocked out and taken to the hospital."

But lightning was not enough to stop the march of progress, soon, there was a complete pool, filled by the local fire department. From those auspicious beginnings, Ward went on to dabble in architecture in college, but was drawn back into construction, which became a lifelong career.

But for Ward, it was not enough to just build. The oil crisis had hit fairly early in his career, and he decided that we needed building practices to reduce our dependence on oil.

"It was a formative time sitting in those dumb gas lines. I was blessed because I had more income, which enabled me to get a diesel car. I got involved in New England Solar Energy Association, became board member and then treasurer, then chair for 2 yrs in the early 80s." The Northeast Solar Energy Association

has expanded its focus over the decades, and is now the Northeast Sustainable Energy Association, an organization that supports and promotes sustainable energy and energy conservation in all types of buildings.

In the early

days of efficient building, there was a lot to learn. One of Ward's earlier projects was the groundbreaking "Salisbury Glen" (now Lion's Head at Salisbury) condo complex in Connecticut. He describes it as, "the charm and craftsmanship of 1779 and energy efficiency of 1979." It had 6" of insulation in the walls, 12" in the roof, fireplaces in all the units, with built-in thimbles for woodstoves! This was amazing technology for the time, but pales in comparison to the current state of the art. Unfortunately, while construction practices have improved over time, most construction does not take advantage of the best practices, costing consumers in energy and comfort, and costing the planet in wasted energy and pollution.

Like everyone, Ward got tired of the doing the same thing after a couple of decades, and took a break from construction to "sell cereal live on QVC." He and his wife, Kitty, had started Vermont Specialty Foods, making high quality cereals (now selling under the "Vermont Morning" brand name). When his wife became ill, he sold the business to spend time with her. When she died, "the idea of hanging around the house & playing w/the kids was still fun, but something was missing," so the next business was born (selling pre-paid phone cards). He used the proceeds to build a new house for himself and his



>> Cont'd on p.32 >

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The field house is one of only a handful of school buildings in the country that are certified as Platinum under the most recent LEED® 2009 Version 3.0 qualifications. The building has been operational since October 2009. A virtual tour of the Putney field house is available at: <http://www.putneyfieldhouse.org/gallery.html>.

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RENOVATIONS

Window & Door Efficiency

by Emily Marsh

Something many of us overlook in the search for more energy efficiency is simply efficiency itself. When building or renovating a home, we must look not only to new alternative energy technology, but more simply building efficiency. Windows and doors play a large part in keeping hot or cold air out of our homes. Here in the northeast our goal is to keep the heat in. There are several ways to ensure that the windows and doors installed in one's home are efficient. Placement, installation, and product quality all contribute to finding the right windows and doors for your home.

There are several ways in which to determine the location of doors and windows in a newly constructed or renovated home. Window placement is the best way to provide maximum solar gain, which is especially important here in Vermont with our cold winters. Windows should be placed on the south facing side of the house, in our region. This will reduce our need for expensive and climate changing methods of heating in winter months. Skylights, if installed properly can also be instrumental in solar heat gain, as well. It is important to install shades or plant deciduous trees to reduce heat gain in summer, and still reap the benefits in the winter. Solid wood doors are less efficient at keeping heat inside and should be placed on the south side of the house, if possible. Installation methods are important, as well.

The value of installing doors and windows that keep the cold air out is underestimated. According to the Consumer Energy Center, up to 30% of heat loss occurs through windows and doors. They must have proper weather stripping to be at their maximum efficiency. If this is done improperly there will be significant heat loss. The best method of insulating between the frame and the casing is with foam spray. It is important to use the expanding foam that is designed specifically for either windows or doors. If used improperly it can affect the alignment of the window or door in question.

Also important is the quality of the product used, which can be found by checking efficiency rating systems, such as NFRC (National Fenestration Rating Council). Fiberglass is the most efficient material for windows. Vinyl is efficient, as well, but contains VOC's (volatile organic compounds) that are carcinogenic, and can also cause other health issues. Windows and doors that contain glass should be double pane and low emissions glass (or, Low-E). Low-E glass is glass that is coated with an extremely thin layer of metal oxide that lets heat and light in, while preventing heat from moving out. The coating is on the inside pane of a double-pane window. Sometimes gas is injected between panes to serve as extra insulation. Triple pane windows are also an option, but there is some debate as to whether or not the resources and cost are worth the small amount of energy savings they have over double pane windows. Doors can also use double pane glass for greater energy efficiency. When looking for windows

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and doors, it is important to also look at the U-factor and the R-value of the product. The U-factor is the rate at which heat is transferred through the product and the R-value is the product's resistance to heat loss. These ratings can be found on the NFRC website (www.nfrc.org).

The importance of building efficiency has often been overlooked in our recent past, in the drive for quick and easy development. Though there is a resurgence of higher quality construction, it is good to pay attention to new designs and products that reduce our energy needs. If you are building or renovating your home, I would recommend researching the windows and doors you will be installing, to get the best energy savings possible. Efficiency Vermont (www.efficiencyvermont.com) is another resource to use for information on home energy efficiency. Reducing Vermont's energy consumption is important in creating less dependence on outside sources for our energy needs. Each step we take to conserve energy will shift us away from fossil fuels and toward renewable and sustainable energy.

Editor's comment: One of the benefits of energy efficient fiberglass windows is that the frames are insulated and they do not conduct the cold... The added value of triple over double panes is that every bit that helps to reduce your heat loss or solar gain, well, the more help - the better, no matter how small or large that is. ♻️

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David Blittersdorf's VIEW FROM THE TOP A Light at the End of the Tunnel



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Like much about the world today, our contemporary energy picture looks a bit dark. Over the past century, human-

ity has managed to make serious headway toward destroying the place we call home; collectively, we seem to be unable to look at our actions and see the terrible damage we are inflicting on ourselves and our planet – or if we do see it, to act decisively toward a meaningful solution.

The recent nuclear disaster in Japan has now been ranked equal with that of Chernobyl. Many experts expect its true extent will continue to be revealed in future years; I grieve for the damage inflicted, but personally hope that it will become the trigger point that stops the worldwide expansion of nuclear power. Elsewhere, powerful forces are at work to continue the development of more nuclear power plants, including making the argument that nuclear is the only viable option to reduce atmospheric carbon & combat global climate change. But nuclear energy is fraught with major safety and waste disposal problems – problems we would continue to saddle on future generations. We need to shift to true renewables now as an energy source, and learn to live in a world where we make do with the energy they can provide.

Here in Vermont, we stand poised to fight for our state's rights and shut down Vermont Yankee. Its parent company Entergy is a powerful, untrustworthy corporation with the full backing of the U.S. nuclear industry, and it is ready to spend tens of millions on a legal battle suing the state of Vermont to keep Vermont Yankee running for 20 more years. Vermont Yankee is the same age and design as the Fukushima #1 plant in Japan. It too has tons of highly radioactive spent fuel rods stored in pools on top of

its reactor. Just like the design of the Japanese facility, no thick concrete containment dome covers Vermont Yankee's reactor or its spent fuel rods.

Vermont Attorney General William Sorrell and Governor Peter Shumlin are leading this important effort to stop Entergy's bullying and illegal behavior, as the company tries to back out of an agreement it signed to abide by the decision of the state legislature on whether it could extend operations past 2012. This court case is being watched closely by legal scholars and industry leaders across the U.S.A. and the world; I believe it is an important and critical effort to stop the "renaissance" of nuclear power. Civilian nuclear power plants are the number one source of material to build nuclear bombs. Let's review the roster of countries that are nuclear powers: In addition to the United States, that list includes India, Pakistan, the United Kingdom, France, China, Russia & North Korea. All of these nations produced the necessary materials for their nuclear arsenals by building and operating "peaceful" electricity-producing nuclear power plants – plants originally supported by the United States government starting with President Eisenhower via the 1950s "Atoms for Peace" program. Iran's nuclear ambitions were supported by the U.S. in the 1970s, before the Shah of Iran was deposed. I believe geopolitics are too unstable an arena in which to be dabbling with a technology that could annihilate humanity. There is no place in our world for such a dangerous and toxic method of generating electricity.

Vermont has the ability to lead in this area, and it is our destiny to do so, to show the U.S. and the world there is a better way. A humane way, one by which we survive and prosper by quickly switching to renewable energy and decreasing our energy usage through conservation and efficiency. Vermont can do this. We are a small state, with vibrant communities that thrive at the local

level, and community members who are seriously interested in creating local, reliable and safe alternatives to our current system. We have a progressive government: a new governor and a Democratic legislature that wants to lead the state (and nation) in a new direction. We must use all the tools and intelligence we have to send the nuclear power industry's bullies into retirement, and beyond that, we must prepare for an energy future where our main sources of power are the wind, the sun, running water and the earth's own natural geothermal heat.

Chief Seattle of the Suquamish gave a speech in 1854 articulating the senti-



The only known photograph of Chief Seattle, taken 1864
http://en.wikipedia.org/wiki/Chief_Seattle

ment that we do not inherit the earth from our ancestors – we borrow it from our children. I would like to believe that we will find a way forward toward an energy future that brings us out of our dark days of dependence on fossil fuels. I can see a light at the end of the world's energy-issues tunnel, but I am not yet confident of its nature. For the sake of our children's children, we need to insure that this light is not the sickly irradiated glow of nuclear waste, nor the blindingly bright explosion of an atomic bomb, but rather pure sunlight. To me, the choice is clear as day.

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

<< CONT'D FROM PAGE 3

MIDDLEBURY OFFICE BLDG

MSV Professional Office Building



WALL CONSTRUCTION

critical area where correct installation is imperative to achieve the highest energy performance of the building.

The original design also called for dense pack cellulose insulation in the walls but during construction the team evaluated the performance benefit of switching to closed cell spray foam insulation for the wall cavities to help ensure minimal air infiltration and higher R-value. Naylor & Breen provided the cost analysis and it was concluded that the value-added suggestion of switching to spray foam wall insulation was a good investment. During the installation of the insulation, Chip Patullo was on-site with a thermal imaging camera to monitor any air leakage, so that problems could be found and fixed before they were sealed away.

The building envelope insulation and air sealing detail changes incorporated during construction highlight what Terry White, Naylor and Breen's project manager for the MSV project, describes as the reason the blower door results were so successful. "The flexibility of the team to make changes regarding the building envelope during several different meetings while we were already under construction was the key factor contributing to the success of this project." Bill Gallup, the Senior Project Manager from Maclay Architects, praised Naylor & Breen's construction management services during construction, saying, "On multiple projects Naylor & Breen have demonstrated their willingness to evaluate any suggestion, during construction that might produce superior results and better quality. They recognize that building a quality project requires a collaborative process with as much dialogue and flexibility as possible."

Following construction, the Vermont Agency of Human Services moved their staff into the MSV professional office building and the organization is enjoying the comforts of a healthy work place. It is projects like this that will continue to move the building profession in Vermont in the right direction, testing and building on the skills of all, so that the state has the designers and builders necessary to complete high-performing buildings right on our home soil and beyond. Continuing to improve on building technologies will be a win for the building owners and tenants who will save money on energy costs year after year and who will be protected from energy price volatility in the future.

Authors: Danielle Petter, Maclay Architects danielle@maclayarchitects.com and Thomasina Magoon, Naylor and Breen tmagoon@naylorbreen.com ♻

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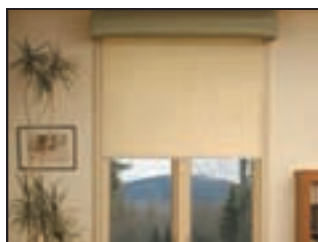
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Food, Fuel, and Money

Recent increases in prices have renewed the food vs. fuel debate. Rising petroleum prices, not agricultural commodity prices are driving food prices higher. The costs of petroleum for transportation, packaging, and processing constitute 44% of the cost of food while raw farm prices are only 29% of final retail prices. Last year's World Bank report confirms that while the declining value of the dollar, adverse weather, and speculation are driving prices higher; the production of bio-fuels has little impact on food prices.

Farming is fundamentally the capture and storage of solar energy in biomass. Up until 60 years ago most of the agricultural production was fed to animals that provided bio-power. The portion that was fed to animals also served as a reserve food supply that was utilized in times of shortage. (Oxen pulling the Vermont maple sap vats are the iconic example of animal power.) Since 1940, engines and tractors have replaced animals as the source of power because petroleum was the cheapest source of energy. This switch has not altered the fact that grain stocks and petroleum are essentially the same, a supply of energy.

The downside is that oil cannot be used as a food reserve.

Petroleum and feed commodities have complementary supply and demand curves. Oil supplies are fixed and do not respond quickly to price, i.e. they are inelastic. Demand for oil does

change with price and is elastic. On the other hand supplies of feed commodities are elastic and demand inelastic. That means that as oil supplies are rationed by higher prices these same increases will stimulate more production of feed commodities for bio-fuels. The greater agricultural production provides a hedge not only against fuel shortages and speculation driven by the perception of potential shortages but also against adverse weather events affecting food prices.

Larger supplies of feed commodities also will support the dollar. Adam Smith's classic seminal text on economics, The Wealth of Nations, showed that the value of money is set by the price of corn. The lower the price of food the more money is worth. However once the price is below the cost of production farmers will abandon the land and flock to the cities. Supplies will plummet and prices will soar. Devaluation of the dollar will be perceived as inflation. In the extreme case, whenever a currency cannot buy food it is worthless.

There is a symbiotic relationship between urban and rural communities.

	1980	2011	Inflation
Heating Oil (\$ / gal)	\$0.75	\$3.75	400%
Corn (\$ / bu)	\$2.75	\$7.65	178%
Corn Flakes (12 oz.)	\$0.63	\$3.79	506%
Wheat (\$ / bu)	\$7.00	\$8.11	16%
Bread (1 lb. Loaf)	\$0.75	\$1.89	152%
Soybeans (\$ / bu)	\$8.00	\$13.89	74%
Eggs (1 doz)	\$0.91	\$1.74	91%
Milk (\$ / gal)	\$2.16	\$3.15	46%
UVM Tuition & Fees	\$1,662.	\$14,066	746%
Harvard Tuition	\$23,000	\$42,000	83%
Median House Price	\$76,400	\$236,500	210%
Median Income	\$17,710	\$51,219	189%

Cities without producing farms will collapse; agriculture without metropolises is mere subsistence. There must be a parity of trade between the two. City dwellers need to be confident that their money will buy the food that they need. Farmers must receive enough money to buy all the urban inputs needed to produce and live. Local production and consumption re-establishes this symbiotic relationship. Buying local food and produce through local markets, greenhouses, or CSA's reduces the role of petroleum for transportation, packaging, and processing. Similarly, with corn energy is 2/3rds the price of heating oil, local production of bio-fuels is good for the economy and enhances food security.

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<< Cont'd from p.28 **TURTLE CREEK BLDRS** <

kids. They built the entire house from scratch - the first time he'd ever personally built everything.

This ushered in the next phase of his building career, courtesy of neighbors once again asking for his help after seeing his work.

In this phase, Ward focuses on quality custom homes. Turtle Creek builds only a few homes a year, allowing a one-on-one relationship with the homeowner. This allows him to help owners learn about sustainability, air quality, and all the factors that make a house into a long-lasting home that will serve many generations well.

In addition, Ward is working to ensure that the best practices become the standard practice, through his roles in the VT Home Builders and Remodelers Association. In his time on the group's board, he helped form the organization's Green Building Council, and has worked to get green practices added to the national home building codes. He has also worked to get VT to adopt the International Code Council building codes (these are codes used throughout the world, including most US states) to ensure safe, structurally sound, and efficient buildings. Ward was the first National Green Building Standard Certified Green Professional in VT. All Turtle Creek employees are now certified, and his goal is to educate 450 builders in VT..

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How Sustainable is YOUR Community?

featuring: Concord, New Hampshire

The city of Concord, centrally located along the Merrimack River, is the State Capital of New Hampshire. Despite its modest population of 43,000, Concord is a lively, historical city, and also shines as an example of an active green community.

HISTORY

Upon the recommendation of Mayor Jim Bouley, the Concord Energy and Environment Committee was formed in April, 2008. During the past 3 years, the City has invested considerable resources in improving the efficiency of the City. Concord received funds under the Energy Efficiency Block Grant Program (EEBG) to install solar domestic hot water systems on three fire stations and at the wastewater treatment plant; to be complete this summer. Battery operated anti-idling/fuel saving devices have been installed in seven light duty city trucks and one police sedan with more in the plans as funds become available. This coming summer, the incandescent crosswalk lighting signals will be replaced with LED lighting.

For the 2009 New England Carbon Challenge, Concord finished first in the entire New England region, narrowly beating Portsmouth, NH. The Committee continues to strongly support local transportation planning efforts such as Green Commute Week and supports local agriculture and food production through the annual Local Grower's Harvest Supper.

GREEN CONCORD

It's safe to say the initial greening of Concord had its roots in the business community.

The non-profit Green Concord was established in the fall of 2007 for like minded businesses wanting to operate in a more sustainable and eco-friendly way. With 10 members and several supporting members, Green Concord not only encourages customers to patronize these dedicated businesses, the organization connects with the community through events, charity work and their website. GC is responsible for recycling during Market Days and recently donated 27 recycling bins to the Concord YMCA to kick start their recycling efforts. GC sponsored Green Traditions in March, an Irish Music Concert, which raised \$3,000 for the YES Team, (Youth Environmental Services.) GC also sponsors Soles for Souls in August and Green Friday, the day after Thanksgiving. GC started the monthly Green Living Film Series held at Red River Theatres 18 months ago. The most recent showing of Queen of the Sun and panel discussion was a sell-out success.



LARGE SCALE ENERGY EFFICIENCY

Perhaps the oldest large scale energy efficiency building initiative can be found at the headquarters for the Society for the Protection of New Hampshire Forests, located in East Concord, overlooking the Merrimack River.

Its first renewable heating system began in 1996. In 1998, 32 120-watt photovoltaic modules were added. The Forest Society boasts a 4-kilowatt solar electric system, the second largest grid-tied photovoltaic system in the state, producing over 10 kW-hours of electricity per day. In 2001, they added "French Wing" won a gold medal under the U.S. Green Building Council's LEED program, the first in New England to gain approval.

FAST FORWARD TO 2011...

Several Concord area projects are worth their weight in green:

- **St. Paul's School** - a private boarding school, has been recognized as an honoree in the Northeast Energy Efficiency Business Leaders Recognition Program (NEEP) for its energy efficiency efforts which resulted in reduction of campus energy use by 1.5 million kilowatt-hours since 2006. In 2010, St. Paul's spent \$150,000 in energy upgrades and received \$53,000 in rebates, which they calculate to recover within 18 months. A new Math and Science Center is currently under construction going for Gold LEED Certification.
- **Downtown** - has its own "going for LEED" construction project underway. CATCH Neighborhood Housing is building a 45 apartment complex for low to middle income multi families. The project, slated to be 50% more energy efficient, is going for Silver LEED Certification.
- **In case** you're looking for an over night stay in Concord, the new Residence Inn Concord is the first Marriott in America with free 220/110 Volt Electric Car Charging Stations. Inside, you'll find climate control rooms, water saving efforts, and a non-chlorine, salted pool.



MORE...

Just outside Concord are two green initiatives worth noting.

- **Grappone Auto**, whose Toyota dealership is located in Bow, is completely renovating its 77,000 s/f facility in hopes of being the first New England dealership to receive LEED Certification. The largest energy saving component will be 32 well geothermal systems providing heating and cooling. Improvements to insulation, lighting and water use are according to LEED standards, in addition to computer controlled heating, lighting and cooling.
- In the opposite direction just north of Concord, Miles Smith Farm of Loudon just opened their 100% solar retail farm store. With grants from REAP and loans from the Community Loan Fund, solar collectors on the roof of the barn will provide hot water to heat a concrete floor, saving 3.1 metric tons of CO2. The solar photovoltaic system for electricity, estimated at 5,400 kW per year, replaces approximately 3.2 metric tons of CO2, which is equivalent to 362 gallons of gasoline or 7.5 barrels of oil. The entire project was installed by local GES Solar Store, located in downtown Concord and a member of Green Concord.

FUTURE...

Concord hopes to continue to be a leader as the State's green light for others to follow. ♻️



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GREEN CONCORD

For local green happenings:
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resources

SOLAR & RENEWABLES LINKS:

- **Efficiency VT** This is a must go to site for immeasurable amounts of info. www.efficiencyvt.com.
- **SEIA/ Solar Energy Industries Association:** The SEIA Tax Manual to answer your solar related tax questions. <http://www.seia.org>
- **Dsireusa.com** www.dsireusa.com. Renewables & Efficiency. Find state, local, utility, & federal incentives for renewable energy & energy efficiency.
- **IREC/ Interstate Renewable Energy Council:** RE educational info. www.irecusa.org.
- **NABCEP/ North American Board of Certified Energy Practitioners:** This organization that tests & certifies PV system installers. Individuals are Certified, companies are not. www.nabcep.org
- **NESEA/ Northeast Sustainable Energy Assoc.** www.nesae.org.
- **New Hampshire Sustainable Energy Assoc. NHSEA** Focused on N.E. US, for consumers & industry- RE & clean building info, events... www.nhsea.org.
- **New York Solar Energy Industries Association /NYSEIA** www.nyseia.org.
- **Clean Power Estimator:** www.consumerenergycenter.org/renewables/estimator
- **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):** http://eetd.lbl.gov/newsletter/CBS_NL/nl6/Sources.html.
- **Federal Energy Regulatory Commission (FERC):** www.ferc.gov.
- **National Association of Energy Service Co. (NAESCO):** www.naesco.org.
- **National Renewable Energy Laboratory (NREL):** www.nrel.gov
- <http://www.susdesign.com/tools.php> Online info for solar benefit with house design. i.e. window overhangs, sun angle & path...
- **NFRC** independent rating & labeling system for the windows, doors, skylights... <http://www.nfrc.org/>
- **NH Office of Energy and Planning** <http://www.nh.gov/oep/programs/energy/RenewableEnergyIncentives.htm>
- **Energy Efficiency & R/E Clearinghouse (EREC):** http://eetd.lbl.gov/newsletter/CBS_NL/nl6/Sources.html.
- **Federal Energy Regulatory Commission (FERC):** www.ferc.gov.
- **Solar Living Source Book:** www.realgoods.com
- **Home Power Magazine** www.homepower.com
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- **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!
- <http://aceee.org/consumerguide/index.htm> Consumer guide to home energy savings...
- <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** <http://www.waptac.org/>
- <http://buildingsdatabook.eren.doe.gov/>
- **The Office of Energy Efficiency & Renewable Energy (EERE)** <http://www.eere.energy.gov/> develops & deploys efficient & clean energy technologies that meet our nation's energy needs.
- **VPIRG** - understand the clean energy resources available to VT. <http://www.vpirg.org/cleanenergyguide>
- **U.S. Department of Energy (DOE)** Energy Efficiency & Renewable Energy: www.eere.energy.gov/consumer. Guide to energy efficiency
- **Track the stimulus money-** <http://www.recovery.gov/Pages/home.aspx>
- **Dept. Public Svc. (CEDF)** http://publicservicevt.gov/energy/ee_cleanenergyfund.html
- **Renewable Energy World** www.renewableenergy-world.com
- **Renewable Energy VT-** www.REVermont.org
- **The Energy Grid:** www.pvwatts.org ♻️

<< Cont'd on p.7 BURLINGTON ELECTRIC

to stabilize rates during this time of transition. Ken Nolan stated that BED was able to generate enough revenue from selling McNeil REC's to pay for the emissions controls in 3-years, and is now using the revenues to help stabilize consumer rates while BED supports the development of additional renewable resources.

BED believes that instate renewable energy is the best way to stay in control of power prices while we move toward a carbon-constrained economy. In describing BED's long range vision Mr. Nolan said, "As the world begins to react to the increasing pressures of a carbon-constrained economy, we need to stay several steps ahead of the pack in order to protect Burlington ratepayers. Moving our power supply toward local, Vermont based, renewable contracts will place us – and Vermont – in the best possible future position. We're now in the 21st century, which – at least regarding energy – will be very different from the 20th century. The beginning of the 20th century moved us into the fossil fuel age. The utilities leading the way in the 21st century

are moving beyond fossil fuels to cleaner, more sustainable alternatives. Staying at the forefront of that transition is the best way we can keep our environment healthy and our economy vibrant."

When BED achieves its goal of being 100% renewable it will be one of very few utilities to make such a claim.

Editors Note: We would like to encourage the inclusion of Solar, Hydro, and Wind for electrical energy generation vs. the use of Biomass. Biomass for heat is a more sustainable option. ♻️



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ENERGY FESTIVAL

SAVE THE DATE. September 17th. **Local Energy & Agriculture Festival (LEAF).** Keynote Address will be delivered by Bill McKibben Main St, Bradford, VT. Shared Focus - Renewable Energy & Locally Produced Food. Watch for details in the next edition of G.E.T.

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"Green" Gardening

by Annemarie Godston

The term "Green" means doing things in an environmentally friendly and sustainable way. Gardeners should make every effort to sustain our gardens without a negative impact on the environment. How can we do that?

Generate healthy soil without the use of chemicals. Chemicals are often made in an energy "expensive" way, and are usually bad for the environment. To make soil better, feed it with "compost". Compost feeds the soil and helps to make it more "user friendly"! Compost, made with garden and kitchen cast-offs, is a "green" product for your garden that only requires sunshine, water, and organic matter.

For sandy soil, compost will bulk up the soil and hang onto water, helping hold the moisture until the plant roots are able to utilize it. If your soil is mostly clay, compost will break up the non-permeable matter and allow the soil to absorb the moisture.

Compost encourages the presence of little critters in the soil, making it more productive, and encouraging the presence of earthworms that leave tunnels for the water to run through, as well as fertile castings. Microbes and insects also come to feast on the organic matter, leaving their own helpful contributions.

Now, let's think about WATER. Plants grow wild ALL over this world, be it roadsides; or non-productive fields and lots. Where there is soil, there will be vegetative growth, surviving, using only rain for sustenance. Use native plants whenever possible, being acclimated to their environment and found in local fields and roadsides - like lupines, blackeyed-susans, daylilies, asters and various white daisies or others found at local nurseries.

If we water often and little, plant roots come up to the surface to grab all the water they can get. If they are watered less frequently, but more deeply, the roots will go deeper, looking for water. Those plants will be healthier because the roots are larger, longer and stronger! Plants with shallow roots are more vulnerable to drought and drying breezes.

The message here is to water deeply. The water should trickle slowly into the soil right around the plant. If you MUST water, do it slowly and gently so the moisture will get right where it is needed. Expensive drip watering equipment is not necessary. If you lay the hose in the garden and let the water slowly seep into the ground, it will accomplish the same thing. There are hoses available that "seep" the entire length, either through the hose itself, or through perforations made for this purpose. You just lay those hoses throughout the garden, turn the water on and allow the water to run gently for an hour or more.

Let's talk about grass. Grass is VERY thirsty and hungry... always! The less lawn you have, the less water and chemicals you'll use. Make your perennial beds larger. If you have a ground cover edging the lawn, move it gradually into the lawn area. A smaller lawn means you need less water, fertilizer or other chemicals. Less fuel will be expended by your lawn mower which is, in fact, far less fuel efficient than your automobile. With this smaller lawn area you might be able to make a push mower suffice.

Water your lawn sparingly, but deeply. Grass cut at 3-4" high creates it's own shade. Clippings left on the lawn generates it's own compost. If clumps are left, they should be added to the compost bin or pile, which is the "greenest" thing you can do.

Finally, MULCH your garden beds! Mulch will keep the soil moist and cool. It will keep drying breezes off your soil while gradually breaking down, further feeding your soil.

As you can see your garden is already "greener"!

Annemarie Godston is a Master Gardener, certified in NH and CT. She writes a gardening blog that can be found at <ncmg.blogspot.com>. She has taught a number of gardening courses for ILEAD (Institute for Lifelong Education at Dartmouth) as well as offering gardening seminars throughout northern VT and NH. She is awaiting publication of her first book on "Accessible Gardening", and is in the process of writing her second book on "Common Sense Gardening". ♻️

Ensuring a successful gardening season from the start



The spring growing season is finally here in northern New England, bringing with it the age-old questions of what to plant, where to plant, and when to plant.

First and foremost, deciding what to plant should take into account a number of factors. Whether your consumer is a family member or a CSA customer, you'll want to grow what the market demands. Secondly, you'll want to plant what you know will reach harvestable maturity in your location and climate.

Select the best ground available. Poor drainage and/or sun exposure will hamper most, if not all, of your efforts. Have your soil tested and follow the recommendations in the report. Most local Cooperative Extension Services will perform soil tests for a nominal fee. Ideally this should have been done last fall along with the initial soil preparation (tilling or plowing), but it's never too late, and you can still amend the soil as needed. Using

the compost you have made the prior season will benefit the soil and reduce the waste stream at the same time.

Crops that prefer cool soil temperatures such as spinach, lettuce, and beets should be directly seeded into the garden soon as the soil can be worked. Crops requiring warm soil conditions such as beans, corn, and pumpkins, should be sown around the last average frost date in your area. Many warm-season crops are started in greenhouses to be set out as transplants, such as peppers and tomatoes. If you didn't get the chance to start your own transplants do not worry, now you have a reason to visit your local garden center. Purchasing locally-grown seedlings is encouraged, keeping dollars in your community and providing plants acclimated to your area.

Next issue will focus on maintaining the plants you have started. Pest management, irrigation, and weed control will be discussed. ♻️

INGREDIENT OF THE MONTH

In this month's column we are going to take a break from our exploration of molecules and talk about sustainability.

What is it? What would it look like? And would we be happy living in a sustainable society?

There is an aspect of sustainability that I am quite sure of. And that is this: "A sustainable civilization will be biological, rather than technologically based."

You see, the ecosystem is sustainable, adaptable and in it for the very long term. Are we?

Let's imagine what it would be like to build a house in our imaginary sustainable Vermont world... One way would be to stack stones. Stonewalls and thatched roof houses can last for hundreds of years.

But today, our imaginary builder is a single woman with minimal tools. How would SHE build a sustainable house? One way might look like this: Our builder selects a well-drained site or knoll and opens up a 100'x 100' clearing using hand tools, and animals. The manure and leaves are carefully gathered and composted, and the dead wood is cut and stacked for later use.

In a sheltered area, she scratches an 18' circle in the earth and plants fast growing industrial hemp along the perimeter. She plants a stand of grain nearby and starts a garden, growing roots and gourds for the winter months. By late August the hemp plants are

nearly 18' tall, and she weaves them together like a net, still growing. Some are harvested for clothing, twine and edible oil containing seed. Space is framed for a door, an antique windshield she found, left over from the old days, and the stacked stone hearth and chimney she has been building all summer.

She harvests the grain and ties and weaves the straw over her dome to cover it tightly. Then she wets down the grasses and inoculates them with special mushroom spores. The mushroom mycelium grows over her dome and they coat it with a hard, waterproof, self-healing covering. By the time the cold rainy season hits she is safely ensconced within her cozy nest with her gourds, grain, seeds firewood and critters.

Sustainable societies will take on many forms, matching individual microecosystems and priorities. But the common theme of biology rather than technology will run through it all.

Worldview and food go hand in hand. Our religious beliefs and practices and our society's beliefs and practices mirror our food growing/gathering patterns. As the average citizen grew further and further away from personal involvement in food growing, storage and preparation, we also have become increasingly divorced from our own biology of being.

Our children's neural nets have now been wired to adapt them to an electronic world and a virtual reality. This has left them over stimulated, hyper and bored. The sustainable world we yearn for will be simpler, quieter, have a lot fewer people in it. And will most certainly be based

in the intelligent utilization of biology, rather than metal and digital based technology.

This is the Soapman urging you to visualize sustainability.

Larry Plesent is a writer, philosopher, farmer, bookseller and soap maker, living and working in the Green Mountains of VT. Learn more at www.vermont-soap.com or www.seasoned-books.com ♻️

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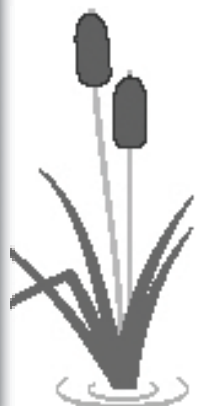
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MASONRY HEATER

- In the Summer?

Ahhh summertime!!! Warm summer breezes on your face; the smell of sweet basil in the garden; chickens in the yard. Yeah that's what we're thinking about now! Sugaring is all done and now it's okay to think seriously about actual for real warm weather. Maybe even hot! Did I say "hot"?

Ding Ding. Reality check time. Maybe now is the time to think about NEXT winter. Maybe now is the time to start planning ahead. The leaves will be turning before you know it!

No, I'm not talking about ordering your firewood for next winter. Everybody knows about that. I'm talking about a masonry heater.

A masonry heater is to a wood stove like a sailboat is to a canoe.

Masonry heaters are first of all beautiful. Custom brick or stone installed by a mason craftsman that will enhance the beauty (not to mention the value) of your home. And of course masonry heaters produce warm gentle even long-lasting heat. And did I mention that they are more efficient wood burners than any wood stove?



But the main reason for installing your masonry heater in the summertime is so you can get it all together BEFORE it gets cold! Then you can look forward to next winter: warm gentle heat radiating from the beautiful stonework; the smell of bread, warming in the masonry heater oven - nodding off on the couch in mid afternoon. ... Ahhh. - by Royce Thompson

But why now? Jeezum crow its summertime!

Well to begin with did you ever think what it would be like to carry all that heavy masonry up to your house with 2' of snow on the ground!? Or how about climbing up on your roof to check the chimney with ice everywhere and a cold wind trying to blow you off the roof! Or maybe you would like native fieldstone from your back 40 on your masonry heater. Kind of hard to dig that up in February.

But the main reason for installing your masonry heater in the summertime is so you can get it all together BEFORE it gets cold! Then you can look forward to next winter: warm gentle heat radiating from the beautiful stonework; the smell of bread, warming in the masonry heater oven - nodding off on the couch in mid afternoon. ... Ahhh. - by Royce Thompson

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SUSTAINABLE HOMES

By Ken Welch

A while back, the creator and editor of this unique and informative newsprint solicited input from folks on how sustainable they feel their lives are and what the activities or conditions are that make it so.

The responses, published in the G.E.T., contained common chords such as using public transportation, having several hybrid cars in their driveway (???) burning wood from their woodlot, gardening and such. Conspicuously absent was the mention of living in a home that sustains itself. (Except for the Keith Dewey excerpt)

I wonder why this is and would like to pursue that topic in this article.

As a home rehabilitation specialist, I am constantly analyzing existing homes and structures in light of trying to make them safe, healthy and efficient...all components of sustainability, right?

My personal goal and one that is reflected in our organization in our low budget home rehabilitation projects is to strive for a zero energy building, one that is retrofitted to all of the above standards and more but pays for itself by contributing positively to the buildings energy appetite.

Zero energy dwellings are readily attainable if you have a lot of cash, LEED certified architects and Green Builders. The real challenge is to achieve this on Vermonters' budgets which are typically pretty sparse. You see our homes and buildings are huge consumers of natural and artificial materials; they provide us warmth and shelter by consuming large quantities of materials and energy. This starts with the loss of land on which the house was built. The impact on the ecosystem where the house is situated is major, that land is no longer able to provide any benefit to the environment and is essentially lost, so building a new house starts you off in a big hole, financially and carbon wise.

This is my perennial plug for folks to purchase an existing home and rehab it rather than build new, it just makes sense and gets you further along on the sustainable scale.

The question that nags me from time to time is whether renewable technologies (Solar, Wind and Hydro) are necessary to make a home sustainable. Can weatherization consisting of air sealing, insulation and HVAC efficiencies make your home sustainable without adding renewables.... what do you think ??? I would like to hear your thoughts.

Every July in Tinmouth VT, is a friendly gathering of the tribes; this four day event is called SolarFest. SolarFest is a celebration of life through community, music and sustainable living.

During this event discussions such as the current topic are bantered about frequently and thoughts shared in presentations, workshops and group discussions. I am proud of my Solarfest involvement in presenting workshops and leading discussions, over the years, on home rehabilitation and energy efficiency measures. This year's discussion is about the current topic so come on down and share your thoughts with me in person; if not call or email me ...until the next time!

Ken Welch is a building analyst and home rehabilitation Specialist practicing his craft for Neighbor Works of Western Vermont, a nonprofit devoted to home rehabilitation. 802-438-2303 X212: kwelch@nwwvt.org.

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Letter to the Editor: Masonry Heater Tips

Dear Green Energy Times,

I read the masonry heater article in the February issue and wondered if you and your readers might like to know of our experience.

We have used a masonry heater for five or six years. We found that more heat is lost than gained in the later stages of the firing, during which one usually rakes down the coals. We can close up the flues sooner and eliminate this heat loss by removing the coals to a covered ash can which we take out and leave in the snow bank overnight. (We would put the can in the greenhouse to recapture the heat if it were closer to the house). This also has the benefit of making biochar for the garden.

Most importantly, during the past year I have repainted the entire interior of the house with an insulative paint additive by Hy-tech Thermal Solutions. It is a vacuum ceramic bead heat barrier which is added to a paint of your choice. It reportedly reflects up to 90% of heat back to its source. (Think roofs in the south and interiors in the north.) We used to fire the masonry heater both morning and evening in the winter, and by four or five o'clock

on many mornings the back-up oil-heat radiators would still go on. This is our first winter with the Hy-tech on the walls and ceiling. We now fire in the evening only, completely eliminating the morning firing and all its attendant fuel use, ash, work. The radiators have not come on, even on our coldest Vermont mornings. Wow is all I can say--and all for the cost of the paint and \$120 for the additive to do the whole house. We are money ahead, even in the first year.

There are just a couple things to remember about using such a heat barrier.

- First, Hy-tech says their product is better than others because its beads are vacuum beads, not just hollow, and so reflect back more heat. I'm not techie enough to know about that.
- Second, remember to use just plain paint (without the additive) on the heater or the heat won't get out.
- Third, the additive has a certain texture, so go up one sheen when buying your paint. It does not affect color.

I hope this can help someone. Best wishes for your success. - Kathleen Sauer, 3/3/11

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<< Cont'd from p.1 **RECHARGEABLE MOWERS**

1. **The new Ultralite™ Lithium Powered Recharge Mower®**-very lightweight but powerful. The Lithium Battery weighs under 4 lbs. providing more than 3 x the charge cycles versus other batteries. Everything is very accessible, including the battery box and the height adjuster (the easiest that I have ever used). The 15" cutting path is a bit narrow, but worth the maneuverability to cut real close and move around easily (even over rough clumps of dead grass). I like the rear bagger, but it comes with a mulching insert to divert the discharge direction to the side. The handle easily adjusts to your height. It is VERY easy to use! I actually liked it much more than my first impression told me I would! I can't wait to use it again. It seemed like I could mow forever on one charge. No changing batteries just 45 minutes into it. It is perfect for small lawns, whether manicured or rough and hilly. It sells for \$489.

The Neuton CE6. I have used mine for a season and a half, so I know it well. I really liked it until I tried the Ultralite

Lithium mower. The 19" wider cut can be a plus. They also offer a narrow 14" cut model. It has the rear bagger, which I like, to keep the garden mulched ... When the bag is full the heavier weight is noticeable from the lead-acid battery. I think this is a good choice for a larger

"The zeon electric riding mower is the first I've seen that can really go toe-to-toe with other large size conventional lawnmowers.

The 42" deck is wide enough for bigger lawns. With the fast 6 mph top speed, this thing no slow poke. Plus the zero turn radius makes maneuvering a snap. Bottom line: At \$5000 it's about \$1000 more than comparable mowers, but you save on gas and have the peace of mind of having a quiet zero emissions mower."

*- Rick Evans
Bradford, Vermont*

fortable doing small hills, but it is perfect for a medium sized country or large manicured lawn. It is a lawn mower, not a garden tractor. Yes, works good. It sells for \$2195.

>> Cont'd on p.25 >

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Lithium and Ultralite are the two key words that set the New [Recharge Mower](#) apart from anything else on the market.

Maintaining your lawn should be enjoyable, easy and without strain. Concerns about the environment have us looking for alternatives to the gas and oil powered mowers that produce large amounts of emissions and other nasty pollutants. Current models of rechargeable lawn mowers use extremely heavy lead acid batteries that can weigh as much as the user. Trying to push some of these units, even up small hills, takes an incredible amount of effort.

The new Ultralite Lithium Powered [Recharge Mower](#) is here to change the landscape.

The new Ultralite Lithium Powered Recharge Mower is so lightweight compared to current lead acid and gas mowers, that we say it is virtually effortless. At only 35 lbs (16kgs.) the Recharge Mower (Model PMLI-14) is so easy to use.

The Ultralite Lithium Powered [Recharge Mower](#) has a fully moulded body that will not rust or dent and provides a 15" cutting path. The cutting height is easily adjusted to 6 increments using only 1 handle. The Ultralite design, allows the unit to be easily rolled even into tight spaces. Since the Lithium Powered Recharge Mower is battery operated, there is NO gas, NO oil and NO fumes. Simply plug the battery pack into the Energy Star rated Smart Charger and in only a few hours you're ready to go again.

The Ultralite Lithium Powered [Recharge Mower](#) features:

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The Ultralite Lithium Powered Recharge Mower is available through the company website at www.RechargeMower.com or through a host of online retailers including:

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GREEN Product Reviews

by Erin A Winter, MD

REUSABLE PRODUCE BAGS

Paper, Plastic or Reusable? The choice is obvious that reusable is the best! But what about for produce? Everyone seems pretty good about bringing their reusable shopping bags to the market and now you can skip those bags needed for lettuce, green beans, fruit, etc!

Some facts: It takes FOUR times as much energy to MAKE a paper bag as it does a plastic bag, AND paper bags mean cutting down more trees. Production of both paper and plastic results in air and water pollution. Paper generates 70% more air and 50 times more water pollutants than plastic bags. It also takes energy to RECYCLE these bags, and since the recycle rates are < 15%, most bags end up in a landfill. Neither bag will completely degrade in a landfill- MORE pollution!

SO- why NOT use reusable bags whenever able? These produce bags are lightweight, washable and come in different sizes for different uses. So next time you're afraid of losing your loose grapes but you don't want to use a store bag- use a reusable mesh bag! Since they are also breathable, they help keep your produce fresh in the fridge as well!

Editor's Note: I noticed that they carry these at: Bonafide Real Green Goods in Concord, NH, or online: <http://bonafidegreengoods.com>. See their Ad on pg. 23. ♻



INTERIORS GREEN SHOTS, features healthy home & living tips for you, your family, your home and our planet. If we act locally and think globally, we make our homes, our lives, and our planet a healthier, happier place. We hope that you find the information useful!

MAY: Green up your spring-cleaning: Clear Clutter: remember to recycle and donate to charity what you can. Dust with a damp cloth and let the fresh air blow through to clear out the stale, stagnant air of our long winter. And remember conventional cleaning products contain petrochemicals and toxic substances. Safe choices are readily available in almost every grocery store. We use Vermont Sunshine all-purpose soap for floors, natural citrus solvent for grease, baking soda/vinegar w/4 drops pure Tea Tree or Lavender oil for disinfecting, Bon Ami for sinks and toilets.

JUNE: Summer arrives, time to protect yourself in the strong sun, but are sunscreens safe? Sunscreens prevent sunburns, but beyond that simple fact surprisingly little is known about the safety and efficacy of these ubiquitous creams and sprays and many of the chemical ingredients may actually be carcinogenic. Please take a look at the wonderful information provided by the Environmental Working Group <http://www.ewg.org/2010sunscreens/>

JULY: Eat Local this season here are just a few of the reasons why: Local Foods Support Our Economy and Create Local Jobs: Money spent with local farmers, growers and restaurants all stays close to home, working to build our local economy. Local Foods Preserve Our Green Space, Farmland and Heritage: Farmers are stewards of the land who protect and nurture millions of acres in the Northeast. Local Foods Usually Have



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Less Environmental Impact: Those thousands of miles some food is shipped? Local Foods Promote Food Safety: The fewer steps there are between your food's source and your table the less chance there is of contamination. Local Foods Promote Variety: (and taste better) Local growers contribute to a greater variety of foods available. Local Foods Create Community: Knowing where your food is from connects you to the people who raise and grow it. Think Globally, Eat Locally! Food is one of life's most basic necessities. Local agriculture assures a food system that is safe, affordable and accessible to all.

For more information on local farms and local meat, visit: <http://www.local-harvest.org>

By Jessica Goldblatt Barber, owner of Interiors Green, The Home & Living Store, located on Main Street in Bethlehem NH. info@interiorsgreen.com 603-616-6499. Interiors Green - helping you create a healthy & beautiful home, one smart choice at a time! ♻

GREEN TIPS

time to start hanging about

By Deborah DeMoulied, Bonafide Real Green Goods.

Your laundry that is. Colorful laundry billowing in the warm summer breeze seems reserved for the working farm house with a sunny backyard. In case your excuse is you don't have a farm house with a sunny backyard, here are some very good reasons why everyone should be hanging up their laundry to dry.

Going from using the clothes dryer to hanging your laundry to dry is the biggest carbon drop you can do besides giving up your car. (carbon drop: a thing or behavior that reduces/eliminates the production of CO2) The dryer is the 2nd largest energy consumer in the household next to the refrigerator, averaging \$25/mon. So by hanging out, you save money, save carbon and help save the environment - a win,win,win.

Here come the excuses..."I don't have time", "It's too cold out", "The towels are too stiff", "I don't have the space", "It's not for me." Let's tackle these one at a time.

- **Time** - Hanging up a large load of laundry takes less than 2 minutes start to finish. *Everyone can find 2 minutes!*
- **Weather** - Tell that to the 80% of Canadians and 95% of the Europeans

who hang their laundry all year long. There's nothing like a Canadian back yard with 3 feet of snow on the ground and laundry stiffly flapping in sub-zero weather to convince otherwise. Yes, it does dry.

- **Stiffness** - To counter stiff laundry, you can use the dryer for only 2 mins. and then hang your laundry, or let it all air dry and use the dryer on moisture sensor (or 2 mins.) Both methods take the stiffness out. You can also add ¼ cup vinegar to the rinse cycle which acts as a softener. Some people actually like stiff towels and look at it as an exfoliating opportunity.
- **Space** - Tell that to the many people world-wide who live in less than 500sf. Many European bathrooms are equipped with laundry lines that can span the room. There are also the multitudes of indoor drying rack options from traditional wooden racks to high tech metal folding ones.
- **Not for Me** - Too bad. Tough. Get over it. Time to start thinking "we."
- **In summary**, the benefits of hanging up your laundry are:

- Saves tons of carbon
- Saves money
- Reduces pollution
- Sunshine disinfects; kills bugs
- Clothes smell wonderful
- Clothes last longer
- Adds exercise
- Avoids dryer fires
- Relaxing; brings feeling of pride
- Helps the environment! ♻



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Middlebury Natural Foods Co-op, Middlebury
Plainfield Food Co-op, Plainfield
Putney Food Co-op, Putney
Rutland Area Food Co-op, Rutland
Springfield Food Co-op, Springfield
South Royalton Food Co-op, S. Royalton
Upper Valley Food Co-op, White River Junction

New Hampshire

Concord Co-op Market, Concord
Co-op Food Stores, Hanover
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Kearsarge Co-op Grocer, New London
Littleton Food Co-op, Littleton
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Finding Food with Value

WWW.GREENENERGYTIMES.ORG 802.439.6675 MAY 15, 2011 39

By Meg Klepack, Local Food Coordinator, City Market

Just last week another study was quietly released that called into question our global food system. The study found half the meat and chicken, purchased at supermarkets across the country, were contaminated by the *Staphylococcus aureus* bacteria. What I found even more alarming was half the bacteria were found resistant to antibiotics.

The dangerous state of the conventional food system is revealed a little more each day. Here is just a sampling of a few of the impressive statistics:

- We're now at a point where the average food item of food travels 1500-2500 miles before reaching the consumer.
- 93% of the soy and 70% of the corn grown in the US is now genetically modified and, as a result, 80% of the packaged products U.S. grocery stores now contain GMOs.
- 10% of the average American's calories (and 20% of many kid's calories) now come from corn sweeteners.
- Iowa is losing an average of 5.2 tons of topsoil/acre to erosion each year.
- An estimated 70% of antibiotics are used for raising livestock in the US where they are routinely fed to poultry, cattle, and swine in their feed.

• The food system is one of the biggest sources of greenhouse gas emissions. Estimates are up to 37% of our carbon footprint comes from growing, processing, and transporting food.

That laundry (or grocery?) list scratches the surface of a few issues hidden behind the shelves of cereals and sodas in every grocery store in the nation. It's clear this is an unsustainable system, corroding both our health and our environment.

"Local" and "regional" food systems are becoming more widely embraced as the sustainable alternative to this industrial food supply. As the local food coordinator at City Market I may be biased, but I see food co-ops' commitment to sourcing from local farms that use sustainable methods as one of the most encouraging responses to the agribusiness food system.

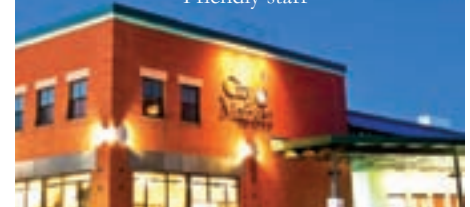
Food co-ops are leading the way for one simple reason – they are created, owned and democratically governed by members of the community who, by investing in the co-op, become member owners.

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SHOP LOCAL

Food Safety and Our Neighbors, Near & Far

by Mary McClintock

Millions of people live in New England and northern Japan and we're all fortunate that some of our neighbors grow food. Now, vegetables and milk grown on northern Japan's farms are contaminated with radiation.

In March, I drove by many farms to stand vigil with 600 of our neighbors outside the Vermont Yankee nuclear reactor. Those farms grow vegetables, milk, and more. The Vernon nuclear reactor is the same design as those leaking radioactivity in Japan. The Japanese nuclear reactors were damaged by lack of electricity to keep cooling water in them. In the 2008 ice storm, parts of New England lost power for a week.

Michael Docter of Winter Moon Organics in Hadley, MA said, "Everything I have ever owned, every piece of land I have worked, every seed sown, and every bushel of food I have ever harvested has been downstream from the Vernon Nuclear Plant. For years, I have often wondered 'what if?' So much of what we do as farmers is manage risk. We diversify, we hedge against weather, we extend seasons, we sell directly to our neighbors. If we manage risk properly and make lots of friends, we can endure natural disasters. Even devastation wrought by hail storms, drought, tornadoes, earthquakes – these are seasonal set-backs. Give us another growing season and we will re-plant. The Fukushima farmers are finished farmers. They have sown their last seeds."

The Japanese nuclear nightmare could so easily happen here. Individually, we can eat foods that help our bodies handle stress and toxins (see my friend's recipe below). Together, we can insist that Vermont Yankee develops safer spent fuel storage and shuts down in 2012.

Mary McClintock is an award-winning freelance writer who lives in Franklin County, MA. Her weekly column, "Savoring the Seasons: Enjoying Locally Grown Food Year-Round" appears in *The Recorder* (Greenfield, MA). Her articles have appeared in the *Christian Science Monitor* and *Orion*. Mary can be reached at mmcclinto@yahoo.com.

Magical Medicinal Miso Soup

by Dori Midnight, Northampton, MA

Miso is suggested for radiation protection.

Sauté one onion, sliced thin until translucent.

Add water, seaweed (I like Kombu and Wakame), shitake mushrooms (dried or fresh), burdock root, carrots, and other hearty roots.

Simmer for 25 min.

Add shredded or sliced ginger near the end, so it's strong, and some garlic.

You can also add greens, like kale or spinach. Because you don't want to boil your miso, I usually put a large dollop of miso paste in my bowl and pour the broth on top to dissolve it.



successful local farms, clean air and water, and healthy food accessible to all members of the community), the cooperative grocery store can operate in ways that keep these 'global ends' in mind as it makes business decisions. This is radically different from the corporate shareholder model that controls most conventional supermarkets where profit is the only driving factor.

Recent survey data from 17 food co-ops in New England found they collectively purchase \$33 million in local products per year. At City Market, over 20% of our sales are from food grown or produced in Vermont. Compare this to the 5% local sales it is estimated Vermont as a whole supports. Twenty percent is a feat City Market is proud of – it would be far easier for our buyers to call up a national distributor and have

the products we sell delivered the next day via tractor trailer. Rather, City Market's staff coordinates with over a thousand local vendors whose products are reliant on the season and limited in supply. These small-scale producers pull up one by one in their pick-up trucks and minivans whenever harvest conditions allow. Yet taking the extra effort allows us to sell products that we can support with our values and our customers are looking to buy.

As we create an alternative food system, the "minivan model" is clearly limiting – we're at a point with local food that demand is outpacing supply. Twenty-two co-ops in western New England have begun working together as the Neighboring Food Co-op Association (NFCA) to address this very issue. The NFCA has undertaken a regional sourcing initiative, compiling demand for products feasible to grow in New England, but for which a steady supply is currently unavailable.

By demonstrating the market for frozen fruits and vegetables, dried beans and grains, and value added dairy products, we hope to begin to work together with farmers, producers, & likeminded organizations to fill these gaps. At the same time we'll be developing regional sources for products in a manner that advances our vision of a thriving regional economy, rooted in a healthy, just and sustainable food system. To learn more about the work of the NFCA, visit www.nfca.coop.

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