ISSUE 22 –OCTOBER 15, 2013

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GROUP NET METERING COMES TO NH

By Kate Epsen

The New Hampshire state legislature passed a group net metering bill, Senate Bill (SB) 98, this past June, which became law in July with Governor Maggie Hassan's signature. After two unsuccessful attempts to expand individual net metering in NH, SB 98 now enables a critical renewable energy deployment tool already used in many other states, including Vermont, Maine and Massachusetts. While individual net metering currently allows a renewable energy system (such as solar photovoltaic or wind) system to spin a single meter backward and credit that NH electric account with the value of that net excess electricity production (up to fifteen cents per kWh), group net metering creates the opportunity for multiple meters at multiple properties to share in

Concord resident installed a 9.275 kW solar array on his roof, taking advantage the new law, HB542, that went into effect on July 29. The cap was raised to 10kW per system, so systems of 10kW or less are now eligible for the residential rebate: 75¢ per watt of panel rated power up to $3,750, or 50% of the total facility cost, whichever is less. Photo: Robert Wyatt

that value from a single system. Can't put solar panels on your roof because it is too shady? Don't own your building but want to invest in local, clean, distributed energy resources? Can't afford your own system? Group net metering could be part of the answer to these past problems of access to renewable, homegrown power.

Under SB 98, individuals with their own account and meter within a single utility's service territory can come together to

Cont. on page 7

City of Manchester, NH Achieves Millions in Energy Savings

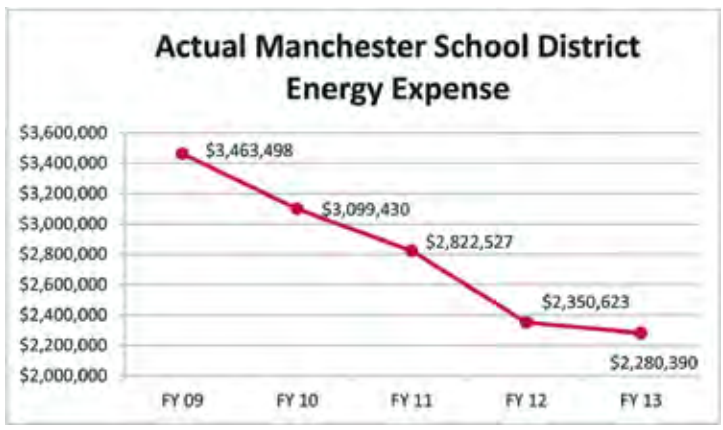
by Andy Duncan

The familiar blue logo "ENERGY STAR PARTNER" is displayed prominently on the City of Manchester's web site. This designation is more than just public relations; energy conservation is rooted in the City's municipal culture.

As the largest city in New Hampshire, Manchester manages close to 3 million square feet of space across 65 municipal buildings and 23 buildings in the Manchester School District (MSD). Overall, the annual energy bill for these public buildings was about $$4.2 million in fiscal year 2013. While that's a hefty energy bill, it is a whopping $1.3 million less than the 2009 energy costs!

The City of Manchester has a long history of making energy improvements, but these efforts were supercharged in 2011 and 2012 when over $3 million was spent on energy upgrades. The net price tag to the City was reduced substantially with cost-share funding from federal, state and utility sources, including 54% of the total in grants and rebates, and 46% in low interest loans. In less than three years, energy savings will pay for the cost of these loans. Taxpayers benefit, the local economy is strengthened, and occupants are more productive in higher-performance buildings.

For example, Highland-Goffe's Falls Elementary School was targeted for energy upgrades. The school received very efficient lighting fixtures along with occupancy sensors. And carbon dioxide sensors were mounted in rooms to gauge an aspect of indoor air quality, allowing a new heat recovery and ventilation system to operate only as much as needed. Kevin O'Maley, Chief Facilities Manager for the City of Manchester said "Highland-Goffe's Falls was the first Manchester school to achieve ENERGY STAR certification in 2011. Now 16 out of Manchester's 22 schools are ENERGY STAR certified." Only the top 25% most energy-efficient commercial buildings can earn the ENERGY STAR certification.



The Manchester, NH School District has reduced its energy bill by over $1 million per year! Chart provided from the City of Manchester.

Cont. on page 10

Photo by Bryce Dalhaus

VERMONT'S SUCCESSFUL NET METERING PROGRAM THREATENED

Net metered solar array at Cold Hollow Cider

By Johanna Miller

Net metering is one of Vermont's most successful renewable energy programs. It makes it possible for Vermonters interested in generating their own renewable power — most often solar — to put a system on their home or property and offset their electric bills. It's a good program for customers, who want to wean off expensive fossil fuels and stabilize their long-term electricity costs. It's also good for utilities, which can use

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ABOUT G.E.T.

Green Energy Times is produced by 100% solar power, off-grid with a 3.8 kW PV system. We live and know that Energy Independence is indeed possible - with clean, sustainable renewable energy along with reducing your needs. We walk the talk!

Our mission is to create Energy Awareness, Understanding and Independence - Socially Responsible Living.
We must work together to save our planet.
Think Solar, Wind, Hydro… and energy reduction!
Solar Power works! … anywhere! under the sun!

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

Disclaimer: G.E.T. allows space to, but does not endorse, contributed content from professionals or vendors.

G.E.T.'s Carbon Footprint Disclosure**. Green Energy TImes is printed on as high of a recycled content paper as one can get - locally. The printing process uses eco-friendly water-based inks. There are not any totally green printers in the area that we are aware of, so it would mean trucking them MUCH further to have G.E.T. published in a totally green manner, thus increasing carbon emissions, as a consequence. We chose to move from printing that used soy based inks because the soy is only used for the colors - not black, which is the most prominent color.... G.E.T.'s distribution emissions are also kept to a minimum, as well. With the wonderful help that we g.e.t. within many communities, it keeps our carbon footprint a bit lower. Hopefully our footprint is offset because we are 100% solar powered! Our Graphic designer, Amy Niebel, who owns and operates Double Plus Green, in Brookline is also Solar-powered. Because all of our employees work from home, our carbon footprint is kept to a minimum. We all grow and harvest organically and live as sustainably as possible. We DO walk our talk! ***Peace!

LETTERS TO THE EDITOR:

Dear Editor,

Just a few weeks ago, Entergy, the owners of Vermont Yankee, announced that they will shut down operations at the plant at the end of 2014. This is welcome news to many throughout Vermont, neighboring Massachusetts and New Hampshire. But is it also an announcement that brings trepidation with it, knowing that VY's demise will have negative consequences as a result. 600+ well-paying jobs will be lost as a result of the shutdown. Economic activity will surely feel an effect from the closure, particularly in Windham County and nearby counties in Mass. and NH. But instead of slapping each other on the back (the anti-nuke group), or commiserating on the loss of the plant (the pro-nuke group), I'd like to offer a proposal that could not only placate both of these groups, but also show the rest of our great country a way out of the economic and environmental mess that we're in.

Here in Vermont we have Interstate 91 weaving its way the entire length of the State, in the neighborhood of 200 miles. Along with the highway are perhaps thousands of acres of median. As it's been since its inception, these fallow acres are merely employed as a safety barrier between lanes going in opposite directions. Why not employ these empty acres as a solar array and windmill power plant? Each section of median power plant could have substations or necessary storage facilities at the highways crossings of local town roads where it could tie into the grid. Many hundreds of jobs would be created to design and build the power plant, which would likely take years to construct. All these workers' added income would drive sales of goods in many sectors of the economy, from restaurants to groceries to durable goods sales and even real estate.

Once completed, there will certainly be a number of permanent maintenance jobs that would be required to keep things running smoothly. I have no idea how much power could be generated by such an entity, but certainly it could generate a few hundred megawatts, perhaps a thousand or more. If that were the case, it'd make any trepidation about shutting VY quickly subside. Vermont would attract established companies looking for ways to clean up their carbon footprints. Start-up companies would flock to our great state too, for the same reason. Our colleges and universities would benefit by green energy research and development. Our air and water would be positively affected. The transportation sector would likely see opportunities in Vermont to also tap our green energy.

But it wouldn't have to end there. There are hundreds of thousands of Interstate miles throughout the U.S. Should this project be successful, it could pave the way for like projects all across the country along all those many, many miles of highways. Such projects could start an economic renaissance not seen since these very same highways were built by Pres. Eisenhower after WWII through the mid 70's. Those post-WWII years were a time of economic expansion that has never been rivaled; this project, I believe, could rival that boom time. Not only would we being greening up our economy, we'd also be taking responsibility for our Industrial Revolution forebears who built our great economy, but also polluted our environment. What better way to show our children and grandchildren that we've learned from our mistakes than by cleaning up the very mess we've made?

- Kevin Downey,

Comment on 8/15 issue

September 27, 2013
To the Editor;

The other day a friend passed along the August 15 issue of GET. I found it interesting and informative. That is, until I got to page 37 where I found a piece reprinted from the Environmental Magazine on the pros and cons of organic foods and products. The "expert" quoted extensively in the piece, one Henry Miller (Google him), glosses over the well-documented concerns related to the cocktail of pesticide residues present in conventional foods. He does not understand -- or care to discuss -- the strict restrictions and limits that apply to the use of natural pesticides in organic production, and, says that organic farmers apply "pathogen-laden animal excreta" that raise the risk of foodborne illness in organic consumers. Wrong!

I think GET should continue to discuss sustainable and organic agriculture in future issues. But how about a little due diligence in checking out the facts in the pieces you pick up before you put them out there? Next time you want to do a piece on organic standards, organic food or organic agriculture -- how about giving us a call?

Thanks.
David L. Rogers, Policy Advisor,
NOFA Vermont, 802-434-4122

Mr. Rogers,
Thank you for your letter.

We agree about Henry Miller, but we believe the quote gives him away. For example, he argues that pesticides are within safe limits in conventional foods more than 99% of the time, but he seems to fail to see this implies that they might be unsafe nearly 1% of the time.

I think the authors' point in quoting Henry I. Miller was not to promote his views, but to illustrate how bad science written up in influential magazines could lead people away from organic food.

We apologize for printing a confusing article.
- George Harvey, Green Energy Times

CORRECTION FOR *"AN AFFORDABLE STRAWBALE SENIOR HOUSING PROJECT"*

Apologies to the author, Stephen Frey - Arocordis Design. In the August 15th Issue of Green Energy Times, we should have included a picture of this great project in Holland, VT. This is Vermont's first strawbale, affordable senior housing project in the northeast kingdom that shows a great example of energy efficiency at an affordable price that will work well in various applications. Using this design for a senior housing unit is a wonderfully innovative idea for which we stand behind. Please read the article, if you missed it, on our website: *http://bit.ly/GET_strawbale*

This copy of *Green Energy Times* that you hold in your hand is FREE. We only ask that you, the recipient, do two things in exchange for this gift.

First, make some action or donation towards stopping climate change. It can be anything that your creativity, time and budget allows -- from weatherizing your grandmother's basement window to using public transportation or walking vs. driving, one more day a week or even taking that step to *'go solar.'* There is so much that each of us can do.

Second, pass this copy of *Green Energy Times* on, when & if you are done with it, to someone else who will appreciate its contents. When it's finally in tatters, we encourage the last user to use it to wrap fish, start a fire, or mulch a garden.

And if you have any ideas or suggestions for *G.E.T.*, drop us a line.

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G.E.T. daily updates on the latest Energy News, as extensively researched by our own General Factotum, George Harvey -- is worth the time to read. It is on our website: www.greenenergytimes.org

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Energy Awareness, Understanding & Independence!

David Blittersdorf's VIEW FROM THE TOP

Our Bright Future: The Powerful Challenge of VT's CEP

We're lucky. Vermonters have already collectively decided that our long-term fortunes will be better if we embrace and implement a serious shift to renewable energy over the next 35-plus years. The good news is that we have a plan to get there. The 2011 Comprehensive Energy Plan (VT CEP) issued by the state's Public Service Department outlines where we as a state feel we need to be in terms of energy generation and use by the year 2050. The goal is 90% renewable energy by 2050. We face a steep challenge, because as of 2011, our energy system is only approximately 11% renewable. This means that to get where we've said we plan to be in 2050, we need to change every aspect of our energy system to realize that 80% gain.

When we speak about our state's energy system, it's important to remember that total energy includes all fuel used for heating and transportation, in addition to generating electricity. Our current energy system is mostly carbon-based, with the primary fossil fuel being oil. It was designed and built on the flawed assumption that cheap fossil fuels could be used forever. This is not the case. About a century and a half into this grand experiment, it turns out that the use of these fuels has serious environmental costs and economic uncertainties attached, and sooner or later they will run out. Fossil and nuclear fuels are costly, finite, and polluting. Another challenge is that on a daily basis, we don't usually think of our energy system as a unified system at all — our electric bills are separate from the gas we pump to fill our cars, which is separate still from the oil or firewood we use to heat our homes when it's cold outside. Understanding what we need to do and working on implementing the VT CEP means first promoting energy literacy and a new way of thinking about how we source and use all of our energy.

Change will come, whether we want it to or not. The time to address this is now. A big part of this major shift to 90% renewable energy will be increasing the percentage of our energy system that relies on straight electricity — that is, decreasing our reliance on fossil fuels pumped into our cars and homes. Today, only 16% of Vermont's delivered energy comes from electrical sources. We must electrify Vermont's economy — transportation and heating sectors need to be converted to run on electricity. We also must tax the carbon we do use to financially support the transition to non-carbon, non-fossil energy. And rather than always trying to compare apples to oranges, we need to start talking in common electrical energy units of watts. (Bye, bye gallons, BTUs, therms, and cubic feet!)

To paraphrase the ancient Chinese philosopher Lao Tzu, every long journey starts with a single small step. To begin the change to renewables, we must first set a closer goal. Today, Vermont uses an annual average total of 5000 MW, or about 44,000,000 megawatt-hours. We are at 11% renewables now. A realistic short-term goal will be 20% renewable energy by 2020 — adding to our current total another 10%, or about 500 MW, based on our current annual total energy use. Adding 500 MW of renewable energy in the next seven years will require major increases in efficiency, conservation, and solar and wind energy, as well as rethinking transportation — but this is eminently possible, and will lay the groundwork essential to further implementation of the VT CEP. It just requires thought and effort, and people working together in a commitment toward this common priority.

Our future energy security demands fundamental changes away from out-of-state fossil fuels and purchased energy to in-state renewables. Vermont will be the best place in the country to live and work if we lead by example in how to manage this transition right. We have already set foot upon this path – all it takes is courage and leadership to progress toward our goal.

David Blittersdorf is the President/CEO of AllEarth Renewables in Williston, VT — a company that specializes in the design and manufacture of the grid-connected AllSun Tracker solar energy system. He is also the founder of NRG Systems in Hinesburg, VT, and is the managing partner of Georgia Mountain Community Wind.

MA'S EFFICIENCY IS TOPS!

RENEWABLE ENERGY GOALS REACHED AHEAD OF TIME!

By George Harvey

The American Council for an Energy-Efficient Economy (ACEEE) ranks states and cities for efficiency. Ratings are given on the basis of scores for each of several areas of achievement, including city efficiency goals, building energy codes, transportation, energy and water utility policies and programs, and community initiatives. The individual scores are added up to give the overall score for the city or state.

Historically, Massachusetts has faired well under their rating system for states. Massachusetts beat out California for the number one spot in both 2011 and 2012.

Now, in September, we learned that Boston was rated the most efficient city in the country.

The maximum possible value is 100 points. Boston got 76.75 points. While that is hardly perfect, it is quite a lot better than any other city of the thirty-one that were rated. Portland, Oregon came in second with 70 points, and all others were lower than 70.

Efficiency, however, is not the only way Massachusetts is distinguishing itself in sustainability. The state has set goals for renewable power and then not only met them, but met them years ahead of schedule.

Last May, the Massachusetts Department of Energy Resources announced that they had received more than 550 MW of Statement of Qualification Applications for solar projects seeking to qualify as Solar Carve-Out Generation Units capable of creating Massachusetts solar renewable energy credits. This represented a problem, because the amount the state had allowed for was only 400 MW. In fact, the state had originally expected only 250MW to be installed by 2017, and this had already been expanded. Some quick action meant that those who had already applied would be included in the program, and the goals would be revisited.

Just as Green Energy Times was going to press in September, Massachusetts saw more progress. The state adopted policies to make it easier to use tracts in landfills to generate solar and wind power. Not long after this, the town of Scituate became the first in the state to have its town buildings all powered by renewable sources.

One might think that would be enough, but in reality there is sometimes extra icing to be put on the cake. First, Governor Patrick announced that the number of green energy jobs in the state had increased by nearly 24.4%, to 80,000, over a period of two years, making the sector the fastest growing in the state.

And then, the four largest utilities in Massachusetts announced that they had entered into contracts for 565 MW of renewable energy, from solar and wind farms, enough to power 170,000 homes. One lovely note on this is that the price for this is 8¢/wWh; meaning that it will not produce any increase in the retail price of electricity. And since the power is from wind and solar, and since wind and solar do not use fuel, this price is good for many years to come. So when those who go for oil, coal, gas, or nuclear are paying high prices, the folks in the Bay State will still be enjoying the current cost benefits of the contracts for renewable power.

Cover Photo: A late-summer, evening view of the Manchester, NH Skyline as seen from above Amoskeag Falls. Photograph by Bryce Dalhaus. Prints Available. brycedalhausphotography.com. 603-856-6326. Publisher's suggestion: This would make a great holiday gift!

SMART COMMUTING IN NH & VT

Transportation emissions are among the worst offenders that add to the rising CO2 levels in our atmosphere. In recent months we have learned that our efforts have begun to reduce the detrimental air quality counts (NHDES), but as you may have learned from numerous other reports such as the International Panel on Climate Change (IPCC), http://climatechange2013.org/, global warming is still advancing faster than expected.

How do we get our emissions down now? By making New commuting choices!

LOTS OF CHOICES. Smart Commuting is all about knowing your options and planning ahead. There are many choices to get around in New Hampshire and Vermont, The first place to start in Vermont is "Go Vermont" for statewide choices to travel more efficiently. Whether getting around town, commuting to work or school, or planning a day trip, share the driving or ride with someone else to help save our planet and to save approx. $2,000 annually. The statewide VT site also lists services for commuters, tourist, and shoppers.

In New Hampshire you'll find a similar site at "NH Rideshare" where you can find carpools, transit routes and schedules, bike and walk trails and links to statewide transportation information.

When carpooling, remember to use the local Park n Ride lots to meet your connections. Start your trip planning at connectingcommuters.org or nh.gov/dot/programs/rideshare/ for statewide choices.

IN NEW HAMPSHIRE

UPPER VALLEY RIDESHARE (UVRS) - Carpool matching, benefits and support for commuters in/out of Upper Valley. 802-295-1824 x208. **uppervalleyrideshare.com**.

ADVANCE TRANSIT (AT) – Free weekday bus for Lebanon, Hanover, Enfield, Canaan, NH, and Norwich and Hartford, VT. Dartmouth and DHMC Shuttles. ADA Services. 802-295-1824. advancetransit.com CARROLL COUNTY TRANSIT - Services and connections to Belknap County. 888-997-2020 tccap.org/nct.htm

CITY EXPRESS - Serves Keene. 603-352-8494 **hcsservices.org/services/transportation/cityExpress.php**

COMMUNITY ALLIANCE TRANSPORTATION - Services for Claremont & Newport. 603-863-0003

CONCORD AREA TRANSIT (CAT) - Serves Concord 603-225-1989 **concordareatransit.org**

CONTOOCOOK VALLEY TRANSPORTATION (CVTC) - Monadnock Rideshare for the southwest region 877-428-2882 **cvtc-nh.org**

COOPERATIVE ALLIANCE FOR REGIONAL TRANSPORTATION (CART) - Serving the Chester, Derry, Hampstead, Londonderry, Salem and Windham, limited service to Plaistow. 603-434-3569 **cart-rides.org**

DARTMOUTH COACH - Services to Boston, Logan Airport and NYC 800-637-0123 **dartmouthcoach.com**

MANCHESTER TRANSIT AUTHORITY (MTA) - Manchester, with links to Nashua and Concord. 603-623-8801 **mtabus.org/services/local-buses**

NASHUA TRANSIT SYSTEM (NTS) - Buses and trolleys with bike racks. 603-888-0100 **RideBigBlue.com**

WINNIPESAUKEE TRANSIT SYSTEM (WTS) - Services Belmont, Franklin, Tilton, Laconia. 603-528-2496 **bm-cap.org/wts.htm**

IN VERMONT

UPPER VALLEY TRANSPORTATION MANAGEMENT ASSOCIATION (Vital Communities) - Works with UV employers and communities to promote and improve commuting options. 802-291-9100 **vitalcommunities.org/transport/index.htm**

VERMONT PUBLIC TRANSPORTATION PUBLIC TRANSIT - Lists transit, ferries and more at **aot.state.vt.us/PublicTransit/providers.htm**

AMTRAK - Long distance train service. Discounts for AAA members and student advantage card. (800) 872-7245 **amtrak.com**

CHITTENDEN COUNTY TRANSPORTATION AUTHORITY - Burlington bus service with links to Montpelier, Middlebury and commuter route to Milton. **cctaride.org**

CONNECTICUT RIVER TRANSIT - Services in Bellows Falls and Springfield. **crtransit.org**

GO VERMONT - Offers carpool matching and commuter connections in VT 800-685-7433 **connectingcommuters.org**

GREEN MOUNTAIN RAILROAD - Day trips from White River, Champlain Valley, Bellows Falls and Rutland. **rails-vt.com**

GREEN MOUNTAIN TRANSIT AGENCY - Local service in Barre, Montpelier, Grand Isle, Stowe and Lamoille. 802-223-7287 **gmtaride.org**

GREY HOUND/VERMONT TRANSIT - Long distance bus services. 1-800-231-2222 **greyhound.com**/

LAKE CHAMPLAIN FERRIES - Transport between New York and Vermont via Lake Champlain. 802-864-9804 **ferries.com**

MARBLE VALLEY REGIONAL TRANSIT- For Rutland, Killington, rural Manchester, Poultney and Rutland to Bellows Falls. City routes Free on Saturday. 802-773-3244 **thebus.com**/

RURAL COMMUNITY TRANSPORTATION (RCT) - Buses, vans, and volunteer drivers. Routes via The Jay-Lyn, The Highlander (Newport - Derby Line); The US RT2 Commuter (St. J. to Montpelier) and Free routes to rural areas. 802-748-8170 **riderct.org**

STAGE COACH - Buses from Randolph and Fairlee to Dartmouth, & local village. 800-427-3553 **stagecoach-rides.org**

Ra Ra Rail Road!

MOVING US TO A CLEAN FUTURE

By George Harvey

On September 5, Vermont's rail network got a grant of $9 million from the US Department of Transportation to upgrade a 20-mile section of track between Burlington and Rutland. This will allow heavier loads to be carried, and it will allow trains to run at higher speeds. It also allows preparation for the Ethan Allen Express to provide passenger service to Burlington at some time in the future.

Rail & Wind - solutions for our future.

These improvements are very important in terms of energy and climate change. Freight transportation is far more efficient, and much less costly, when it is done by rail rather than by road vehicles. While it is clearly true that trucks can go places that are inaccessible by rail, it is certainly true that we can save fuel and global warming gasses by using rail wherever possible.

If 10% of national long-haul freight were diverted to rail, over one billion gallons of fuel would be saved annually, according to the US EPA.

Moving freight by truck requires a lot of fuel, compared to shipping by rail. The most efficient truck carriers are the big tractor-trailers, which we often see struggling up the New England hills and gaining speed as they go down. Light-duty trucks use about four times as much fuel per ton-mile as tractor-trailers.

By comparison, rail freight is fairly efficient. A train can move one ton of freight 480 miles on one gallon of diesel fuel (and might be able to used biodiesel). Tractor-trailers would use 2 to 4 gallons of fuel to move a ton of freight the same distance. This means rail transportation has lower greenhouse gas emissions, about a third of those of heavy trucks.

The following table gives a comparison of efficiency of freight transportation modes:

Mode	Freight ton-miles	Freight Fuel used
Water	15%	18%
Truck	30%	65%
Rail	40%	8%

There are many reasons why rail is more efficient than road traffic. Some have to do with the nature of iron wheels and rails. Iron does not deform like rubber or asphalt, so it loses less efficiency on rolling. Iron also does not have the traction that tires do on a road, so the tracks have to be put down on much gentler inclines than are allowed for roads. This means less powerful engines can be used to haul greater loads. Engines for railroads can operate within limited ranges of speeds, and so can be tuned for greater efficiency.

Though fewer people would be employed moving a given load by train than by truck, changing to ship more by rail does not mean jobs would be lost. Rail freight does not usually go directly from one place to another, without road transportation being involved. Instead, what typically happens is that freight is loaded on trucks, driven to a railhead, offloaded from the trucks, to be loaded onto trains, moved by rail, offloaded from the train, to again be loaded onto trucks and driven to the final destination, and offloaded there. Each step requires that work be done, thus keeping the jobs -- and probably most are local.

We might also note that emissions standards have been applied to rail transportation, just as they have on road vehicles. Rail pollutants, such as the particulates, are very much reduced now are scheduled to be reduced by 90% by 2015.

While most of us do not make arrangements that require our choosing to ship by one mode or another, we all vote, and when we do, the condition of our railroads is something to consider. We have good reasons to support rail transportation for freight and for passengers as well.

Source: US EPA report, "Freight Locomotive Emissions Overview," (http://www.epa.gov/midwest-cleandiesel/sectors/rail/materials/ls.pdf)

SEPTEMBER BRINGS THE END OF SUMMER BUT NOT THE END OF SAVINGS

RIDING PUBLIC TRANSPORTATION SAVES INDIVIDUALS $10,122 A YEAR

September means back to school and work after a summer of vacation and relaxation. While the days of summer fade, the savings you accumulate while commuting to work and attending your favorite fall activities continue. These activities could include attending a professional football and baseball game via public transit in the same month. You still can take advantage of convenience of public transit and the money you save on gas and parking. According to the American Public Transportation Association's (APTA) September Transit Savings Report, individuals who ride public transportation instead of driving can save, on average, more than $844 this month, and $10,122 annually. These savings are based on the cost of commuting by public transportation compared to the cost of owning and driving a vehicle which includes the September 11, 2013 average national gas price ($3.56 per gallon- reported by AAA), and the national unreserved monthly parking rate.

RANK	CITY	MONTHLY SAVINGS	ANNUAL SAVINGS
1.	New York City	$1,251	$15,015
2.	San Francisco	$1,100	$13,194
3.	Boston	$1,095	$13,136
4.	Philadelphia	$1,008	$12,094
5.	Chicago	$1,001	$12,014
6.	Seattle	$987	$11,844
7.	Honolulu	$979	$11,748
8.	Los Angeles	$944	$11,323
9.	San Diego	$896	$10,749
10.	Minneapolis	$888	$10,652

APTA releases this monthly Transit Savings Report to examine how an individual in a two-person household can save money by taking public transportation and living with one less car.

The national average for a monthly unreserved parking space in a downtown business district is $166.26, according to the 2012 Colliers International Parking Rate Study. Over the course of a year, parking costs for a vehicle can amount to an average of $1,995.

The top 20 cities with the highest public transit ridership are ranked in order of their transit savings based on the purchase of a monthly public transit pass. The savings also factor in local gas prices for September 11, 2013 and the local monthly unreserved parking rate.*

**Based on gasoline prices as reported by AAA on 9/11/13*

Source: American Public Transportation Assoc.

USDA RENEWABLE ENERGY GRANTS FOR NH & VT

By N. R. Mallery

The U.S. Department of Agriculture (USDA) on August 15 announced more than $21 million in funding for 631 projects across the nation that will help agricultural producers and rural small businesses reduce their energy consumption and costs, use renewable energy technologies in their operations, and conduct feasibility studies for renewable energy projects. Farmers, ranchers, business owners, and agriculture producers in 42 states, the U.S. Virgin Islands, and Puerto Rico will receive funding. Grants and loans are made through the USDA's Rural Energy for America Program (REAP).

Photo courtesy: USDA.gov

Larson Farm 40kW Solar System on tractor shed - Wells, VT

Luna Blue Farm 17kW Solar on tractor shed - So. Royalton, VT.

New Hampshire received funding for three projects, all photovoltaic (PV) installations. A.B. Logging of Lancaster received a grant of $20,525. Northern Design Precast, Inc. of Loudon received a grant of $19,144. And Barrington Solar, LLC of Barrington received a grant of $118,332 and a loan of $182,000.

In Vermont, six projects were awarded $180,760 in REAP grant funding, "for businesses to reduce their carbon footprints, reduce energy costs and improve profitability, stated David Robinson, Acting State Director.

USDA's investment is leveraging $867,000 of private funding placing the bulk of project investment with the benefitting businesses." Businesses receiving assistance include: Vermont Cranberry Company, Rodney Bushey Jr., Louise & Randi Calderwood, Lawrence Sloan Jr., Westminster Energy, LLC and The Big Picture Farm. A diversity of technologies was funded including: Solar photovoltaic, Micro Hydroelectric, Reverse Osmosis and an Electrical Generation System to support "Cow Power" energy production.

Massachusetts info not available due to the government shutdown.

For information about REAP grants/loans, please contact Cheryl Ducharme of USDA at 802-828-6083 or visit www.rurdev.usda.gov/nh-vtHome.html.

Solar and wind are highly reliable; coal, gas, and nuclear are not.

The argument against solar and wind based on their purported intermittent or variable nature has an interesting counterpoise, which is that they have outstanding reliability. Solar and wind use no fuel, so their operating costs are highly predictable years in advance; by contrast, the costs of coal, gas, and nuclear are so variable that they are impossible to predict.

SANDERS STATEMENT ON U.N. CLIMATE CHANGE REPORT

WASHINGTON, Sept. 27 - Senator Bernie Sanders (I-Vt.) issued the following statement after the United Nations Intergovernmental Panel on Climate Change released its latest report.

"Once again, the world's leading scientists on climate change have spoken. Their conclusion is that global warming is real, that it is already causing enormous problems for our planet, and that it will only get worse unless we take bold action to cut greenhouse gas emissions and transform our energy system. It is long past time for Congress to address this major planetary crisis."

CONFUSING DATA FROM THE DOE ON THE FUTURE COST OF RENEWABLE ENERGY

By George Harvey

Over the past couple years, there have been increasing amounts of information coming from the advocates of nuclear power and fossil fuels that seem out of touch with reality. Their estimates of both the amount of renewable power being installed and the cost of electricity it would produce appeared to be based on bad data.

At first glance, it seemed that they were using old sources in a world where the rate of change is clearly increasing. One might think that the whole thing would be settled as the Department of Energy (DOE) and Energy Information Administration (EIA) updated their figures, as they do annually. Last year, however, the projections for the cost solar power in 2017 was significantly higher than the actual costs of projects going up in New England, all around us.

The costs of electricity from renewable sources have been dropping below the costs of "grid" power from utilities. One after another, we have seen small companies offer power from solar and wind farms for prices lower than prices charged by utilities. Green Energy Times has repeatedly run articles advising people that there is no economic reason why they should not invest in renewable power now – it will only lower their power costs. Yet the DOE-projected grid parity for wind and solar – the point when they were able to compete on an even basis with coal, gas, and nuclear --would be achieved in 2025.

Cost in $ per MWh	Technology
0 – 50	Energy Efficiency
45 – 95	Wind
61 – 87	Gas, Combined Cycle
89 – 99	Solar
87 – 116	Biomass
86 – 122	Nuclear
65 – 145	Coal
89 – 142	Geothermal
102 – 135	Microhydro
179 – 230	Gas, peaking

The amounts of power from various sources estimated by the DOE and EIA also appeared to be wrong. Projections from the DOE have shown that coal and gas would dominate power generation for quite a long time to come.

Two interesting news items came up in September. One, appeared in various news sources on the 10th of the month, saying that nearly 100 businesses and other organizations had sent a letter to the head of the EIA asking that the agency change the methods used for their calculations. An example they cite is an EIA projection that we might get to have 14% to 16% of our power from renewable power, including solar, wind, hydro, geothermal, and biofuels, by 2040. The problem is that at the time the figures were released, their own statistics on installed renewable power said we were getting 14.2% already.

The following day, Lazard, a financial advising company, released its analysis of the current energy market costs, "Lazard's Levelized Cost of Energy, Version 7.0." Aside from energy efficiency, the least expensive power they list is from wind. Solar and biomass are listed as more expensive than gas, but less expensive than nuclear, and the price is still declining on both solar and biomass. These figures are for unsubsidized power – the price of subsidized power is lower. They represent the average wholesale prices for electrical power. The table shows the figures, ordered by average of high and low costs.

PV POWERS MANY BRATTLEBORO APARTMENTS

By George Harvey

Jason Cooper Management has another project to report. It is an impressive solar array installed to provide power for the various rental units they manage.

The project is part of an ongoing effort to switch to renewable energy. They have a district heating system connected to five buildings on Elliot Street in Brattleboro, supporting twenty units, including their own offices. The district heating was reported in an article in the August, 2013 issue of Green Energy Times. Another earlier installation was a 10 kW solar array mounted on the roof of an apartment building in Brattleboro. But now, they have moved on to something much larger. There has also been extensive work at increasing building efficiency to reduce energy use.

Their new solar system has a 150 kW capacity. It is mounted on 100 poles, each with six panels. These were installed on a field that is probably too wet for practical agricultural use aside from hay or straw, though it is not a wetland. The land is held on a long-term lease. Electricity is fed into the grid in Putney, and applied against accounts in Brattleboro.

This 150 MW solar system powers a set of apartment buildings in Brattleboro, VT.

The installation was done by Soveren Solar, of Putney, Vermont. The installation process is surprisingly fast, once it is started, and was completed in a very few weeks.

Output of the solar array is intended to offset utility bills for people and businesses occupying units managed by Jason Cooper Management. This very much reduces business costs, making power costs essentially free, once the array has paid for itself.

Planning for the future, Jason hopes to be able to use electric power, generated from sunlight, to provide heat for building spaces and water systems, and to provide air conditioning in the summer. He is currently preparing for installation of a special system with a heat pump into a house as a test. It will provide the heat, hot water, and air conditioning, powered by electricity provided by photovoltaic panels. It this is successful, it will be adapted for other structures.

This means that ultimately, the PV system will not only reduce grid power demands of the business, but also replace oil and propane with sunshine as the overall power source. Between now and then, there is clearly a lot of work that will be done. It will be interesting to see it all happen.

SEON, A NEW NETWORKING RESOURCE

By George Harvey

We have a new networking resource in southeastern Vermont and adjoining areas, the Sustainable Energy Outreach Network, or SEON. Modeled on successful initiatives in Europe and Canada, SEON is very different from the networking operations most people are familiar with.

SEON was formed through a collaborative effort of local energy-related businesses, and Guy Payne, whose background is in leadership and organizational development. The founding members recognize that when businesses operate independently and isolated from one another they miss out forming business connections, becoming a learning exchange for new processes and products, as well as marketing their region's economic assets. It was out of this group's passion, knowledge, and experience that the network was founded.

SEON is first and foremost devoted to sustainability, with a particular emphasis on efficient energy solutions. SEON promotes the development and commercialization of renewable energy, including energy efficiency technologies, products, services, and processes. A further focus is on the economic and physical well being of people in communities, the communities themselves, businesses, and those who work for businesses.

The goals of the organization include promoting the region as one of the foremost centers of sustainable energy and resiliency in rural America, including fostering a work environment in which people can develop thriving businesses and careers. This means educating people who are here, and it also means attracting talent into the area. The health and safety of the people, the natural environment, and economic well-being are all concerns. Activities focus on sustainable use of energy, efficiency, renewable power, net-metering, and whatever other sustainable projects members might find of important interest.

One activity is to have community forums every other month, at which time topics on sustainable energy are presented for the public. The November topic will be heat pumps. Past topics included European energy cooperatives, and a report by Margaret Cheney and Bob Walker on Vermont's delegation to Germany in 2012. Often, members at any meeting may find that their discussion reveals some common interest that warrants further development. When that happens, a group is formed devoted to that interest.

The Building Science Guild (a working group of SEON) has already formed, so practitioners in the trade can network, participate in problem solving of members' projects, learn and apply advanced concepts of building science, and form stronger business relationships and connections. For example, the technology and science behind moisture control, heat, and air movement is developing rapidly, and it is important that builders understand current knowledge. The Building Science Guild helps them share that sort of information. Members of the guild include general and building-performance contractors, architects, energy consultants, manufacturers of SIPs, building suppliers, and faculty from higher education.

Another group that is forming will deal with biomass. While this group may attract builders, it is as likely to be useful to potential large scale users of biomass (municipalities, schools, institutions, landlords, commercial end-users, housing trusts), members of town energy committees, and all elements of the 'supply chain' who are likely to be involved in the decision making processes for communities.

Most people in our area do not really appreciate the importance of biomass. Very few people realize that biomass is the largest source of renewable energy worldwide, in terms of energy output. Problems with traditional biomass include unsustainable harvesting and extensive pollution. The understanding of how these problems can be solved by using currently available technology, based on sustainable fuel production, efficient energy use, and elimination of nearly all pollutants is vital, as we move forward with our communities. SEON offers people who need the information a place to discuss these things.

Other groups being envisioned relate to facility management at industrial and commercial sites as well as the PV sector. SEON does not have a schedule for these as yet, but is always adapting and expanding its operations as they are needed. Yet as these groups form, SEON will emphasize they represent systems thinking and how they all relate to energy efficient solutions. They must always function to ensure the interdependency and interrelatedness of the various processes and technologies.

SEON's offices are at 532 Putney Road, Suite 204, Brattleboro, VT 05301. The telephone number is 802-376-9262 and information can be found at www.seon.info .

GROUP NET METERING COMES TO NH

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form a group, with a host and registered members, to share in the value of the electricity production from the group's host system. Instead of a bill credit that is transferred among the members of the group, the host will receive a monthly check for the value of the excess production to distribute to all members. This production will be measured against a historic baseline of usage across the whole group. Under the NH program, much of the work will fall on the group host who will be responsible for receiving the credit check and distributing it among the group members. The value paid is based upon the size of the system, where systems under 100 kilowatts (kW) receive the full kilowatt-hour (kWh) based charges (approximately 12-15 cents per kWh), and systems over 100 kW and up to one megawatt would receive approximately 5-6 cents per kWh based on the current state of the net metering rules at the NH Public Utilities Commission.

Many towns and businesses are well-positioned to generate their own electricity, empower their communities, and ultimately lower their energy costs. The NH Public Utilities Commission is currently writing the interim rules to implement this new law. Stay tuned for the green light to use SB 98 to better finance and deploy community energy projects, multi-meter office park systems, or campus and municipal projects. While the law may not be perfect yet, it shows important progress toward a clean, smart, and local energy landscape for NH.

NH governor Maggie Hassan signs SB 98 into law, accompanied the bill's sponsor, Senator Molly Kelley, of Keene, and other.

Kate Epsen is Executive Director of the NH Sustainable Energy Association and member of the NH Local Energy Work Group.

On October 8, 2013, Jim Yong Kim, head of the World Bank, and Christine Lagarde, managing director of the International Monetary Fund, held their first joint news conference to address climate change. Jim Yong Kim said the matter must be the main priority of both institutions. Christine Lagarde added, "It is important that our two institutions always have climate change, environmental issues and price setting at the forefront of our agenda. We have got to think about it every day."

TOO MUCH SUN IN THE ISLES OF VT?

PRODUCING & OVERPRODUCING SOLAR POWER IN THE NORTHEAST!

Staff Article

After seeing how well solar works at Cedar Ledge Builders, in South Hero, VT, Tim Parizo, seriously looked at the actual economics of solar for his own company. Today a 50kW system for Island Excavating Corporation in Grand Isle, the largest excavating business in the Champlain islands, secures their energy costs for running their office and shop at a much lower rate than they were previously paying to the utility company. The system was installed on their available roof space.

One of the keys to making this project work well was the tax credits and depreciation benefits available for businesses who install solar systems. This allows these business systems to offer an excellent economic return. Island Excavating's system is producing more power than their business can use and the Parizos plan to use the excess to offset their home electric bill! Dolly Parizo, who works with her husband Tim, exclaimed "We love it. Why? No power bills. It's great. Normally we had $700-900 per month electric bills and more, in the winter when welders are running. Right now we have a $2,000 credit."

The Isle La Motte Elementary School's 47kW PV system is estimated to offset all the electrical usage at the school that is located on the island of Isle La Motte in the very northwestern corner of Vermont. It was designed to attach to the standing seam roof of the school, without penetrating the roof. Due to a few shading obstacles, a relatively new optimizer system was used. Each solar panel has its own optimizer so that it can perform independently and at its best. If one panel is shaded, other panels on the roof are not affected. Ben Gordesky, the renewable energy manager at DC Energy Innovations conveyed that they "were very excited to have helped the school become carbon-neutral and realize long term savings for the town taxpayers."

D.C Energy Innovations has also installed some other interesting systems beyond the Champlain islands of Vermont, such as five projects for Housing Vermont, the well-known affordable housing provider. These five different mixed-income housing locations are owned by the Champlain Housing Trust.

These projects helped one of the biggest affordable housing developers in the state to secure a lower cost of energy and keep this savings to pursue their mission of providing more affordable housing for Vermonters. The low-profile installation locations include: Good News Garage Building in Burlington, Willard Mill in Saint Albans, and Housing Vermont's offices on St. Paul Street in downtown Burlington.

Another solar project installed by DC Energy in 2011, is at the Sustainability Academy at Lawrence Barnes Elementary School in Burlington. This was the last of the Solar on Schools projects funded by a grant from the U.S.Congress that was spearheaded by Senator Bernie Sanders. Funding was also provided by Seventh Generation.

This project was unique because part of the system was a solar tracker that is installed on the roof of the building. If you are in the neighborhood and go to the baseball field behind the school, you can see the tracker following the sun!

The entire system is connected to the school-wide energy monitoring system which monitors all energy usage in the building.

Another renewable energy installation was of a Northern Power Systems 100KW community-scale wind turbine at Northland Job Corps in Vergennes, VT. This system is owned by Green Mountain Power for the utility to generate some of its own renewable electricity. Some of the power generated helps offset the energy costs for the host facility.

The host facility provides training for young people who are struggling to find a career. The energy produced by this system helps this organization to have more funds for their primary mission instead of going into their electrical bill.

This turbine is visible at many points along Route 7 as you approach Vergennes, as well as from many vantage points in Vergennes.

DC Energy Innovations was started in 2002 and is PV NABCEP certified. Owner, Dwayne Cormier, has been installing renewable energy systems since 2005 and manager, Ben Gordesky, has been installing renewable energy systems since 2009. The company is based in North Hero and in Burlington, VT.

If you look up from the ground, you cannot see the 195 solar panels for the 50kW solar system on the roof of Island Excavating Co.This system produces more than 100% of their electrical needs - free from the sun! Electric bill: $2,000 credit!

VERMONT'S SUCCESSFUL NET METERING PROGRAM THREATENED

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solar customers' valuable excess power on hot, sunny days to offset the high price of buying peak, dirty power off the market.

The program has evolved significantly since it started in 1998, expanding as public interest in small, distributed, renewable energy has grown, and making Vermont's net metering program one of the strongest in the country — until now.

Several utilities in Vermont have now met or are rapidly closing in on the state-mandated 4% cap, meaning that they are no longer required by state law to allow their customers to net meter. The result? Some Vermonters who want to go solar — depending on where they live — can't, or soon might not be able to.

For Jeff Forward, the chair of the Richmond climate action committee, this situation is deeply troubling.

"This program made it possible for me to put together a net metered solar project that meets the electricity needs of my family and five other neighboring households," said Forward. "The fact that hundreds of families across Vermont now can't do the same is a huge disappointment. We have to address this issue quickly, and ensure that all Vermonters who want to invest in renewable power for themselves and the benefit of the state can."

It's a problem with many negative ramifications, and one that state leaders are working to fix. The Public Service Department is convening developers, utilities and renewable energy advocates but agreement on the right fix, however, isn't yet clear.

The Vermont Electric Cooperative — the state's second largest utility — stopped taking net metering projects in July, leaving many solar-interested customers in the lurch. In an apparent attempt to resurrect their program, VEC recently petitioned the Public Service Board on its proposed solution. Their request for a 12.5¢/kWh rate (far below their retail rates) is a radically different and, many argue, woefully inadequate solution.

"VEC's proposal drastically under-values the full benefits of renewable net metering, including its recent role in deferring one transmission upgrade representing a savings of $250 million to all Vermonters," said Renewable Energy Vermont Executive Director Gabrielle Stebbins. "Their proposal is assured to stop net metering by customers of all types — farmers, small businesses and homeowners — in the VEC service territory."

Everyday more Vermonters want to invest in distributed, renewable, local energy. But without a fix to net metering — such as removing or significantly raising the utility cap, exempting residential systems from the cap and maintaining the current or similar rate structure — they won't be able to.

A swift solution that strengthens, expands and stabilizes this successful program is essential. Those who agree should make their voice heard to the Vermont Public Service Department, lawmakers and their utility.

Johanna Miller is Vermont Natural Resources Council Energy Program Director. jmiller@vnrc.org.

Residential net metered home array. Photo Credit: Alan Pierce, Waterbury LEAP

GROW VERMONT'S SUCCESSFUL NET METERING PROGRAM

A Call To Action!

Net metering makes it possible for people to generate their own renewable power — most often solar. Unfortunately, because some Vermont utilities are no longer required to allow their customers to net meter, some Vermonters who want to go solar — depending on where they live — can't… or soon might not be able to.

A swift fix is essential!

Tell your lawmakers and the Public Service Department to expand, strengthen and grow Vermont's successful net metering program!
Public Service Department: Email: Chris.Recchia@state.vt.us
Phone: 802-828-2811
Leave a Message for Your Legislator with the Sergeant of Arms:
Phone: 802-828-2228 http://www.leg.state.vt.us/legdir/LegDirMain.cfm

City of Manchester, NH Achieves Millions in Energy Savings

Cont. from page 1

Energy savings also come from a wide variety of efforts beyond major capital improvements. Better programming of automated building energy-management systems reduces heating and cooling loads, including when buildings are not occupied. Many of the buildings have benefited from retro-commissioning, where the heating, cooling and ventilation systems are programmed for maximum comfort at minimum energy costs. Energy awareness programs for teachers and other building occupants are saving over $20,000 per year throughout the City.

Another school, West High School, was one of New England's biggest losers in U.S. EPA's 2011 "Battle of the Buildings," winning an award for their energy reduction efforts. "It was really fun to watch the excitement among students, teachers and staff around their sustainability initiative at West High School," says O'Maley.

The City has benefitted from extensive use of ENERGY STAR's free Portfolio Manager benchmarking tool. With fuel bills entered into Portfolio Manager, O'Maley and his staff can see at a glance how each building is performing. It's no surprise that 40% of U.S. commercial buildings are being energy benchmarked in Portfolio Manager.

Looking to the future, O'Maley notes "we are in the process of initiating Phase II Energy Improvements. Although these projects have longer paybacks, there is already a great deal of support. And we are proposing a solar photovoltaic array on the old landfill, taking a brownfield and turning it into a bright field." For O'Maley and his colleagues at the City of Manchester it's all about raising energy consciousness and achieving practical results.

City Hall, Manchester, NH has reduced its energy bill through many renovations including a new high efficiency boiler system, a complete LED lighting retrofit, modifications to 693 light fixtures, and motion sensors. Photo: City of Manchester.

For more information go to the Sustainability Manchester's web page at www.manchesternh.gov/energy.

Andy Duncan is Professor of Energy Services and Technology at Lakes Region Community College, Laconia, NH.

SOLAR ENERGY FOR AMERICA
KEEPING SOLAR LOCAL!

By Fred Greenhalgh

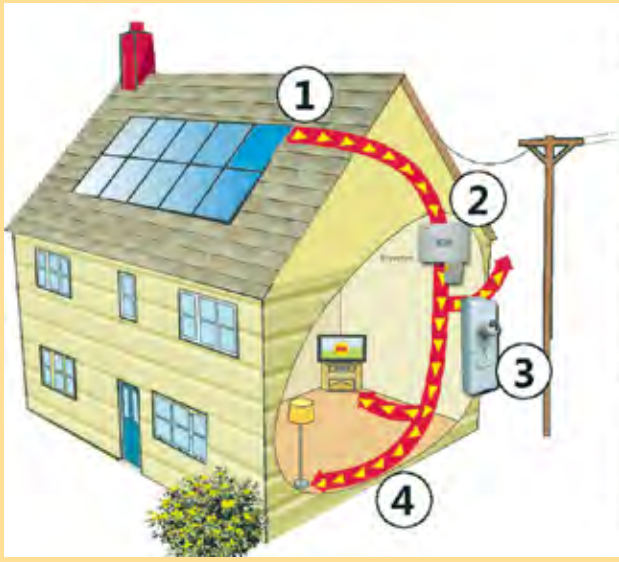
It's been nearly 60 years since the first photovoltaic, or PV module was invented by Bell Labs in Murray Hill, N.J. This pioneering technology went on to supply power for NASA's first permanent satellite, and even in those days people imagined that sunlight might provide the bulk of humanity's energy needs. "Oil is on the way out, and solar is on the way in," said an Exxon representative in June 1977.

Three decades later, the United States has ceded its leadership in renewable energy to countries more serious about tackling their dependence on carbon energy. Germany is a stellar example of a country that has used smart public policy to drive strong private investment in solar, resulting in its ability to phase out nuclear energy and plan for 80% renewable energy by 2050. China's aggressive subsidies and push for cost efficiencies have led to more than a doubling of Asia's market share of the global PV industry.

•More than 723MW of solar were installed in the first quarter of 2013 (up 33% from 2012) in the U.S.

•In 2012 the U.S.'s share of globally installed solar nearly doubled from 6.5% to 12%.

Solar is becoming a powerful economic engine, increasingly dotting the rooftops of housing and businesses. We have the skilled people to install this equipment, why can't we also make it in America? Though American manufacturers have struggled over the years, the bright-side answer is: yes we can.



1. Solar array harvests sunshine.

2. Solar Inverter converts DC power from solar panels to AC power for building.

3. Utility measures solar kWh's exported to the grid during sunny periods (credit), and measures the kWh's purchased from the grid at night or during cloudy periods. This is called net-metering.

4. On-site electricity demand is provided locally from solar production, or can be offset by credits previously banked with the utility.

Installation of one of the first solar panels on a rural Georgia phone pole on Oct. 4, 1955. Courtesy of Alcatel-Lucent Bell Labs

Bring on the Sun

With China, Japan, and Europe claiming well over 93% of the PV panel market, it's no easy task to find solar panels manufactured in the United States. The steep drop in solar panel prices in 2008-2011 (largely a result of the global economic downturn and the Chinese influence mentioned above) forced many U.S. solar manufacturers into bankruptcy and others to move operations overseas.

One manufacturer that remains in the U.S. is Suniva, based in Norcross, Ga.

"We like Suniva." said Fortunat Mueller, an engineer at Exeter-based ReVision Energy, "Rather than focusing on the lowest-cost product, Suniva instead focuses on producing PV modules that are both high-efficiency and cost-competitive. They also are a well-established company, which gives us confidence they will be around long-term to honor their warranties decades in the future."

Dave Gould of Candia, N.H., who invested in a 27.5kW solar array said, "We try to buy local and buy American whenever feasible. In this instance, the price was not much higher to buy the Suniva modules, and they looked better to boot so it was an easy decision. We love our solar array!"

Inverters Are Not All the SMA

In order to utilize solar-generated electricity in conventional appliances and lighting, homes must also have DC-to-AC inverters. One example is the German-owned SMA inverters, which are manufactured by their SMA America division in Colorado. "SMA's exacting German engineering and quality construction leads to an extremely reliable and flexible product," said Mueller.

SMA's business boasts a large number of innovations. One of the most dramatic is a new-to-the-industry feature that allows a solar home to run loads directly off the solar inverter in event of a power outage.

Also deserving of mention is Solectria, an inverter manufacturer based in Lawrence, Mass. Solectria is a great "buy local" option and is a popular choice for solar installations throughout New England.

Drive Local, too

The planet's future depends on finding a better way to get from point A to point B, and American companies are among those leading the way.

There's a great immigrant story in Elon Musk, who left South Africa in the 1990s to head to California. Musk founded and sold PayPal in the dot-com boom, before going on to found three amazing companies, including Tesla. Despite initial skepticism, Detroit automakers have been racing to catch up with Tesla with the launch of the innovative Chevy Volt and Ford Focus Electric (to come later this year).

26.78 kw all black Suniva USA-made Solar Electric Array at the home of David Gould in Candia, NH. This system also features a Solectria inverter built in Lawrence, MA

Need a charge? You can plug-in with an American-made car charger – with Clipper Creek units built in Auburn, California, or the GE WattStation built in Auburn, Maine. Electric car chargers are becoming increasingly common, with the U.S. Department of Energy listing them at www.aldc.energy.gov/fuels/electricty_locations.html.

A Nissan LEAF plugged into USA-made Clipper Creek EV charging station at the Exeter, NH

Renewable Energy

The reality is that manufacturing is global. Regardless of where solar panels come from, the money they save from fossil fuels is likely to stay local. An estimated $2 billion leaves just New Hampshire, alone, each year -- to import liquid fossil fuels. Saving even a small percent of that would have significant effects on the local economy.

On the front lines of solar are determined individuals, savvy businesses, and community-driven organizations, who are taking advantage of solar technology to cut their ties from burdensome oil and electric bills. Now the challenge is for the United States to regain its leadership before other countries dominate this rising industry.

Fred Greenhalgh is a Media Manager at Revision Energy in their Exeter, NH branch. He is committed to sustainability and simple living, and is also a passionate writer. Since 2007 he has been producing a radio show called Radio Drama Revival at community station WMPG, as well as his own fiction stories as audio plays with his award-winning FinalRune Productions. Revision Energy also has branches in Portland and Liberty, Maine. Learn more at www.revisionenergy.com.

JUST ONE WEEK OF NEWS

By George Harvey

Our move toward renewable energy and sustainable living seems to be proceeding at an every-increasing pace. Evidence of this is clear in a series of news articles that appeared in a single seven-day period in the Northeast.

• On Friday, September 20, Connecticut's Governor Dannel P. Malloy announced that his state had signed two contracts for renewable power. One will take power from a 250 MW wind farm in Aroostook County, Maine. The other is for power from a 20 MW solar farm in Sprague and Lisbon, Connecticut.

The power will be supplied at a price that averages slightly less than 8 cents per kWh. The price for the power is competitive with other power sources, such as natural gas, coal, and nuclear, even without taking into account federal incentives for renewable power. The power covered by these two contracts will supply about 3.5% of the state's needs.

• On Monday, the Massachusetts Clean Energy Center released its report, the "2013 Massachusetts Clean Energy Industry Report." The state had added 5,557 green jobs in the previous year, bringing the total to 79,994, a growth rate of 11.8% per year. The clean energy industries provided about 1.9% of all jobs in Massachusetts.

The clean jobs in Massachusetts include 30,537 in green energy, 46,613 in energy efficiency, 5,338 in transportation, 11,807 in carbon management, and 8,467 others. Of the jobs in renewable energy, something more than half are in solar power generation.

Employers are bullish on the future of renewable jobs in the Bay State, with 27% saying they expected to hire more employees in the renewable energy field in the near future.

The report is taken as clear evidence that Massachusetts policies on renewable energy are paying off economically.

• On Tuesday, the Associated Press reported that the largest utilities in Massachusetts had signed contracts to buy power from six planned wind farms in New Hampshire and Maine. The wind farms have a combined capacity of 565 MW, and will provide the state with enough power for 170,000 homes.

The price of the power is slightly less than 8 cents per kWh, which is lower than the projected price of power from coal or nuclear. It is estimated that the customers will save between $0.75 and $1.00 per month on their electricity bills because of the reduced costs. In addition, because there is no fuel involved in wind power, the cost can be locked in, providing a more stable price than could be had from fossil fuel plants, which are dependent on much more variable prices.

• Also on Wednesday, we got word that the American Council for an Energy-Efficient Economy (ACEEE) released its scores on efficiency of the nation's cities. An earlier report had said that Massachusetts was the most energy-efficient state, and that made it at least slightly unsurprising that Boston is listed as the most energy-efficient city.

Boston's score is 76.75 out of 100 possible. Portland, Oregon, which came in second, has a score of 70.0. This is followed closely by New York City and San Francisco, which are tied at 69.75.

Scores reflect achievement in a number of categories, including buildings, community initiatives, energy and water utility programs, and transportation. Boston had the highest scores on all categories. The ACEEE said it found the Renew Boston program particularly impressive.

• On Thursday, news came out that the Long Island Power Authority (LIPA), one of the largest municipal utilities, is increasing the amount of renewable power it is providing to its customers. The effect, in terms of cost to the customers, is that they will save $84 million over the next seven years. The source of the power is solar PVs located throughout the LIPA service area.

One thing that is particularly interesting about the situation on Long Island is that it seems to fly in the face of conventional wisdom. Many renewable power detractors have dwelt on a supposed problem with the intermittent nature of solar PVs. They say that in order to make use of the power, it is necessary to have a very robust power grid, and improvements to the grid will be necessary in most cases.

The situation on Long Island seems to be that LIPA is saving money precisely because the addition of solar power is distributed on a grid that needs improvement. Since solar power is typically delivered during peak demand periods, LIPA is using it to reduce the need for grid improvements. In this case, using solar power reduces grid costs and saves money.

We might as well admit that it was at least a somewhat unusual week. That, however, is because of the amount of news, not the nature of its content. The move to renewable power is gaining powerful momentum.

THE FUTURE IS NOW!

By George Harvey

Every once in a while, we all get to be spectators at a grand show, as the world changes for better or for worse. The societal changes that brought about modern democracy or that put an end to slavery are examples. These are exciting times we live in, and we can hope for better times to come. Unlike some of those earlier times, perhaps we can save our society and the environment without a need for war.

We are learning as we go. The purported problems of intermittent and variable power being put on the grid, projected to put a barrier on solar and wind at 20% of the total supply, have failed to materialize in the states where the power generation is beginning to surpass 25%. In fact the 20% barrier has been raised to 80% and beyond, according to the most recent studies.

A number of people have believed that the cost of renewable power was too high to be affordable. This idea, however, is based on incomplete calculations because it fails to take normal costs into account. Our fossil fuel plants all need to be replaced as they age, even without considering problems of global warming or peak oil. The question should not be how much renewable power will cost, but how much it costs compared with fossil fuels.

The latest reports from financial analysts on the Levelized Costs of Energy say those for important renewable types have actually fallen below those of nuclear and fossil fuels. The cost of power generated by unsubsidized wind has dropped below that of natural gas. The costs of power generated by unsubsidized solar PVs and biomass have dropped below that of nuclear, even when the cost of dealing with nuclear waste is left out of the equation. And the price of solar power does not have to go much lower for it to be less expensive than natural gas.

And so we have a Grand Show. Renewable power generating capacity is being installed in ever increasing amounts because it makes clear sense to do so for every scientific or financial reason we can imagine (NIMBYism aside).

To be sure, there are a few organizations that persist in their old ways. They say the old business models they have used in the past always worked and always will. So they will not abandon gas, coal, and nuclear power. In the United States, these include some, but not all, power generating companies and those on whom they depend for fossil fuels. In other countries, there are also organizations that want massive, centralized power systems for political reasons.

But the tide has turned, and it is hard to imagine anything stopping it now. I think the next few years will produce increasing surprises.

ENERGY PROJECTS MAKE KINGSBURY LABS UNH'S MOST EFFICIENT

by Beth Potier, UNH Media Relations

The roof of Kingsbury Hall is HOT. Even on a cloudy, cool June day, stepping from the attic out onto the white rubber surface is like opening an oven door.

Come winter, that heat will help save UNH money and energy, thanks to the most recent of two energy innovations that have made Kingsbury the least energy-intensive lab building on campus. The building's new passive-solar air pre-heating system will bring that warm air into the building, saving on heating costs.

These perforated dark plastic panels along the south-facing wall of Kingsbury's rooftop mechanical penthouse pre-heat the air going into laboratories, saving heating costs. Photo: Beth Potier, UNH Media Relations

Because of the continuous ventilation needed to maintain a healthy air environment, lab spaces like those in Kingsbury's south wing are notorious energy pigs. "All the outside air we bring into these labs and vent out needs to be heated or cooled," says campus energy manager Matt O'Keefe.

Harnessing passive solar energy to warm that air in winter, this newest project installed 2,600 square feet of perforated dark plastic panels along the south-facing wall of Kingsbury's rooftop mechanical penthouse. In heating season, fans draw outside air through those panels, which measure one by three feet, into the south wing's main air-handling ducts. That air, pre-heated, requires far less energy to heat to room temperature.

The system, installed by Maine firms Shift Energy and Colby Company Engineers, cost $130,000; UNH received a grant of $60,000 from the New Hampshire Public Utilities Commission (PUC) to offset nearly half the investment. With a total reduction in ventilation heating costs of up to 80 percent, the project is anticipated to save between $7,000 and $10,000 per year.

"And because there are no moving parts, it will last at least 20 years," O'Keefe says.

A demand-control air flow system installed in 2010 addresses the efficiency and conservation side of Kingsbury's energy needs. Created by a company called Aircuity, the system comprises sensors in each lab that "sniff" for contaminants in the air – chemical or particulate – then adjust the flow of fresh air into the room appropriately.

"You increase or reduce the amount of airflow needed based on sensor data from the space," O'Keefe says, noting that the constant monitoring showed him that their baseline ventilation needs could be dramatically reduced. "We found that 99 percent of the time, we were over-ventilating the lab spaces."

Demand-control ventilation has been so effective that the system recouped its $120,000 price tag in just 18 months.

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'BUSINESS ENERGY ACTION' HELPS COMPANIES BECOME MORE EFFICIENT

By Julia Andrews

Business Energy Action is a program of Vermont Businesses for Social Responsibility (VBSR), and in its first year it has helped more than 50 businesses reduce their energy needs. The program aims to have participating businesses reduce their consumption by 5% per year for three years. Energy efficiency is a significant part of the overall statewide plan to have 90% of Vermont's energy needs be met by renewables by 2050, which is why Senators Leahy and Sanders worked to secure federal funding for Business Energy Action.

One town that is seeing positive results from the program is Manchester, Vermont. Tucked into the southwest corner of the state, Manchester is a quaint, picturesque Vermont town that thrives on tourism. It is also home to Hand Motors, a quiet leader in energy efficiency in the state.

Hand Motors garage LED lighting (top), Hand Motors Front (right)

Jim Hand, the co-owner of Hand Motors with his brother John, credits his children, who attended Middlebury College, for educating him on energy efficiency. That first lighting project switched the company over to more efficient CFL bulbs, which then led to an even better upgrade to LEDs. This alone is now saving $1,400 to $1,600 per month.

Also, in one year, after replacing a 40-year-old oil furnace with a new, efficient propane boiler, the company has saved a whopping $25,000! While lower propane prices contributed to the savings, it's clear that the boiler is making a major impact.

"Hand Motors was interested in efficiency even before it became such a mainstream idea," said Jim Hand. "We're really proud of the efforts we've made here at the company and in the Manchester business community over the years. We've also embraced efficiency as a practical business matter, as you can see from our boiler project. We have saved a lot of money over the years."

Vermont Country Store, another Manchester-based firm, is well known for its old-timey products. But their approach to energy use is anything but old fashioned. They have also upgraded to an efficient boiler that reduces their energy needs while keeping their employees and customers comfortable.

The company has also swapped out their lighting to LEDs in the warehouse. LED lighting is a great business investment because they are highly efficient but also keep spaces very well lit. The company likes the results of the warehouse project so much that they are in the process of moving to LEDs for their outdoor lighting as well.

Gringo Jack's: Painting by Vermont Artist Peter Huntoon. www.peterhuntoon.com. www.ADayinVermont.com.

Smaller businesses are also finding ways to participate. Gringo Jack's, a downtown Manchester landmark, is participating in Business Energy Action, too. But their approach has been a little different. Without a budget for replacing equipment, they have opted to focus on behavior change with employees. In order to save energy, the restaurant staff is focusing on things like ensuring the door to the outdoor seating area is closed when not in use. They are also shutting off the grill and other kitchen equipment during the slow times in the afternoon when they are not in use.

"Business Energy Action is one of the many ways that we fulfill our mission to help companies make socially responsible choices," said Andrea Cohen, Executive Director of VBSR. "Business Energy Action is interesting in that it appeals to companies more broadly, too. You don't have to identify as a socially responsible company to want to save money and reduce your energy needs. Many companies have joined for practical purposes, too."

Currently, Business Energy Action is enrolling companies in its second year of operation. Though the program is operated by VBSR, any company is welcome to sign up, regardless of whether it is a member. To learn more, email Chris at bizenergy@vbsr.org. The upcoming Renewable Energy Vermont conference will also include a Business Energy Action panel discussion on October 28, www.revermont.org. The panel includes some of the program's biggest success stories: Hand Motors, Black River Produce, and Vermont Public Radio.

Julia Andrews is a communications professional that works from her home office in Westford, Vermont. Business Energy Action is one of her clients.

SUNNYSIDE SOLAR RETURNS!

By Dave Bonta

Richard Gottlieb and Carol Levin ran Sunnyside Solar for over thirty years from their home in Guilford, Vermont. They sold their first PV panel in 1983, and have helped thousands learn about solar, either as students, installers or customers. Their remarkable story started in a renovated barn that Carol created as the Chelsea House Folklore Center, in 1974. Richard met his future wife here, at the edge of West Brattleboro, during the famous concerts and contradances. Today the Chelsea Royal Diner, on the same property, still sports the name. The couple married at the Chelsea House in September 1979.

Sunnyside Solar is now owned and operated by Carol Levin and Dave Bonta.

After the Chelsea House Folklore Center closed in 1981, Richard and Carol decided to dedicate their work to solar photovoltaics (PV). Richard had received his master's degree in Solar Energy from Goddard College, but he was a true pioneer in solar even before that. His first experience working with PV was on Project Vanguard, which launched some of the earliest US satellites. He installed the solar cells on the first satellite to use solar PV, which was used to measure temperature in space.

The original Sunnyside Solar store designed and installed systems for such notables as Pete Seeger, providing solar powered sound for Pete's Hudson River Revival. They also did work for Ben Cohen and Jerry Greenfield of Ben and Jerry's Ice Cream, outfitting their vehicles with PV to do solar education. Carol and Richard were committed to promoting solar and renewable energy, participating in the development of Renewable Energy Vermont (REV), solar-powered sound at the first SolarFest in Vermont, taught many PV and renewable energy classes at Greenfield Community College in Massachusetts and at Ulster BOCES in New York State, as well as other locations.

The late Richard Gottlieb on a teaching assignment in days gone by

Although Richard died in 2012, his legend is that of a veritable member of a 'Who's Who' of solar. He understood, well before many of us that renewables could be a real solution to meet our energy needs. The legendary Sunnyside Solar had to be closed after Richard's death.

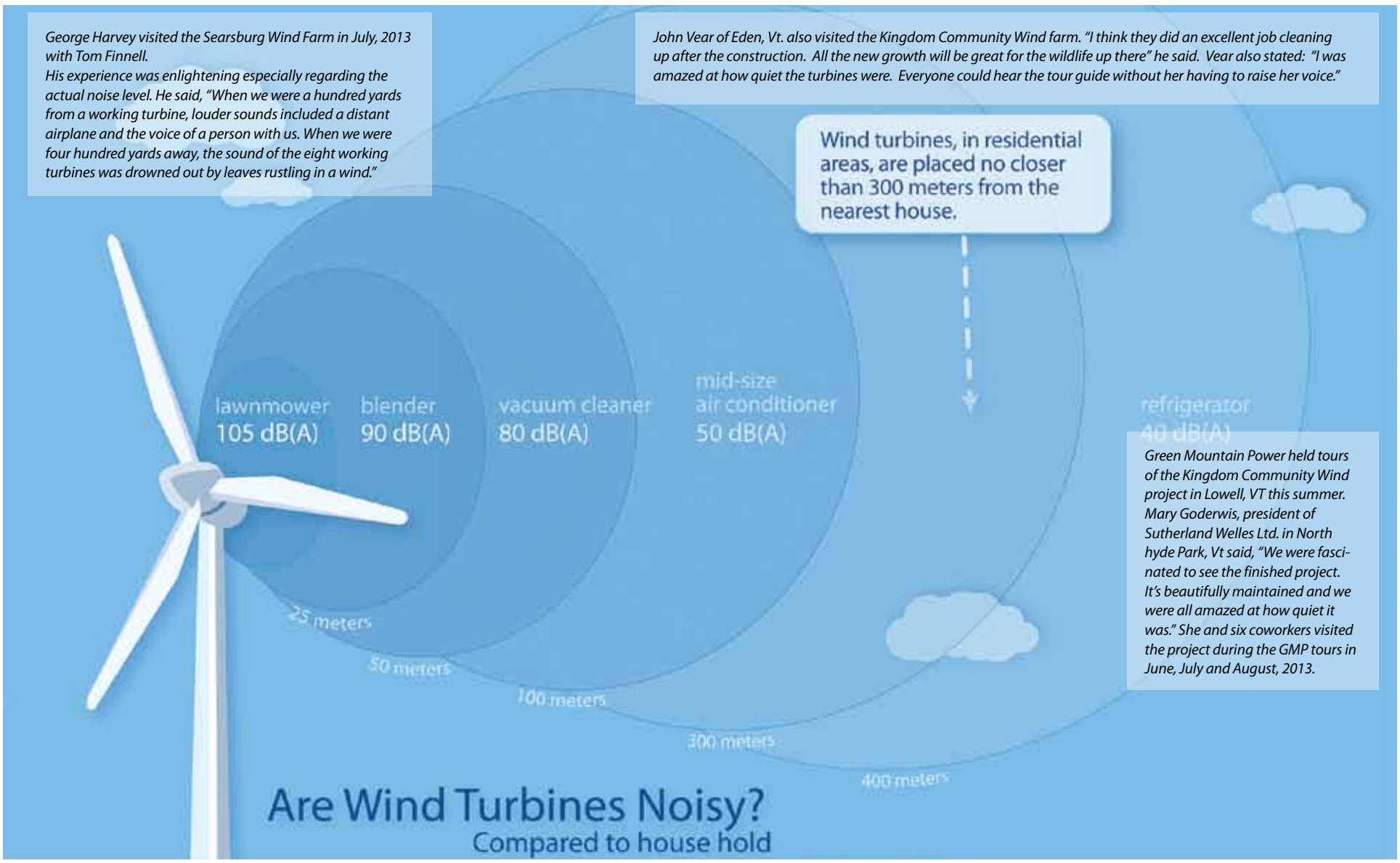
There are some things that call for action to make them right, and there are times when a person finds he can help. I found myself in that position, through a Sunnyside Solar "reboot." I have opened 40 Solar Stores over the last dozen years and have learned how to help them to succeed.

Recently, Carol has been seeing the industry she helped found to be finally growing up. But now, she has also seen the old business returning to its proper place. We made some calls, and raised some money. The USA Solar Store provided some support. And so, amazingly, the Sunnyside Solar Store is back at the Chelsea House Folklore Center. A Grand Opening Celebration will be held on October 26th at the 499 Marlboro Road location of the store, in West Brattleboro. They are open Wednesday through Saturday from 10am to 6pm. Stop in!

Dave Bonta is President and Founder of USA Solar Stores.

George Harvey visited the Searsburg Wind Farm in July, 2013 with Tom Finnell.
His experience was enlightening especially regarding the actual noise level. He said, "When we were a hundred yards from a working turbine, louder sounds included a distant airplane and the voice of a person with us. When we were four hundred yards away, the sound of the eight working turbines was drowned out by leaves rustling in a wind."

John Vear of Eden, Vt. also visited the Kingdom Community Wind farm. "I think they did an excellent job cleaning up after the construction. All the new growth will be great for the wildlife up there" he said. Vear also stated: "I was amazed at how quiet the turbines were. Everyone could hear the tour guide without her having to raise her voice."



Green Mountain Power held tours of the Kingdom Community Wind project in Lowell, VT this summer. Mary Goderwis, president of Sutherland Welles Ltd. in North hyde Park, Vt said, "We were fascinated to see the finished project. It's beautifully maintained and we were all amazed at how quiet it was." She and six coworkers visited the project during the GMP tours in June, July and August, 2013.

WHAT IS GEOTHERMAL?

By George Harvey

The term "geothermal" is properly used to describe just about anything that uses heat energy from the Earth. This makes it rather confusing, because there are very different technologies used, for very different purposes, which are properly referred to as geothermal. There is geothermal heat, and there is geothermal power. There are different types of each.

Not far below the surface of the Earth, the temperature is fairly constant and close to the average year-round temperature of the area. In New England, this is typically above 50° F. As you go deeper below this, the temperature increases about 1° F. every seventy feet down in most parts of the planet. The heat energy from these areas can be used in various ways.

Geothermal heating can be a matter as simple as constructing a building in an earthen mound or into the side of a hill to reduce its heating requirements. If such a building is sufficiently well insulated, it may require very little beyond the body heat of its occupants and the residual heat of their activities. Cooking in such a building goes a long way toward heating it.

Geothermal cooling can be used instead of air conditioning. Green Energy Times had an article on the subject in June of 2013 called "Windcatchers – Ancient Persian A/C."

Geothermal heating and cooling need not be passive, however. By burying heat exchangers, it is possible to heat or cool just about any building. For residences, the heat exchangers are usually either tubes buried a few feet down in trenches or wells that go deeper into the rock. In either case fluid is pumped through the tubes, providing a heat source for a heat pump, the source being much warmer and therefore more effective than outside air. Though such a system is usually rather expensive to install, it is typically very inexpensive to use for heat.

Another use of the Earth's heat is geothermal power. This is a very different matter from heating buildings. It means extracting heat from parts of the Earth that are hot enough to cause a fluid to boil. There are a number of different ways to do this. In a place such as Iceland, where there are geysers and volcanoes, the heat is so close to the surface that it requires very little drilling to get down to it. In New England, it requires drilling deep wells, typically thousands of feet deep.

Typically, two wells are drilled, side by side. Water is pumped down one well. At the bottom, it passes through permeable rock, which heats it up. It makes its way

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FEDERAL

Federal Investment Tax Credit

The federal investment tax credit (ITC) for most technologies, including solar, wind, heat pumps, and fuel cells, is 30% of expenditures. For commercial geothermal generating systems, microturbines, and combined heat and power the ITC is 10% of expenditures.

USDA Rural Development Program

USDA Rural Development Program - Rural Energy for America (REAP)

Finance the purchase of renewable energy systems, and make energy improvements; energy audits. Funding is awarded on a competitive basis; grant funding cannot exceed 25% of eligible project costs and combined loan guarantees and grants cannot exceed 75% of eligible project costs.

Applicants include Feasibility studies/ regular REAPs: agricultural producers and rural small businesses. Energy audits and renewable energy development assistance: local governments, tribes, land grant colleges, rural electric coops, public power entities. Grant must be used for Construction or improvements, purchase and installation of equipment, energy audits, permit fees, professional service fees, business plans, and/or feasibility studies. Find more at www.rurdev.usda.gov/NH-VTHome.html or call 802-828-6080 in VT or 603-223-6035 in NH

Biorefinery Assistance Program

As the call for increased production of homegrown, renewable forms of fuels has grown, so has the need to develop and produce them. USDA Rural Development offers opportunities to producers to development such fuels through the Biorefinery Assistance Program. The program provides loan guarantees for the development, construction, and retrofitting of commercial-scale biorefineries.

The Biorefinery Assistance Program was established to assist in the development of new and emerging technologies for the development of advanced biofuels and aims to accomplish the following:

- Increase the energy independence of the United States
- Promote resource conservation, public health, and the environment
- Diversify markets for agricultural and forestry products and agricultural waste materials
- Create jobs and enhance economic development in rural America

For More information go to www.rurdev.usda.gov/BCP_Biorefinery

REGIONAL

New England Grassroots Environmental Fund

Modest grants are available for community-based environmental work in CT,MA,RI,NH,VT,ME

- Must be volunteer driven or have up to 2 full time paid staff or equiv.
- have an annual budget up to $100,000
- "Seed" grants of $250-$1,000 and "Grow" grants of $1,000-$3,500
- Go to www.grassrootsfund.org/grants/ or call 802-223-4622 for more info.

VERMONT

Clean Energy Development Fund

The The Small Scale RE Incentive Program, administered by Renewable Energy Resource Center (RERC), provides funds to help defray the costs of new solar thermal, photovoltaic, and micro-hydro systems

Solar Incentives – based on rated capacity of system

- http://rerc-vt.org/incentives/index.htm
- http://www.dsireusa.org/incentives
- residential (including leasing)= $0.25/ Watt up to 10 kW for PV; $1.50/100Btu/ Day up to 200kBtu for ShW.
- commercial/industrial = $1.50/100Btu/ day up to 1100kBtu/day for ShW
- special customer* = $1.25/Watt up to 10kW. $3.00/100 Btu/day up to 1500 kBtu/day for ShW. **Group net-metered projects are only eligible for residential customers with residential meters.
- PV and ShW Efficiency Adder - adder is calculated separately and added to standard incentive subject to customer caps (eligibility requirements apply, contact RERC)
- residential = $0.15/Watt for PV; $0.50/100Btu/day for ShW. Capped at a cumulative $350, residential customers; $450, commercial/industrial/special customer = $0.15/W; $0.50/100Btu/day up to a cumulative $450 per customer

Micro-Hydro

- residential/commercial/industrial - $1.75/3'gal/minute Capped at $8750
- special = $3.50/3' gal/minute Capped at $17500 or 50% of installed cost

***sspecial customer category limited to municipalities, non-profit housing authorities, public schools. All incentives are subject to availability and may change.*

Visit www.rerc-vt.org or call (877)888-7372

VT TAX CREDITS

Vermont offers an investment tax credit for installations of renewable energy equipment on business properties. The credit is equal to 24% of the "Vermont property portion" of the federal business energy tax credit from 2011 to 2016. For solar, small wind, and fuel cells this constitutes a 7.2% state-level credit for systems and for geothermal electric, microturbines, and combined heat and power systems, this constitutes a 2.4% state-level tax credit. Any unused tax credit may not be carried forward.

EFFICIENCY VERMONT

Lighting (must be ENERGY STAR)

- CFLs - select ENERGY STAR qualified spiral and specialty CFLs are just 99¢ at participating retailers
- LED's – bulbs with special pricing/ coupons at register while supplies last at participating* retailers

Home Efficiency Improvements

- improvements: air sealing, insulation and heating system upgrades - up to $2,100 in incentives - using participating* contractors

Appliances (must be ENERGY STAR)

- Dehumidifiers - $25 mail-in rebate
- Clothes Washers - $40 rebate for CEE Tier 3 qualifying models, $75 rebate for ENERGY STAR Most Efficient
- Refrigerators - $40 rebate for CEE Tier 2 Refrigerators, $75 for CEE Tier 3 & ENERGY STAR Most Efficient
- Working second refrigerators or freezers are potentially eligible to be picked up. $50 incentive to retire old units.
- Clothes Dryer –rebate for replace electric with natural gas (contact EV*)

Heating/Cooling

- heating & hot water systems – see EV*
- energy efficient central AC and furnace fan motor - $100 mail-in rebate
- central wood pellet boilers (excluding outside wood systems) - $1,000 (See announcement on page 25)

Residential New Construction

- enroll in Residential New Construction Service – up to $1,500 in incentives and free home energy rating and expert technical assistance throughout construction and eligible for ENERGY STAR label
- Washington Electric Coop and Vermont Gas Systems customers may also receive additional incentives (contact EV*)

Other Opportunities To Save

- Advanced Power Strips – special pricing/ coupons at register at participating retailers*
- Pool Pump (2-speed/variable speed) - $200 mail-in rebate
- Meter Loan – borrow "Watts Up" meter to measure the electric consumption of your appliances

**all rebates/incentives subject to availability, limits and may change – for complete incentives and requirements, and for participating retailers/contractors, visit efficiencyvermont.com or call 888-921-5990*

NEW HAMPSHIRE

Renewable Energy Incentives Offered Through the NH Public Utilities Commission

Commercial Solar Rebate Program

Program open to non-profits, businesses, public entities and other non-residential entities

Rebates for solar electric/thermal projects 100kW (or thermal equivalent) or less

- Solar PV = $0.80/Watt D/C up to $50,000
- Solar thermal = $0.07(or$0.12 for systems of 15 collectors or fewer) per thousand-Btu per year, up to $50,000

Contact jack.ruderman@puc.nh.gov

Residential Solar PV Rebate Program

- $0.80/watt capped at $3,750 per system, whichever is less. Systems must be under10kW. Subject to funding availability.

Contact jon.osgood@puc.nh.gov

Residential Solar Water Heating Rebate Program

- $1500 - $1900 per system based on annual system output

Contact barbara.bernstein@puc.nh.gov

Wood Pellet Boiler or Furnace

- 30% of installed system up to $6k
- Must meet thermal efficiency and particulate emissions standards

Contact barbara.bernstein@puc.nh.gov
www.puc.nh.gov – Sustainable Energy or tel. 603-271-2431 for more information and current program status

Local Incentives

Some towns provide property tax exemptions for renewables – visit www.bit.ly/NHtownRenewablesTaxBreaks

- These are offered on a town-by-town basis.
- The state also has passed PACE (property-assessed clean energy) enabling legislation which will allow towns to use the PACE mechanism to finance clean energy projects through property taxes.

Visit http://www.nh.gov/oep/programs/energy/pace/index.htm for more information.

NH Electric Cooperative's Solar Incentive

- is 25% of the project cost up to $20,000.

The NH Electric Coop

- incentive program covers up to $1000 of the air source heat pump space heaters.

PAREI

To explore the possibility of a solar installation. Plymouth Area Renewable Energy Initiative. www.plymouthenergy.org

www.nhsaves.com

NH Home Performance with ENERGY STAR

Sponsored by all NH electric and natural gas utilities in partnership by the U.S. Dept. of Energy. Fuel-blind eligibility using the Home Heating Index (BTUs of heating fuel / conditioned square feet / heating degree days). Must provide at least 12 months of heating fuel history. Once qualified, eligible homes get a $450 value comprehensive energy audit for $100 (rebated if improvements installed), and 50% instant rebate for eligible weatherization improvements up to a $4,000.

Visit www.nhsaves.com/residential/retrofit.html for more information and an online Home Heating Index calculator

NH ENERGY STAR Homes

Incentives for builders of new homes who meet ENERGY STAR guidelines. Incentives include HERS rating fee paid by the utility, rebates for ENERGY STAR lighting, appliances and heating systems, and $800 - $4,000 additional incentive depending on the HERS score.

Visit www.nhsaves.com/residential/homes.html for more details.

NH ENERGY STAR Appliances & Lighting

Mail-in rebates for ENERGY STAR-rated clothes washers ($30), room air conditioners ($20), room air purifiers ($15) and smart strips ($10).

Visit www.nhsaves.com/residential/es_appliance.html for more information and rebate forms.

Instant rebate coupons ranging from $1 to $7 for ENERGY STAR-rated CFL and LED light bulbs purchased through qualifying NH retailers.

Visit www.nhsaves.com/residential/es_lighting.html for more information.

nhsaves Lighting and Efficiency Catalog

Extensive catalog of efficient lighting

While we at Green Energy Times try to keep things up to date, incentives are always changing. Be sure to check with the appropriate sources for the latest information.

products, from stylish lamps to hard to find specialty bulbs. Catalog includes other efficiency items such as smart strips, power monitors, and water-conserving devices

Offered at discounted pricing for NH electric utility customers, and fulfilled by EFI.

Visit catalog.nhsaves.com/ for an online version of the catalog.

Other NH Electric Utility Programs

See also individual utilities for additional programs and variations. NH electric utilities may offer low or no interest on-bill financing for energy efficiency projects.

Visit www.nhsaves.com/resource/ for individual utility contact information.

Business Programs

Includes programs for: small and large business, new equipment and construction, seminars, lighting incentives and catalog, and low and no interest financing programs.

Visit www.nhsaves.com/ for information about NH business incentives for electricity efficiency.

NH Weatherization Assistance Income-Eligible Programs

Home Energy Assistance and NH community action Weatherization Assistance Program. Financial assistance paying fuel bills, and free weatherization improvements for qualified applicants. Funding from U.S. Dept. of Energy, NH utilities and Greenhouse Gas Emissions Reduction Fund (RGGI).

Visit www.nh.gov/oep/programs/weatherization/index.htm for application criteria, FAQs and local program contacts

MASSACHUSETTS

Commonwealth Solar Hot Water (SHW) Programs

Applicants must be served by National Grid, NSTAR, Unitil (Fitchburg Gas and Electric), WMECO or a participating Municipal Light Plant community.

- Residential Rebate: $25/per collector X the SRCC thermal performance rating of the collectors (pls refer to kBTU/panel/day for Category C, Mildly Cloudy climates)
- Metrics for typical SHW system for 2-4 people, 2-panel roof-mounted plus 80 gal solar tank: materials/installation costs = $10,000, MA CEC rebate = $1100, MA State Tax Credit (use only once) = $1000, Federal Tax Credit (30% system cost) = $3000, Net Cost = $4900

Visit **www.masscec.com/index.cfm/page/Commonwealth-Solar-Hot-Water/cdid/1176/pid/11159#shwresources**

MassSave Heat Loan SHW

Through this loan program, customers may borrow at 0% interest the costs of a Solar Domestic Hot Water and/or Thermal Heating system minus the MA CEC rebate. Apply through receiving the MassSave Energy Audit.

Efficiency

After conducting a free residential Energy Audit, residential customers are eligible for up to $25,000, commercial loan up to $100k at 0% interest heat loan with terms up to 7 years to cover the following energy efficiency improvements: attic-wall-basement insulation, high efficiency heating systems, high efficiency domestic hot water systems, solar hot water systems, 7-day digital programmable thermostats, Energy Star replacement windows

Available only to utility customers of Western Mass Electric, National Grid, Berkshire Gas, Nstar, Unitil and Cape Light Compact Visit **www.masssave.com/residential/heating-and-cooling/offers/heat-loan-program Please call 866-527-7283 to schedule a free home energy assessment.**

Commonwealth Solar PV Programs

www.masscec.com

Commonwealth Solar II, offered by the Massachusetts Clean Energy Center (MassCEC), provides rebates for the installation of grid-tied photovoltaic (PV) systems at residential, commercial, industrial, institutional and public facilities.* Commonwealth Solar II rebates are available to electricity customers served by the following Massachusetts investor-owned electric utilities: Fitchburg Gas and Electric Light (Unitil), National Grid, NSTAR Electric and Western Massachusetts Electric. In addition, customers of certain municipal lighting plant (MLP) utilities are now eligible including Ashburnham, Holden, Holyoke, Russell, and Templeton. Commercial projects are eligible for rebates for PV projects less than or equal to 15 kilowatts (kW) in capacity and the rebate will be based on the first 5 kW only. Funding is released in "blocks" every quarter. All rebate applications must be approved BEFORE the project installation begins.

Rebate amounts are based on the total PV system size per building, regardless of the number of electric meters in use and certain other characteristics of the project. The proposed Commonwealth Solar II rebate levels for residential and commercial PV systems are:

- Base incentive: $0.40/watt
- Adder for Massachusetts company components: $0.05/watt
- Adder for moderate home value: $0.40/watt (applicable to resid. projects only), or
- Adder for moderate income: $0.40/watt (applicable to residential projects only)
- Natural Disaster Relief Adder, only for projects completed in the Springfield area impacted by June 1, 2011 tornado: $1.00/watt

The rebate is available to the system owner, which may or may not be the host customer. In the case where the system owner is a third-party owner serving a residential host customer, the project is treated as a commercial project (and eligible for the commercial rebate amounts only). Solar renewable-energy credits (SRECs) associated with system generation belong to the system owner and may be sold via the Department of Energy Resources (DOER) SREC program. Note: appropriate, approved tracking must be utilized in order to qualify to sell SRECs. MassCEC reserves the right to conduct post-installation inspections of PV projects prior to approval for payments.

MA State Income tax credit for residential solar hot water or pv systems are eligible for a one time 15% off system cost, capped at $1000 max tax credit. • No sales tax on solar hw or pv systems.

• There is no increase in property tax assessment for residential hw or pv systems for 20 yrs.

Database of State Incentives for Renewables & Efficiency: www.dsireusa.org

NH PUC SUSTAINABLE ENERGY NEWS

THE UNH SOLAR AIR GRANT PROJECT

One of the success stories of the Commission's competitive grant program is the UNH Solar Air Project. In 2012, the Commission awarded UNH a $60,000 grant to install a solar hot air system on the roof of Kingsbury Hall on the Durham campus. The system is now up and running. Read about this project on page 13 of this issue of Green Energy Times.

LEGISLATURE RAISES SIZE LIMIT FOR RESIDENTIAL PV AND WIND SYSTEMS CAP RAISED TO 10 KW

Since its inception in July 2009, the Commission's residential renewable energy rebate program has made rebates available for photovoltaic (PV) and wind systems with a nameplate capacity of less than 5 kilowatts (kW); larger systems were excluded. The cap on system size was mandated by HB 1628, the bill directing the Commission to establish this program.

Over the years a significant number of homeowners and solar installers expressed dissatisfaction with the 5 kW cap, noting that larger systems were becoming more commonplace as prices for PV systems plummeted. In some cases homeowners would install systems sized just below the cap, apply for and receive a rebate from the Commission, and then expand their PV systems to a larger capacity - a perfectly legitimate maneuver, but not an efficient way to go.

On July 29, a new law (HB542) went into effect, raising the cap to 10 kW per system. Systems of 10 kW or less are now eligible for the residential rebate, although the rebate remains the same: $.75 per watt of panel rated power up to $3,750, or 50% of the total facility cost, whichever is less.

Program Manager Jon Osgood reports that since the new law went into effect, most new rebate applications have been for systems larger than 5 kW. It seems that larger residential systems are the new normal. As a result, more homeowners will be able to more fully meet their electrical needs with renewable power, and at times generate surplus energy which is returned to the electrical grid - and for which homeowners receive a credit on their electric bills. At times of peak system demand, these systems shore up the regional power grid, and reduce the need for expensive, dirty "peaking" power plants to be brought on line. In the long term, these and other local renewable energy facilities help reduce the need for expensive new power plants and transmission infrastructure upgrades and expansions.

RGGI-FUNDED ENERGY EFFICIENCY PROGRAMS CONTINUE TO DELIVER STRONG RESULTS

A 2013 study by UNH's Carbon Solutions New England found that the RGGI-funded grant programs were yielding strong results:

As of June 2012, cumulative energy savings due to projects that received GHGERF funds ($21.8 million spent) are expected to be $107.8 million through 2030 based on current energy prices. For every dollar spent as of June 2012, the expected return is $4.95 in energy savings.

Read the full study and some impressive results at: http://1.usa.gov/GF7Kl3.

RETAIL MERCHANTS ASSOCIATION GIVING POWER BACK

Since 2009 the Retail Merchants Association of NH (RMANH) - www.rmanh.com/ has operated the Giving Power Back program for small and medium sized businesses. This program offers participating retailers and other commercial businesses guidance, technical support, financial assistance for audits and rebate funds for energy makeovers. So far 193 businesses have enrolled in the program, 177 businesses have had energy audits, and 89 businesses have begun or completed energy retrofits. Recently, the program's rebate awards reached the $1 million mark and these businesses are expecting to see annual energy savings of over $695,000 with the changes they made to their facilities

THE NH PAY FOR PERFORMANCE PROGRAM

P4P, managed by TRC Energy Services (http://nhp4p.com/), comprehensively addresses the energy efficiency needs of the commercial, industrial, and municipal government sectors by working with participants, such as developers, building owners and their representatives, to improve energy efficiency of commercial and industrial buildings. The Program is implemented through a network of qualified Program Partners. Partners are selected based on their demonstrated experience to develop comprehensive energy efficiency work scopes in commercial and industrial facilities, oversee the installation of the proposed scope, and verify that the installation will achieve the estimated energy performance.

To date, 45 New Hampshire buildings have participated in the NH P4P program. A key goal for the program was to develop energy retrofit projects totaling $5 million in value. P4P has exceeded that goal by more than 100%, with construction projects now at the $11.5 million mark. Energy savings have averaged 26%. Read about P4P's success stories, including Gregg Hall at UNH, Hitchiner Manufacturing in Littleton, and Oyster River High School at http://bit.ly/NHP4Pprojects.

Both the Giving Power Back and P4P programs were recently granted extensions by the Commission and will operate through June, 2014, using previously awarded funds.

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THE HEAT IS (ALWAYS) ON: INSIDE & OUTSIDE THE MASONRY HEATER

By Jim Cavan

He didn't know it at the time, but a miscommunication with his home's previous owner would eventually result in one of the best purchase decisions Bill DeCarolis ever made.

DeCarolis, who lives in Newcastle, New Hampshire, thought that the owners agreed to include their vintage, early 20th century woodstove and porcelain kitchenette in the sale.

"When we went to move in, all that was left was a plate-sized vent hole with nothing attached," DeCarolis recalled.

This led to a call to Les Veilleux, an old friend and fourth generation mason, who launched Eco Firebox – a company specializing in super-efficient heating systems – in 2010.

Building on concepts popular in Europe for over two centuries, masonry heaters use only a fraction of the wood required by standard woodstoves, producing a clean, radiant heat that provides even temperatures for 12 to 24 hours -- after the fire itself has died out.

Veilleux has created a system at Eco Firebox that can be pieced together in various configurations, thus allowing the heating appliance to suit multiple interiors, without compromising the complex internal functioning that makes the masonry heater green and efficient.

"The Eco Firebox is made up of 'heat cubes' that I liken to my kids' Legos, where the squares can snap together to create different shapes," Veilleux explained. "Some customers prefer a design that's more like a traditional fireplace, while others want to achieve a more modern aesthetic and incorporate bells and whistles – a pizza oven, heated benches, that sort of thing. The design options are endless." The fully modular system is thus more affordable.

How does a masonry heater work? Think of a concrete patio on a hot summer day. Even after the sun has long since set, the concrete still radiates heat. Unlike metals, brick and stone retain and release heat evenly and efficiently over time.

Les Veilleux in front of a masonry heater he installed.

A traditional woodstove may burn wood efficiently, but releasing heat to the building is another matter. The efficiency rating a stove gets from the EPA relates only to the stove itself and cannot take details of a specific installation into account. Even the most efficient stoves lose most of their heat up the flue system. By contrast, a masonry heater extracts and retains nearly all the heat from flue gasses, and that speaks volumes to efficiency.

After installing his Eco Firebox, DeCarolis's oil consumption was reduced by a staggering 670 gallons in only 2-1/2 months. At today's prices, that equates to $2,500 in savings (less $250 for the cord of wood used). DeCarolis arrived upon this estimate even after factoring in the drop in Degree Heating Days (DHD), due to last year's mild winter.

"Because the bedroom is right above the unit, the heat is rarely turned on upstairs, if ever," DeCarolis said. "On the first floor, there's only one room that ever requires an additional heat source."

For a technology whose performance suggests it resides squarely on the cutting edge, the masonry heater design just goes to show how, sometimes, the best ideas lay in the past.

Jim Cavan writes for Green Alliance, a Portsmouth-based organization that seeks to connect green-minded consumers with the businesses doing their part to lessen their environmental impact. Eco Firebox is a Business Partner of Green Alliance, http://ecofirebox.org/ www.greenalliance.biz

ENERGY PROJECTS MAKE KINGSBURY LABS UNH'S MOST EFFICIENT

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Ongoing energy savings are rolled into UNH's revolving energy efficiency fund, launched in 2009 with a grant from the American Recovery and Reinvestment Act. The fund rolls energy savings over to new efficiency projects, meaning that Kingsbury's demand-control ventilation paid for its solar pre-heating panels.

With an eye toward continuous reduction of UNH's campus-wide energy use, O'Keefe is justifiably excited about the savings realized in Kingsbury Hall. "Ventilation heating and cooling has the largest impact and footprint of just about any process in commercial and industrial buildings," he says. "There's still a lot of energy being used in these spaces, but it's as little as possible."

To watch a video about the installation of the solar heating system go to http://bit.ly/16kzc1N.

Campus energy manager Matt O'Keefe shows off the passive-solar air pre-heating system atop Kingsbury Hall. Photo: Beth Potier, UNH Media Relations

HEATING OPTIONS OFFER SOLUTIONS

TRADITIONAL • NEW • HYBRID

By George Harvey

People often ask about heating options, and what the best solution is. We knew about a number of developments, but information seems to come from all sides, with each touting its own solutions. Real clarity requires a disinterested approach, and there are many options to choose from.

We talked to Jake Marin, who is an energy consultant for the Vermont Energy Investment Corporation. Jake sees all sorts of housing situations in all sorts of buildings. One thing that becomes clear very quickly is that there is no single approach that fits all situations. Also, there is very often no single, best solution for any given place.

One traditional New England approach to heating is a hybrid. Many of us have a conventional heating setup with a backup in case of power outage or for remote parts of the house. The combination of an oil or gas furnace with a wood stove or two for backup is very common. Another common setup is having a conventional fossil fuel-based heater in one room and a pellet or wood stove in another.

When a hybrid system is designed with a view to cost and ability to function in a power outage, it can serve well for both. In today's energy market, one of the least expensive heat units to run is a heat pump. Since heat pumps require electricity to function, a good hybrid system might add a wood stove, which can provide relatively low-cost heat from cordwood, as it is needed.

Heat pumps come in two basic types. One, the ground-source or geothermal heat pump, is super-efficient, but expensive to install, with the cost depending on the composition of the earth underground at the site. Air-source heat pumps are much less expensive to install, but slightly less efficient. Even so, the air-source heat pumps are much less expensive than nearly any other type of conventional heater.

Jake Marin was kind enough to supply his estimates of normal operating costs, by heating type. The table below gives the information he supplied.

Heating type	Fuel cost	Efficiency	Cost per MMBTU
Air source mini-split heat pump	$0.14/kWh	3.0 COP	$14
Natural gas	$1.40/ccf	80%	$17
Wood pellets	$220/ton	80%	$17
Cord wood	$250/cord	50%*	$25
Oil	$4.00/gal.	80%	$36
Propane	$3.60/gal.	80%	$49

** This figure represents average heat delivered to a building, not burning efficiency of a particular stove.*

Jake has a few points of advice:

Even a person with a passive solar house probably needs a certain amount of heating backup for comfort, especially for inclement weather. A heat pump is a good solution for this.

Aside from passive houses, wherever a heat pump is used, it is good to have another source of heat for especially cold days, as the heat pumps loose efficiency in very cold weather and will not operate at all when the temperature falls too far. Typically the minimum temperature at which they will operate is 0º to -15º F, depending on the model and the building.

A great combination for a conventional house with good insulation and a tight shell is a heat pump with a wood stove.

In a conventional house with a standard heating system, such as oil, it is very often best to retain the old system as backup and add a heat pump as the primary heat source.

The most important thing of all is to make sure the house is properly insulated and buttoned up for air leaks. Without doing this, heating will be expensive, no matter how efficient it is.

WHAT IS GEOTHERMAL?

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to the second well, which brings it back to the surface. Under the pressure of the great depth, it usually stays liquid. But as it gets to the lower pressure at the surface, it boils. The boiling drives turbines to make electricity.

Some of the technology for geothermal power is fairly mature. Some, such as enhanced geothermal is not. Enhanced geothermal is done where the rock at the bottom of the well is insufficiently permeable for a sufficient quantity of water to go through from the one well to the other. In such a situation, cold water is pumped down, forcing the rock to cool and contract. This cracks the rock making it more permeable. This is very like fracking, except that it is on a much smaller scale and does not require any chemicals aside from water.

Geothermal power can have a higher carbon footprint than most other renewable resources, because it can allow gasses to escape from underground. Nevertheless, the carbon footprint is far below that of natural gas, even in the most efficient natural gas usages.

There is little potential capacity for traditional geothermal in New England. The potential for enhanced geothermal, however, is very high. We could get a multiple of our power needs met by geothermal – about 636% in Vermont; 958% in New Hampshire; 160% in Massachusetts, where the large population has a high power demand; and 3270% in Maine, where there is a lot of land area for the population. These percentages are greater than those for wind, but less than what we could get from solar PVs.

There is a downside for geothermal power we should be aware of, especially enhanced geothermal. It has been known to cause earthquakes. Those that have arisen from it have nearly always been so small that a human being could hardly feel them. Nevertheless, it is something to consider, before we bet too heavily on the system.

PASSIVE HOUSE: Capturing Energy & Imagination, Part 1

By Ken Levenson, AIA

Passive House is an international building energy standard, and a methodology to meet that standard - developed by the Passive House Institute (PHI) in Darmstadt, Germany. Passive House turns traditional notions of energy efficiency on their head. Instead of being about compromise and sacrifice for only incremental benefit, Passive House demands dramatic energy savings to address climate change head-on, and in so doing, counter intuitively, provides occupants greater comfort and health, a better life and a more resilient existence. Consequently Passive House represents a paradigm shift – challenging our imaginations to make a better world, and daring us to rise and meet the threat of climate change.

A look at Passive House characteristics, its metrics, its methodology and its results can provide an introductory glimpse into how this is possible.

Passive House Characteristics:

Very Energy Efficient: Providing dramatic energy reduction, up to 90% for heating and cooling demand from average existing building stock – offering a proportional response to the climate crisis confronting us.

Healthful: Fresh, high-quality indoor air with very low levels of typical contaminants.

Comfortable: A quiet interior environment with steady temperatures and no drafts.

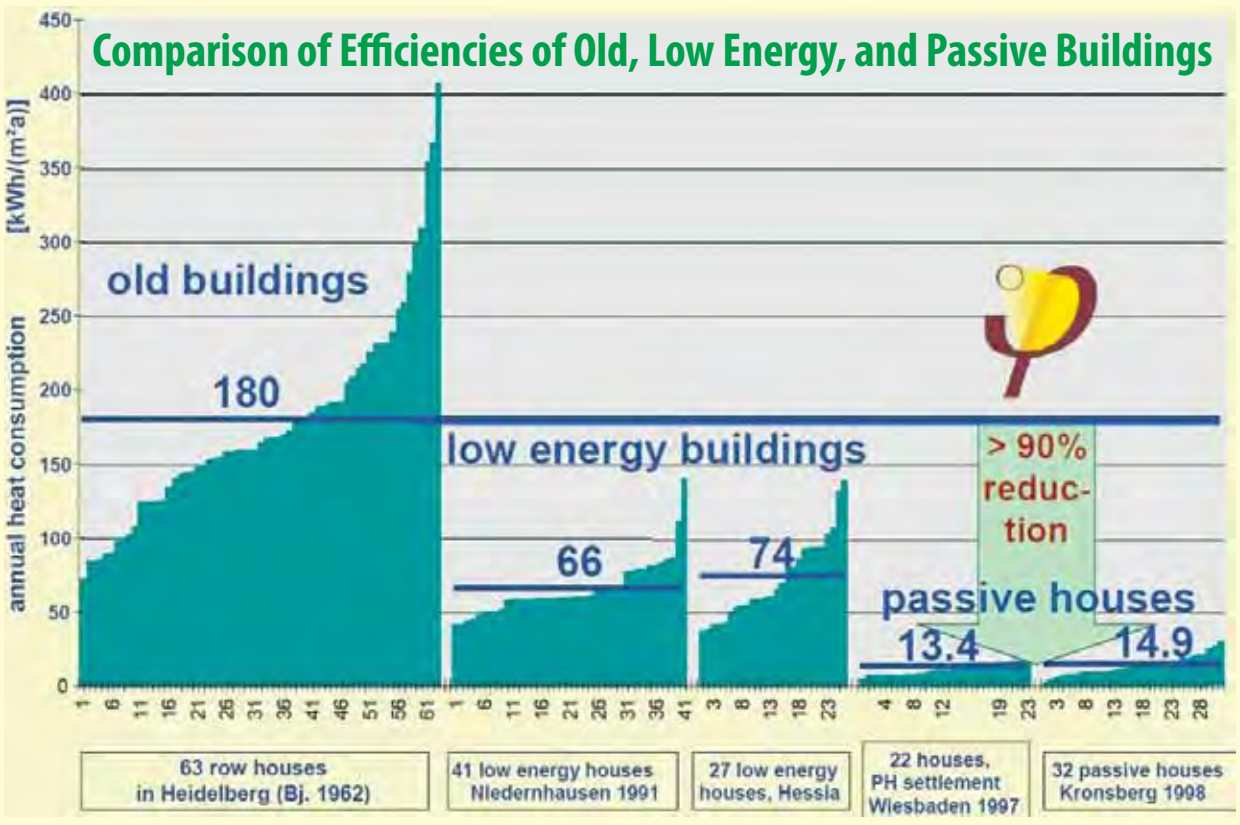
Affordable: Added costs of high-performance features are substantially offset by a reduction of systems' sizes. Occupancy is affordable because the reduced energy use translates into lower bills and protection from future energy price shocks.

Predictable: An integrated methodology and energy model provides performance predictability, an essential element in optimizing system sizing and costing.

Resilient: Passive House buildings foster greater resilience in three ways.

- By indefinitely maintaining habitable interior temperatures in freezing weather without power, allowing people to shelter-in-place.
- Power distribution systems can be more robust and flexible with lower demand.
- Reduced power demand makes Net Zero Energy building readily achievable with rooftop photovoltaic solar panels or other onsite renewables.

The Standard: The term Passive House is used because "thermal comfort is achieved to a maximum extent through passive measures (insulation, heat recovery, passive use of solar energy and internal heat sources)." So while the objectives of Passive House are broad, perhaps disconcertingly, the standard focuses on energy usage. The standard doesn't mandate sustainability measures we've come to expect such as green materials, water conservation or transportation sensitivity to name a few – these are the prerogatives of the design-build team. To oversimplify here, we can boil down the standard requirements for new construction to basically three numbers:



Heat Energy Demand: 4.75 kiloBTUs per square foot of treated floor area per year.

Primary Energy Demand: 38.0 kiloBTUs per square foot of treated floor area per year. This number is to ensure that all the energy saved in optimizing heating demand is not then wasted in equipment and plug loads.

Airtightness: 0.6 ACH50. This means, when pressurized or depressurized with blower door fans at 50 Pascals pressure, the building enclosure leaks no more than 60% percent of its interior occupied air volume over the course of an hour. This is extremely airtight. Because air tightness has the single greatest impact on energy efficiency this is the one physically confirmed measurement.

Because of this narrow and clear focus, again counter intuitively perhaps, Passive House has been able to grow rapidly in acceptance around the globe in the past few decades.

A Short History: The first contemporary Passive House was constructed as an experiment in Darmstadt-Kranichstein, Germany in 1990 following an international scientific research project by German physicist Wolfgang Feist, Swedish academic Bo Adamson and others. This effort developed high-performance

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WEATHERIZING WINDOWS

WHEN NET ZERO IS NOT AN OPTION

By Bob Walker,
Sustainable Energy Resource Group

Replacing windows might well be on the list of to-do's for folks doing a 'deep energy retrofit,' where you are trying to

Roy Prochorchik installs an inside storm window.

make very deep savings at much higher costs with much longer paybacks. If your goals are to reach Net-Zero, this is the route to take (100% savings). The planet will appreciate it if you can possibly find a way to do so.

"Weatherizing windows is almost always more cost-effective than replacing them because new ones are very expensive and there are many things that can be done to make existing windows work better. Replacing windows rarely turns up in recommendations for Home Performance with ENERGY STAR contractors where the goal is usually to save 25%-30% energy in homes with very high return on investment - 10% -15% avg.

Weatherizing Windows

Windows are one of the first things most homeowners think about replacing when deciding they want to weatherize their homes. But replacing windows is VERY expensive and existing windows can usually be improved to work better, and have better energy performance,at a fraction of the cost of new windows. Here are a few tips and resources you can use to tighten up your windows. We are going to focus here on conventional 'hung-sash' windows, the most common general type.

- Close and latch all windows and storm windows tightly.

- If any of the storm windows do not close tightly, for instance leaving gaps at

Rick Biddle weatherstrips a window

top, middle, or bottom, or leaving a gap in opposing corners when closed, you will need to loosen the storm window frame from the trim outside, square it up so it closes properly and reattach with caulk and screws.

- Caulk the edges of exterior storm windows to the trim with high quality acrylic latex caulk with silicone – make sure not to caulk over the weep holes at the bottom of the frame that drain condensation.

- With the main window, if you can shake the sash and they rattle, you can tighten the window latches that pull the sash together by removing the inner portion of the closing mechanism, filling old screw holes with wooden match sticks or slivers of wood, replacing the latch, drilling new holes where they will make the lock work better, and reinstalling the lock.

- Window sash can be sealed at top, bottom and edges by installing v-shaped weatherstrip. Top and bottom weatherstrip can be installed on the window casing where the top and bottom sash close, with sash in place. To install side weatherstrip, remove the window bands from one side of the sash, remove the sash, install v-shaped weatherstrip on the window jamb the weatherstrip "pointing" in, and replace the sash and the bands. Adjust everything as needed to work well. You might first try out your window-improvement skills on a less-used window as a "guinea pig." As a rule, don't permanently caulk windows shut. Vinyl v-seal weatherstrip is available from most building supply warehouses. Much longer lasting bronze v-strip is available from Architectural Resource Center: http://www.aresource.com/cushion.html#start

- Sometimes window bands (the trim boards on the window unit's sides holding the moveable sash in place), or the window stool ("sill" to most people) need to be removed and adjusted, to fit more uniformly against the sash. Do a careful job so that sash still can move.

- If you have old window types with ropes, pulleys and counterweights, remove the inside trim piece covering the counterweight cavity on each side of window. Cut the counterweight cord and remove the counterweights (make sure sashes are latched so they do not drop when removing counterweights). Remove window stops from one side and remove sash. (This is a good time to install v-seal weatherstrip at sides – see above.) Remove cording attached to sash and remove pulleys from window jambs. If you do not need to retain opening capability of upper sash, reinstall it, temporarily screwing sash in place and caulk at edges. If you want to keep both sash operable, replace the old counterweigh pulleys with new window counterbalances, and attach the counterweight spring to sash and replace. Then fill the counterweight cavity with polyisocyanurate foam insulation board, slightly undercut around the outside and air seal edges of foam board with spray foam. (We suggest "Pullman Window Counterbalance" available at: 585-334-1350, http://pullmanbalances.com/).

Bob Walker is the Executive Director for Sustainable Energy Resource Group (SERG) 802-785-4126, Thetford Center, VT www.SERG-info.org.

OPTIMAL INSULATION OPTIONS FOR HIGH PERFORMANCE- PART 2

By Jon Haehnel

In part one of this series we discussed why an optimized building envelope was valuable. The envelope needs to be optimized during new construction or major renovation because that is when the potential energy savings is highest and the installed cost is lowest. We also learned that with an optimized envelope our heating and cooling load is reduced, so that we can purchase a smaller HVAC system and lay the foundation for renewable energy sources to heat the building. Finally, we learned that the optimized envelope has to be thoughtfully designed and carefully installed in order to be successful. Envelope approaches done by enthusiastic designers, implemented in the 1970's and 1980's, produced failures in the 1990's that we have learned from.

Now, in part 2 we will discuss some of the design considerations that will help you determine the best insulation system for your situation.

When you have a complex roof shape such as this one your options for an effective insulation system diminish

Cost. The best way to compare insulation costs is in dollars per R-value. Take the cost per square foot for the installed insulation and divide by the R-value you will get for that price. The chart below shows some comparisons in $/R-value.

Simplicity of the Installation. For a high performance envelope the insulation has to be installed so that you get air tightness as well as maximum R-value. Some insulation products do that all in one product (like the spray foams) while others require supporting products (like the batts) to be airtight. Any system can be made airtight but some are simpler.

R-value per inch. How thick are the cavities where you need insulation? This is especially a concern on major renovations- the original framing cavities may be thin, and what would it cost to make them thicker? How much living space can you sacrifice? Insulations with higher R-value per inch can save the day in these situations.

Complexity of design. Especially in roof designs the complexity of the building shape may limit the number of insulation systems you can use that will work well with the design. How do you make the roof venting work on a complex roofline? How do you make the air barrier and insulation continuous when the roof changes plane so often? Some insulation systems answer these difficult questions better than others.

Sustainability and embodied energy- Is the insulation locally produced? Does it have a high recycled or biodegradable content? How much energy and natural resources does it take to make the stuff? These are hard questions to answer but again, some insulation systems are better than others on these grounds. For example rigid foam from flat roofs can be reused whereas spray foam cannot.

So, how do they all stack up based on the design factors I just described? This chart above will help you tell. On columns 3, 5, and 6 the systems are rated from 1-10 with 10= best and 1=worst. Columns 2 and 4 simply list values for $/R and R-value/inch

1	2	3	4	5	6
Insulation System	$/R-value Installed Cost	Simplicity of installation?	R-value per inch	Handles complex designs?	Sustainability & low embodied energy?
Spray foam closed cell	0.15	10	6	10	3
Spray foam open cell	0.17	10	3.5	10	4
Dense Pak Cellulose	0.15	7	3.8	7	10
Loose Cellulose	0.07	7	3.5	7	10
Rigid foam expanded polystyrene (EPS)	0.22	7	5	3	5
Fiberglass batts	0.04	4	3.5	2	4
Aerated concrete	0.13	7	3.9	2	8
Denim	0.11	4	3.5	2	10
Sheeps wool	0.14	4	3.8	2	10
Structural insulated panels (SIPs) - Urethane core	0.32	7	6	8	4
Insulated concrete forms (ICFs)	0.48	7	5	2	6
Hybrid – spray foam and batt	0.10	6	varies	6	4
Hybrid - rigid foam & cellulose	0.12	6	varies	6	7

Jon Haehnel has tested the building enclosures of over 100 buildings, some as large as a city block in downtown Manhattan and some as small as a 9-foot cube slated to go to Antarctica. Jon also teaches blower door testing and energy auditing for Vermont Technical College. Jon's firm Zero by Degrees LLC is based in Fairlee, VT.

BEYOND EFFICIENCY AND TOWARD REGENERATIVE SYSTEMS DESIGN

The Putney School Field House, a VT net-zero building

By Marc Companion

It's inspiring to see all the good work folks are doing to reduce the impact of our communities on the natural world. From energy efficiency and renewables, to local food production and land/water stewardship, to pedestrian friendly design and a greater attention paid to toxins in the built environment, encouraging strides are being made.

Some of our strategies involve "applying the brakes" to undesirable activities, such as wasting energy or generating pollution. Others fall into the realm of sustainability, whereby our activities are in balance so that we don't use more than what we need. Still other strategies go beyond sustainability to actual repair the damage done to our finite planet that's already stressed beyond its carrying capacity.

Water droplets shed from a leaf's surface. Biomimicry is informing designers and engineers on how to create better materials.

I'd like to begin a series of articles that explore the realm of regenerative design and how it is changing the way we approach various systems in the built environment. Using green buildings as a starting point, we'll look at some of the fundamental tenants driving a design ethos that repairs, heals and indeed adds value by increasing natural capital and the delivery of ecosystem services. Here's a brief introduction to some of the topics I'll cover in future editions.

Nature as a model for design: The fields of biomimicry and ecological design are inspired by the realization that the natural world is built better than just about anything we humans have created. On a macro-scale, living systems support all of their inhabitants, treat their own wastes and make very efficient use of resources. Countless organisms perform feats that are the envy of engineers, chemists and architects. For example, spider's silk is five times stronger than steel and we are still learning how to make it. What is the natural world teaching us about how to design our own infrastructure? How are nature's technologies being applied to building science for things like insulation, adhesives and the ability to shed water?

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BEYOND EFFICIENCY AND TOWARD REGENERATIVE SYSTEMS DESIGN

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The properties of complex systems: Nature figured out a long time ago that monocultures are not a viable strategy for long term survivability. Neither is assembling individual components in relative isolation from others. Instead, the whole becomes greater than the sum of its parts when a few attributes are present, such as a diversity of participants that have multiple relationships between each other. Complex systems, like an economy or ecosystem, can self-organize, self-regulate (homeostasis), repair themselves and adapt to changing conditions. We'll explore how our buildings and the built environment can emulate these abilities.

A constructed wetland at the edge of a parking lot treats pollutants. Integrating biologically-diverse ecosystems into the built environment can grow foods, treat wastes, produce fuels, create habitat and deliver other ecosystem services.
Image by Marc Companion

"Upcycling" as an improvement on recycling: Reduce, reuse and recycle are important ways to limit waste and manage the embodied energy that goes into the products and materials we use. Through metrics like life cycle analysis, we can track the inputs and impacts of making something, using it, and then what happens after it's no longer needed for its original purpose. A cradle to cradle approach helps us keep useful resources in service. But the process of recycling often involves converting a product or material into something of lower quality. In a world of regenerative design, we begin to think of "upcycling" to make materials better than their original, whether containing fewer toxins becoming fully biodegradable or incorporating new-and-improved manufacturing techniques.

The Indoor Biome: There is intriguing new research into the "indoor biome" and the microbial communities that inhabit our indoor spaces with us. Microbes are everywhere and we cannot live without many of them, but we are increasingly aware of harmful organisms and superbugs that have evolved and thrive in parts of our built environment. Advances in our ability to identify distinct species of bacteria enables us to now know which microbes live among us indoors.

Indoor air quality is especially important when making structures more energy efficient through tighter building envelopes. "Make it tight and ventilate right." One emerging realization is that if buildings are not properly ventilated (i.e. connected regularly with the outside microbial world), then the indoor biome starts to contain microbes associated more with the human body rather than those of outdoors - which are associated with plants and soil. The implications can be quite significant for places like hospitals, which often have windows sealed shut and rely on mechanical ventilation to exchange air with the outside. How can we ensure that we have a healthy diversity of beneficial microbes indoors? Are there ways that mechanical ventilation could be limiting our ability to do so?

Bacteria on the tip of a pin. Why are your microbes different from mine? How do microbes assemble indoors and how can ventilation systems ensure a diversity of healthy microbes? Image by Dr. Tony Brain & David Parker/Science Photo Library.

Stay tuned for future articles that will elaborate on these and other fascinating topics that relate to regenerative design.

Marc Companion works at the Vermont Housing and Conservation Board in Montpelier and teaches a Green Buildings course at the University of VT.

PASSIVE HOUSE: Capturing Energy & Imagination, Part 1

Cont. from page 20

prototypes for critical building components such as windows, ventilation and thermal-bridge-free connections. The scientific experiment was then developed into a functional energy standard with the formation of the Passive House Institute (PHI) by Wolfgang Feist.

PHI is an independent research institute dedicated to the research "and development of construction concepts, building components, planning tools and quality assurance for especially energy efficient buildings." To assure quality Passive House buildings PHI has developed a comprehensive and transparent energy model and planning tool, the Passive House Planning Package (PHPP). PHI has also researched and developed protocols for certified building components, the training of professional designers and contractors and the certification of buildings. Through continuous research and data collection from actual buildings and dynamic simulations the energy model algorithms are continually improved upon and make it the first validated truly global standard.

Today there are tens of thousands of Passive Houses around the globe in every imaginable climate and in all major building types: factories, schools, apartment buildings, high-rise office buildings, in both new construction and retrofit. The capital region of Brussels Belgium has fully incorporated Passive House into its energy and building planning so that in 2015 all new construction and substantial retrofits for both private and public buildings will be required to be Passive House.

Part 2, covering Methodology, Components, and Results, will appear in the December issue of Green Energy Times.

Ken Levenson is an architect, Certified Passive House Consultant, President of the non-profit New York Passive House, a founder of the North American Passive House Network, an International Passive House Association Affiliate Council Member, and COO of 475 High Performance Building Supply.

1. *PHI Passipedia website, http://www.passipedia.org/: Passive House Basics.*
2. *Building retrofits have slightly more lenient energy requirements for airtightness and energy demand.*
3. *Treated Floor Area is not a typical gross or net calculation but a measure of the actual usable square footage as defined by PHI - typically about 10% smaller than gross.*
4. *PHI Passipedia website, http://www.passipedia.org/: Passive House Basics.*

A FIERCE GREEN FIRE

A NEW DOCUMENTARY FILM

A Fierce Green Fire is a new film documenting the rise of the modern environmental movement from the 1960s through the present day. It premiered at last year's Sundance Film Festival and will be playing at select theaters across the country beginning in September 2013. Educators, environmental groups and grassroots activists also will be showing the film at small and large events from coast to coast over the course of the fall. Written and directed by Mark Kitchell, Academy Award-nominated director of Berkeley in the Sixties, A Fierce Green Fire (the film) is based on the 1993 book of the same name by environmental journalist Philip Shabecoff.

A new film by Academy Award-nominated Mark Kitchell, based on a 1993 book by Phil Shabecoff, documents the rise of the modern environmental movement from the 1960s through the present day. Pictured: Lois Marie Gibbs and other Niagara Falls, New York residents' struggle against pollution buried beneath their Love Canal neighborhood in the 1970s. Photo Credit: A Fierce Green Fire

The phrase "a fierce green fire" refers to a longer passage in one of the seminal environmental books of the 20th century, 1949's A Sand County Almanac. In the famous "Think Like a Mountain" section of that book, author Aldo Leopold relates his experience as part of a predator extirpation team that shoots a wolf in the New Mexico desert: "We reached the old wolf in time to watch a fierce green fire dying in her eyes. I realized then and have known ever since that there was something new to me in those eyes, something known only to her and to the mountain. I was young then and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view."

Kitchell's film shows how this passage and other writings were instrumental in raising awareness about the importance of wise stewardship of the natural environment and as such played a crucial role in the re-birth of the environmental movement in the 1960s.

Featuring five "acts," each with its own central story and character, the film depicts a central environmental conflict of each decade since the 1960s. The first act, narrated by Robert Redford, focuses on David Brower and the Sierra Club's battle to halt dams in the Grand Canyon in the 1960s. Act two, narrated by Ashley Judd, tells the story of Lois Gibbs and other Niagara Falls, New York residents' struggle against pollution buried beneath their Love Canal neighborhood in the 1970s. Act three is all about Greenpeace and efforts by Captain Paul Watson to save whales and baby harp seals, as told by Van Jones. Chico Mendes and Brazilian rubber tappers take center stage in Act four, as narrated by Isabel Allende, in their fight to save their Amazon rainforest. Lastly, Act five focuses on Bill McKibben, as told by Meryl Streep, and the 25-year effort to address the foremost issue of our time: climate change.

Intertwined within these main stories are strands including the struggle for environmental justice, getting "back to the land," and sustainability efforts in the developing world. The film ends on an optimistic note, driving home the point that environmentalism is really about civilizational change and bringing industrial society into balance with nature and that each of us can make a difference with a little effort.

Those interested in seeing the film should check out the schedule of theatrical releases at the film's website, afiercegreenfire.com. The website also features more information on the film and features historical photos of some of the scenes and events depicted in it. Anyone who wants to find out more about the the makings of the modern environmental movement should be sure to see A Fierce Green Fire.

Written and edited by Roddy Scheer and Doug Moss. EarthTalk® is a registered trademark of E - The Environmental Magazine (www.emagazine.com).

A SUSTAINABLE FOOD SYSTEM ON A TYPICAL INNER-CITY LOT!

Book Review by N.R. Mallery

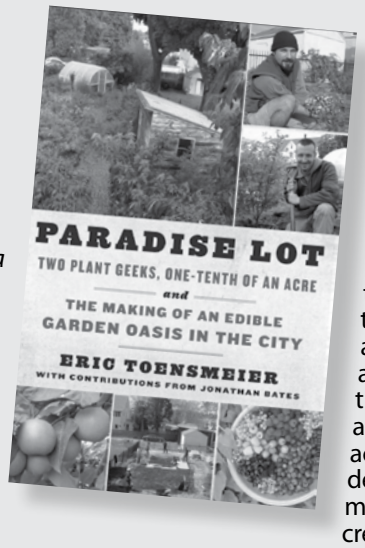
PARADISE LOT

TWO PLANT GEEKS, ONE-TENTH OF AN ACRE – AND – THE MAKING OF AN EDIBLE GARDEN OASIS IN THE CITY

By Eric Toensmeier, with Contributions from Jonathan Bates, 235 pages, Chelsea Green Publishing

Since one of my loves is gardening and sustainable living which is ingrained in my soul, I found this book to be absolutely fascinating. I found it hard to put down. I have underlined, dog-paged, bookmarked and highlighted so many parts that I barely know where to start to tell you how important this book is. As we all begin to walk our own path to a sustainable future, we need to start to take responsibility for many of our own needs. One way we can do this is by simply growing our own food -- no matter where we live!

The authors take you down their own journey that started on a rural setting where they had the space to grow all of the typical fruits and vegetables that you see here in the northeast. That beginning also grew into a friendship based on their own love of plants and love of the land. This friendship eventually led to a desire to buy and move into a duplex in the city of Holyoke, Massachusetts -- with a plan to grow their own edible forest on a small inner city, barren lot where nothing was able to grow. This is an exemplary success story.



Both of them have backgrounds that qualify them to tell their adventure about how they were able to achieve the development of creating what Toby Hemenway, author of Gaia's Garden called, "a sustainable, peaceful, and abundant oasis in the urban jungle." Their paradise took a few years of learning, not only of what and where to grow the more than 200 low-maintenance edible plants, but also learning through a series of just what this particular lot's needs were. The plan was for the garden to function as a natural ecosystem with the plants themselves providing natural fertilizer, pest control and weed suppression for low-maintenance edible plants.

Not all of the original plans worked however. They quickly learned that some perennials can actually turn into problems as bad as the weeds they were hoping to avoid. Then they had to find a new solution to the ideas they had learned were misguided. Time showed them what they needed to learn, even if it meant re-thinking and re-planning at times. The permaculture plan included challenging vegetation that does not normally survive the cold climate of New England. Their knowledge was extensive, so that they were able to find many alternative exotic and tropical crops to really make it a true paradise. It included an unheated greenhouse, chickens, silkworms and especially a place to go for a peaceful retreat -- all on a tenth of an acre lot.

As with all permaculture, it is really a learning experience for us all - but it is evolving, as did Paradise Lot.

Eric Toenmeier had been involved with and practicing permaculture since 1990. He is the author of Perennial Vegetables and co-author of Edible Forest Gardens with Dave Jacke. He has worked in many farming programs throughout New England and is a graduate and former faculty member of the Institute for Social Ecology in Plainfield, Vermont. His current interest is in large-scale permaculture farming as a carbon-sequestering solution to climate change. More about his business can be found at www.perennialsolutions.org.

Jonathan Bates owns Food Forest Farm Permaculture Nursery (www.permaculturenursery.com), an educational service and offers edible plant for sale. He has been working in the Connecticut River Valley for over a decade. He has a BA in Blology and an MA in Social Ecology, co-founded Apios Institute and teaches at Yestermorrow Design/Build School. He loves working with others to better the world we live in.

Paradise Lot is much more than a story about two plant geeks and their making of a permaculture paradise. It is also a guide - a resource manual that we can all learn from and follow to make wherever you live into a place where you can realize actual results from the 'fruits' of your labor.

Appendix A shows their own hand drawn design plan and field sketches which are fun to figure out. Appendix B is what I really consider a bonus to the book, adding so much additional value to it. It shows the "species they have successfully grown and harvested. All have overwintered except a few of the aquatic and tender tropical species," the authors write, with a a , "Note that 'native' means native to the Northeast and not necessarily to Massachusetts or our country."

Now my own challenge is to go back through the book and make my own plan on a much larger scale on my own 26 acres. I plan to use this inspiring book as a resource to make my own sustainable paradise meet even more of my own food needs with many more options - for fun, for health and for a future.

ENERGY INSIGHTS: WINDOWS

Paul Scheckel, Author, The Homeowner's Energy Handbook

A typical energy-efficiency project for many homeowners is to install new windows. It might seem like a no-brainer, but if you are among these homeowners, consider your options and motivations. Window replacement solely for the sake of energy cost savings is not often the best place to invest your efficiency budget. If the windows are damaged and in need of replacement anyway, it will often pay to spend extra and get the most efficient window you can. In most cases, this means a triple-glazed unit with three panes of glass, or two panes of glass with a coating on the glass, or a plastic membrane in the space between glass layers. If comfort is the issue, better windows offer an immediate payback. When I replaced a large, old, single-pane, double-hung window near my living room couch a few years ago, the increased comfort allowed the use of a space that was previously too cold and uncomfortable to use in the winter. This again was an immediate non-energy-related benefit but in terms of cost savings, it would never have made sense.

When it comes time to upgrade, put the right window in the right place for a good balance of efficiency, light, and solar heat gain. Before shopping, learn to read and use the performance label found on all windows. This label is provided by the National Fenestration Rating Council (NFRC), and is based on testing a sample from the window manufacturer. Performance varies with the number of glazing layers, glass coatings, and whether the space between layers is filled with a gas which reduces heat loss better than air does. One of the inert or noble gases is used, most often argon.

You may find that more than one type of window will offer the best performance. For example, you may want to capture the sun's energy early in the morning while rejecting late summer afternoon sun. This approach would call for a window with a high solar heat gain on the east side and low solar heat gain on the west. Such a strategy is known as "orientation-tuned" glazing. Following is some guidance on reading the NFRC label. Ratings are based on the entire window unit, not just the glass area.

U-factor indicates the overall insulating value of the window. Lower numbers mean less heat transfer through the window. To find the R-value of a window, divide 1 by the U-factor. A single pane of glass has a U-factor of about .91, translating to an insulating value of about R-1.1.

Solar Heat Gain Coefficient (SHGC) is a measure of how much solar radiation (resulting in heat gain) is allowed to pass through the window. Higher values indicate greater solar heat gain. An SHGC of .45 means that 45 percent of the solar energy that is incident on the window passes through it.

Visible Transmittance (VT) measures how much visible light comes through a window. VT is expressed as a number between 0 and 1. A higher VT means more light is transmitted. A VT of .58 means that 58 percent of the sun's visible light passes through the window.

Air Leakage (AL) is an air-leakage rating expressed in cubic feet of air passing through a square foot of window area. Much heat loss and gain occur by infiltration through small air leaks in the window unit. The lower the AL, the less air will pass through these cracks. We should mention the obvious, too: good window-sash operation and tight closing are essential to the energy performance of windows, as of course is professional-grade installation.

Condensation resistance (CR) measures the ability of a window to resist the formation of condensation on its interior surface. CR is expressed as a number between 1 and 100, with higher numbers indicating better resistance to condensation.

Learn more about widow technology on the web at www.efficientwindows.org and obtain ratings of new windows at www.nfrc.org.

Paul Scheckel is an energy efficiency and renewable energy consultant and author of The Homeowner's Energy Handbook. He lives in Calais, VT and is a partner at Shelter Analytics www.shelteranalytics.com.

ENERGY EFFICIENCY TIPS
from Bill's Appliance, Portsmouth, NH

1. Clean your refrigerator condenser coils with a vacuum to keep it running efficiently. This is the definition of a simple cleaning chore that can also help you cut that electric bill!

2. Purchase Affresh, a high efficiency cleaner for your front-loading washer to help prevent mildew buildup in your machine. Get those mildew smells out of your clothes, and cut down on the number of washing cycles. Save money and water!

3. You only need a couple tablespoons of liquid dishwasher detergent to do the job. Filling the entire detergent cup in a dishwasher is a waste, and not necessary.

4. Use green liquid fabric softener or white vinegar, instead of lint sheets in the dryer. Doing so can prevent clogging, unwanted repairs, and extend the life of your machine. It is also much better for the environment.

5. Make sure you clean your dryer vent twice a year to help keep it running at optimal efficiency.

Bill's Appliance is a Green Alliance Partnering Business. Reprinted with permission from Green Alliance, Portsmouth, NH. www.greenalliance.biz

CONDO OWNERS WILL SAVE ENERGY AND MONEY WITH ASSISTANCE PILOT PROJECT

COLCHESTER, VT….Green Mountain Power (GMP) has launched a pilot project to help local condominium owners improve comfort and reduce energy costs in their homes. This opportunity is open on a first-come, first-served basis to condo owners and associations in some regions of GMP's service territory. Condo owners along the RT 4 corridor, and in and around Manchester can take advantage of this opportunity right away.

Icicles on your eaves mean you're losing heat. This photo shows icicles on the two left side units, while the unit on the right received efficiency improvements from the Shelter Analytics condo efficiency team.

To spearhead the initiative, GMP has hired a local energy services firm, Shelter Analytics to provide tools and consulting support to help homeowner associations navigate the energy efficiency upgrade process. The Shelter Analytics team will inspect the condos, assist in planning projects, identify financing and rebates, help hire contractors, and support work quality.

According to Bob Griffin, Vice President of Power Supply at GMP, "We are really pleased to be able to help our customers by making it easier for condo owners to become more energy efficient. It is especially satisfying that this project will help them work through all the details of hiring contractors and building consensus among all the interested parties at their condominium homeowners' association."

Bret Hamilton, General Manager of Shelter Analytics, adds "We are here to help condo association members come to agreement on the best ways to save energy and money for their building, figure out the best way to pay for the work, and facilitate the process from start to finish. Our goal is to make the whole process as transparent as possible and demystify what is often a fairly technical process."

The real value for condo owners is getting neighbors together to improve entire buildings. The savings increase and improvement costs are lower when homeowners work together. Improved comfort and health are typically reported as unexpected, but welcome, side effects of energy upgrades.

Interested condo owners should contact Shelter Analytics to see if their condo association is eligible for an informative workshop on how to plan and make efficiency improvements. A condo efficiency team will be available for consultation and support and is currently scheduling workshops and home energy checkups with eligible condo associations through 2013.

More info available through Amy of Shelter Analytics: 1-800-858-4420 x 5, amy@shelteranalytics.com, or www.shelteranalytics.com/GMP

About Green Mountain Power. Green Mountain Power (www.greenmountainpower.com) generates, transmits, distributes and sells electricity in the state of Vermont. The company, which serves more than 250,000 customers, has set its vision to be the best small company in America.

IS NET-ZERO THE BEST YOU CAN DO? WHAT ABOUT NET-NEGATIVE?

By George Harvey

Many people question whether a zero-energy building is really possible. In fact, it is not really hard to imagine, if you think about it. And it is not all that hard to do – lots of people do it.

To achieve zero-energy does not really mean using no power and putting out no carbon emissions. It means producing at least as much power as you use and emitting no more greenhouse gasses than are sequestered by your activity.

Burning firewood is considered by some people to be carbon-neutral, apart from the carbon emissions from equipment to cut and move it. And carbon emissions from burning fossil fuels can be offset by activities that sequester carbon.

We might reflect that most farmhouses were carbon-neutral in the not-so-distant past. A country house that was heated by hand-cut firewood and lighted by homemade candles could easily have been carbon-neutral. For some folks a carbon emitting lifestyle was ordinary living, until their houses got electricity. Today, many people choose to life off the grid and achieve carbon neutrality.

For our planet to continue as we know it, carbon neutrality by a few off-grid exemplars will not suffice. We will all have to move in that direction. Some of us will have to go farther, just to make up for those who do not make it. Some of us must have net-negative consumption.

Net-negative energy consumption means producing more energy than you consume. If you have a solar or wind system and are grid-tied, it is easy to understand putting more energy on the grid than you consume. In many places, you get a statement with a check instead of a bill, when you do this. It is common for this to happen in Europe.

There are good points about this aside from making money. One thing it means is that when the power on the grid goes down, if you are set up to detach your power from the grid, you will go on producing electricity you can use.

Another good thing is that you wind up offsetting your neighbors' energy consumption and carbon emissions. Financially, this is to your benefit and at their expense.

In fact, we can extend the idea of net-zero carbon emissions into areas of life that are not exclusively associated with electrical power or heat. Any act that sequesters carbon is net-negative in carbon emissions. For example, if you use a woodstove and put your fire out, you can grind or smash the charcoal and bury it in the ground. Done with a little knowledge and care, the charcoal, called biochar, is a permanently fertilizing soil amendment. It is also profoundly net-negative in carbon emissions.

Understanding that some people will be net-negative energy consumers and net-negative carbon emitters, we can see that at some point in the not-so-distant future our entire society can achieve a net-zero status, or possibly even net-negative. When that happens, we will be able to emit less carbon dioxide than we remove from the atmosphere.

We might add that there are well-informed and intelligent people who believe not only that this is possible, but also that it will happen at some point in the not-so-distant future.

THE EVOLUTION OF A SUSTAINABLE VILLAGE - IN MINIATURE

A Community of Net-zero homes utilizing 3 types of construction; Modular, Pre-fab and Stick Frame.

Harvesting Kilowatts and Crops on the same piece of land

By George Harvey

Paul Biebel of Prudent Living, based in Windsor, Vermont, has worked with his crew to build a large museum-grade scale model of a town with a theme, "How America makes energy and how we use it." It was built in the tradition of a model train setup, but it goes far beyond that, with much more emphasis on the community and the activities in it. Paul says it illustrates the advances of the past six decades in how we produce and use power.

The scale model town can be seen at LaValley Building Supply in West Lebanon, New Hampshire. It is well worth looking at. It shows our past, and it shows the technologies we might expect for the future. Energy technologies represented include those from the past - coal, natural gas, nuclear, and oil -- and renewables for the future - wind, solar, biomass, and hydro.

Various technologies are illustrated by facilities showing extraction, production, transportation, use, and in some cases waste disposal. They are included in ways that can help educate people about the advantages and disadvantages of different power sources, without making political commentaries in the process.

A list of every model feature related to energy is probably too long for a short article, but it is worth mentioning a few examples. One element that stands out in the model is the Coal and Gas Railroad, for moving cargoes of fossil fuels. It connects a coal mine, an oil well, and a natural gas plant.

Contrasting with this is a series of renewable energy systems. A number of homes standing in a neat row have solar panels on their roofs and backyard vegetable gardens. A farm field has more solar panels elevated above a hay field with bales of hay in it. The farm also has a biomass plant, representing Cowpower. A number of the renewable resources are connected by the Upper Valley Railroad, which delivers logs to another biomass plant, among other things.

Quiz question #1: How many sources of energy do you see in this picture? Quiz question #2: How many sources of energy are renewable?

Other renewable power sources include three wind turbines and a hydroelectric dam. The designs for these come from actual facilities in Vermont. They are served by the Dam and Nuke Railroad, which also serves a nuclear facility. Since neither the dam nor the wind turbines need any fuel, they get very few deliveries by rail. The nuclear plant, however, produces waste from its fuel, and our society's lack of ability to deal with nuclear waste is reflected by the fact that the train goes back and forth, endlessly looking for a place to unload.

There is a lot more going on in the town. A superhighway has cars and trucks running along it. It carries a far smaller load of traffic than the railroads, but occupies a lot of space and shows a lot of fuel usage. It provides a look at the relative efficiencies of road traffic, which uses a lot of fuel to move very little weight, and rail, which uses a relatively small amount of fuel to move massive loads. Innovative installations of power capacity include mountings for solar panels, some of which are above parking areas to double as shade for cars.

Of course, as in any community, some care has to go into a comfortable lifestyle for the residents. People operate boats on the small river carrying water away from the hydro dam. There is a drive-in movie theater for the residents. It is easy to imagine the residents of the town living active, fulfilling lives in a community dedicated to the production and use of power.

The display is intended to be educational, to show what we are moving away from – a wasteful environment fueled by fossil fuels and nuclear – and what we are moving toward – a future in which renewable power supplies us with what we need to have: communities which produce much of their own energy, use it wisely, with net-zero carbon emissions. By law, in Vermont all residential and commercial buildings must be net-zero, starting in 2030. Since what we need to do the job is already here, Paul Biebel asks, "Why wait?"

Solar Gardens and Carports!

Crops, Cowpower and Kilowatts = Sustainable Harvesting at its best!

Amy Todisco's Green Living Now

GROWING FRESH VEGETABLES IN THE WINTER IN VERMONT?

Not fond of sad looking greens shipped across the country in the winter that are virtually devoid of flavor and nutrients? Me too. Living in the Northeast, most of us have believed that we cannot grow fresh veggies in the winter with the lack of sunlight and bitterly cold temperatures. But, there are some folks who are growing and enjoying the fresh picked goodness of vegetables even when the temperature dips below freezing.

How? A variety of methods, from attached solar greenhouses to cold frame greenhouses with hoop tunnels, extra covers, heavy mulching and more. It's important to keep the ground from freezing in your unheated greenhouse. Be aware that one row cover only offers an extra 2 degrees of protection per layer.

Mother Earth News Readers Top 5 Winter Protection methods:

- Use low tunnels made of plastic pipe bent over beds and covered with plastic sheeting.
- Cover crops heavily with straw or leaf mulch (this can create a haven for mice and moles).
- Grow in a greenhouse (many said a greenhouse had been their best garden investment).
- Cover crops with blankets, old sheets or row cover draped over stakes.
- Put hay bales on the sides of a planting bed and cover the area with old windows.

Choosing the right variety of seed is important as is the planting time. A well-established plant going into November will have a much better chance of surviving. Crops like spinach, kale and salad mixes can freeze and thaw, which actually lends a fabulous sweetness and tenderness to them that you don't get in the summer.

According to Barbara Damrosch, Eliot Coleman's wife, winter gardening is easy. She says that at any latitude there is enough winter sun to grow a variety of winter crops, such as:

- Space spinach,
- Lettuce (prefer leaf lettuce closely planted and cut at 3 inches), some of the most cold-hardiy lettuce varieties are 'Red Oak Leaf', and romaines such as 'Winter Density' and 'Rouge d'Hiver.' "Five Star' lettuce mix from Johnny's Selected Seeds in Maine is mildew-resistant — an important trait if you grow in the wetter, more humid conditions of a greenhouse", says Ms. Damrosch,
- Arugula ('Astro' and 'Sylvetta'),
- Asian Greens like Tatsoi and "Mei Qing Choi," a dwarf bok choy,
- Chard,
- Kale ("Winterbor' is exceptionally vigorous and more cold-resistant — though less tasty — than the deep blue-green Tuscan kales, such as 'Lacinato.' 'Even' Star Smooth' kale, hardy to 6 degrees Fahrenheit, is tender and sweet. Hardiest of all are the Siberian types, which are tender and have a milder flavor than other kales. Some of these, such as 'True Siberian' and 'Western Front' from Adaptive Seeds in Oregon, keep producing leaves all winter long," according to Ms. Damrosch.),
- Then there is slow growing Mâche, reportedly one of the hardiest winter greens,
- Hardy parsley (choose the curly variety, such as Forest Green), and
- Claytonia.

Bread and Butter Farm in Shelburne, Pete's Greens in Craftsbury, and Hazendale Farm in Greensboro have been having success with winter growing, as has four season gardeners, Eliot Coleman and his wife in Maine. For more details, check in with them. Happy winter growing!

Want some interesting info about winter growing and storing, check out this study by NOFA:

http://bit.ly/NOVAVermontstudy or this posting on Wishing Stone Farm: http://bit.ly/WSFpost

Amy Todisco is an accomplished author on issues relating to health, sustainability, and organic gardening. She has co-authored a best-selling book, 'How To Easily Grow Organic Food Almost Anywhere' and has been featured on Vermont Public Television and numerous other media. You can learn more about her at greenlivingnow.com

Salad mixes can freeze and thaw, which actually lends a fabulous sweetness and tenderness to them that you don't get in the summer. Photo: Foodaddicts.com

Solar Greenhouse in Boulder, owned & built by Peter Howell. At 8500'elevation, they were able to grow lettuce and peas through the winter - even with a foot of snow on the ground outside. Photo: Wikimedia Commons

EMERGING FRONTIERS IN BIOENERGY

VERMONT BIOENERGY INITIATIVE

OILSEEDS, GRASS & ALGAE EACH HOLD A PLACE IN VERMONT'S RENEWABLE ENERGY FUTURE

By Sarah Galbraith, program manager of the Vermont Bioenergy Initiative

The term "bioenergy" refers to renewable energy fuels and feedstocks derived from biological sources and the power resulting from their use. These can be forest and agricultural biomass, liquid biofuels, and biogas to be used for heat, electricity, or vehicle fuel.

Sunflowers grown for making biodiesel or grass grown for heating fuel help farmers to become more self-sufficient, diversify their operation, use marginal land, and lower fuel and feed costs. Algae production and processing for making biofuels can accomplish multiple goals such as wastewater and nutrient management along with producing algal oil for fuel and algae for animal or fish feed.

Some examples of bioenergy feedstocks and fuels being developed in Vermont include switchgrass, hay and other agricultural biomass for heat and power; oilseeds (like canola, sunflower and soybean) and algae for biofuels; and animal waste or food scraps for anaerobic digesters and captured landfill gas to create electricity and biomethane.

Further definitions and uses can be clarified as:

Oilseeds: Oilseeds such as sunflower, soybean, and canola can be grown and pressed for oil that can be made biodiesel or food-grade oil. The oilseed meal is a co-product that can be used for livestock feed and organic fertilizer.

Grass: Perennial grasses like switchgrass, big bluestem, reed canarygrass, and Miscanthus can be grown and baled or compressed into pellets or briquettes for use as heating fuel.

Algae: Microalgae such as green algae and diatoms can be grown and pressed for oil, fuel, feed, food and fertilizer.

This column will showcase uses, successes, and challenges in Vermont in each of these areas over the upcoming months from the partnerships within the Vermont Bioenergy Initiative. Since 2003 the Vermont Bioenergy Initiative has focused on biodiesel production and distribution for heating and transportation, oil crops for on-farm biodiesel and feed, grass for heating, and algae for biofuels and wastewater management. The program draws the connection between diversified agriculture and local renewable energy production for on-farm and community use by supporting research, technical assistance, and infrastructure development in emerging areas of bioenergy.

The newly launched website www.vermontbioenergy.com offers a series of educational videos centered on crop farming for feedstocks and fuel aiming to help farmers, researchers, educational institutions, and entrepreneurs overcome barriers to diversify operations. The videos, along with renewable energy resources and project development ideas can be used in the classroom, the field, or in advocating for sustainable business ventures.

The Vermont Bioenergy Initiative is a program of the Vermont Sustainable Jobs Fund and partners with other organizations expanding the use of renewable energy in Vermont like Renewable Energy Vermont and the Energy Action Network. The Vermont Bioenergy Initiative also coordinates crossover with the Vermont Farm to Plate Network by providing resources and technical assistance to farmers, facilities, and communities to support energy crops to be grown alongside food production.

Algea incubation lab at UVM courtesy General Systems Research

Borderview Farm Oil Press courtesy VT Sustainable Jobs Fund

Switchgrass Harvest at Meach Cove Farm courtesy VT Sustainable Jobs Fund

FRESH VEGGIES WITHSTAND NORTHEAST WINTERS WITH VERMONT VICTORY GREENHOUSES

By N. R. Mallery

Healthy eating while keeping food local can be a challenge here in the northeast, after harvest season turns into winter. Beyond this, the reality that climate change and our unpredictable weather patterns will again wreak disasters upon us similar to hurricane Irene is real. The IPCC report of Sept. 25th, confirmed that we need to prepare for this future scenario. What if your town or home or neighborhood was stranded without access to a local grocery store? Will you be prepared?

A local business offers a great solution that will allow you to grow your own food all year round and likely through disasters. Vermont Victory Greenhouses survived Irene, when others did not.

The team at Vermont Victory Greenhouses

Located in Cornwall, Vermont Victory Greenhouse is a family business, owned and operated by Jonathan & Kim Hescock. They started building greenhouses in 2009 as an off shoot of their existing construction company, Golden Ruler Construction, which gave them their extensive experience in home building, interior/exterior renovations, and painting.

Greenhouses and gardening have a long history in the Hescock Family. Jonathan and Kim have over 60 years of combined experience in gardening. It has become a mainstay for the entire family, providing both outdoor enjoyment and a steady supply of food throughout the year.

This includes actually growing vegetables & plants, as well as an escape during our long winters and days of inclement weather. Imagine, on a cold windy March day, being able to retreat into a warm, sun-filled, green environment to harvest greens, read a book or transplant basil. Imagine being able to pick fresh lettuce, radishes, or spinach every day of the year, eating tomatoes until the holidays, and enjoying cucumbers by May - with the snow piling up and wind blowing outside your door! These structures are year-round greenhouses that work in northern climes.

Heat gathered from sunlight is stored in the concrete floor, which doubles as a heat sink, and retained by double glazing in the walls and roof. This provides a slow, steady release of the day's heat into the greenhouse throughout the night. By connecting your greenhouse space to your home. your heating requirements can be greatly reduced. Jonathan does point out that, "Having heat sinks and other devices all help, but to avoid a freeze in the worst of weather its important to have some sort of backup heater. Of course those attached to houses simply use the heat from the house and with the sun the greenhouse more than returns the heat". In the case of a well insulated workshop or garage, where 55-60º is a sufficient working temperature, the heat from the greenhouse is often enough even in the middle of winter.

Each energy efficient Vermont Victory Greenhouse is custom-built to stand alone or attach to another building. Features include a rugged spruce permanent wood frame that is built with standard construction methods. The framing is independent of the polycarbonate walls that are extremely durable and will not shatter or crack like traditional glass. The 8 mil thick polycarbonate is double layered, giving it twice the "R" insulation value of single pane glass, and provides a diffused sunlight.

An ingenious thermally operated cylinder controls the opening and closing of the vents, maintaining the correct temperature in the greenhouse. Other features that make these greenhouses work independently are the automatic battery-powered drip watering systems, irrigation benches, and solar powered interior ventilation. The unique interior venting allows heat, oxygen rich air and fragrance to pour into an adjoining building automatically on any sunny day. Custom tables are equipped for bench top irrigation, and custom shelves provide a sturdy, beautiful and practical solution for growing plants and vegetables.


Veggies thriving while the snow is piling up outside of the greenhouse!

If a "full" garden before gardening season sounds good to you, it might be time to think about investing in one of these beautiful, efficient greenhouses for yourself. It is an investment towards a sustainable future. www.vermontvictorygreenhouses.com

WANT HEALTHIER TOMATOES? GROW 'EM WITH LEDS!

by Casey Danson

Relatively easy to grow and extremely versatile, nothing gets you in touch with your inner farmer faster than a juicy red tomato plucked right from the vine. When planning a garden, most people envision neat rows lined up in the back yard, but as we've reported many times, indoor growing through the use of hydroponic technologies is now affordable as well as convenient.

If you're considering an indoor system, you may want to opt for one that features LED lights rather than fluorescent. Recent research by Philips, in conjunction with Wageningen University, found that tomatoes can contain more vitamin C if they are exposed to LED lamps while growing on the plant.

Wageningen University is the only university in the Netherlands to focus specifically on the theme 'healthy food and living environment', so it's the perfect testing facility for research into the use of LED lamps in greenhouse horticulture.

To discover the impact of LEDs on the vitamin content of homegrown tomatoes, scientists chose several different plant varieties and suspended LED modules around the tomato clusters. These clusters usually appear under the leaves, so they are partially shaded from the sun. By adding the LED spotlights, the scientists exposed the tomatoes to a little extra 'sunlight'.

In the tomato variety that showed the strongest reaction, the tomatoes receiving extra light from the LEDs contained up to twice as much vitamin C as the tomatoes not exposed to the LEDs, even though the extra dose of light was equivalent to only a quarter of the natural light intensity on a sunny day.

This information is valuable to both the LED industry and to those interested in alternative methods of agriculture. Hydroponic and greenhouse systems are helpful to those who want to grow year-round in harsh climates, or who can't grow in the ground for lack of space or quality soil. Still, these systems, when paired with traditional lighting systems can consume a huge amount of electricity. Understanding how LEDs can reduce energy consumption, while possibly producing a superior product, could be helpful for those interested in large scale hydroponic systems.

Source: EarthTechling.com

SUSTAINABLE COLLEGE NEWS IN NEW ENGLAND

By George Harvey

In addition to teaching sustainability in their courses, our colleges are getting results that are exemplary from all angles. We have chosen three in our region that are quite impressive. They are truly 'Walking their Talk!"

Keene State College, in Keene, New Hampshire, has received LEED Platinum certification for their Technology, Design, and Safety (TDS) Center. The students studying in the building will have an ongoing functioning example of energy efficiency and renewable production all around them as they work.

A 127.7 kW PV array sits on the roof of the LEED Platinum TDS Center. This is just the beginning for Keene State College's sustainability measures - Keene, NH.

One of the most impressive things about the TDS Center is that unlike most LEED Platinum certified buildings, which are built from scratch, part of the work to achieve their certification entailed upgrading a pre-existing building. This meant that difficult choices had to be made and important work had to be done, which would have been far easier without the constraints of old construction.

Perfection in efficiency starts with the building envelope. When all was ready, the firm Zero By Degrees did the blower door testing, producing surprisingly good results. Of course, the new construction fared best, but careful work on the existing building meant it did very well also.

Triple glazed, argon filled windows were used in the new construction. The older parts of the building, with windows only six years old, got additional storm windows. Other features include such things as low flow bathroom fixtures with waterless urinals.

A PV array covering 40% of the roof area provides 15% of the power for the building, which includes electricity for wood and metal shops. As funds become available, the PV array will be expanded to cover the entire roof. The array produced 82.2 MWh in the period from June to September. There is also solar thermal hot water.

The building got 85 points toward LEED Platinum status, five more than the 80 points being needed for platinum rating. This is a truly impressive achievement. Colin Burdick, of Keene State, did much of the project's on-campus organization.

Architerra Inc was the architect. Brown Sardina provided landscape architecture. The civil, structural, mechanical, electrical, plumbing, HVAC engineers were from Rist-Frost-Shumway Engineering. Atalier Ten did energy & carbon modeling. Commissioning agent was Rist-Frost-Shumway Engineering, and the enhanced commissioning agent was Demand Management Institute. Solar Source, the Melanson Company, Inc., of Keene, New Hampshire, undertook the job of installing the solar array, a unique installation on a steel I-beam structure above the building's roof.

Small wind turbines share a rooftop with a solar array at Castleton College.

Castleton College, in Castleton, Vermont, has four new micro-wind turbines installed on the roof of Hoff Hall. The turbines are part of an experiment by the manufacturer and hosted by the college, partly to find out how the turbines do in the Vermont weather.

The Zefr micro-turbines are very small. Their blade diameter is only three feet, and they produce only one kilowatt, when operating at full power.

They share the rooftop with a 28.8 kW solar array, which they compliment to a degree. On a day-to-day basis, the wind blows hardest at night, when PVs produce no power at all. Seasonally, the wind is strongest in the winter, on average, when the sunlight has least energy.

The manufacturer of the Zefr turbines is JLM Energy of Rocklin, California. The original impetus for the project came from Green Mountain Power, which brought JLM Energy and Castleton College together. JLM Energy gave Castleton two of the turbines, and other funding was from the college, with students and faculty chipping in to do much of the work. The mounting system was designed by Peck Electric, of South Burlington, Vermont.

The turbines were mounted in such a way that they are very visible on the campus. It is the hope of the college that more wind projects may develop.

Speaking of the installation of the new micro-turbines, Mary Powell, President and CEO of Green Mountain Power, commented, "Partnerships like this are one of the keys to changing the way energy is generated and used in Vermont. GMP is excited to be working with organizations that are willing to try new things in the quest for energy solutions."

Green Mountain College, located in Poultney, Vermont, is getting a new solar array. The solar farm will have a capacity of 156 kW, and is intended to help the college "walk the walk," as it talks the talk, teaching students about renewable energy.

The team working on the array is headed by Khanti Munro, who graduated from Green Mountain College in 2005, and who was instrumental in putting up the campus's first wind turbine.

The solar farm is sited near tennis courts and a nature conservatory, close to a biomass facility. The combination of wind, solar, and biomass is being developed to reduce the college's use of fossil fuels and reduce its carbon footprint. Other ways to reduce fossil fuels are also being used, including the use of electric vehicles.

The solar project will have 624 modules of 250 watts each, mounted on 24 stationary racks, used to reduce maintenance. The output power is equivalent to what would be needed for 20 to 30 ordinary homes.

Khanti Munro is vice president of Positive Energy, of Granville, N.Y., which is the company awarded the installation contract. Green Lantern Capital of Waterbury, Vermont, is financing it.

It is exciting to see such impressive progress in our colleges and universities. We certainly look forward to more with anticipation. We will keep you updated.

The post-driving and racking phase of the Green Mountain College, VT's Solar Farm is complete, and awaiting the installation of 624 250-watt PV modules. Construction of the 156kW project is expected to be completed by late October.

FARM TO SCHOOL'S BEST OF THE BEST

Caption: Educators learning about a greenhouse program during a Vermont Farm to School Network meeting at Montpelier High School. Photo Courtesy of Food Connects.

Beginning this fall, two of Vermont's regional Farm-to-School organizations are combining the best parts of their successful pilot programs into one that is rolling out statewide. Green Mountain Farm-to-School in Newport and Food Connects in Brattleboro have launched Harvest of the Month (HOM) through a collaborative grant from the Vermont Community Foundation.

As a result, K-12 schools across Vermont are signing up to be part of the free HOM project. In return, they receive beautiful and informative materials to promote the use of local, seasonal foods. Each month, year-round, original illustrated posters, recipes, and curricula materials about the featured items are sent to every participating school. They also get a monthly e-newsletter, with lots of ideas about how to incorporate the HOM into school meal sites. HOM offers a wonderful way to connect the "3cs" of cafeteria, classroom, and community.

The idea is really taking off, with over 88 schools already in the network. Sales of farm products are also up, as Green Mountain Farm-to-School and Food Connects fill demand from local sources through two emerging food hubs: Green Mountain Farm Direct in the Northeast Kingdom and Windham Farm and Food.

The new Farm and Food Initiative (FFI) from the Vermont Community Foundation is supporting work at the intersection of sustainable agriculture and food security to ensure that all Vermonters have the opportunity to eat healthy, local food. This is one of the key goals of the Vermont Farm

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Harvest of the Month is looking for schools to participate in this free program. Learn more at:

- Food Connects: www.foodconnects.org
- Richard Berkfield: Richard@foodconnects.org, (802) 258-8902
- Green Mountain Farm-to-School: www.GreenMountainFarmtoSchool.org
- Lauren Sopher: hom@gmfts.org, (802) 334-2044.

The new Vermont Community Foundation report, Local Food for Healthy Communities: Bringing Food Security to All Vermonters is at www.vermontcf.org/localfood or call Emily Jacke EJacke@vermontcf.org , 802-388-3355 x285 for more information.

RESOURCES

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. **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.nesea.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/tax credits.

Tax Incentives Assistance Project (TIAP): www.energytaxincentives.org

American Solar Energy Society (ASES): www.ases.org

Energy Efficiency & Renewable Energy Clearinghouse (EREC): 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

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 **www.nfrc.org**/

NH Office of Energy and Planning: www.nh.gov/oep/programs/energy/RenewableEnergyIncentives.htm

Energy Efficiency & R/E Clearinghouse (EREC): 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

Solar Components: www.solar-components.com

Backwoods Solar: Specialty: solar, off-grid - **www.backwoodssolar.com**

Solar Systems: NEsolar.com

National Solar Institute: www.nationalsolarinstitute.com

NeighborWorks® Alliance of Vermont: Low-cost energy loans - **www.vthomeownership.org**

Energy Guide: Unbiased advice about today's energy choices. Find ways to save, lower your bills & help the earth's environment - **www.energyguide.com**

Home Energy Saver: Interactive site to help you identify & calculate energy savings opportunities in your home. A lot of great information! - **hes.lbl.gov**

American Council for an Energy-Efficient Economy: Consumer guide to home energy savings - **aceee.org/consumer**

VT Energy Investment Corporation (VEIC): nonprofit organization that issues home energy ratings for new & existing homes. 800-639-6069 - **www.veic.org**

SmartPower: www.smartpower.org

Greywater Info: www.oasisdesign.net/greywater

Weatherization, Energy Star & Refrigerator Guide: www.waptac.org

Buildings Energy Data Book: buildingsdatabook.eren.doe.gov

The Office of Energy Efficiency & Renewable Energy (EERE): develops & deploys efficient & clean energy technologies that meet our nation's energy needs - **www.eere.energy.gov**

VPIRG: understand the clean energy resources available to VT - **www.vpirg.org/cleanenergyguide**

Track the Stimulus Money: www.recovery.gov/Pages/home.aspx

Dept. Public Svc. (CEDF): publicservice.VT.gov/energy/ee_cleanenergyfund.html

Renewable Energy World: www.renewableenergyworld.com

Renewable Energy VT: www.REVermont .org

The Energy Grid: www.pvwatts.org

350-Vermont: General group that coordinates a variety of statewide actions.
To join this group go to: **groups.google.com/group/350-Vermont**

Vermont Tar Sands Action: Group working to stop the XL Pipeline and any other developments stemming from the Alberta Tar Sands.
To join this group go to: **groups.google.com/group/vt-tar-sands-action**

Fossil Fuel Freedom: Group working to make Vermont's energy plan 100% free of fossil fuels:
To join this group go to: **groups.google.com/group/fossil-fuel-freedom-**

Consumer Guide to Home Energy Savings, Heating, Appliances, Refrigerator Guide, Building Envelope, Driving: http://aceee.org/consumer

FARM TO SCHOOL'S BEST OF THE BEST

Cont. from page 33

to Plate Plan and the Community Foundation is making a long-term commitment to achieving it.

While Vermont is a national leader in the local food movement, there are still many in our state who don't have access to, can't afford, or don't know how to make use of the food produced here. This includes one in five Vermont children who are food insecure because their families can't reliably meet basic nutritional needs.

These are some of the findings in a new report from the Community Foundation titled Local Food for Healthy Communities: Bringing Food Security to All Vermonters. It clearly spells out the challenges that farmers, institutions, and individuals face while building a sustainable and equitable food system, and highlights some promising approaches and opportunities where philanthropy can make a difference.

Though barely under way, the FFI is already strengthening links between farmers, school cafeterias, classrooms, community members, and local food hubs. When the Foundation announced the first round of these grants last December, one of its goals was to expand successful local programs to serve new parts of the state. With the kick-off of the 2013-2014 school year, Harvest of the Month is doing just that.

Written by Michael Levine for The Vermont Community Foundation.

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Ingredient of the Month

By Larry Pleasant

NATURAL PRODUCTS FOR ORAL CARE!

By Larry Pleasant

Now before you sigh and flip the page, wait! How much time, energy, and money do YOU spend each year in a losing battle against gum disease? If this sounds like you or someone you know, read on.

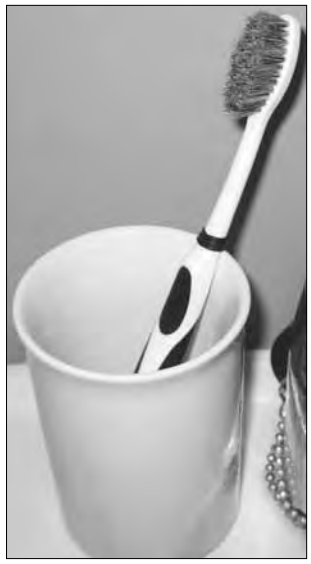
When you get a sore throat what's the first thing to try? A salt water gargle! Bring a couple of cups of water to a boil. Dissolve about 20% table salt into it. Cool to room temperature. This salt solution makes a safe and effective sore throat gargle, infected tooth rinse and is great mouth rinse for sore and bleeding gums. Swish and gargle to your heart's content. There is no toxic dose for gargling with salt water.

If you are on the go you can dissolve one-half teaspoon to a 4 oz. cup of warm water. Salt kills germs, reduces swelling and it is safe and nontoxic to you.

People have cleaned their teeth and mouth since Roman times using sea salt and water, apparently without ill effects and you can too.

While commercial toothpaste may be amazing for combating tooth decay (that's the claim in their ads anyway), it does little for the long-term health of your gums. In fact, the foaming agent sodium lauryl sulfate used to make toothpaste suds (and, more important, to keep the toothpaste emulsified in the extruder or filler), actually increases skin and gum permeability dramatically. This means that IF you have a bit of gum disease and brush with commercial toothpaste, there is a strong likelihood that you will have gum disease issues the rest of your life. Why not try using a 50-50 mixture of baking soda and sea salt instead?

I do not recommend the common supermarket brands of baking soda either for baking or for brushing. There is a possibility of heavy metal contamination and even arsenic in some of these products. Spend a few cents more and buy the health food store brand instead. Vermont Soap (shameless self-promotion here) makes an easy-to-use dentifrice called Tooth Salt. We chose laboratory quality sodium bicarbonate rather than risk exposing our customers to a potentially contaminated product. Tooth Salt comes pre-mixed with sea salt and organic peppermint essential oil for added effectiveness.



The Internet is full of warnings that brushing with sea salt and baking soda can wear your teeth or enamel down. However, no one actually seems to have seen this happen! I am sticking with the half dozen or so people we found, typically in their '90s, who have been using salt or baking soda most of their lives without harm. Many report going for 70 years without cavity or gum issues. If it was going to wear their teeth out it would have happened by now.

You wouldn't use the same hand towel month after month and never wash it, would you? Use the same sponge for a year without changing it? Wear the same underwear for months? Probably not! So, why do most people settle for a simple rinse of their toothbrush in cold water? It makes zero sense to do this. Watering germs just makes them grow faster. And the germs you are watering are the exact same germs you worked so hard to clean off your teeth and gums. Re-infecting yourself day after day with a grody toothbrush is counterproductive to the cause. Stop it now!

The ideal rinse for killing germs on your toothbrush is alcohol. Alcohol evaporates off the brush in about 20 minutes leaving a clean fresh toothbrush behind. Disinfect your toothbrush after EACH use. And as you may have guessed, Vermont Soap makes the world's first spray-on toothbrush sanitizer from organic alcohol and essential oils. Never use denatured alcohol or methylated spirits for this as the methanol in it makes it quite poisonous! Use organic alcohol to be absolutely sure that what you are getting is pure and clean. Despite the trashing that organics have taken from the mainstream press, it is important to remember that "organic" means audited as natural. From farm to bottle, every step has been inspected and audited to ensure naturalness. Isn't that worth paying a little extra money for?

You don't have to be a millionaire to be healthy. Just remember that the big corporations are not your friends and that you can probably do just fine without buying the goods they are trying to sell you.

This is the Soapman reminding you to keep it clean, keep it natural; and to try to stay sane in a world that is not.

All the Best, Soapman

STAPLES RECOGNIZED FOR GREEN POWER LEADERSHIP

EPA recently recognized Staples, Inc. of Framingham, Mass. at the 13th annual Green Power Leadership Awards. Staples was one of only to 21 organizations and three suppliers recognized nationally for their achievements in advancing the nation's renewable electricity market.

Staples was recognized for Sustained Excellence under EPA's Green Power Partnership, a voluntary program where partner organizations work with EPA experts to reduce the environmental impacts of conventional electricity use. Staples has been a member of the program since 2002.

"Our 2013 Green Power Leadership Award winners are driving new renewable energy generation and providing clear examples of organizations thriving on innovation and sustainability," said EPA Administrator Gina McCarthy. "These winners are moving us closer to the vision President Obama outlined in his Climate Action Plan – cutting harmful pollution and promoting American leadership in renewable energy."

"New England citizens, organizations and businesses are often leaders in finding practical and common-sense solutions to protecting our environment," said Curt Spalding, regional administrator or EPA's New England office. "We applaud Staples for demonstrating a long-term commitment to a cleaner and healthier environment."

As part of its commitment to the Green Power Partnership, Staples maximizes their energy efficiency and use renewable energy throughout its more than 1,800 stores, distribution centers, and warehouses nationwide. Earlier in 2013, Staples increased its company-wide green power use from 80 percent to 100 percent through a combination of green power purchases and on-site generation. Staples is using more than 635 million kilowatt-hours (kWh) annually, an increase of approximately 119 kWh from 2012.

"Staples is committed to being a leader in sustainability and incorporating green power as part of our energy program. We are honored to work with the EPA to help lead the industry in combining green power purchases and alternative energy resources to reduce our carbon footprint. Green power purchasing, development and implementation play a key role in meeting the company's sustainability goals and objectives," said Bob Valair, Director of Energy and Environmental Management at Staples, Inc.

Staples and the other 20 award-winning partners were chosen for their exemplary use of green power from more than 1,500 partner organizations, including Fortune 500 companies, small and medium sized businesses, local, state and federal governments, and colleges and universities. By using green power, communities, businesses and organizations can dramatically reduce greenhouse gas emissions, support America's growing renewable energy industry, improve public health, and help transition the United States to cleaner energy sources.

EPA, through the Green Power Partnership, works with partner organizations to reduce the environmental impacts of conventional electricity use. EPA defines green power as electricity that is generated from renewable resources, such as solar, wind, geothermal, biogas and low-impact hydroelectric sources and produces no fossil fuel-based carbon pollution. Nearly two-thirds of partners use 100 percent green power. All together, the partners are voluntarily using more than 28 billion kWh of green power annually, equivalent to avoiding carbon pollution created by the electricity use of more than three million average American homes each year.

More Information on the Green Power Partnership: www.epa.gov/greenpower

Interiors green Shots!
THE HOME AND LIVING STORE

CLAY: EARTH PLASTERS IN PRACTICE

By Jessica Goldblatt Barber

Earth or clay plaster is a blend of clay, fine aggregate, with an addition of fiber and pigment, depending on the look one wants to achieve.

Earth materials were used extensively in buildings of all sorts prior to the 19th century. The disappearance was not because the material was considered primitive or inadequate in any way, but because of the changing economic conditions of the time. This is an important fact to remember when looking at clay plasters in practice. They are not only primitive materials, even though they are not synthetic or a result of high-energy processes, but clay plasters still perform well after many centuries.

Earthen plasters are less toxic and energy-intensive than many other wall coverings, which makes them appealing to the environmentally-conscious. They provide protection, structural and insulating abilities as well as texture and color. Clay plasters have many complex qualities and require a proper understanding. Given that understanding, they can perform very effectively, and are durable as well as amazingly attractive.

Because the rate at which clay plasters absorb moisture is much higher than that of other materials (timber, for example, takes in and releases large quantities of moisture but over a much longer period), clay plasters can act to protect vulnerable organic materials (and in particular timber) from high levels of relative humidity, when microbial and insect attacks can be triggered. In addition to the building benefits of clay, the hygroscopic qualities mean that molds caused by condensation are minimized, and that a relative humidity of 50 to 60% is maintained. This is the ideal level for healthy mucous membranes of the human body, and also for the control of dust mites and other organisms which affect human health.

Preparation: Clay plasters can either be made from local soil with a careful process, or can be bought in a proprietary form, from companies such as American Clay Plasters.

Application: Clay plasters may be applied like any other plaster, troweled by hand or by spray application onto standard drywall, concrete block, brick and many other substrates. Where exposed to direct spray of water, for example in showers, just above sinks and in other vulnerable areas, it is necessary to use tiling or some other impermeable material. It is also suggested that timber is preferable to clay plaster for lining the reveals (perimeters at the wall-window intersections) around cold windows where condensation occurs frequently on the frames. Where clay plasters get wet only occasionally, then a coat of casein, silicate paint, or limewash is usually sufficient protection. Clay plasters are very forgiving, and easy to use even to a novice plasterer. However, very fine smooth finishes require practice or professional experienced help to perfect.

Warm to the touch in winter and cool to the touch in summer, clay plasters bring health, comfort and what can be described as organic, biological and living beauty to interior spaces.

Jessica Goldblatt Barber is the owner of Interiors Green, a home and living store, in Bethlehem, NH. Jessica supports sustainable principles in her everyday life and when creating designs for clients. www.interiorsgreen.com

RECYCLING FOR YOUR CONSTRUCTION PROJECT... DID YOU KNOW?

By Clare Innes

When you're making plans to button up your house, close down your cabin, and shore up the shed for winter, it's easy to keep a good amount of construction materials out of the landfill - which can also keep that to-do list from putting such a dent in your wallet!

•Recycle new drywall scraps: The Chittenden Solid Waste District's Williston, VT Drop-Off Center accepts drywall scraps for recycling. It's cheaper than landfilling it ($18/cubic yard for small loads, rather than $60/cubic yard if it's mixed in with regular construction material), and it's recycled as a soil amendment, good for improving water penetration, softening soil with a high clay content, neutralizing acidic soil, and adds plant nutrients calcium and sulfur. (NOTE: We don't recommend that you crumble it into your own soil. It needs to be processed and mixed with attention to soil chemistry).

•"Hardware" and "fixtures" take on a new name when they are no longer usable: They become known as "scrap metal." That's right, when you replace those hinges, plumbing fixtures, door knobs, lighting fixtures, etc., they may no longer be useful in their current form, but if you bring them to a Drop-Off Center or your local scrap metal dealer for recycling, they can be melted down and made into a new product. You can also keep a little sack handy for tossing in metal bottle caps, guitar strings, bent coat hangers, rusty nails, and the like, which can go into the scrap metal bin as well.

•Clean wood and lumber: All clean wood and lumber we collect at CSWD is chipped up and used as fuel to generate electricity or to fire a wood-drying kiln at a lumber company. Clean wood is defined as never having been painted, stained, treated, or glued, and free of dirt and stones. Depending on where you take it, it will likely be free for most load sizes, though there are

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usually specifications and limits.

•Reuse shops are springing up everywhere and they buy and sell reusable building materials and home-improvement products. If you're replacing your cabinets, doors, knobs, fixtures, or other items, remove them carefully so they can be resold instead of landfilled. Give your local reuse shop a call and see if they are interested in it.

•Got a pre-winter drainage project? Consider using crushed glass instead of gravel for French drains or foundation projects. Processed glass aggregate ("PGA") is the jargony term we use for crushed, recycled glass. When you toss your glass bottles and jars into your recycling bin in Chittenden County, the glass is crushed when it reaches our recycling facility, then tumbled until sharp edges are worn smooth, and then offered free as a substitute for 3/8" and under gravel for use in certain types of building and civil engineering projects.

You can also find lots of information on how to keep your home improvement projects out of the landfill on the CSWD website: cswd.net.

Clare Innes is the Marketing Coordinator, Chittenden Solid Waste District. E-mail: info@cswd.net, Hotline: 872-8111.

Crushed glass, as mentioned in the article, used in place of crushed gravel to build a French drain at a residence.

A GREAT EMERGENCY GENERATOR YOU CAN DRIVE

By George Harvey

Last February, Green Energy Times reported on a backup power system available from ConVerdant Vehicles LLC. It is a neat little piece of equipment that is put into the trunk of a Prius, and supplies power as the car's engine is running. It comes in a number of different sizes for different situations, and has a fair amount of built in ability to deal with power surges.

An Inverter in the Trunk of a Prius and A Prius Powers a House. Photos courtesy ConVerdant Vehicles LLC.

When I first heard about this system, I was very skeptical. I could not imagine how such a system could be powered efficiently by using the engine of a car. On seeing how it was done, however, I realized that I had misunderstood the potential.

The ConVerdant system has the Prius running as a generator. To do this, the car idles, with either its engine or its battery supplying power to the house. The engine shuts down when the battery is full, and restarts to fill the batter when it is not. That being the case, it is no harder on the car than normal driving. It is a robust design with a lot of advantages. It costs less than a typical generator of the same size, and it uses gas more efficiently to make electricity. Additionally, it is very quiet, compared with most alternatives.

Now, the time has come when we can say more. We have a review of how it ran in the field.

Gayathri Vijayakumar, a Building Systems Engineer, set up one of the ConVerdant power systems in her Prius, so it could be connected to her home in New Haven in case of a power outage. Her system is has a 1600 watt capacity, which is sufficient to run the critical circuits in her home, supporting the refrigeration and the electric ignition for her tankless gas water heater.

Gayathri had previously experienced a power outage for which she was not fully prepared. While the gas stove could still be used, and a gas fireplace could provide heat for comfort quite nicely, lack of electricity meant she had neither hot water nor refrigeration.

Her first power failure after installing the ConVerdant showed the problems she had previously had were a thing of the past. Using the car as a generator was quiet and easy. While the cost was double that of grid power, it was still only a fraction of what a typical gas generator would cost to run. There was no need to store gasoline in cans, and no problems with it getting old and gumming up an engine.

Gayathri said of her experience, "Being able to provide basic power for three days on one tank of gas is pretty amazing."

Keeping Up with Local Harvest

2 COUSINS & BURRITO ME ARE WORKING IT NATURALLY!

By N.R. Mallery

Here we are in the midst of a great harvest season. What that means for Burrito Me, in both Laconia and Plymouth, NH, is that they are right in their element, doing what they do best - keeping it local, natural and healthy.

Manager Sarah Hancock promotes healthy, fresh, and local, at the Plymouth, NH Burrito Me.

I stumbled upon this little gem about a year ago and look forward to any reason that puts me going to or through Plymouth, NH. It was love at first bite of the veggie burrito I ordered. In spite of the large portion, I could not put it down. Every bite simply said "Yum!"

Burrito Me's background confirms much about why their food at is worth stopping in for.

The Burrito Me taqueria was founded and owned by two cousins, Aaron and Reuben, opening in Laconia in February, 2010. The Plymouth restaurant opened in March, 2012. "Their philosophy is simple: fresh and local food is the healthiest and tastes the best. Their desire was to provide Laconia with good, fresh, and inexpensive food, using local ingredients whenever possible," said Sarah Hancock, a manager at the Plymouth location. "This was just an extension of the values they exude in their home. Their families love the challenge of cooking from scratch using ingredients from their own gardens or from local farms and farmers' markets."

This love of cooking with local ingredients has led them to develop close relationships with local farmers, such as Arbutus Hill Farm and Picnic Rock Farm in Meredith, NH. These connections provide high-quality local ingredients for their restaurant, passing on the benefits of buying and eating locally to the people in the community. Locally sourced ingredients include tomatoes, tomatillos, lettuce, peppers, and summer, zucchini, and winter squash for their famous Harvest Habanero Salsa. Everything is made fresh daily. Aaron and Reuben have found that working with area vendors has allowed them access to better-tasting and harder-to-find foods and beers, building stronger connections in the communities, in addition to keeping the money local (and foregoing any need for a can opener).

Though the Burrito Me menu is simple, it is ever evolving. Specials include roasted corn and black bean salsa, crispy chipotle pork, buffalo chicken tacos, and their most recent addition, the "All-American Burrito," which has lines reaching out the door on Fridays!

Whether you're vegan or carnivore, you can support local, and make it healthy and yummy and fill your tummy with the generous portions at Burrito Me. I never go to Plymouth, NH without stopping in for their scrumptious fare and am thrilled to have found this little, local gem. http://burritome.com/

Shop Local - Harvest, Home, and Holiday

Green Tips

By Deborah DeMoulpied, Bona Fide Green Goods

Carbon Diet

The Intergovernmental Panel on Climate Change (IPCC) has spoken. And it isn't pretty.

IPCC's long-awaited Fifth Assessment Report is underway. (It's a crazy, long undertaking.) The IPCC was established by the World Meteorological Organization (WMO) and the United Nations Environment Programmee (UNEP) to assess scientific, technical and socio-economic information concerning climate change, its potential effects and options for adaptation and mitigation.

The report in a nutshell:there's no more denying that climate change is human-caused and it's time to you-know-what or get off the pot. (And that is not a reference to marijuana.) This is no slouch report. The summary is over 30 pages with the final report over 900 pages. The report is based on over 9,000 peer-reviewed scientific studies. Whew.

Yes, the time is now. No more excuses. No more whining. We have to reduce our emissions of greenhouse gases and carbon output.

Time for the Low-carbon Diet!

1. Exercise. Like any good diet, exercise is key. So park the car (forever). Walk or bike. Use public transportation if you must. Bum a ride.
2. Stay cool. When it's heating season, keeping a building at cooler temperatures means your metabolism has to work a little harder. So turn down the heat and put on a sweater. (Locally knitted from local sheep.)
3. Go veg. A vegan, locally grown diet has the lowest carbon footprint. The higher up the food chain you go, the higher the carbon output.
4. Go bulk foods. Avoid packaging when possible. Recycling isn't good enough. That's why it is after Reduce and Reuse in Reduce, Reuse, Recycle!.
5. Count kilowatts. Do an energy assessment and reduce your electric consumption where you can. Change to LED lights, hang-dry clothes, and turn the lights out.
6. Wash wisely and be miserly.
7. Kill vampires. Turn off or unplug anything that is not being used. That little red light is using power. Use Power Strips to turn things off completely.
8. Diminish drafts. Windows, doors, attics, crawl space, vents, and dog/cat doors.
9. Get a tune up. Your furnace, car, and you work more efficiently after a tune-up.
10. Go gadget-free. Reduce the use of electrical appliances. Do you really need that electric wine bottle opener?

Don't waste. Don't waste. Don't waste. Period.

Deborah deMoulpied is owner/founder of Bona Fide Green Goods, an earth friendly department store in Concord, NH. Bonafidegreengoods.com won the Webby Awards Green Honoree in 2011. Deborah is also faculty of the Anticancer Lifestyle Program, teaching patients about environmental toxins and healthier solutions.

Ask the Soapman

"What is Castile Liquid Soap used for?"

Castile Liquid Soap refers to a family of vegetable oil soaps made with potassium hydroxide. This is what turns plant oils, which make you greasy, into soap; which makes you clean. Long before synthetic detergents were invented, the royalty and the wealthy of Europe used fine liquid soaps from Castile-La Mancha in central Spain. Made from natural coconut and olive oils, these liquid soaps were the product of choice for body, hair, laundry, dishes, hands, floors and surface cleaning for a hundred years.

Now that we bathe more than once a month, people fine pores and dry skin may find straight castile soap too strong for regular bathing. However, modified Castile style liquid soaps are the bases from which Vermont Soap crafts our hand foamers, Liquid Sunshine cleaners and concentrates; and our own moisturizing shower gels.

Always Certified Organic for your safety and the safety of the planet. When you see the Vermont Soap brand it is always *Natural Inside!*

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Code: GreenEnergy101
(Offer Good until 12/21/13)

FARRO SALAD WITH CHERRIES

- 2 cups cooked farro
- 1 cup toasted walnuts
- 1 cup dried cherries
- ¼ cup fresh parsley, chopped
- 2 Tbsp pomegranate molasses
- 1 Tbsp balsamic vinegar
- 1 Tbsp red wine vinegar
- 5 Tbsp olive oil
- Kosher salt and fresh cracked black pepper

Toss all ingredients together in a mixing bowl and season to taste with salt and pepper. Serve cold, warm or room-temperature!