ISSUE 18 – FEBRUARY 22, 2013

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RUTLAND, VT SOLAR CAPITAL OF THE NORTHEAST!

By Steve Costello

The Solar Capital plan of Green Mountain Power (GMP) is intended to create and inspire construction of enough solar capacity to provide Rutland with the highest solar reliance per capita of any city in the northeast. The Solar Capital effort is part of a larger focus on revitalizing Rutland through energy development.

The plan includes construction of a new Energy Innovation Center in the former Eastman's Building in downtown Rutland. Here we expect to develop new generation, and pilot new customer programs, efficiency ideas and educational opportunities for students and customers statewide. The building has sat empty for a decade and is the largest, and arguably most decrepit, building in downtown Rutland.

GMP is recruiting new businesses and organizations to locate in Rutland. One example is Small Dog Electronics. As part of our effort to attract Small Dog, we committed to building a solar-power car charging station near their new store, which is scheduled to open on West Street in Rutland in April. Vermont Energy Investment Corp. and Neighborworks of Western Vermont have also announced plans to co-locate some staff in our Energy Innovation Center when it opens this fall.

So far, we have about 400 kW of solar capacity in the city toward a goal of about 7 MW by the end of 2017. I am optimistic that we will actually reach that goal much sooner.

In addition to about a dozen privately owned small-scale systems in the city, we have two of our own projects up and running so far, just since the

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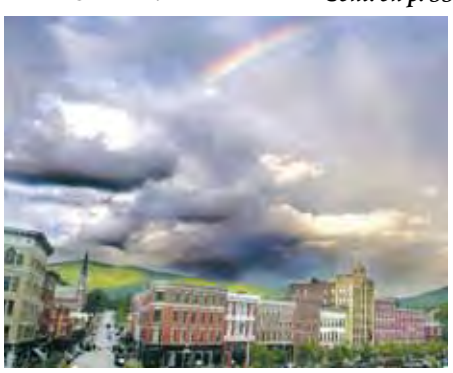
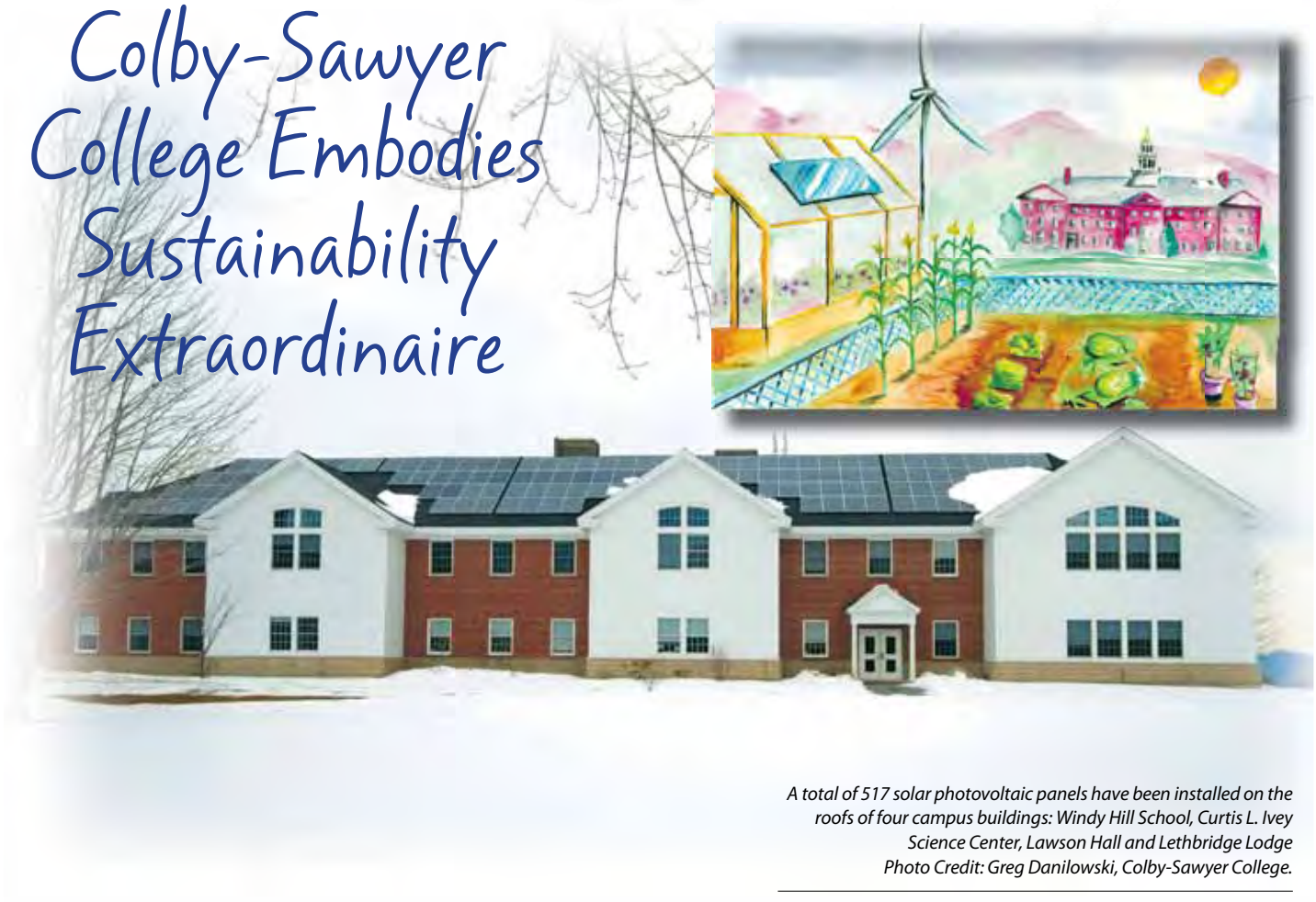


"Rutland Rainbow" photo taken by John Olender, Rutland Herald, that appeared in "Greening Vermont".

Colby-Sawyer College Embodies Sustainability Extraordinaire



A total of 517 solar photovoltaic panels have been installed on the roofs of four campus buildings: Windy Hill School, Curtis L. Ivey Science Center, Lawson Hall and Lethbridge Lodge Photo Credit: Greg Danilowski, Colby-Sawyer College.

Colby-Sawyer College is proud of their splendid new 127 kW solar array, installed on four of their campus buildings. They have a right to be proud of that, but they also have a right to be proud of a whole lot more.

In 2010 Colby-Sawyer President Thomas Galligan outlined the steps the college had recently taken to move toward two related visions: the quantitative achievement of climate neutrality and the qualitative embodiment of whole systems sustainability. There were a number of them, and they were impressive.

Over a period of years, Colby-Sawyer's steps toward sustainability had been increasing, both in scale and in number. They dated back to 1996, when the college decided to move away from oil-based heat and started changing out incandescent lights for fluorescents. In following years, a number of environmentally sound measures were taken, such as replacing large numbers of windows with high performance models in 2001.

The year 2007 saw an increase

Cont. on page 10

CAN WE BALANCE A GRID SUPPLIED BY WIND AND SOLAR?

By George Harvey

Local pundits in Vermont and New Hampshire are asking for a moratorium on development of wind power. One has complained that the technology to support 95% reliance on renewable power by 2050 does not exist.

A recent article in a publication called Bernama (http://www.bernama.com/bernama/v6/newsworld.php?id=920112) said Nicaragua is hoping to move from a 70% reliance on oil for generating electricity to a 94% reliance on renewable power, mostly wind, by 2017. Nicaragua is described in the article as the second poorest country in Latin America.

A list of 45 countries that are currently getting over 60% of their electric power from renewable sources, including 13 that are getting over 95%, was attached to the article. The list was prepared by Karl-Friedrich Lenz, whose blog posting is at http://k.lenz.name/LB/?p=6525. Many of the countries in the list are small, and many are poor. The larger countries include Brazil, Canada, Sweden, Norway and New Zealand. Also, nearly all the countries on the list are relying on hydropower for most of their power, which has made maintaining uniform power on their grids a rather simple problem. Two interesting countries are Iceland, which produces 100% of its electricity and 80% of all energy from renewables, and Uruguay, which produces ten times the electricity it needs from hydro, keeping the 10% it uses and exporting 90%.

> ***"President Obama gave a strong speech with a sensible set of priorities. I look forward to working with his administration . . . to combat climate change, one of the great threats facing our planet."***
> ***- Senator Bernie Sanders, Feb. 12, 2013.***

Developments in countries not on the lists, however, fly in the face of the predictions of those who say a system driven largely by wind and solar cannot be balanced (and will not come to be balanced by any technology developed in the next 37 years). One of these is Tokelau, a place sometimes called a country

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GREEN ENERGY TIMES (G.E.T.)

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Thank you all for your help!

ABOUT G.E.T.

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

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

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!

The following editorials originally appeared in The Laconia Daily Sun:

Batteries or no, solar energy isn't cost effective for most people

. . .in the first edition of this paper for 2013, Charlie St. Clair reveals the astounding news that batteries have been invented. Thanks Charlie for being right on top of the latest technology. But be that as it may many of us still consider solar power to still be inefficient and expensive. Checking out wholesale prices of solar panels on the Internet appears to confirm this in my mind. Whether someone chooses to purchase many smaller panels or fewer of the larger, more powerful, ones the cost is in the thousands. I do think most folks would have to hire professional installers so add more thousands. Charlie's batteries, 30 or so -- if car batteries at around $65 each -- add a couple thousand more. Now I may be wrong, so I invite anyone out there to correct me on this but it seems to me that even a basic system up and running would cost the consumer something between $15-$20 thousand. The payback, they claim, is 10 years, but remember car batteries normally need replacing every 4 to 5 years. Large industrial batteries could be used but up goes your costs there. Charlie's letter was short and due to that a lot of information was excluded such as the energy needed to recycle those old batteries. That is often not taken into account by people. Just thought I'd mention that. Supporters of solar energy must be pretty well off, being able to put their hands on so much ready cash. As for my wife and I, we're retired on fixed income and to afford to go solar we would need either to refinance or take out a home improvement loan. Realize that a five year loan (on just the principal) of a $15 thousand loan would be $250 a month. Throw in interest and we're somewhere in the $300 zone. (I think I'm pretty conservative with these numbers.) So really how realistic is it to expect myself and millions of other retired seniors to jump to assume thousands of more debt? As for that matter, how about millions of lower middle class working families struggling to make ends meet, to do it? No Charlie, batteries or no batteries -- solar is just not cost effective for most people. - Steve Earle

To the Editor,

I read the letter from Mr. Steve Earl with great interest. I would like to thank him for pointing out his misconceptions in as far as it relates to solar PV. My opinion, just like Mr. Earl's opinion, really does not matter in the Renewable Energy discussion. What is important are the hard facts.

Solar PV is either grid-tied -- which means the energy produced through the system is dumped directly onto the grid, spinning your meter backward -- or it is a battery-based system which allows the owner of the system to use the generated power directly, without involving the meter and the grid. Generally, quality battery systems are more expensive and the batteries have a lifespan of 8-10 years. I would suggest the only time to use battery systems are when your property does not have access to the grid in the first place. If you are like the majority of us, we are grid connected and our goal is to be grid neutral -- meaning we would like to produce the power needed to not have an electric bill.

Until fairly recently, the biggest hindrance has been the substantial upfront cost of buying a solar production system. System costs have dropped and production efficiency has increased dramatically. Panels produce more power and inverters convert more power for far less cost.

Breaking a solar production system down to incremental factors is fairly meaningless, something akin to purchasing a new car one part at a time. By the time you are done pricing your car one part at a time you will quickly realize you can't afford to ever own a car in the first place -- and yet we do own cars and they are affordable.

Looking at system cost is irrelevant to looking at system value. By way of example would anyone buy a home if the number we looked at was the amortized cost over 30 years? A 300,000.00 property costs 620,000.00 over the life of the mortgage. Would we ever pay 620,000.00 for a 300,000.00 property? Probably not, and yet we enter into mortgages willingly.

The really positive aspect of solar PV is that it actually has a pay-back unlike your car, furnace, electric bill, heating oil or propane bills. For people on fixed incomes nothing makes more sense than renewable energy. The reason is: you become a fixed cost producer NOT a consumer.

A real life example:

•10kWatt system (Note from G.E.T. -- This would be a very large system. A typical home would not need even half of this. We, at G.E.T. have a 3.8kW system, which more than meets ALL of our needs.)
•$72,000.00 installed
•Payback in year 4.
•No electric bill for the next 25 years.
•Net return on the life of the system (under warranty): $138,387.00 (190.41%)
How many oil or gas fired furnaces have a return of investment of 190% or any payback at all?
•Monthly cost: less than the electric bill.

- Regards, John Ramsey, Planet Green, Inc., Meredith, NH

Dear Green Energy Times,

~ from the Jordan Institute, Concord, NH

In our move to our new location, we submitted a survey to our staff asking which of the hundred publications they would like to see make the move with us. We are happy to say that Green Energy Times is among the top 7 most important publications that made the move.

Mission Statement: The Jordan Institute's mission is to reduce energy use and carbon emissions in buildings. Responding to the threat of climate change to both human and ecological health, The Jordan Institute aims to transform the way buildings are designed, built, renovated, and operated.

Vision Statement: The Jordan Institute envisions a region in which high-performance buildings – resource efficient, comfortable, durable, and healthy – are the norm, both in new and existing structures. The organization implements its mission through high-performance building consultation, comprehensive project management for major energy-efficiency projects, training of professionals in the building design and construction field, and energy-related state policy design and implementation. www.jordaninstitute.org

WE ARE SORRY

We at Green Energy Times want to apologize for the facts that our website and emails were down for the period of January 11 to 21, and that our February issue is a week late getting to press. We have been learning about websites and domain providers, including what happens when neither the website nor email has been operating.

We would like to suggest to our readers and advertisers that they profit from our unhappy experience by taking heed. It is a good idea to keep track of an organization as vital as a domain provider and the way it does business. Had we been aware of the fact that 1and1.com was the defendant in a class action suit brought by over 500 customers, we might have had the foresight to prevent disaster by going to another provider.

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David Blittersdorf's

VIEW FROM THE TOP

Our Vermont Community

Vermont is one of the smallest states in both size and population, by geographic area we're 45th in the country, and as of the 2010 census, only Wyoming has fewer people. Not surprisingly, we Vermonters are used to the idea of relying on our neighbors, and figuring out how to get along with each other. Our state is also one of the most socially and environmentally progressive. While we're not strangers to conflict here, many of us share common beliefs and strongly value being on the forefront of positive change, as far as the rest of the nation is concerned. We are proud of who we are and what we do, and enjoy the idea that in the future we'll continue to show the same sort of cohesive, common-sense attitude toward energy, the environment, civil rights, and sustainable food systems, among other areas of our collective community life. We also value socially responsible businesses that nurture people and the planet as much as profits. Over all, we have a commitment to working things out. A key part of the Vermont way of doing things is a respect for individual rights and privacies, while also holding certain "common goods" as being greater than any individual wish or need.

It's rare to run across an entire state where this kind of community cohesion is possible. Most other states struggle to achieve it, as they are too big in most regards. We share a strong belief in being independent and of taking care of ourselves. We are strong and fortunate enough to have the wherewithal – the time, energy and money, to be responsible and caring for each other. We recognize that climate change is real and is caused by burning fossil fuels. As a state, we accept our role in causing the horrible dilemma we're in as a society, where a century of carbon consumption, and consumptive behaviors generally, have contributed to resource depletion and a major shift now underway in the very way nature behaves.

We are now acting to do something about the energy situation in which we find ourselves. We have a comprehensive energy plan that sets an ambitious but necessary goal: 90% of Vermont's total energy needs – that's all the energy used for electricity, heating and for transportation – will come from renewable energy sources by 2050. In order to meet this goal, Vermont needs to pursue large wind and solar, the two largest energy resources we have within our borders. I firmly believe this shift is required and cannot be denied if we are going to survive and prosper in coming years, as fossil fuels become less available, and nuclear and imported hydro either too fatally risky, or too distant and outside of our control. Access to reliable, non-polluting energy is an undeniable common good. We have a strong need to maximize our in-state renewable resources, reduce our energy consumption, and develop systems of living within and by our energy means, while we still can.

A very small group of anti-renewable-energy folks is dividing our statewide community on energy issues, and this group claims to speak for the majority. I applaud their passion and their love of place, and I understand their urge to protect Vermont's natural resources, i.e., to protect the "commons," because I too am working to protect the natural resources of our state. Today we use fossil fuel resources from other states and countries around the world to supply over 90% of our energy for electricity, heating and transportation. These external resource needs are far more damaging to all of us than developing our own in-state renewable resources would ever be. We must think of ourselves as the Vermont community. We cannot let the personal self-interest of small groups or towns stop what is necessary to provide for ourselves as a state. We must look out for the greater common good, and serve as a model for other communities and states looking for leadership in our society's present energy transition. Vermont must lead in this major energy transition, and I believe we will.

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

A PRIUS WITH A SOLAR PANEL ON IT?

The December issue of Green Energy Times had a picture of Dave Birmingham, owner of 802 Toyota, standing next to his Prius. The picture caught our attention because of something we had not seen before. It had a solar panel on the roof. We had to find out what that was all about.

The reason we had not seen such a thing before was easily answered. While the solar installation is a factory option, it is not often installed. Its use is currently rather limited, as well. For the time being, the purpose is to provide the power to monitor and modify the cabin temperature, especially for self-venting to keep it cooler in hot weather.

While that might not sound like much, it means that the car is far more comfortable when it has been sitting in the sun. It is also much safer if ever a pet is inadvertently left locked inside. When such things happen, even in New England, the results can be very sad, but the Prius's solar system offers a margin of safety. Another important point is that it will reduce the amount of energy needed for air conditioning for the first five minutes or so of operation, while the car would otherwise be hot and the engine is not yet warmed up. This increases efficiency.

One of the very strong points of the Prius are the low maintenance needs. This struck me as really surprising, considering the complex and sophisticated nature of the car. A Prius never needs a tune-up, because the engine is monitored and adjusted continuously, under computer control. The hybrid system seldom allows the engine to be stressed, because any need for extra power automatically engages the electric backup system. This means spark plugs last a very long

Cont. on page 5

A PRIUS WITH A SOLAR PANEL ON IT?

Cont. from page 4

time, and oil changes happen only once every 10,000 miles. Every 15,000 miles, an electric checkup should be made on any Prius, with or without a solar system.

Like other systems of the car, the solar system also requires very little maintenance. Most of that consists of occasionally washing off any dust that accumulates on the panels (in other words, wash your car). With no need for fuel, it can do its silent work without attention or continued costs.

The solar unit is a little-known factory option, but we are told it is available for anyone who is buying a car, depending only on availability. Dave says it should probably still be considered an experimental technology that might lead to bigger things in the future. He says he is not sure whether it will become standard. That will probably depend on how people like it, and what happens with the costs of solar power.

Asked about his expectations for the future, he says, "My hope is that the Solar Roof Prius harnesses energy in a more significant way and leads the way (again) in terms of green technology."

Dave drives his Prius, with the solar on the roof, quite a lot, putting on an average of 150 miles each workday. Allowing for days off, here and there, this means that he drives about 45,000 miles per year. Even if he did not own a dealership, that would be enough for him to know this car quite well.

Clearly he was qualified to answer our question as to what recommendation he would give. He answered this, saying "I wholeheartedly recommend the Prius to anyone that is ecological minded, budget minded, or just plain cheap! The Prius enters the market at slightly BELOW the average price of a new car these days, and the Prius C at less than $20,000 and 53 MPG is the cheapest car to own in the USA!"

-- Staff Article

URUGUAY... ICELAND AND HYDROGEN FILLING STATIONS

Uruguay produces all its electric power at hydro plants. Interestingly, the country uses only a tenth of the electricity it produces, with nine tenths being exported for sale to other countries. You might say Uruguay produces about 1000% of the power it uses from renewable power.

Iceland gets 100% of its electricity from renewables, and most of this is from hydro. The rest is nearly all from geothermal, which also supplies most of the country's heat. Recently, spare electrical power is being used to manufacture hydrogen, and Iceland is one of the few places in the world where there are hydrogen filling stations for vehicles. Hydrogen fuel cells power buses for public transportation, and the fishing fleet is increasingly getting reserve power from fuel cells as well. There are plans underway to use fuel cells in the cars in the future. There are also plans to develop the oversupply of geothermal to provide electric power to the UK through a submarine cable.

a PUBLIC transportation commitment

What would the primary benefits of public transit be, as an alternative to the private automobile, if our country were to make a major commitment to it?

The benefits of making a major commitment to building up and efficiently managing a larger and more comprehensive public transit network are many.

According to the National Alliance of Public Transportation Advocates (NAPTA), an organization that represents grassroots transit coalitions, organizations and advocates, expanded public transit, coordinated with greener development and other "operational efficiencies," can reduce our carbon footprint by some 24 percent, which is significant given that carbon dioxide (CO_2) output from the transportation sector as a whole account for 28 percent of total U.S. greenhouse gas emissions. After all, buses and trains burn much less fuel per rider than a car with a single rider in it. Switching to public transit for a typical 20-mile round trip commute would decrease a commuter's annual greenhouse gas emissions by some 4,800 pounds a year, which is equal to about a 10 percent reduction in a two-car household's carbon footprint. Another group, the American Public Transit Association (APTA), reports that current use of public transit in the U.S. already saves 37 million metric tons of CO_2 annually, equivalent to the emissions resulting from electricity generation to power some five million typical American homes. A massive shift to public transit would also be good for our pocketbooks. According to NAPTA, U.S. car owners can save as much as $112 billion a year in gasoline and other vehicle costs. "Public transportation offers an immediate alternative for individuals seeking to reduce their energy use and carbon footprints," reports NAPTA. "Taking public transportation far exceeds the combined benefits of using energy-efficient light bulbs, adjusting thermostats, weatherizing one's home, and replacing a refrigerator." As to reducing oil use, NAPTA says public transit already saves Americans the equivalent of 4.2 billion gallons of gasoline annually, or some 900,000 automobile fill-ups every day. And the Texas Transportation Institute (TTI) reports that individuals who live in areas served by public transportation save more than 300 million gallons of fuel a year. Meanwhile individuals can save upwards of $9,000 a year by taking public transportation instead of driving and by living with one less car. An improved quality of life is yet another benefit of more public transit. In some ways public transit can be considered a life saver: It produces 95 percent less carbon monoxide and nearly 50 percent less nitrogen oxide—both key triggers for asthma and other respiratory and cardiovascular health problems—per passenger-mile than driving a private vehicle. Also, transit users tend to be healthier than car commuters because they walk more, which increases their fitness levels. Public transit use also means fewer cars on the road, thus reduced travel times—and less stress and road rage accordingly—for everyone. TTI reports that Americans living in areas served by public transportation save themselves almost 800 million hours in travel time every year. CONTACTS: NAPTA, www.publictransportation.org; APTA, www.apta.com; TTI, tti.tamu.edu.

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

A large public transportation network, in concert with other sustainability efforts, could reduce our carbon footprint by 24 percent, significantly reduce our oil consumption, save us money, reduce our travel time and its associated stress, and improve our overall health. Pictured: a Washington, DC Metro station. Credit: iStockPhoto

NREL Studies Hybrid Delivery Vans Show 20% Higher Fuel Economy

The U.S. Department of Energy's (DOE)'s National Renewable Energy Laboratory (NREL) recently completed a performance evaluation report that showed significant fuel economy benefits of hybrid electric delivery vans compared to similar conventional vans.

"During the on-road portion of our study, the hybrid vans demonstrated a 13-20% higher fuel economy than the conventional vans," said NREL Project Engineer Michael Lammert. "During dynamometer testing, three standard drive cycles were chosen to represent the range of delivery routes. The hybrids showed a 13-36% improvement in fuel economy and up to a 45% improvement in ton-miles-per-gallon. This wide range in fuel economy is largely dependent on drive cycle."

The new NREL report — Eighteen-Month Final Evaluation of UPS Second Generation Diesel Hybrid Electric Delivery Vans— details the impact of hybridization on fuel economy and performance and identifies the conditions under which the hybrids offer maximum fuel savings.

The NREL team collected and analyzed in-service fuel economy, maintenance, and other vehicle performance data on 11 hybrid and 11 conventional step vans operated by the United Parcel Service (UPS) in Minneapolis. The team also performed dynamometer testing at the Renewable Fuels and Lubricants (ReFUEL) Research Laboratory in Denver.

"The reliability of the hybrids was slightly lower, 92.5% compared to 99.7%, in part due to troubleshooting and recalibration issues related to prototype components," Lammert added. "Differences in per-mile maintenance and operating costs were not statistically significant."

The hybrid vans feature hybrid propulsion systems: 44 kilowatt electric motors, lithium-ion batteries and regenerative braking that captures energy normally lost during braking to power the electric motor. The comparable conventional vans were approximately the same age and were operated in similar conditions out of the same facility. The two vehicle groups switched route assignments during the study period to provide a balanced review of the vans on the same route.

NREL has been working in partnership with UPS for five years to track and evaluate the performance of its hybrid vehicles. In 2008, they focused on first-generation hybrid vans operated by UPS in Phoenix. In 2010, UPS deployed 200 second-generation hybrid vans to eight U.S. cities, including the 11 under study in Minneapolis. These second-generation hybrids feature more advanced control algorithms and an "engine off at idle" feature that automatically stops and restarts the engine at stoplights and during other short-stop conditions.

These evaluations are part of the Advanced Vehicle Testing Activity, which supports the Energy Department's Office of Energy Efficiency and Renewable Energy. Visit www.nrel.gov/vehiclesandfuels/fleettest to learn more.

NREL is the U.S. Department of Energy's primary national laboratory for renewable energy and energy efficiency research and development. NREL is operated for DOE by The Alliance for Sustainable Energy, LLC. www.nrel.gov

YOUR PRIUS JUST GOT EVEN BETTER

ConVerdant Vehicles LLC of Concord, New Hampshire announces two new Plug-Out Island products for turning a Prius into a powerful generator: with 240v/120v split phase at higher power output of 3 and 4kva.

The addition of 240v output, now enables the Plug-out system to provide support for critical house appliances like well water pumps, central air handlers and heat pumps.

The 240v Plug-Out products come in 3 and 4 KVA power ratings, and support surges up to 1.5 rated power. Higher power levels are needed for 240v house central appliances.

These products turn a Prius [g2-3, and Lexus CT200H] into an emergency power generator for the home, worksite, camp, or any outdoor event. The Prius [hybrid] is a high quality DC generator, and Plug-Out provides quality grid-like AC power from the car to the home.

The Plug-Out-Prius combination represents an entirely new, efficient and effective way to power a home during power outages. It's quiet, reliable, efficient and cost effective when compared to mechanical generators. Operation is safe enough for a well ventilated garage. When power is needed, the Plug-Out product is connected to the Prius and appliances are connected to the Plug-Out. The Prius remains unmodified except for a cable on the battery.

A tank of gas can last 1-7 days continuously, depending on power needs.

ConVerdant President, Randy Bryan, says "Our existing 120v 1, 2 and 3kva Plug-Out products are great for many homes, but just as many more need 240/120v and a little more power. This is a critical extension of capabilities for our entirely unique product line". Availability: mid March 2013. www.converdant.biz/plug-out 603-225-7422

ConVerdant Vehicles LLC is a leading vendor of green vehicle products based in New England. They have sales and service capabilities in Concord, NH and a network of authorized service locations throughout the country.

SMART COMMUTING IN NH & VT

WHY. Transportation emissions are one of the two worst offenders that add to the rising CO2 levels in our atmosphere. As you might have read or heard from President Obama's State of the Union Address and numerous other reports, global warming is advancing MUCH faster than expected -- at alarming rates. How do we get our emissions down now? YOU CAN HELP TO MAKE THE DIFFERENCE!

OPTIONS. Commuting smartly is all about knowing your options and planning ahead. There are many options to getting around in both New Hampshire and Vermont, handicap -- bicycle accessible, and discounts for students and seniors. The first place to start in Vermont is GoVermont at www.connectingcommuters.org for everything you need to know to travel more efficiently. Whether getting around town, commuting or planning a day trip, leave the driving to someone else, enjoy the ride and help save our planet. Why wouldn't you want to save on average $2,000 annually by sharing a ride or taking transit? It will certainly cost less than using your own vehicle. There are services for commuters, tourist, and shoppers. It is time to do things a better way -- a smart way, and plan on using these services for your daily routines.

And, don't forget about the train, carpooling and just sharing rides, for which there are many ways to connect for using them. Park n Ride lots are there to use. Keep 'em full!

LINKS AT-A-GLANCE:

Upper Valley Transportation Management Association (Vital Communities) The UVTMA works with area employers and communities to promote and improve commuting options. 802-291-9100 www.vitalcommunities.org/transport/index.htm

NEW HAMPSHIRE

Upper Valley Rideshare (UVRS) is the ultimate website for getting to and from the Upper Valley, providing carpool matching, benefits and support for commuters. www.uppervalleyrideshare.com.

Advance Transit (AT) will get you around the Upper Valley, weekdays, in Lebanon, Hanover, Enfield, Canaan, NH, and Norwich and Hartford, VT. Dartmouth and DHMC Shuttles.

ADA Services. 802-295-1824. www.advancetransit.com

Contoocook Valley Transportation Company (CVTC) - Monadnock Rideshare program for the southwest region & beyond. 877-428-2882. www.cvtc-nh.org

Cooperative Alliance for Regional Transportation (CART) serving the Chester, Derry, Hampstead, Londonderry, Salem and Windham, limited service to Plaistow. www.cart-rides.org

Community Alliance Transportation Services for Claremont & Newport, NH 603-863-0003.

Concord Area Transit (CAT) serves Concord, NH www.concordareatransit.org

City Express serves the City of Keene. 603-352-8494 www.hcsservices.org/services/transportation/cityExpress.php

Manchester Transit Authority (MTA) for Manchester, and connections to Nashua and Concord. 603-623-8801 www.mtabus.org/services/local-buses/

Nashua Transit System (NTS) for buses and trolleys with bike racks. 603-888-0100 www.RideBigBlue.com

Carroll County Transit provides services and connections to Belknap County. 603-752-1741 or 888-997-2020 www.tccap.org/nct.htm

Winnipesaukee Transit System (WTS) services Belmont, Franklin, Tilton, Laconia . Ride Line 603-528-2496 www.bm-cap.org/wts.htm

VERMONT

Vermont Public Transportation [Public Transit/Ferry/Rail] http://www.aot.state.vt.us/PublicTransit/providers.htm

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

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

Connecticut River Transit provides services in and around Bellows Falls and Springfield. http://www.crtransit.org

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

GO VERMONT is the place to go for carpoolers and commuter connections in VT! 800-685-7433 www.connectingcommuters.org

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

Green Mountain Transit Agency provides local service in Barre, Montpelier, Grand Isle, Stowe and Lamoille. http://gmtaride.org

Grey hound/Vermont Transit for long distance bus services. 1-800-231-2222 http://www.greyhound.com/

Lake Champlain Ferries providing transportation between New York and Vermont via Lake Champlain. 802-864-9804 http://www.ferries.com/

Marble Valley Regional Transit for Rutland, Killington, rural Manchester, Poultney and Rutland to bellows falls. Service is free on Saturday for city routes. 802-773-3244 http://www.thebus.com/

Rural Community Transportation, Inc. (RCT) uses buses, vans, and volunteer drivers. Routes also via The Jay-Lyn, The Highlander (Newport - Derby Line; The U S 2 Commuter (St. J. to Montpelier) and Free routes to rural areas. 802-748-8170 http://www.riderct.org

Stage Coach -commutes from Randolph to Dartmouth & trips within the village... 800-427-3553 http://www.stagecoach-rides.org

"Button Up NH" Weatherization Workshops to be Held Throughout State

Plymouth, N.H. - The Plymouth Area Renewable Energy Initiative (PAREI) and Lakes Region Community College (LRCC) will provide NH residents with information and techniques to save money on home energy use through a series of "Button Up NH" weatherization workshops offered in locations throughout the state this winter.

Originally created in 2010 by energy efficiency advocates in Vermont, the presentation has been adapted for use in New Hampshire with help from UNH, Lakes Region Community College, Clean Air Cool Planet and the Plymouth Area Renewable Energy Initiative. Funding from various sources over the last two years, including the NH Office of Energy and Planning and the American Recovery and Reinvestment Act, has kept the program evolving. In 2013, funding from Liberty Utilities, Plymouth Better Buildings and the Efficiency Training Program (ETP), funded through the Greenhouse Gas Emissions Reduction Fund, are making these workshops available to the public.

Certified energy professionals will present the workshops. Participants will learn basic building science concepts and learn how to undertake basic air sealing, insulation, and conservation measures to reduce fuel and electricity use. Workshop attendees will learn how to sign up for Home Performance with Energy Star (HPwES) – a program offered by local utilities that provides financial incentives and technical expertise to assist homeowners with buttoning up their homes.

According to Craig Cadieux, a BPI Certified Building Analyst and Button Up Presenter, "The Home Performance Program assists residential homeowners in making energy efficiency improvements to their homes. When a homeowner participates in the program they will receive a list of recommendations for cost effective energy efficiency improvements and will be eligible for a rebate of 50% of the costs up to $4000. The initial investment to take part in the program is $100 which initiates the energy audit."

Zak Brohinsky, PAREI Project Coordinator said "The workshops will start in late January. We already have received requests from local energy committees and community groups who are eager to host the workshops. We have the capacity to run about 20 Button Up Workshops now through June. Workshops funded by Liberty Utilities will take place in Nashua, Manchester, Concord, Laconia, Hooksett, Merrimack and Milford"

Button Up NH workshops are free and open to the public. For more information on registration, dates and locations of Button Up NH workshops or to view a series of energy efficiency and weatherization videos to help NH residents learn more about home energy issues and savings visit the "Button Up NH" tab on www.plymouthenergy.org. Or e-mail Zak Brohinsky, zak@plymouthenergy.org or call PAREI at 603-536-5030 for an upcoming schedule. Registration for any event is encouraged but not required.

The Plymouth Area Renewable Energy Initiative, whose motto is "Plan Now for Your Energy Future", has a current membership of over 525 families and business as well as community partners throughout the state conducting similar work. They were founded in 2004 and operate an office at 79 Highland Street in Plymouth, NH. PAREI coordinates local and statewide energy related trainings and workshops, monthly networking opportunities, lectures, energy assessment sessions, solar site visits, community solar energy raisers and professional solar thermal and solar pv installations. The organization's mission is to work together in a community minded spirit to combat the economic and environmental ramifications for an overreliance on fossil fuels.

'Farm to School' meets 'Local' Food Movement

By Dana Rubin

Since 2007, the Vermont Farm to School program has supported over 50 Vermont schools. Within five years, the program has served 26,688 students, healthy, local food options for lunch. How does it work you ask? Let's break it down.

Milton MS students enjoying a typical lunch of local vegetables, meat, and cheese during their lunch break.

The Vermont Farm to School program is funded through federal, state and private funding. Nationally, the USDA established the "Know Your Farmer" program to encourage classroom conversations about where our food comes from. Thanks to this USDA program, 68 projects nationwide, in 37 states, have instituted Farm to School programs. For more information about the national network, head to www.farmtoschool.org to stay updated on the expansion of the program, and seek out resource publications, news and events.

Last year, the USDA granted $100,000 to the Vermont Agency of Agriculture. In turn, the agency has distributed $75,000 to their Farm to School grantees and $40,000 towards the development of local food market development. Beyond federal assistance, the Vermont Department of Health and the Community Foundation have donated $80,000 and $284,000, respectively, to further improve nutrition, healthy lifestyles and enhance the relationship between consumer and farmer relations. Families deserve to eat local food, regardless of their income and/or location. Currently, 40% of students that are eating school lunches are on a subsidized program.

VT FEED (Food Education Every Day) dubs the mission of the program with the 3 C's approach: local food in cafeterias, food education and community connection. And with over $500,000 in received givings, the program has accomplished much of what was sought out to achieve. The program has been able to provide trainings to teachers and food service workers, to learn how to better prepare local ingredients. Food based lesson plans have been adapted for classroom explorations, and now, more than 200 farms have been visited by participating schools, k-12.

Students, rather than aiming for the junk-food vending machines are making conscious efforts to choose their farmers. In fact, students who have spent time smelling the manure, meeting the farmers and getting their hands dirty, are more likely to eat vegetables! Now parents, what an incentive!

Now of course, these increases in local food in the cafeterias have increased demand for equitable food buying clubs, distribution centers, and the overall demand for year-round, Vermont-grown products. This certainly is an added weight to our local producers. The Farms to School program has been able to provide more than $160,000 to Vermont farmers to support the agriculture industry, rather than out-of-state, large-scale agro-industries.

The Farm to School program has increased students' appetites for a school lunch, has increased the variety of vegetables served and has provided a better public understanding of locally sourced food. For more information on what it takes to facilitate a farm to school program, refer to food-hub.org, A Guide for Farm to School Community Action Planning. Challenge yourself to start a steering committee, and before you know it, your kids will be telling you to eat more broccoli.

Things to Understand, Remember & Act

By George Harvey

Things to understand:

Everything that is not sustainable will end.

If we do not end a non-sustainable practice ourselves, in a manner we choose ourselves, it will end on its own, in some way we have not chosen.

Non-sustainable products cannot be replaced. Their price always hides part of their cost, because it does not include the cost of what happens when they disappear.

We can only continue providing for the function of non-sustainable products by switching to sustainable products.

If we fail to make human society sustainable, it will end.

We cannot make human society sustainable, unless we make ourselves sustainable.

The future begins right now; changing to a better future must begin right now.

Things that are very important to remember:

Sustainable living can be comfortable and happy.

Non-sustainable living will ultimately become both uncomfortable and unhappy.

You are what you consume. If that is not sustainable, then neither are you.

The best fertilizer comes from organic waste. The cost of aluminum that comes from recycling is a tiny fraction of what we pay for aluminum that is freshly mined. Waste is precious. Manure is gold.

You cannot smell the roses if you cannot breathe the air.

Those are your children.

No one has a right to destroy the future.

Things to do:

Every time you fill a gas tank or an oil tank, look at the price and remember that the figure you see is only a part of the total you will pay.

Every time you buy food, consider what it has in it. It will end up being part of you.

Get active about the environment. Get political, if that is your inclination. Talk if that is your ability.

Support efforts to convert our society to renewable energy and sustainable living. Do it proactively.

Recycle, reuse, repurpose, compost.

If you really want to be happy, forget wealth and power – they don't work.

Transition Putney begins anew!

- Submitted by Daniel Hoviss

New Web site – http://transitionputney.net

Movies, meetings and activities are starting up again within the Putney community.

The new core group is working with past Transition Putney core members and looking at ways of bringing in more leaders, more events and offering training for new core members.

This past month we had a book group on Joanna Macy's new book, several movies and a presentation by one of our local farmers.

We continue the work of the Great Turning by holding meetings, creating workgroups, projects, and workshops pushing for change at every opportunity.

Sister groups include the Putney Energy Committee, Post Oil Solutions, Putney Food shelf, Great Falls Food Bank, and all the local farmers that make our life so rich here in Southern Vermont.

Growing Local Energy Awareness & Action: by the numbers…

By Larry Chase

In Andover, NH, it's beginning to look like a trend:

12: In June 2011, an Andover Beacon article inviting the public to a meeting designed to gauge local interest in alternative energy sources and energy conservation drew a dozen people.

30: In January 2012, a Button Up home-weatherization workshop drew 30.

35: A month later, a second Button Up workshop drew 35.

50: In November 2012, an Energy Awareness Day drew more than 50.

80: Last month, on January 12, a two-hour solar-energy workshop for homeowners, presented by the ReVision Energy company drew nearly 80. Twenty-six attendees signed up for the company's offer of free solar evaluations of their homes.

All of these events have been sponsored by the Andover Energy Group, which grew out of that initial 2011 meeting. The numbers have the group members asking themselves, and others, what next steps could be taken to respond to what appears to be increasing interest in energy efficiency and alternative energy sources.

Among the possibilities: workshops on sources of funding (loans, rebates, incentives) for alternative-energy installations; tutorials on geothermal and wind-power installations; additional weatherization workshops for do-it-yourselfers; efforts to reduce municipal energy consumption; seminars on the local impacts of climate change.

Do Green Energy Times readers have additional thoughts or ideas? Please send them to lbchase@aol.com.

THERE IS NO EXCUSE NOT TO SWITCH TO SOLAR

By George Harvey

Some months back, I was surprised by some news items I was seeing, as I went through headlines for a blog I keep. A town in Massachusetts was getting a discount by buying power from a provider who had a solar farm. Residents of Pittsburgh, Pennsylvania were being offered the option of 100% renewable power, and getting a discount, if they signed up for it. Other parts of the country had similar options available.

I called my son, who lives in New Hampshire, and told him about the exciting news. He was surprised, not because of the news, but because it was new to me. He told me he was already getting 100% renewable power through FairPoint Energy, and had reduced his costs by switching.

I would suppose this prepared me for the next bit of news. A number of companies in the New England area are offering green power at low rates, and in many cases the rates are lower than what most people now pay.

Talking with Peter Thurrell, of Soveren Solar, I find that just about anyone, from ordinary folks to the wealthy, for-profit and non-profit, and even municipalities, can benefit from switching to solar right now. The benefits include a reduction in the power bill, the knowledge that you are saving the planet, and very extensive bragging rights. The downside to this seems to be nearly absent. There is not even a requirement to put money down.

Part of the cause of this is the rapid decline in costs of solar PVs. Part lies in the tax incentives given by various governments. Part of the cause lies in Vermont's small amount of regulatory obstacles.

A large part of the reason Soveren Solar can offer price reductions to just about anyone is a matter of economic and regulatory savvy. Normally, a non-profit organization or municipality could not get the economic benefit of tax breaks. Peter and his team solved that by finding investors who can pass the benefit on to tax-exempt customers indirectly. The fact that investors front the bill also means that even low-income customers can get involved without producing up-front cash. Everyone who has a home can benefit, regardless of the building or property; this is because the solar farm can be at a distance, and a number of people can band together to form a cooperative for solar electric production.

The Soveren Solar program offers a reduction of at least 5% from current costs. There are no down payments. There is an option to buy the equipment at fair market price, after seven years of paying the reduced costs. Anyone who decides not to take advantage of the purchase option, and who continue to pay at the reduced rate, will get full possession of the equipment after twenty years, for free. For more on this, you can call 802-869-2500 or email info@Soveren.org.

There is only one downside to this that I have been able to find, and it seems minor, all things considered. The downside is that there are no excuses left.

There is no excuse not to switch to solar - Right Now.

A SOLAR FARM FOR BELLOWS FALLS

Some of our readers will doubtless remember an article, "Local solar company pitches idea to BF trustees," which appeared in the Brattleboro Reformer on December 13, 2012. The article covered plans presented to the trustees of Bellows Falls by Soveren Solar.

For those who are wondering where this all went, I am happy to say it has not gone away. The plan is still being considered, according to those I know who are involved, but the actions of any government, even those of a small community like Bellows Falls, do not usually happen suddenly. Due diligence takes time, and so things sometimes proceed a bit more slowly than some might like.

INNOVATIVE SOLAR VENTURE FUNDS 4 COMMUNITY SOLAR PROJECTS

Waterbury Center, Vt. Green Mountain Power, National Life Group and Green Lantern Capital have collaborated to pilot an innovative way to finance the development of solar projects, producing clean energy and immediate savings on electric bills for customers.

The event celebrating the initiative was held at the Cold Hollow Cider Mill, which thanks to its new solar orchard, will now get two-thirds of its power from the sun and save money annually.

Two of the pilot projects are located in Rutland County, one is in Washington County, and one is in Chittenden County.

Green Lantern Capital partnered with AllEarth Renewables, the Vermont-manufacturer of the dual-axis AllSun Tracker, to work with host customers and install the solar farms at the Poor Farm in the City of Rutland, Cold Hollow Cider Mill in Waterbury, Woods Market Garden in Brandon, and the Town of Williston. The projects totaling 600kWs were installed this fall and earlier this winter.

The host customers participating in the program can reduce their electric utility bills and in the future they will have the opportunity to make their own solar investments by buying the projects at a reduced cost.

"This represents a new paradigm for solar financing in Vermont. With grant and subsidy programs drying up, innovative financing will become increasingly important to solar vendors and host customers. And by pooling funds at this kind of scale, we greatly improve the economics of solar. These projects provide host customers immediate savings on their electric bills, and give them the opportunity to make their own long-term investments. It's win-win for all," said Luke Shullenberger, founder and CEO of Waterbury-based Green Lantern Capital.

"This is a great way to increase the number of small renewable generation projects throughout the state," said Mary Powell, president and chief executive officer of Green Mountain Power. "We embarked on this project as a way to support our customers who want to lease solar arrays and we are pleased that one of the projects will contribute to our goal of making Rutland the regional solar capital."

"National Life Group has been using the sun to help power its Vermont headquarters since 2008," said Tom Brownell, the company's chief investment officer. "We are pleased to participate alongside Green Lantern and Green Mountain Power in these projects and look forward to supporting the future development of solar energy in Vermont."

"This is an exciting initiative for expanding renewable energy investment in Vermont. This partnership allowed for new community solar projects that feature local investors, local renewable energy, local manufacturing, and local economic benefits. It provides a great local benefit all around," said David Blittersdorf, President and CEO of AllEarth Renewables.

GRID STORAGE

By George Harvey

Two of our most important renewable resources, wind and solar, are intermittent. Neither wind nor sun can make electricity all the time. These resources are especially important, however, because they are renewable, have a relatively low cost, and can be put in place quickly.

The fact that wind and sun are intermittent power sources makes grid storage important. We have a couple of old traditional storage systems. The earliest systems for storing electric power were batteries, not unlike those used in most home-scale energy storage today, but lead-acid batteries are not particularly good for grid-scale storage.

Another old system is pumped storage, and this is still used for grid-scale power storage. These systems fill reservoirs when electricity is abundant and inexpensive, typically at night, and use the water to make power when electricity is in demand, usually during the day. They can be very large. The Northfield Mountain pumped storage facility, in Massachusetts, has a capacity for peak production of 1080 MW, almost 170% of the capacity of the Vermont Yankee nuclear power plant.

We have identified eleven technologies, most with a number of subtypes, for grid electric storage and load leveling.

•Batteries are potentially very important. There are several different kinds that might be useful for grid-scale storage. One example is the sodium-ion battery, which is similar to a lithium-ion battery but much less expensive. The inventors, at Australia's Murdoch University, say they expect it to be ready for grid-scale use in less than two years.

•Electric vehicles could contribute to grid storage. Cars plugged into chargers on smart meters can contribute to answering high demand.

•Compressed air has been proposed, with storage in mines. During high demand periods, the air drives generators.

•Air can be compressed to the point that some of it liquefies. The liquid can be used to drive turbines during high demand times, because it boils at temperatures far below anything we normally see in nature. A pilot program for supplying the grid is being tested in the UK.

•Flywheels can be used to store and supply power.

•Hydrogen can be generated by electrolysis and subsequently used. It need not be used for electric power, and can be used for such things as for powering vehicles or as a chemical feedstock.

•Many different kinds of chemicals can be produced during low-demand times from hydrogen. Catalysis with carbon monoxide or carbon dioxide can produce chemicals functionally identical to, and environmentally better than, natural gas, propane, diesel oil, home heating oil, and gasoline. If the carbon comes from properly chosen sources, the result does not contribute to global warming.

•Pumped storage systems pump water to high elevations when demand is low, and use it when demand is high to drive power turbines. The facility at Northfield Mountain doubles as a park for hiking and cross-country skiing.

•Some concentrating solar systems can store power as heat, which is later used to produce electric power. In this way, solar can be used to produce power 24 hours per day.

•Another thermal storage system advocated by the computer folks at Apple is to use wind power to heat a thermal mass, which is then tapped for power as needed. (See the article, "Apple Has a New Windpower Patent," in this issue of G.E.T.)

One thing to remember is that with a diversified grid, when one source is not producing power, different sources often will be. When the sun is not shining, the wind is often blowing. If neither is happening here, one or the other probably is, not far away.

COLBY-SAWYER COLLEGE SUSTAINABILITY

Cont. from page 1

Windy Hill School, a silver-level LEED certified building that houses one of Northern New England's only laboratory schools

The installation of the 127 kW solar array is a significant step toward the college's long-term goal of becoming a carbon-neutral campus by 2050. ReVision Energy installed the PV, with the 30% federal tax credit, state rebates and other financial incentives

in the pace of change, however. One important event was the establishment of the GreenROUTES program. Describing the program, the college's website says, "GreenROUTES is a campus-wide initiative to eliminate our greenhouse gas emissions, integrate sustainability into our curriculum and overall educational experience, and achieve our shared vision of personal well-being, social justice, financial security and environmental stability for ourselves and our larger global community."

Also in 2007, President Galligan became one of the charter signatories of the American College and University Presidents' Climate Commitment (ACUPCC), an organization that now has 650 member institutions. With that commitment, Colby-Sawyer has signaled its resolve to be 100% carbon neutral by 2050.

After 2007, development of environmental and sustainable policies quickened. Environmental Studies became an academic department in 2008. The college hired a sustainability coordinator in 2009. And meanwhile, new steps were taken to increase recycling, efficiency and to decrease waste.

In 2010, the college instituted a policy of purchasing only LEED Energy Star rated appliances. The issue of food waste was addressed, with food scraps being sent to either a vermiculture composting system, or a program called "Chows for Sows." Paper waste initiatives were also undertaken.

Since President Galligan produced his outline of steps of achievements in 2010, the pace of change has only increased. Solar power installations were undertaken in 2012. One of the buildings receiving solar panels, Windy Hill School, received a silver-level LEED certification. Possibilities for wind power are being studied. Special extensive courses in sustainability and design have been introduced. Students are getting involved in sustainable gardening. The list goes on and on.

Jennifer White, Sustainability Coordinator and Assistant Professor in Environmental Studies explains this, saying, "Colby-Sawyer College has always been guided in its decision making process by the answer to one question, 'How will students benefit?' We believe that our students, and future generations, will all benefit as we progressively model global citizenship in our infrastructure, operations, culture, and curriculum. As we embody the skills and characteristics that reflect the real changes occurring in the world, our students become the very people that the world needs."

Colby-Sawyer students will become the very people that the world needs! The idea is reinforced by outreach projects to the local communities. One example is the college's activities in developing the infrastructure for a Transition Town initiative in the Kearsarge Valley.

Aerial pic of the Colby-Sawyer Campus, taken in 2010

Among current goals are that the college reduce carbon emissions 50% by 2015, 70% by 2020, and 100% by 2050. Other goals include plans for reducing waste of fuel for vehicles, reducing waste of water resources, creating native/edible species landscaping policies, and a variety of ongoing educational projects.

The depth of some programs is impressive. An example is a special course called "Sustainable Design & Construction," started on a one-time basis in 2012, to last three terms. In this program, the students are exposed to administrative design process, consensus decision making, esthetic design, health and environmental issues, building performance, designing with natural materials, timber frame design, cob and cordwood construction, straw bale walls, super insulated roofs, natural plasters, rainwater collection, passive solar design, site assessment, material sourcing, photovoltaics, use of appropriate technology, and more.

The achievements at Colby-Sawyer College are enough to make me wish I could be young again, and back in school.

-- Staff Article

SOLAR Q&A

SOLAR UNCERTAINTY

with Howie Michaelson, Catamount Solar

Howie Michaelson (who has lived in a solar, off-grid home for 14 years) answers solar related questions in a simple, clear fashion. Submit your questions to G.E.T. or uncertain@catamountsolar.com for inclusion in future editions!

What is the story with the state incentive programs, and why do they keep changing?

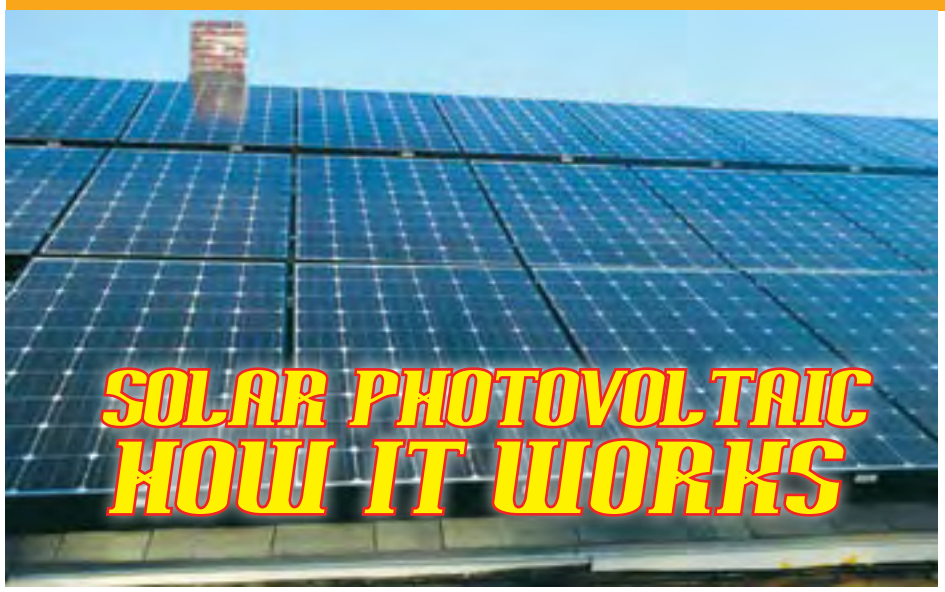
Both Vermont and New Hampshire have had state supported "rebate" programs for encouraging Renewable Energy projects in the residential and commercial arenas. Over the years, the programs have been adjusted to be as efficient as possible in leveraging as much outside investment as possible, while coping with diminishing resources for all programs. This has led to several temporary program closures while funds have been identified to allow for continuation of the programs and adjustments were made to the program rules.

To date, the basics of the programs have remained fairly consistent: the state helps defray the cost of installing renewable energy projects by paying either the installer or the customer a certain amount per "Watt" of production capacity of the system -- up to a certain limit. For technologies other than solar, the payment formulas have been changed to be dependent on other system measurements as well. The per Watt payments, particularly in Vermont, have gradually crept downward over the years, as well as the system size eligible for a rebate. This trend is likely to continue, and in the near future may lead to ending this type of state rebate altogether.

In the meantime, the programs continue to be funded and make payments to individuals and businesses choosing to make an investment in a renewable energy system. The combination of these incentive payments, the available 30% Federal Tax credit, and the amazingly low solar module prices make investing in renewable energy systems affordable to a much broader population than ever before, with "payback" timetables in many instances at or below 10 years, and an excellent investment in everyone's future.

In order to receive the state incentive money, an application and final documentation needs to be filed with the program. In Vermont, the system will need to be installed by a Vermont program "Partner" (the Partner program was created to help oversee the many contractors who are now working in the Renewable Energy field). Once the final documentation is approved, money is released to either the installer or the customer, and credited toward the whole system expense.

SOLAR PHOTOVOLTAICS



Solar Photovoltaic (PV) panels on the roofs of homes and businesses capture the sun's energy to generate electricity cleanly and quietly. Light energy is converted directly into electricity by transferring sunlight photon energy into electrical energy. This conversion takes place within cells of specially fabricated semiconductor crystals. While it might be true that solar cannot generate electricity all the time, it does generate electricity when it is needed most – during the day and on hot sunny days when electricity demand is at its peak driven by air-conditioners.

Importantly, electricity is generated at the point of demand - where people live and work which means there is no need to transfer the energy long distances across expensive infrastructure.

Greenhouse gas savings

Solar power is a zero-emission electricity source. One megawatt hour of solar-derived electricity avoids approximately one ton of CO_2.

Potential

As one of the sunniest continents in the world, there is massive potential for solar PV to make a significant contribution to electricity generation in the US. Couple this unrivalled resource with a multitude of open spaces, and there is no reason why the US cannot have large scale installations generating uncountable megawatts of electricity for sale into the grid.

Global view

Globally, the annual solar PV market grew to 5,500 megawatts in 2008, 9,450 megawatts in 2009, 11,600 megawatts in 2010 and 13,400 megawatts in 2011. Germany, Spain, Japan and the USA dominate the solar PV industry accounting for 80 per cent of global capacity. The growth in these markets and the emergence of new markets in France, South Korea, Czech Republic and Portugal has driven a six-fold increase in global installed capacity over the last five years.

Solar Electricity - The Basics

Electricity generated from solar PV systems can either be connected to your normal mains supply or the electricity can be stored in batteries if you do not have a mains supply.

With a grid connected solar PV system, the solar generated electricity is used at the time of generation first by any electrical appliances that require electricity at that time. If the PV system is generating more electricity than your property requires then the excess is automatically exported to the National Grid. If the PV system is not producing enough electricity to cover your usage then any additional is pulled from the National Grid in the normal way.

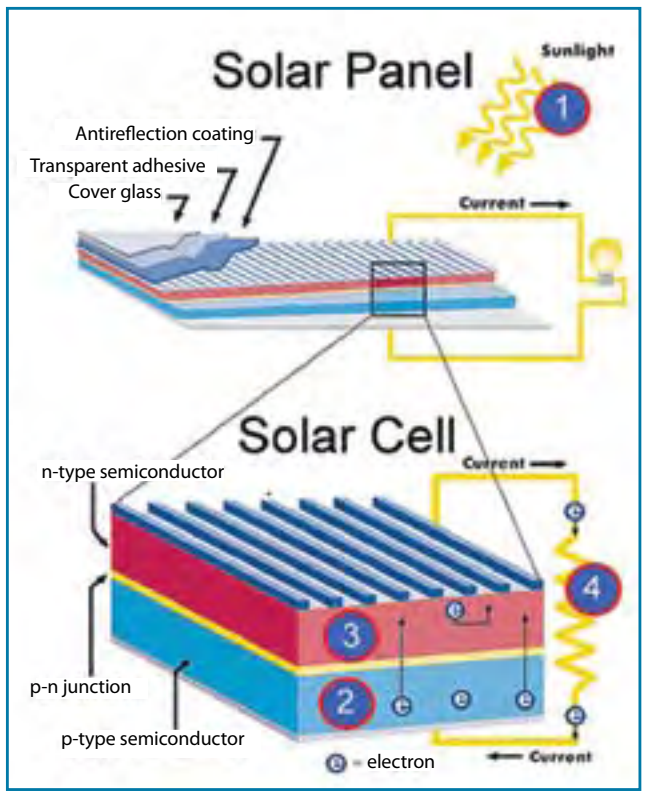
With grid connected solar PV there is no maintenance or batteries to worry about and all the equipment is tried and trusted with extensive guarantees. Solar PV produces electricity without producing carbon dioxide in the process, which is the main global warming gas that is produced by current coal, oil and gas generated electricity. The Federal government's aim is to drastically reduce carbon dioxide emissions and as electricity accounts for at least 25% of these emissions from US homes. Solar PV for your own business or residence can make a major difference. Aside from being attached to rooftops and building structures, photovoltaic solar arrays can also stand on their own. Known as freestanding arrays, these range anywhere from the smallest portable single-panel package to large commercial structures supported on massive steel framing.

For many people, choosing a home solar energy system is difficult simply because of aesthetics. Although PV panels have greatly advanced in look and feel, some would still rather these systems operate out of sight and out of mind. In these cases, solar panel arrays are often better off being installed far away from the home, with buried connective wiring running the power back into the residence. In this type of installation, the homeowner gets all the benefits of renewable solar power without having to disrupt their roofline or alter the look of their house in any way. Another reason for choosing a freestanding photovoltaic solar energy system over a fixed one is strictly due to functionality. Sometimes a home or residence is not optimally positioned for roof-mounted solar panels. Either the roof lacks a sun-facing configuration or the home falls into shadow for much of the day, losing out on too much sunlight. This could be because adjacent houses cast their own shadows, or looming tree lines exist too close to the solar residence. In these cases, choosing another location on the property – a higher location or a clearing away from trees - is the best solution. Panels mounted in the best possible location will always produce more solar energy, allowing their PV cells to maximize sunlight all day long. Other advantages to this type of system include scalability, adjustability, and easy access. Whereas roof-mounted systems are limited by available space, you can add as many panels or panel units to a freestanding array as desired. Additionally, ground mounted freestanding PV panels can be accessed directly or via a small ladder without having to climb onto a home's roof, making for easy repair or angular adjustment toward sunlight. The further the location from the equator, the more drastic changes the sun's path will see over the course of the different seasons. Angling the photovoltaic panels directly into the sun can greatly increase PV cell efficiency, which is an option not always available with fixed roof solar panels.

Whether utilizing a ground mounted or roof mounted system meets your optimal needs the most important aspect is your choice to become an energy producer.

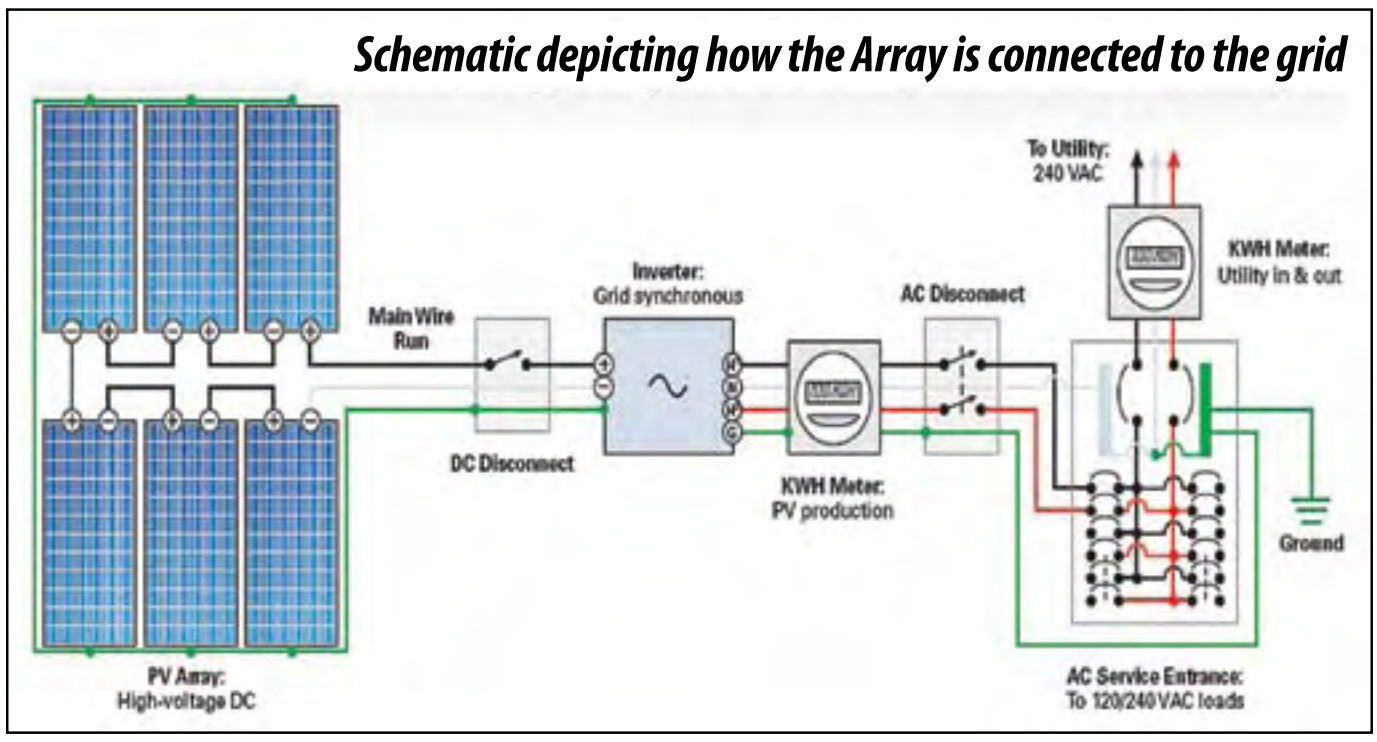
Fossil fuels have defined and constrained our lives financially for many decades.

Self produced Renewable Energy can reverse that 50 year trend. Unlike the consumption of any other form of non-renewable energy, energy produced using the sun generates profit for the producer. There will never come a time when your electricity, gas or heating oil provider will stop charging you for energy consumed- but that reality does exist by converting to solar PV. With Solar PV you, as a producer take charge.



We would like to thank Planet Green of Meredith NH, for their contribution of this information. Visit them online at www.planetgreeninc.biz

Schematic depicting how the Array is connected to the grid



Vergennes Seniors Are Living Sustainably!

Seniors are enjoying Solar Hot Water

An independent senior living community building, located on Armory Road Extension in Vergennes has been operating for the past year, under the auspices of Housing Vermont (HVT) and the Addison County Community Trust (ACCT). The building provides 25 units of affordable senior housing as well as community and activity space located on the first level. The building's exterior walls are extremely efficient and the building's hot water is heated by a combination of solar domestic hot water panels located on the roof and a wood pellet boiler hydronic heating system.

Another community is the 80-unit (single and double) senior assisted living facility with an additional 20 units of memory care in a prominent location in South Burlington. The site is built into a hillside that lends itself to a 4-story elevation alone a busy thoroughfare with a 2-story elevation on the "residential" side of the building. The community uses domestic solar hot water and has rainwater collection for non-potable use. It is owned by Bullrock Development.

THE SUN IS A FREE AND CONSTANT SOURCE OF ENERGY. IN ONE SECOND THE SUN PRODUCES ENOUGH ENERGY TO SUPPLY THE WORLD FOR ONE THOUSAND YEARS. BECOME A PART OF THE SOLUTION RATHER THAN THE PROBLEM.

Solar Hot Water Making Quite A Splash in Vermont

Figure 1: Solar thermal panel with copper micro-tubing (left), heat exchanger (center), and solar storage tank (right).

Figure 2: Ground mount unit with solar storage tank (left), heat exchanger, microtubing, and glycol (center), solar thermal panels, PV panel, and frame (right).

By Ben Griffin

You might not think of Vermont as a very sunny place. So it may surprise you to know how many solar hot water systems are being installed in the Green Mountain state.

Over 1,200 SHW systems have been installed during the last decade alone, saving homeowners thousands and reducing their greenhouse gas emissions.

Vermont actually gets about 83% of the sun that Miami does! In fact, Vermont has more sunny days than Germany, which leads the world in solar installations.

How Solar Hot Water Systems Work

The concept of making solar hot water is pretty simple. If you've ever gotten into a hot car on a sunny day, you've experienced the basic premise of solar hot water.

Solar hot water panels do an amazing job of harvesting the sun's energy. But how does that heat our water? In Vermont and places that get below freezing, a heat transfer fluid is generally used to carry the heat from the outdoor panels to an indoor heat exchanger. Glycol is the most common fluid used in cold climates because it has a lower freezing point than water.

The next component is the pump. The electric pump is usually the only moving part of the system. A small, photovoltaic panel can power the pump, so there is no additional electricity cost to run it. The pump circulates the hot glycol that has been heated in the panels by the sun.

Once the pump brings the hot glycol into the heat exchanger, the heat energy is transferred to the domestic water. The hot water then moves into a solar storage tank, which is connected to your existing hot water tank. When you turn on the faucet or dishwasher, your existing system simply pulls hot water from the solar tank, meaning it doesn't have to work as hard and you don't have to pay as much! The cooled-down glycol solution is pumped back out to the panels and the whole process starts again.

Regardless of how you heat your domestic water, a solar hot water system can help reduce your carbon emissions and save significant dollars on your heating bill. Some systems are designed to work with traditional storage systems, as well as with on-demand units, and can help pre-heat your water whether you use natural gas, electricity, heating oil, propane, pellets or wood.

Solar Hot Water Systems Are More Affordable Than Ever

Shelburne's Sunward Systems has found a unique way of bringing more solar hot water systems to more Vermonters. By partnering with local cooperatives such as the Energy Co-op of Vermont and the Washington Electric Cooperative, as well as local credit unions such as VSECU, Sunward is making solar hot water in Vermont more accessible and more affordable than ever before.

Co-op Solar, the Energy Co-op of Vermont's solar hot water program, helped over 40 Vermonters install solar hot water systems in 2012, saving 5,000 gallons of heating oil annually. "It may be the best investment you can make for your home and planet," said John Quinney, general manager at the Energy Co-op of Vermont.

Based on the success in 2012, the Energy Co-op is running the program again for 2013. On February 4th, Senator Bernie Sanders helped kick off the new program at Sunward's offices in Shelburne. "What is particularly exciting about this program is that people can move in this direction without spending any more money on their fuel bills than they currently are, because they're going to pay off their loan from the credit union by reduced fuel costs. That is exactly the right direction to go", said Mr. Sanders during his opening remarks.

The 2013 Co-op Solar program has been expanded to include all of Chittenden County and parts of Grand Isle, Franklin, Lamoille, and Washington counties. The program is open to any home or business owner and is scheduled to end on April 30th. Because of the program's timeline and uncertainty around funding for the state incentives, interested Vermonters are encouraged to sign up for their free solar site assessment sooner rather than later at www.Co-opSolar.net or call the Energy Co-op of Vermont at (802) 860-4090.

Above: Roof mount unit
Right: Timber frame, ground mount unit finished as an outbuilding

Our Solar Hot Water content for this issue of Green Energy Times was contributed by Benjamin Ray Griffin, who has been working with the Co-op Solar Program for a year. We would like to thank him for his time and expertise to help us bring this important information to our readers.

The Economics of Solar Hot Water

By utilizing financing options, these solar hot water programs allow a system to be purchased with no money down. Combined with current state incentives of $900 - $1,200 and a 30% federal tax credit, the cost of an installation has been reduced by upwards of 50%. With fuel costs continuing to skyrocket, some homeowners may see more than $20,000 in savings over lifetime of the system.

As far as renewables go, a solar hot water system offers one of the best returns on investment. A typical Vermont family of four spends about $600-700 a year just to heat their domestic hot water - as much as 30% of their overall heating bill. By heating water with free energy from the sun, that family can reduce the amount of fuel used by 50-80%, paying for the system in 9-12 years or sooner.

Credit unions and banks in Vermont are starting to offer loans oriented towards energy-efficiency and renewables. For example, VSECU provides a variety of "Energy Saving Loans", including Energy Improvement and Green Vehicle Loans. The addition of financing means that solar hot water systems can be cash positive from day one. Now Vermonters don't have to go "out of pocket" to purchase something they are passionate about!

WIND

Points on the Wind Power Moratorium

By George Harvey

Unwittingly, perhaps, a local politician gave me a set of bullet points on why some people wanted a windpower moratorium. Here they are, with my comments:

1. Windpower is said to do environmental damage to birds, bats, and ridgetop habitats.

If you think about it almost all human development has some sort of associated damage. The issue should not be whether damage is done, but whether we will do more damage by putting windpower in, or by failing to put it in.

Independent studies of bird and bat populations show little damage to them from wind turbines. But some scientists say global warming will render about one million entire species extinct.

Only a small portion of ridgetops can be damaged at all, because most of it is parkland or reserved forest. Siting laws and regulations protect what remains rather strictly. By contrast, failing to act on global warming will severely damage all eco-systems, including ridgetops.

On balance, we need windpower to protect the environment, because it saves birds and bats, and helps preserve ridgeline habitats.

2. Some people say wind turbines are ugly.

Beauty is in the eye of the beholder. Many people think wind turbines are beautiful. But I would like to point out to those who use this as an issue, that the predictions for global warming include whole forests full of dead stands of trees, and our fall colors going to uniform brown. Not having wind power installed will probably make things worse.

3. Windpower is said to reduce land values for nearby properties drastically. At a meeting I recently attended, some people said realtors told them land prices typically go down 40% to 50% in the areas around new wind farms.

There are many independent studies on this subject. One, "Impact of the Lempster Wind Power Project on Local Residential Property Values," was conducted by faculty of the University of New Hampshire. It concluded that there was no discernible difference in property values near that project. It also contains analysis of earlier studies covering 50,000 property transactions in 11 states, all of which produced very similar results.

There are reasons why a realtor might say values will decline drastically. One potential reason is to get worried owners to put property up for sale before it is devalued, giving the realtors more to sell. I will say this is not the only reason, but it is worthwhile to do independent research before selling property out of fear.

4. Infrasound from windpower is blamed for a wide variety of illnesses among those who live nearby.

A number of independent studies have been unable to verify increased illness near wind farms. "Wind Turbine Health Impact Study: Report of Independent Expert Panel," from the Massachusetts EPA, states, "There is no evidence for a set of health effects, from exposure to wind turbines, that could be characterized as a 'Wind Turbine Syndrome.'"

Recently, the EPA of Southern Australia released a study, "Infrasound levels near wind farms and in other environments." They did not find increased levels of infrasound near wind farms.

5. There is a claim that wind and solar power make it hard to balance the grid. There are even utility executives who have gone so far as to say that Vermont's goal of 90% reliance on renewable power by 2050 is unreachable, if wind and solar are the primary power sources, because the technology to balance the grid does not exist.

New technology is being developed very rapidly, and 2050 is still years away, but we do not have to wait until then to see how wrong this argument is. The first power grid 100% reliant on solar power was started up last year in Tokelau. While that grid is admittedly small, Scotland is planning to be 100% reliant on renewable power, mostly wind, by 2020. Other countries are moving similarly.

Perhaps what the utility executives meant was that the grid cannot be balanced under their current business plan. Windpower is threatening to utilities that cannot change with the times.

6. The most surprising claim was that it takes more power to build a wind turbine than the turbine will ever produce. If this were true, they would be too expensive to put up, relative to the value of the power they produce.

VPIRG executive director Paul Burns pointed out an obvious fact, lost in a debate sometimes driven by hysteria. Global warming is not going to slow down so we can take time to discuss the issue.

Georgia Mtn Wind: Katherine Norris

Groton: Neil McIver

KCW: Green Mountain Power

Sheffield: Herb Swanson/SWANPIX

Lempster: Cathy Sturgeon

Ohio State University has contracted to buy 50 MW of electric power from the state's biggest wind farm. The university will save about $1 million a year of the $35 million it spends on electricity.

APPLE HAS A NEW WINDPOWER PATENT

By George Harvey

One of the interesting things that has been in the news lately is that large business organizations are getting heavily involved in energy. Ikea is investing in solar PVs for all of its furniture stores. Computer giant Google has put over $1 billion into wind and solar farms and intends to do more. Others have worked in the same way.

One of the most interesting companies in this movement is Apple, the computer giant. Apple is not just putting its money into renewable energy. Apple is putting its inventive abilities into producing new technology.

One particular problem with the sun and wind is that they are intermittent producers. Though PVs and wind turbines do compliment each other to a great degree, both still need some way of storing power. Apple has addressed this problem with a system that initially converts windpower directly into heat, rather than an electric current.

In the Apple design, the wind turbine turns a set of blades or paddles in a heat-storing fluid. The fluid could be a liquid, such as mercury or ethanol, or it could be any of a number of inert gasses. The motion in the fluid causes friction, which produces heat. Those who are familiar with automotive torque converters will know what this is all about. The fluid can get very hot.

Power is generated by using the hot fluid to heat up a second fluid, which turns a turbine to produce electricity. Since the heat-storing fluid is in a heavily insulated container, there is no reason it could not be used to generate power at any time that power is needed, regardless of whether the wind is blowing.

Apple has been assigned the patent on this system. The title of the patent, "On-demand generation of electricity from stored wind energy," sums up the point of the system pretty well. It turns windpower from an intermittent source of electricity into one that is on-demand, or what is called "baseload power."

Storing electric power has been done before, in a variety of ways. Nevertheless, there are a couple of features of Apple's system that are particularly worthy of note.

First off, while thermal storage has its own inefficiencies, Apple's system avoids the inherent inefficiency of converting electric power into some other form, and then back again.

In a conventional wind system with battery backup, we find the following steps: (1) Wind power is converted into electricity. (2) This is converted by a battery charger into chemical storage in the battery. (3) Chemical storage power is converted back into DC power. (4) This is then usually put through an inverter to produce AC power. When storage is used, there is total of four steps, each with its own inefficiency.

In the Apple system the steps are these: (1) Wind power is converted through friction into heat in a fluid. (2) The fluid heats a second fluid. (3) The second fluid drives a turbine to produce AC power. The reduction in the number of steps may be important.

A second, and much more obvious, advantage of this system is that the chemicals involved, two different fluids, are not chemically altered in the process. This provides the huge advantage of long life and no need to reclaim toxic chemicals.

And third, the relative simplicity of the system may make it significantly less expensive than earlier storage systems.

I will admit that when I first saw this, my reaction was skeptical, because I usually wonder about the efficiency of thermal storage. The fact that this is done by Apple gives me a measure of confidence. And a close look makes me feel it will probably work well enough to have a significant place in the market.

And so I think I can provide this one-liner:

I am confidently hoping to see baseload wind power in the not-too-distant future.

Energy Independence with Microhydro

By James Perkins

Microhydro Benefits

Today's microhydro technology can provide the lowest-cost per kilowatt-hour of any renewable source and can be responsibly installed in an environmentally-sustainable manner. Vermont has thousands of viable sites for microhydro systems that can contribute to meeting the State's renewable energy goals with small-scale, distributed generation.

Regulatory Barriers

Unfortunately, anachronistic regulation imposes insurmountable barriers for farms, businesses, towns and citizens wishing to adopt microhydro technology. This includes numerous State and Federal governmental entities with a myriad of regulations. This situation is understandable given that small-scale renewables have only become more widely adopted within the past decade and that regulation reform usually lags reality.

As I write this, I have just learned that on February 13th, the U.S. House of Representatives unanimously passed the "Hydropower Regulatory Efficiency Act of 2013" also known as HR267. Not many bills have gained this level of broad bipartisan support recently!

Breakthrough Possibilities!

HR267 is a no-cost, no-downside measure that alleviates the costly and protracted Federal Energy Regulatory Commission ("FERC") burden for certain types of non-traditional hydropower generation projects. This includes specialized "conduit" projects and other mostly-Western-States projects on Federal lands and irrigation districts. HR267 is supported by industry, environmental stakeholders, citizens and, obviously, the US House of Representatives.

However, as currently written, HR267 does nothing to enable microhydro. . . but it easily could!

Today, in order to connect any size hydropower generator – even microhydro - to the grid for net metering, it is sobering to find that a Federal (FERC) proceeding is required. If a Federal proceeding were required to connect rooftop solar PV panels to the grid then there would be very few grid-tied solar PV arrays!

We are working with the renewable energy/environmental stakeholder communities and others to remove the counterproductive regulatory barrier to microhydro. The Senate will undoubtedly take up action on the House's bill this year. Achieving a supportive policy at the Federal level will be a positive influence in modernizing the regulatory approach taken by the States to better support adoption of small-scale renewable energy technologies.

Using the approach for solar PV arrays, wind turbines and other renewable sources, it would be relatively simple to extend appropriate oversight to microhydro.

FEDERAL

Investment Tax Credit

The federal investment tax credit (ITC) for solar, small wind, and fuel cells is 30% of expenditures and for geothermal systems, microturbines, and combined heat and power the ITC is 10% of expenditures

. Some businesses may also be able to take accelerated depreciation.

www.dsireusa.org

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 information.

VERMONT

EFFICIENCY VERMONT

Lighting (must be ENERGY STAR)

- CFLs - while supplies last, select ENERGY STAR qualified spiral CFLs are just 99 cents and specialty CFLs are $3.99 at participating retailers
- LED's – bulbs with special pricing/coupons at register while supplies last at participating* retailers

Home Efficiency Improvements

- improvements eg air sealing, insulation and heating system upgrades - up to $2,000 in incentives - using participating* contractors

Appliances (must be ENERGY STAR)

- Seasonal Dehumidifiers - $25 mail-in rebate
- Clothes Washers - $50 mail-in rebate
- Refrigerators - $50 mail-in rebate
- Clothes Dryer –rebate for replace electric with natural gas (contact EV*)

Heating/Cooling

- heating & hot water systems –rebate for replace electric with natural gas (contact EV*)
- energy efficient central AC and furnace fan motor - $100 mail-in rebate
- central wood pellet boilers (excluding outside wood systems) - $1,000

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 (seasonal)
- 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*

Clean Energy Development Fund

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

Solar Incentives – based on rated capacity of system

http://rerc-vt.org/incentives/index.htm
http://www.dsireusa.org/incentives

- residential (including leasing)= $0.45/ Watt up to 10 kW for PV; $1.50/100Btu/Day up to 200kBtu for ShW.
- commercial/industrial = $0.40/Watt up to 10kW 25kW for PV. $1.50/100Btu/day up to 1100kBtu/day for ShW
- special customer* = $1.50/Watt up to 10kW. $3.00/100 Btu/day up to 1500 kBtu/ day for ShW.

-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; $0.55/100Btu/day for ShW. Capped at a cumulative $350 per customer.
- commercial/industrial/special customer = $0.10/W; $0.50/100Btu/day up to a cumulative $450 per customer

Wind Incentives

- residential = $1.20/kWh for each kWh up to 15,000 kWh/yr**
- Limit 1 turbine up to 10kW; incentive capped at 30% of total installed cost; systems >10kW are ineligible for incentives
- For turbines less than or equal to 5kW in rated capacity, 100% incentive payment is made at time of installation. Greater than 5 kW, 60% is paid after installation, 40% paid after 1 year of operation if targeted annual production is achieved.
- **Incentive capped at 30% of installed cost

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

***special 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, 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.

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

- $0.75/watt capped at $3,750 per system, whichever is less. Systems must be under 5kW. 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

Funding for this ARRA program has been spent, and additional funding is unlikely.

- 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

LEGISLATION FOR THE PLANETARY CRISIS

On February 15, 2013, Senators Bernie Sanders and Barbara Boxer introduced legislation on climate change to tax carbon emissions and eliminate subsidies for fossil fuels. The revenue from the tax would provide incentives for efficiency and renewable energy.

Author and activist Bill McKibben looks on at a Washington news conference as Sen. Bernie Sanders describes his bold new legislation to reverse global warming. (Photo: J. Lopez, Project Survival Media)

Bernie's own words on the legislation were, "I fear very much that our children, grandchildren and great-grandchildren are going to look back on this period in history and ask a very simple question: Where were they? Why didn't the United States of America lead in cutting greenhouse gas emissions and preventing the devastating damage that the scientific community was sure would come?"

The World Wildlife Federation issued a statement on the legislation saying, "By putting a price on carbon from the biggest polluters, investing in clean energy sources, and improving energy efficiency, this legislation would reduce the risks and exorbitant costs our nation faces from climate change impacts. At the same time, it will drive job growth in the renewable energy sector and generate $1.2 trillion to reduce our national debt over the next ten years. And by returning more than half of the revenues it generates back to consumers, this bill also ensures polluters are the ones who will pay if they don't clean up their act."

We at Green Energy Times want to focus on the following points about the legislation:

It will reduce the national debt.
It will increase employment.
It will decrease costs of ordinary citizens.
It provides strong guidance for saving the planet for those who follow us.
Bernie, we are proud of you.
- All the staff at Green Energy Times

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 Utility Energy Efficiency Incentives Residential Programs

For more information about the many incentives offered through the NH electric utilities,

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 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 Natural Gas Utilities Programs

Programs and incentives are similar to nhsaves electric programs, with additional incentives for energy saving natural gas heating and hot water systems and controls.

Liberty Utilities has purchased National Grid's natural gas utility in NH. Visit libertyutilities.com/east/gas/saving/index.html for more information and specific programs.

Unitil Natural Gas: www.unitil.com/energy-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 also borrow at 0% interest the costs for a SHW system

Efficiency

After conducting a free residential Energy Audit, customers are eligible for up to $25,000 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.

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

REPORT FROM THE NATIONAL WILDLIFE FEDERATION

The National Wildlife Federation has released a report called "Wildlife in a Warming World," dealing with the impacts of global warming. The report identifies global warming as the single biggest threat to wildlife. It is full of important material, but one point worth noting is this:

"The latest science on climate change is sobering news: Recent reports find that without significant new steps to reduce carbon pollution the world is on track for global temperature increases of at least 7ºF by the end of the century. Such a scenario will guarantee that future generations will inherit a world fundamentally different than the one we know today, one in which scientists predict that almost half of wildlife species would suffer mass extinction."

In a final summary, they say: "America needs to recognize that inaction is not a viable climate change policy and prevents us from taking advantage of the opportunities to create jobs and economic prosperity in concert with bold, swift action to reduce the carbon pollution that is heating our planet."

A moratorium on windpower constitutes inaction, which is clearly not is not an option for viable climate change policy.

The report is available online at http://www.nwf.org/News-and-Magazines/Media-Center/Reports/Archive/2013/01-30-13-Wildlife-In-A-Warming-World.aspx

CAN WE BALANCE A GRID SUPPLIED BY WIND & SOLAR?

Cont. from page 16

in the South Pacific and a sometimes a territory of New Zealand. Tokelau has just put up an electric grid that is 100% solar, with seldom-used backup supplied by fossil fuels.

Another widely circulated story is about Germany, which achieved at least 23% of the total output in 2012, double what the country had in 2006. Most renewable power in Germany is from wind, and the fastest growing sector is solar. The Germans are planning to be primarily dependent on wind and solar in the future. They are well aware of the problems of grid balancing, and have plans to deal with them.

Yet another interesting story is about Scotland. That country produced something over 36% if its power from renewable sources in 2011, and was increasing by over 15% in 2012, according to most recent reports. This means that Scotland is getting over 40% of its power from renewable sources, mostly from wind, wave power, and ocean currents. The Scots claim to be on target for getting 50% of their power from renewables by 2015 and 100% by 2020.

Though Iceland and Uruguay do not provide examples of a balanced grid dependent on wind and sun, Tokelau shows it can be done. Germany provides an example of a country with highly skilled technical experts who believe it can be done. And Scotland provides an example of a country whose technical experts believe it can be done very soon. It seems other countries have scientists who know about some technology which the pundits in Vermont and New Hampshire do not.

GALUSHA HILL MASONRY HEATERS

A much larger heater for the large house showing the grate holder and opening to the ash pit below.

By Selenda Girardin

"Who doesn't like something that does two things at once!" says Megan Quiros of their masonry heater. "No energy is wasted---we use it for cooking as well as heating. Food comes out better tasting because of the way it's cooked. I use it every day."

Megan lives with her husband and two small daughters in the cottage at Galusha Hill Farm. The new dwelling is compact and cozy, measuring 24"x24' with a finished loft and deck. Ample electricity is provided by solar panels. Although there is a back-up propane generator, it is rarely used. The masonry heater, made by Roywood Masonry Heaters of Newbury VT, is located on the first floor and keeps the whole home warm.

"Once a day, we light a fire with a full load of wood," Megan adds. Masonry heaters only need this once daily care because of the ability of its system of retained heat that radiates out until the following day. Installing an oven in a heater is an added bonus. With a woodlot on the property, the energy source for a heater is renewable and relatively inexpensive.

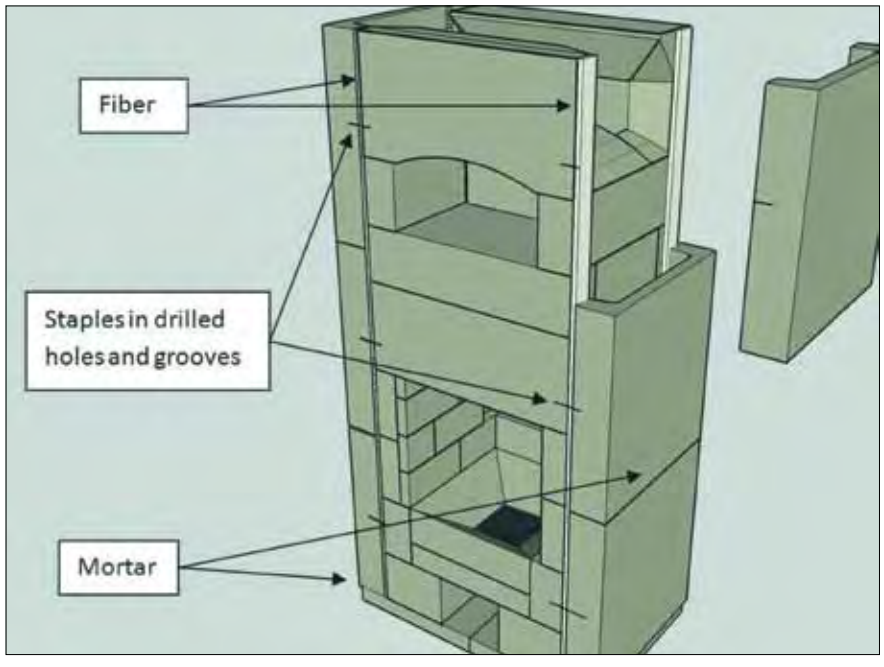
Another added bonus of a masonry heater is the capacity for a variety of artistic designs in the sheathing of the core. Some home owners traditionally choose brick but this can vary depending upon color, age, and type. Others use stucco or stucco embedded with stone or pebble designs. Still others are covered with flat stones, pebbles, bricks or anything else durable to create a real masterpiece of art. The Galusha Hill heater falls into this latter category with its flagstone-like mosaic interspersed with a few special antique bricks.

The owners of Galusha Hill Farm are working hard to make their venture environmentally friendly with as small an energy footprint as possible. At the moment, they specialize in growing organic produce and have recently planted an apple orchard which they plan to double this coming year. Other crops are seeds grown for High Mowing and a nice growing herd of sheep.

At the moment, a larger house is being built up the hill from the cottage where a spacious deck commands a fabulous view. Inside, another masonry heater is taking form. This one is three times the size of the heater in the cottage and it will be a great source of comfort and atmosphere.. After all, what is better than one masonry heater? The answer: TWO masonry heaters!!

Home Owners can choose a design or surface that is pleasing to them.

Designs in masonry heat storage can be cool (Oops, I mean really warm and radiant).



The artistically designed outter surface encloses the Roywood 1500 core kit.

Passive House Standard used at 1300 square foot Shelburne House

By Chris West, Certified Passive House Consultant, President - Passive House Alliance US, Vermont Chapter

Architect: Carol Stenberg, AIA, Certified Passive House Consultant

Builder: Tom Moore Builder, Inc.

The Passive House building standard should not be confused with passive solar design.

Passive House is a building standard that was developed in the 1990' s by Dr. Wolfgang Feist in Darmstadt Germany which brings all of the collected knowledge on building science together under one standard.

A house has three major heat losses.

- Transmission – where heat moves through the material of a wall, floor, roof, window, door or other building element.
- Ventilation – heat that is lost when fresh cold air is brought into the house by a mechanical ventilation system.
- Infiltration – this is the heat that is lost when cold air is blown through cracks in the walls, between walls and windows or doors and the gaps that occur where the roof meets the walls, the walls meet the foundation or where walls meet walls.

Modern building techniques from the 1900' s confronted these losses by putting a really big furnace or boiler into the house. This worked because heating fuel was cheap. This is no longer the case. We need to develop ways to make houses lose less heat and therefore use less fuel and be more affordable to live in.

The name Passive House refers to the passive nature of the approaches to make a house very energy efficient.

A Passive House approach deals with these three losses by applying basic principles:

Transmission Losses. Reducing a home's energy usage through transmission losses is done by having a complete insulation barrier/thermal break between framing and concrete.

A Passive House has three times the insulation for foundations, walls, ceilings, and under slabs, than a Vermont Energy Code Home, reducing the use of the fuel by ~40%.

Ventilation Losses. Passive Houses use a ventilation system which takes the warmth from the stale indoor air and transfers it to the cold fresh air that is being brought into the house, efficiency of around 93%.

Heat Recovery Ventilation systems use very little energy themselves and the indoor air quality they provide is excellent as shown by data collected in Passive Houses in Vermont.

Infiltration Losses. The Vermont Residential Building Energy Standard (Code) states that a house must not have more than five (5) Air Changes Per Hour (ACH) at 50 Pascals.

A Passive House requires that a house have no more than 0.6 Air Changes Per Hour at 50 Pascals. This is very air tight and reduces the amount of heat that the furnace must produce to keep the house warm.

Orientation. A Passive House orients the house with the larger wall to the South. It puts most of the windows on the South side of the house as well. There are windows to the West, North and East, there are just fewer of them and they are smaller.

Once you apply all of these techniques it leads not only to a house that uses 90% less energy to heat and cool, but one with excellent indoor air quality and thermal comfort.

Use of Materials that have Low Embodied Energy. Embodied energy is the amount of energy that is required to produce a material. Foam insulations all have rather high embodied energies. Extruded Polystyrene (XPS) uses the most energy of all. This is your standard blue board (sometimes pink as well).

Cellulose is produced from used newspapers and other paper and cardboard products. It has one of the lowest embodied energies of all of the insulations. Rockwool also has a relatively low embodied energy.

The foam we used for the foundation is EPS (Expanded Polystyrene) which has the lowest embodied energy of all of the foam products.

Air Tightness. To achieve high levels of air tightness, great care must be used in the building process. Quality is of the utmost importance if you are trying to get 0.6 Air Changes Per Hour at 50 Pascals!

In this house the main air barrier is the OSB layer on the outside of the 2×4 frame. Each of the OSB panels were caulked and then the seams were primed and taped over.

Windows. Energy efficient triple pane fiberglass windows were used on this project. In a Passive House the inside temperature of the window is the same as the inside wall. All of the surfaces in the room are the same temperature. This leads to a level of comfort that a regular code house just can't achieve.

Mechanicals. This home uses a high efficiency ventilation system from Ultimate Air that keeps the warmth from the ventilation air in the house and maintains the balance of moisture. This type of system is called ERV (Enthalpy Recovery Ventilation).

The house has a wood stove as well as solar hot water. The heating load of this house is 6,248 Btu/hr! This is the same heat as is given off by a 1,500 Watt hair drier!

This home was meticulously constructed by Tom Moore and Sons. Tom had previously built a high performance LEED certified home that was awarded Efficiency Vermont's "Most Energy Efficient Design/Build" and The Home Builders Association "Energy Efficiency Award" in 2011.

"The sun is a free and constant source of energy. In one second the sun produces enough energy to supply the world for one thousand years. Become a part of the solution rather than the problem."

The Passive Solar House

By James Kachadorian

224 pages plus CD, Chelsea Green Publishing Company, $40

Book Review by George Harvey

The Passive Solar House is intended to serve the needs of people who plan on building a passive solar house. It assumes its readers have the intelligence and knowledge to decide to do that. It begins with the most basic information such a person would need, and proceeds to supply all the intellectual resources to pursue that goal. It does this clearly and thoroughly.

James Kachadorian's experience qualifies him as an expert on the subject. He has been involved in the design and construction of hundreds of passive solar houses over a thirty-year period. Prior to doing that, he managed a company making prefabricated post-and-beam houses. He has engineering degrees from MIT and Worcester Polytechnic Institute.

The book begins with a discussion of the most basic principles of siting, orienting, and designing a house. The various technical issues are addressed, but there is also consideration of appearance and comfort. After describing the concepts of passive solar building, including thermal capture and storage, attention is given to insulation, moisture control, and fresh air. The impact of passive solar on floor plans is discussed in chapters on layout.

At this point, the emphasis of the book shifts to numbers. Worksheets are provided so readers can understand effects of different types and sizes of windows and how they are oriented, amounts and placement of insulation, and a number of other considerations. Backup heating and cooling are discussed. The question of how to use the sun to heat in the winter and to cool in the summer is covered.

The needs of those who might despair of having to spend long hours filling in worksheets are addressed with a CD with a computer program that allows Windows users to do the calculations at the computer.

I recommend this one.

BUILDINGENERGY 13
CONFERENCE + TRADE SHOW FOR RENEWABLE ENERGY AND GREEN BUILDING PROFESSIONALS

PLANNING FOR A RESILIENT TOMORROW AT BE13

Resiliency in energy and buildings is the central focus of regional member-driven sustainability conference and trade show BuildingEnergy 13

Greenfield & Boston, MA . - "We've got three feet of storm-surge water over a hundred city blocks. We've got a half-dozen really angry high-level people with conflicting priorities in the same room trying to fix things. What happens when the arguing and finger-pointing stops and they get to work on solutions?"

Sound like a news report from Hurricane Sandy-battered New York City of December 2012? Actually, it's a session description from the BuildingEnergy 13 planning process earlier that year, after Conference Chair Paul Eldrenkamp announced that resilience would be the theme of the 2013 BuildingEnergy conference and trade show. Resilience has long been on the minds of BuildingEnergy conference planners. With a focus on renewable energy and sustainability in the built environment, BuildingEnergy is the perfect place to be having serious discussions on resilience. Says Eldrenkamp "Events have made it clear that we're not ahead of the curve, that climate change is catching up with us. The discussions between stakeholders at BuildingEnergy will give individuals, businesses and communities a definite advantage from a strategic point of view as well as a climate point of view."

Indeed, the conference is well equipped to do so, with a full-day workshop and six 90-minute sessions dedicated to urban resilience -- sessions with titles like "Efficiency, Durability, or History: Pick 2?" and "Planning for Resilience and Building in an Era of Climate Change: The NYC Response" -- as well as 76 additional accredited sessions and workshops on related sustainable building, energy efficiency and renewable energy topics.

Resiliency implies learning from mistakes as well as successes, and that's the kind of frank, honest conversation you'll find at BuildingEnergy. Says Eldrenkamp, "Ask a politician what mistakes they've made and you'll get nothing; ask a NESEA practitioner and you can't shut them up...you'll get a whole seminar over lunch if you ask a NESEA practitioner what mistakes they've made – and you'll learn a thing or two."

Not only can you learn about sustainability and resilience, but BuildingEnergy is the place to meet, learn from, and potentially partner with like-minded professionals from every segment of the market. It's this multidisciplinary aspect of the conference, and the honest conversations that occur amongst practitioners, that sets BuildingEnergy apart. Says Conference speaker and co-owner of New Frameworks Natural Building, Jacob Deva Racusin: "At BuildingEnergy, you can expect to have a conversation, a generation of new ideas, an identification of potentials and directions to pursue, as well as case studies and real-world examples to prime the pump of the examination of resiliency in action, not just in design."

BuildingEnergy is a member driven, multidisciplinary conference and trade show for renewable energy and green building practitioners. Organized by the Northeast Sustainable Energy Association (NESEA), this annually occurring conference will take place March 5-7 2013 at the Seaport World Trade Center in Boston, MA. Typically it attracts 160 exhibitors and more than 3,500 practitioners for three days of networking and cross-disciplinary learning. Learn more and register at www.nesea.org/buildingenergy.

GREEN ENERGY TIMES READERS
Use code GETTOBE13 to save $50 on Wed., Thurs., or both day conference passes!

NESEA'S BE13 TRADE SHOW

March 6-7, 2013,
Seaport World Trade Center,
200 Seaport Blvd, Boston, MA

Exciting News: NPR's Alex Blumberg will be delivering the BE13 keynote address. He'll be bringing his signature wit and clarity as he speaks on the issue of "economics for environmentalists."

Alex Blumberg is a contributing editor for NPR's Planet Money. He is a producer for the program "This American Life," and an adjunct professor of journalism at Columbia University. He is known for prize-winning radio documentaries and the This American Life Episode "Giant Pool of Money", on the housing crisis. Called "the greatest explainer ever heard" by noted journalism professor Jay Rosen, Blumberg's "Giant Pool of Money" became the inspiration for NPR's Planet Money.

24 Fully Accredited Workshops
Need to go deeper than a 90 minute session will allow? Tuesday's fully accredited workshops offer everything from Passive House to biomimicry to solar design and installation.

Full-day Workshops include:
- Auditing Multifamily Buildings
- Biomimicry in Action: Applying Nature's Lessons for Resilient Design
- Building an Air-Tight House
- Building Passive House Homes – Details, Process, Lessons Learned
- Building Science 101
- Crash Course on Building Science for Military Veterans
- Deep Energy Retrofits
- Net Zero Energy and Beyond
- Skills for Building Resilient Communities
- The Master's Guide to Designing Spray Foam Insulation Projects & Installing Them Right

BuildingEnergy Trade Show 2012


photo credit : Matthew Cavanaugh

Morning Workshops *Tues. Mar. 5, 9am-12pm*
- An Introduction to PHPP Software
- Best Practices for Efficient Hot Water Systems in Single & Multifamily Buildings
- Conflicts Between Performance and Compliance: What it Takes to Make High Performance Buildings
- PV 101: Grid-tied PV Systems for Architects, Engineers and General Contractors
- Simplified Space Conditioning Strategies for Low Load Homes
- Structural Engineering for a Brave New World
- WUFI Passive Workshop: Next Gen Modeling Tool for Passive House & Building Professionals in No. America

Afternoon Workshops *Tues. Mar. 5, 2-5pm*
- Commercial Passive House Design Principles
- Fundamentals of Energy and Buildings: Calculating and Understanding Heating Loads
- Getting Real About Primary Energy
- Lessons Learned from High Performance Buildings: What Went Wrong?
- Advanced PV Design for Practitioners
- Structural Detailing for Energy Efficient Building Envelopes
- Trade Secrets for Getting to Deeper Savings in Commercial Buildings
- Each half-day workshop receives 3 continuing education units, each full-day workshop, 7 credits, from the following professional organizations: AIA, BPI, GBCI, InterNACHI, NAHB, and NARI.

Ten Fully Accredited Six-session Tracks:
- Homes - protecting occupant health, resilient homes, scaling DERs, standing up to extreme weather and historic preservations.
- Multi-Family - boilers, energy data in rehabs/retrofits, blower door use, LEED, WAP & DER in rehabs, combined heat & power, and portfolio based energy management.

Cont. on page 24

Sustainable Home Design

By Stephen Frey

A friend recently asked what the word "sustainable" for home design and interiors means to me. The word leads many to think about natural systems in equilibrium and renewal over generations. How can interiors and home design be sustainable? How can sustainability be achieved?

The US Green Building Council's LEED for Homes program offers one way to understand this. With this starting point, you can define a set of interrelated values, goals, and strategies to achieve sustainability. Built upon and extending the DOE's ENERGY STAR program for efficiency and performance, the program offers a more holistic framework of eight broad categories for the design process.

LEED certification points are granted by category. Homeowners earn points when design requirements for higher performance levels are satisfied. Understanding the "why" behind the judgment criteria, the "how" to achieve them, and "what" specifically can be done, makes this all clearer. A project checklist helps people assess potentials for points, the benefits and costs, and what level of certification can be reached by the project. Key LEED for Homes criteria can be included in project specifications for clear performance benchmarks and accountability. Home size is accounted for through a Home Size Adjuster. Smaller home sizes need fewer points to achieve a level of certification and larger ones need more. This provides an incentive for a smaller home.

"Innovation in Design" is the first to consider, as it includes integrated project planning, building orientation, durability, and unique regional issues.

The "Location and Linkages" category relates to location. It considers whether a project is part of a LEED neighborhood, the home site selection, and whether the project is an edge development, infill, or on previously developed land. It also examines existing site infrastructure, community resources, and open space, while considering "smart growth"-oriented development.

"Sustainable Sites" rewards minimizing impact on ecosystems and water resources. It considers impact of land use, site stewardship, landscaping choices, reducing heat-island effects, surface water management, non-toxic pest control and compact development. For example, green roofs helping reduce heat island effects are considered here.

The "Water Efficiency" category focuses on smarter water use. It considers low-flow faucets, appliances using little water, water-saving toilets, as well as on-site reuse of gray water for plants, and reliance on native vegetation that need little watering.

"Energy and Atmosphere" focuses on building efficiency and reducing energy use. The building envelope, including foundations, walls, windows and roof, should be optimized with consideration for systems providing heating and cooling. Improved insulation, window performance, and air sealing reduce energy required for comfort. Efficient lighting and controls are considered in this category.

The "Materials and Resources" category addresses use of sustainable low-toxicity building materials and reduced project waste. Sustainably harvested wood should be used where possible. Recycled content is important, so make sure to compare product labels for recycled content and environmental statements. Use of local sources, which reduces distance from manufacturing plants, is considered.

"Indoor Environmental Quality" covers indoor air quality, acoustics, access to views, and day lighting. The use of paints and finishes with low or no Volatile Organic Compounds is important, as well as products without urea-formaldehydes. Daylighting interior spaces with south-facing exterior windows, roof clerestories or skylights all help reduce electric lighting demands. In our climate, it is best to use reduced glass on the north, less glass on the east and west (due to the low sun which overheats buildings), and more glass on the south for passive solar heat gain. Tune the amounts and locations of glazing, while respecting function, views, and privacy.

The "Awareness and Education" category has only a few points available but can be critical. Points are awarded when homeowners go through operations training. The education of the building manager is considered, as is raising public awareness by holding open houses and writing articles.

All together, the LEED for Homes Program offers a framework within which the right sustainable balance in home and interior design can be achieved by the designer and the homeowner. It can lead to a sustainable result: a home lasting for generations, enhancing livability, and reducing costs while preserving value.

For More Info:
www.leedforhomes.org.
www.efficiencyvermont.com/for_my_home.aspx
www.buildinggreen.com/articles
www.buildingscience.com
National Association of Home Builders Green program.

STATEWIDE HOME ENERGY CHALLENGE LAUNCHED BY EFFICIENCY VERMONT

Efficiency Vermont

Vermont HOME ENERGY CHALLENGE

Efficiency Vermont has launched a year-long effort designed to encourage more Vermonters to make their homes more energy efficient. So far, 62 towns from across the state have signed on to the "Vermont Home Energy Challenge," and the enthusiasm continues to build.

Under the Challenge, which is being promoted in partnership with the Vermont Energy and Climate Action Network (VECAN) and other organizations throughout the state, towns are setting a target of weatherizing 3% of the homes in their community over the course of a year and fostering more public awareness and engagement in energy efficiency efforts. They will be able to measure their progress toward this goal along with that of other communities in their region and across the state. At the end of 2013, towns, regions, and local partners will be recognized for the effectiveness of their efforts to encourage participation in their communities.

If the Challenge is successful, it will have a major impact. Efficiency Vermont estimates that it could result in more than 2,400 home comprehensive energy efficiency projects – and produce more than $2 million dollars in annual energy savings. This is the equivalent of saving enough energy to heat 400 Vermont homes for an entire year. It could also result in a 5,000 ton reduction in CO2 emissions, the equivalent of taking 900 cars off the road.

"The Home Energy Challenge is designed to build on the focus and enthusiasm of community groups that are engaging with their friends and neighbors around energy issues every day," said Jim Merriam, Director of Efficiency Vermont. "Over the course of 2013 – and beyond – we will continue to seek innovative ways to support these efforts, and we are hoping that the Challenge will help inspire even more action to increase energy efficiency at the local level."

Johanna Miller, Coordinator of VECAN, noted that recent years have seen a surge of interest in community-based energy efforts: "The goal of VECAN is to strengthen and support a grassroots movement that is growing throughout every corner of Vermont," she said. "We are very excited by the potential of the Home Energy Challenge to further increase the momentum behind investing in energy efficiency and helping our state achieve its energy efficiency goals."

As part of the Challenge, Efficiency Vermont and its partners will support a number of turnkey projects that local partners can implement in their communities, including home energy visits, door-to-door community outreach, home energy workshops, and free home energy saving kits.

Towns and organizations that want sign up for the Vermont Home Energy Challenge, or learn more about it may visit www.efficiencyvermont.com/homeenergychallenge.

The Vermont Energy and Climate Action Network's mission is to start and strengthen town energy committees as a powerful people-powered response to advancing efficient, renewable energy solutions -- www.vecan.net.

Efficiency Vermont was created by the Vermont Legislature and the Vermont Public Service Board to help all Vermonters reduce energy costs, strengthen the economy, and protect Vermont's environment. For more information, contact Efficiency Vermont at 888-921-5990 or visit www.efficiencyvermont.com.

NESEA'S BE13 TRADE SHOW

"Everyone who's here is someone you're going to want to talk to because they're an expert in the field." - Kate Goldstein, Ph.D Candidate, MIT

Cont. from page 21 Commercial & Institutional - airtightness performance, successful large zero net energy projects, scaling DERs, taking zero net energy into operation, campus zero net energy and complicated passive house projects.
Retrofit for Resilience - Cities - cities as whole systems, resilient historic buildings, resource resilience, innovative small cities, planning for resilience, and neighborhood retrofits.
Whole Systems in Action - the generative economy, resilient urban waterways, resilient capacity, systems literacy, sensing resiliency, and visioning and creating tomorrow, today.
Renewables - On the grid and on your building: renewable energy markets in the region and beyond, the secure and resilient grid, renewable tech frontiers, REC markets in the region, net metering, and stand alone vs grid PV.
Fundamentals - residential water consumption, managing heat, water, vapor, air & light, mechanical systems, energy calculations, building as a system, and high performance building follies
Cutting Edge - What the pros want to know: how much is too much, advanced water issues, measured retrofit results, moisture regulation as building code, and heat recovery in passive houses
High-Performance Mechanicals & Ventilation - heat pump water in cold climates, air source heat pumps, maximizing condensing boilers, multifamily ventilation, solar heating, and simplified space conditioning
Moving the Marketplace - the power of a good story, investing in sustainable building, making mass markets for efficiency, green revolving funds, green financing 101, and PACE case studies

Live Wood Fastening Demonstration on the Trade Show Floor. ***Photo credit: Matthew Cavanaugh***

Mike Duclos Speaking on Deep Energy Retrofits ***Photo credit: Matthew Cavanaugh***

2 Day Trade Show with Live Demonstration Stages:

There will be 150 exhibitors on the trade show floor Wednesday and Thursday, with live demo stages. You'll have the opportunity to "stump the experts" with your energy questions.

More trade show info: nesea.org/buildingenergy/tradeshow/

"To me, if you care about what you're doing in the field you'll be at the BuildingEnergy conference." Marc Sternick, Dietz & Company Architects, Inc.

GOING SOLAR IN VERMONT

Senator Bernie Sanders kicks off the Co-op Solar program (From left to right: Michael Ly - CFO of Sunward, Tom Berry - Legislative aid to Sen. Patrick Leahy, Sen. Bernie Sanders, Tom Longstreth - Executive Director of ReSource, Dr. Molly Loomis – Director of Education at ECHO, Vince Crockenberg – Co-op Solar Customer in Charlotte)

From 'The Vermont Bernie Buzz', Feb. 6. 2013

"We know that we face a planetary crisis with global warming, and that we must cut greenhouse gas emissions and cut back on fossil fuels," said Sen. Bernie Sanders, who is a member of the Senate energy and environment committees. "One of the greatest barriers that people face when they decide they want to improve the energy efficiency of their home or business, or when they want to install solar energy or geothermal heat pumps is the upfront cost." Vermonters are tapping an innovative program, dubbed Co-Op Solar 2013, to help them install solar water heating systems in their homes. "This makes solar affordable and accessible to more Vermonters. For members of the Energy Co-op of Vermont, you can now get solar water heating with no upfront cost. That is a pretty good deal. We need to expand programs like this so that every family has the chance to move to solar energy," Bernie said. "With families in Vermont paying $600 or more per year to heat their water with fossil fuels, this type of solar energy system cuts emissions and saves money by reducing the need for fossil fuel water heating." State and federal incentives help drop the price of solar heat by about half. Further increasing the affordability of obtaining solar hot water heat, the Vermont State Employees Credit Union has developed a lending program to help people finance the remaining upfront costs with the money saved from reduced hot water expenses. For more information about this program, please call Bernie's office toll-free at 1-800-339-9834. Read more at http://www.sanders.senate.gov/newsroom.

THE GREEN DISTRACTION

by By Ben Falk

Sometime in the latter third of the twentieth century, upwardly mobile, socially conscious, academically educated professionals—those who could afford to—began to drive the commercialization of products and services that were healthier, less cruel, and more conserving of natural and cultural resources. The intent behind this movement was, and is, well meaning. It grew out of an increased awareness of the destruction wrought by global consumerism and has sought to change that; in the words of the movement itself, to "make the world a better place through conscious consumption." People set out to reverse the course of destruction wrought by consumerism, through a different type of consumerism.

No doubt this movement toward no-VOC paint, ecotourism, green building, compact fluorescent lightbulbs (CFLs), organic foods, fair-trade goods, low-flow fixtures, hybrid vehicles, and more stringent regulations slowed the rate of cultural- and natural-resource obliteration. But, these progressive consumer and political movements of the late twentieth century failed to change the underlying structure that gave rise to massive human-ecological unsustainability in the first place.

Confronting the fact that the social justice and green movements (let's call them "surface movements") have not succeeded in changing the human trajectory away from perennial emergency toward a positively evolving, healthy, peaceful world forces us to recognize the structural forces that are at work. We start to see how surface movements have served largely to distract us from being nothing more than "conscious" consumers.

So how do we effect meaningful change, recognizing that our choice of dish detergent or fair-trade goods is not going to change the underlying drift toward deepening catastrophe?

Escape the consumer society.

What if the same cultural process that stimulated the social-justice and green causes coalesced into a massive force and began to replace consumer society itself with a society of producers based in decentralized, egalitarian, human-scaled, smaller units of organization? This shift is beginning to happen, starting from the home scale and working outward to the neighborhood, village, city, and region. It's what the Transition Town movement and other shifts represent.

To affect this type of more meaningful change: Ask yourself what actions you can take to harness this transition away from a consumer society that belittles your own humanity to an organizing force that fosters individual empowerment—a liberating and enlightening cultural revival that replaces consumers with producers, hyperdependency with self-reliance.

The following table highlights the relationship between typical consumer-based actions and solutions that address problems (classified as "Issues") at a deeper, more systemic level. The categories are not mutually exclusive: Actions defined as "Less Bad" often support the regenerative "Producer" action but by themselves usually will not result in meaningful, long-term change at the societal level or empowerment at the individual level.

This is just the tip of the iceberg. Starting down this road opens the door to scores of other possibilities. The lifestyle of the producer can actually be far more stimulating, complex, and interesting than a consumption-oriented way of living.

Issue	The "Less Bad" Consumer	The Producer
Food	Buys organic groceries	Grows a vegetable garden, maintains food trees and berries, raises animals
Waste/Energy	Recycles	Buys less and produces, processes, and stores more
Social Justice	Donates to a national charity	Organizes neighbors to alleviate a local problem
Energy	Conserves electricity	Produces electricity with solar, wind, water, or wood, or doesn't need it
Water	Buys a water-conserving appliance	Harvests rainwater and greywater and cycles it on her land
Policy	Votes once a year	Organizes with neighbors, meets with elected officials, holds town office

This article is adapted from Ben Falk's forthcoming book, The Resilient Farm and Homestead: An Innovative Permaculture and Whole Systems Design Approach (Chelsea Green Publishing, July 2013).

CAN WE ACHIEVE SUSTAINABILITY IN VT?

Book Review by N.R. Mallery

GREENING VERMONT: THE SEARCH FOR A SUSTAINABLE STATE

by Elizabeth Courtney and Eric Zencey, 176 pages, Thistle Hill Publications, $35.00

If you live in Vermont, and are like me, you are probably here because you love it and all this state stands for.

Today we are facing some important decisions for the future of our unique state. Greening Vermont: The Search for a Sustainable State, addresses how to keep it that way, and how a balance between nature and culture will determine how we achieve the sustainability that is imminent.

With this book, Eric Zencey's hopes are to help others see the way to our goal more clearly, as we take on the huge tasks at hand on this path to a sustainable future.

Elizabeth Courtney, with 15 years as executive director of VNRC and as an environmental advocate, understands the tools available to us from conversation to conservation to localization, litigation, confrontation and collaboration - and now to include climate change to the mix. Her writings about what has been learned from the first 50 years will hopefully serve to guide us through the urgency of today's issues and into our future.

The authors take us back to the start of how Vermont was transformed in the 1950's -- from the arrival of the 'petroleum economy' and how that laid the groundwork for the Vermont that we proudly live in today. They take you back to a time before interstate highways and the challenges that Vermont-ers faced to protect the landscape and small town communities -- through protests, legislation, litigation and compromise. This has all kept us strong. Evolution leads us to today's concerns for the future, in search of solutions, in our move to energy independence while balancing it with respect for our ecosystem and impending changes from a warming planet.

As Tom Prugh, Worldwide Institute commented, "By measuring social change and environmental policy against a new yardstick of ….. 'finite planet thinking', Courtney and Zencey point us toward …. the absolutely crucial role that the environmental movement has played and must play in the future."

The book describes a variety of solutions including programs to make our buildings more energy efficient, as well as the cost of energy - from a "lump of coal, a killowatt hour of electricity, a cord of wood, or a gallon of gas and what our options are to secure the energy to power our lives. Other smart growth and sustainable measures are covered beautifully, like Hardwick, Vermont's example of what can be achieved from the angle of how food can save a town… for jobs as well as to feed us. We have much work to do.

Greening Vermont is a must read as we move forward with our Search for a Sustainable State.

Our past achievements have indeed led us down the path towards a somewhat sustainable state. The road ahead of us is not all paved. As a fellow Vermonter, Bill McKibben states in the Afterword, "Vermont has to help take the lead in getting the whole planet off the fossil fuels that cause climate change and towards some kind of reasonably soft landing,"

SAME SUN OWNERS PLAN UNIQUE SOLAR STORE IN DOWNTOWN RUTLAND

RUTLAND, VT – Same Sun of Vermont, which operates a solar design and installation studio on Center Street and recently completed the Creek Path Solar Farm on Cleveland Avenue, Recently announced plans to open a unique new retail store at 53 Merchants Row, also in downtown Rutland. The venture, known as Same Sun Choice, will open in April and feature solar-produced goods from Vermont and across the country.

"We think there is a great opportunity here, and hope to fill a void in the downtown by offering customers a wide array of household goods and products produced by companies that share our commitment to solar energy," Same Sun's co-owner Philip Allen said. "Through this venture, we are asking consumers to choose to support renewable energy, as well as manufacturing in America."

Same Sun of Vermont, Inc. was established in 2011 by Rutland Town residents Marlene & Philip Allen, whose passion for solar power became evident after having their own system installed. The company's mission has not been limited to clean energy – they have continuously stressed the importance of the industry as a vital economic engine, creating manufacturing opportunities across the USA and throughout Vermont with jobs that cannot be outsourced.

The company has built dozens of small-scale residential and commercial projects in Rutland County and across Vermont. Last fall, Same Sun was selected by Green Mountain Power to build the first array in Rutland, as part of GMP's promise to make Rutland the "Solar Capital of New England." The 150-kilowatt Creek Path Solar Farm was built on a former brownfield owned by GMP and completed by Same Sun two weeks ahead of schedule last month.

"We are committed to solar and Green Mountain Power's initiative in Rutland, and the store is a direct result of that effort. With the impending opening of Small Dog Electronics and GMP's new Energy Innovation Center, we see the revitalization of downtown as a great opportunity," co-owner Marlene Allen said. "Rutland has been a vibrant, fun place to do business since we opened Same Sun more than a year ago, and we want to continue to add to the vibrancy and be part of the ongoing renaissance."

"Same Sun and the Allens have already brought new life to downtown Rutland, and we look forward to continuing to work with them to improve and expand the revival of the city's core," said Mary Powell, president and CEO of GMP. "The new store is a creative and exciting connection to the Solar Capital concept, and we're thrilled by the Allens' commitment to the effort and downtown Rutland."

Same Sun of Vermont, Inc. is currently located at 24 Center Street, Rutland, VT. www.samesunvt.com.

LOCALLY MANUFACTURED LED LIGHTING: A PRODUCT REVIEW

We recently had an opportunity to test an under-counter LED from LED Dynamics, a lighting manufacturer in Randolph, Vermont. Now we can say with certainty, that not only were our expectations fulfilled, but so were our hopes.

The unit we tested was their EverLED-LVL2. Lights in the EverLED series come in your choice of three colors, rated according to an equivalent of Kelvin degrees of a glowing object. The 3000K light is a warm white, 4000K is medium white, and 5000K is cool white.

Our light was one foot long. Two-foot and three-foot lights are also available. They consume 4.5 watts per foot, though there is also a power adapter that has to be used, unless it is hard wired, which uses 1 watt. Though the light has its own switch, if you are trying to keep your phantom loads as low as possible, perhaps plugging it into a power switch would be an option, as is always a good idea with transformer boxes. This way, you do not add even this minuscule amount of power as a phantom load, while the light is off. (Mind you, this is getting really picky - 1W is like nothing!) A single power adapter can handle a number of lights, according to its rating, and several different sizes are available.

The LVL-2 produces about 220 lumens, per foot, which means that a one-foot light is theoretically about as bright as a 15-watt incandescent bulb. This is plenty of light for an under-counter application, and works well if it is positioned suitably over a desk. However, the quality of light from the EverLED-LVL2 should not really be compared to incandescent or fluorescent lights. This LED produces light

that is better than our own older products in a number of important ways.

The lights have a life expectancy of 10 years, and are warranted for the first five. Unlike fluorescent lights, there is very little in the way of danger of environmental pollution from these lights, which can be recycled at our own local factory here in Vermont, as well.

These lights are not inexpensive, in terms of initial payment. Nevertheless, they are well worth the price because of long life and high efficiency. They are far less expensive to run than the old incandescent lights were, and are less expensive even than the fluorescents. The lights range from $49.95 for the one-foot model to $89.95 for the three-foot unit. The power adapters are purchased separately, and cost from $14.99 up, depending on wattage and model.

Our editor, Nancy Rae Mallery, says of these lights, "The lighting is exquisite, and much better than the other under-counter LED lights we have been using for years. The light is cleaner, clearer, and generally better."

A web page with more detail and photos is http://www.everled.com/led-lighting-products/everled-lvl2/.

- Staff Review

FARM-WAY SAVES ENERGY WITH VERMONT-MADE LED'S

Farm-Way, a Bradford, Vermont store selling footwear, clothing, gear, sporting goods and house wares, began using LED's for lighting in 2009. The first lights installed were 4-foot drop-in replacements for fluorescent tubes made by LED Dynamics, of Randolph, Vermont. The initial installation included 200 of these for existing fixtures in the main store.

These bulbs have a 10-year average life expectancy and are 80% more efficient than the tubes they replaced. They have better "true color," and this is important for store customers choosing such things as clothing.

Last year they replaced the tubes in the "Gifts and Country furniture" store with LED lights, as well. The conversion of 75 fixtures to LED lights resulted in 60% less energy being used.

Last fall, Farm-Way also replaced 55 of the 60-watt incandescent bulbs used in many buildings that utilize that type with 25,000 hour 9-watt LED bulbs. They also switched 21 outdoor yard lights that averaged 250 watts to LED's averaging 25 watts. This alone will save approximately $70 per year per fixture. The energy consumed for the project went down from 4.6 to 0.9 kilowatts! Most of these investments will pay for themselves in two to three years, and the outdoor fixtures, though warranted for 5 years, have a life expectancy of 20 years.

Aside from saving money for Farm-Way, the business has a smaller carbon footprint and is kinder to the environment. So, does this mean that they are now more than 43% solar powered?

SAVING ENERGY, SAVING $, SAVING OUR EARTH

by N.R. Mallery

Sustainable Interiors, our theme throughout this issue of G.E.T. , is our take on the famous f'White Sales' that are generally held this time of year. Perhaps this started because of cabin fever and to life your spirits in the midst of long, cold winters. While we don't agree with going out and buying, buying, buying, there are also many important benefits for making your interiors of both homes and work places more sustainable. Please also see our Building and Heating Efficiency, Lighting and It's a Green Life after All sections to learn more.

Everyone can save energy and fight climate change with ENERGY STAR qualified products. They use less energy, save money, and help protect the environment.

Energy Star Products include:

Appliances: Clothes Washers, Dehumidifiers, Dishwashers, Freezers, Refrigerators, Room Air Cleaners & Purifiers, and Water Coolers.

Building Products: Seal & Insulate, Roof Products, Window, Doors and Skylights

Computers: Computers, Displays, Imaging Equipment, Uninterruptible Power Supplies.

Electronics: Audio/Video, Cordless Phones, Set-top & Cable Boxes, Televisions

Battery Chargers: Handheld Vacuums, Personal Care Products, Power and Yard Tools with Qualified Chargers

Heating & Cooling: Air Conditioning, Boilers, Ductless Heaters, Fans & Ventilating Equipment, Furnaces, Air Source and Geothermal Heat Pumps, Insulation & Air Sealing.

Lighting and Fans: Decorative Light Strings, Ceiling Fans, Light Bulbs, Light Fixtures

Plumbing: Water Heaters: Gas Condensing, High Efficiency Gas Storage, Solar Water Heaters, Tankless Water Heaters

REBATES! REBATES! REBATES! See more Rebates and Incentives on page 16-17 .

ENERGY STAR (888-782-7937) http://www.energystar.gov/index.cfm?fuseaction=rebate.rebate_locator

EFFICIENCY VERMONT 1-802-860-4095 http://www.efficiencyvermont.com

BOSCH HOME APPLIANCES 1-800-944-2904. Purchase 3 or more eligible Bosch kitchen appliances and receive up to 15% Rebate for qualified dishwashers and refrigerators. (01/01/2013 - 03/03/2013) www.bosch-home.com/us/bosch/promotions.html

NH SAVES 1-866-266-2420. www.nhsaves.com

Ways to reduce energy and make your interiors more sustainable : Power Strips, Battery Powered Clocks, Low flush Toilets, Low Flow Shower heads and on faucets, window treatments to reduce heat loss at night - keep them up during the day for solar gain and to keep your lighting needs down. Masonry heaters and efficient wood stoves keep you warmer and reduce your carbon emissions and fossil fuel usage. Natural paints, organic mattresses and bedding, can really help with allergies, asthma and your quality of life. Eco-friendly flooring and carpets are a plus. Kitchen utensils and stainless steel cookware - iron skillets, cloth napkins . . . rags that you can rewash vs. paper products -- reducing waste. Natural and eco-friendly cleaners work! (See Non-toxic Household Cleaners article in our It's a Green Life After All section). And while you are at it - be sure to shop for local and organically grown foods (buy in bulk whenever possible and bring your own container & bags to re-use and reduce waste). Remember the 3 R's: recycle, re-use, Reduce!

Source: http://www.energystar.gov/index.cfm?c=products.pr_find_es_products

Did you know?

Your two biggest electricity consumers in your home are your refrigerator and water usage.

An estimated 170 million refrigerators and refrigerator-freezers are currently in use in the United States. More than 60 million refrigerators are over 10 years old, costing consumers $4.4 billion a year in energy costs. By properly recycling your old refrigerator and replacing it with a new Energy Star certified refrigerator, you can save from $200–$1,100 on energy costs over its lifetime. They are 15% more energy efficient than models that meet the minimum federal energy efficiency standard.

Models with top-mounted freezers use 10–25% less energy than bottom-mount or side-by-side models. The most energy-efficient models are typically 16–20 cu.ft. Automatic ice-makers and through-the-door dispensers increase energy use by 14–20%.

Protect the environment. Nearly 70% of U.S. electricity is generated with coal and natural gas, which release greenhouse gasses into the atmosphere and contribute to climate change. Energy Star certified refrigerators use less energy and help us reduce our impact on the environment. If everyone purchasing a refrigerator this year chose a model that has earned the Energy Star, together we would save 715 million kWh/year and reduce greenhouse gas emissions equivalent to those from about 100,000 cars.

THE WATT-HOUR METER

By George Harvey

You can check your power bill and see how much you use, but when you do, some of the most important questions remain unanswered. How do you reduce that amount, your costs, and your environmental load? To do that, you need to be able to find out what individual appliances and lights use, and that requires a device that is usually, but inaccurately, called a wattmeter. Accurately, it is called a watt-hour meter. A watt-hour meter can do the work of a wattmeter, but the reverse is not always true.

If you look on the nameplate of a microwave, you will see how much power it draws. You can verify this with a wattmeter with the microwave at full power, and should see that same amount of power or less. The problem with using this to understand your energy usage is that the microwave is not usually running. If you leave it off for a month, it will draw little or no power at all. In order to know the power used, the equation must include both the number of watts and the number of hours.. That is why you use a watt-hour meter.

A watt-hour meter plugs into the wall, and the appliance gets plugged into it. It tells how much power the appliance uses during the time it is plugged in. The calculation multiplies the power load by the amount of time of actual use. If the microwave draws 500 watts, and is used for a total of three hours during a week, then the amount of power used is 1500 watt-hours, or 1.5 kilowatt hours.

If you plug a lamp into a watt-hour meter, you might discover that it is on more than it should be, and people's habits are wasteful. Say, for example, that the light uses 25 watts, and you estimate that it should be used one hour per day. It should show an average of 25 watt-hours per day in use, or 175 watt-hours per week, if your estimate is correct.

You can test an appliance to see how efficient it is. By leaving a refrigerator plugged in to a watt-hour meter, you can find out how much power it uses in a month, from which you can calculate exactly what it costs to run it for a month. And you can consider what you learn when you decide whether to retain or replace it.

Old appliances are not necessarily bad, and you might find one well worth keeping. Several years ago, I found myself in possession of a refrigerator I was told my grandmother had bought in 1947. It still ran okay, but when I tested it with a watt-hour meter, I found it was as good as most modern, efficient models. It is still running like a champ today. (Perhaps GE should have kept this model alive.)

Watt-hour meters can be purchased at some hardware stores. The one I use was purchased at the Solar Store of Greenfield, Massachusetts. Many libraries have them for loan to members. But don't be surprised if people call them wattmeters.

Lakes Region Community College Sustainability

By Krista Goddard

Located in the heart of the Lakes Region of NH, and home to 1,400 students, the Lakes Region Community College (LRCC) offers its students a variety of programs. Included in the list is everything from business to culinary arts, early childhood education to media arts; but the newest, and perhaps most unique, program is the Efficiency Training program.

A fully functional Solar Hot Water System

"With the energy area of the college there are both short-term not for credit workshops and trainings, as well as a two year, four credit associate program," said Andy Duncan, Energy Training Manager.

In 2008, New Hampshire adopted the Regional Greenhouse Gas Initiative (RGGI) to reduce greenhouse gas emissions that contribute to global climate change. The state's emissions allowances are sold at auctions and the proceeds fund the Greenhouse Gas Emissions Reduction Fund (GHGER). These proceeds are portioned out among state participants including energy efficiency and conservation, and LRCC Energy Efficiency Training is one of them.

The short-term Energy Efficiency Training Program workshops are partnered with the Building Performance Institute (BPI). BPI has developed a set of standards for energy efficiency and LRCC follows those standards. LRCC offers a variety of workshops, some of them including energy auditing, commercial building auditing, weatherization installing, building analysts, and building energy performance. At the end of the workshops, LRCC offers a certification test through BPI.

A plus to the certification from BPI, through LRCC, is that it is not limited to the state of New Hampshire. According to Duncan, the certification is a stamp of approval and is recognized nationally. Also, anyone could participate in the workshops and get certified.

"It is certainly possible for someone with no experience to be BPI certified. We have a mentoring program to connect beginning energy professionals with more experienced ones," said Duncan. "However, most of the people that we train might already be an auditor or a building contractor, but want to add the skill set of the certification to their existing skill set," he added.

One workshop that LRCC is just starting is energy efficiency in existing homes for real estate professionals. According to Duncan, real estate agents are more knowledgeable than the average person about homes and features of homes, so they are giving an introduction to energy issues in homes and energy efficiency features. Through their different programs, LRCC is hoping to give incentives or rebates to help clients save energy (and money) in their homes.

State of the art Environmental Application System

On the other side of things, LRCC has the two-year Energy Services and Technology degree, which got their start in 2007.

"It came about because energy is getting expensive and because there is a real potential there; most programs are centered on renewable energy, which is great," said Wes Golomb, Energy Services and Technology professor.

The program primarily looks at energy efficiency, which includes residential energy, indoor air quality, electricity, building materials, and commercial energy. With 13 graduates from the EST program, 10 of them have graduated with a full time job lined up; maybe due in large part that almost everybody does an internship, according to Golomb.

"This is a great degree program to get someone started out in the energy field, whether it be an installer, auditor, renewable energy sales, or even a consultant, there are many avenues you can take," said Jean-Paul Hamel, EST student.

The EST degree is certainly prestigious. The program has received awards from both the New England Board for the Department of Higher Education and the New England State Senate. Employers have recognized the success of the program and are paying the tuition cost for their employee/student to complete it.

With the success of the program comes great funding. The department was able to build a state-of-the-art energy efficiency lab on campus, according to Golomb. The lab was designed to emulate a normal, every day house. The house can be used to demonstrate how to heat and cool it efficiently, how to humidify the house, change the amount of ventilation, and train students how to use infrared cameras and effective lighting. One thing that EST also does outside of its department is train employees in the electrical department on campus how to install solar panels.

Lakes Region Community College has recognized that energy efficiency is a growing and important field of study, and they are slowly gaining both popularity and demand. The key factor is getting people interested and passionate about renewable energy and sustainability.

"The funny thing is that this energy efficiency and renewables can potentially provide all our energy needs today, however it will still take time to get there," said Hamel.

Sterling College pushes further for a safe and sustainable environment

By Spencer Hunt

Located in a "green" atmosphere in northern Craftsbury, VT, there is no secret to why Sterling College is all about sustainability. The school has two resident buildings that are controlled by two, 4400 watt solar panels that produce over 90% of the energy used by those buildings.

"Pretty cool isn't it?" said Vice President Ned Houston.

The Sterling community combines structured academic studies with experimental challenges and plain hard work to build responsible problem solvers who become stewards of the environment as they pursue productive lives. The school offers a unique experience that not only challenges the students to work hard but also live a sustainable life. Sterling offers a full spectrum of courses related to sustainability and how to better the environment. They stress the importance of sustainable campuses and abide very well by their mission statement.

The school is in the process of working out a plan that challenges the residents to live under that 90% energy. It would be a huge step towards a more sustainable college if they can have most of their energy come from solar power. The college's fuel consumption has lowered by 1/3 since the use of the solar panels, added Houston.

It's not just sustainable energy that is keeping Sterling so green, but their food program too. According to Anne Obelnicki, Director of Sustainable Food Systems, from 2010-2011 alone over 50% of the food students consumed was organic.

Sustainability at Sterling goes well beyond conventional practices—the reality of living and learning on our rural Vermont campus cultivates a deep sense of community based on an intimate relationship with the natural world, making "sustainability" both a way of life and a path of study.

"We haven't crunched the numbers for last year yet, but I expect local and organic food consumption will be significantly higher as we're always purchasing more from our neighbors," said Obelnicki.

Based on their research 12% of the food students consumed came from Sterling's farm. 22% was local food, 40% was Vermont raised, 52% was Vermont produced, 48% was regionally raised (200 mile radius), 53% was regionally produced 27% was certified organic or fair trade, and 95% of unprocessed meat was purchased direct from Vermont farmers. The Vermont products they purchase include companies like King Arthur Flour and Cabot.

"I think it's an interesting to see to what extent we support the VT economy even if the products aren't strictly local," explained Obelnicki.

But what happens to all food scraps once a meal has been finished? No worries, Sterling composts all of its food waste. ALL OF IT, even from the barn.

When it comes to sustainability Sterling is right on top. When working in the fields Sterling College uses both manual and mechanized tools to cultivate and harvest crops. But most of their work is done with draft horses. The College also has a portable band saw mill that is used in campus projects.

"It is good to have something like this; it is good hands on learning. It shows the students how the process works from getting the tree out of the ground to building a barn," stated Houston.

Sterling College has also created a water-tracking system that shows the residents the amount of water they have used in that day. According to Houston the average person goes through 100 gallons of water per day, but Sterling has dropped to about 35 gallons of water per person per day. This includes showering, washing hands, toilets and more, Houston explained.

It's not a secret that Sterling College is pushing for a safe and sustainable environment. Efforts have proven to be important towards the environment and the issues that we might face in later years.

As a student at Castleton State College, Spencer Hunt participated in a course taught under the direction of Dr. Sanjukta Ghosh for 'Service-Learning' and 'Civic Engagement'. The course of study sought to impart knowledge, skills and values to make students active participants in their communities. Students worked individually or in teams with 'Green Energy Times', to help develop participatory media projects for social change. Great job, Spencer!

Proctor Academy Eliminates 120,000 lbs. of C02 Annually With Solar, Resulting in "Triple Win"

Caption here

Proctor Academy's environmental mission statement, drafted with help from students, is "to teach and practice sustainability throughout our school community" - and by practice this means heating with geothermal, biomass, and wood boilers. Roughly 25% of their wood is harvested on-site.

The school, located in Andover, New Hampshire, contacted ReVision Energy to investigate how we could help them harness their solar resource without a massive capital investment. We proposed a Power Purchase Agreement (PPA) by which the school pays no upfront cost for the system, but instead agrees to buy the clean solar electricity from the array at a discount, compared to buying kWhs from the power company (more about PPAs here:http://www.revisionenergy.com/maine-nh-nonprofit-solar-power.php). With this structure in place, the project moved forward: 273 American-made Suniva solar panels went up on the roof of Proctor Academy's Wilkins Meeting House in the weeks leading up to Christmas 2012.

John Ferris, Chief Financial and Operating Officer of Proctor Academy, explains that the solar "Is a triple win: it promotes educational goals, improves our financial situation, and promotes a better world and environment. We don't have many opportunities to meet all three goals with a single project and so we were thrilled to make our first solar investment."

A Student-Driven Commitment

Like their mission statement, Proctor's exploration into solar started with their students. Students measured the south-facing rooftops of Proctor's campus and identified solar opportunities. What the students found was that the roof of their Wilkins Meeting House was ideal for solar and would be able to hold a significant solar array.

"The students are very enthusiastic," Ferris says, "We held a celebration on Jan 17th, which included a 'cable cutting' ceremony to symbolize our reduced reliance on fossil fuel electricity from the grid. The plans were led by the students."

Helping the educational mission is a real-time data supplied by the solar array and will be available using the inverter's online monitoring feature (SolRenView) or at a large kiosk display located inside the Meeting House. The system is estimated to produce over 90,000 kWh each year, offsetting an estimated 121,000+ lbs of C02 emissions from fossil fuel power sources. Over 30 years the system is projected to save Proctor Academy over $250,000 in utility costs.

ReVision Energy was grateful for the opportunity to design and install a number of solar projects for educational institutions in 2012 through a new power purchase agreement (PPA) program: 26kw for Good Will-Hinckley, 37kw for Unity College, 170kw for Thomas College, and 71kw for Proctor Academy.

Green Winter on the White Slopes

IN THE SHADOW OF CAMEL'S HUMP . . .

SLEEPY HOLLOW IS DEFINITELY NOT SLEEPING!

By N.R. Mallery

The Legend of Sleepy Hollow had a headless horseman chasing Icabod Crane. Well, we have our very own 'Sustainable' Sleepy Hollow, here in Huntington,Vermont -- and they have both heads and heart very well placed!

It started in October, 1999, when the Enman Family of St. George, VT, founded Sleepy Hollow Inn, Ski and Bike Center on the site of the old Sherman Hollow Touring Center (1978-1993), which featured a 3km lighted loop trail, a 50 seat restaurant, and an outdoor hot tub. The Enmans had dreamed of owning an inn and ski center for years. Sandy was a CPA at Enman & Associates. Dave was a builder and used bookstore owner, and his son, Eli, now the general manager, had just graduated from Middlebury College. Molly joined the rest of her family in 2002. She is now the weddings/event coordinator.

Today, Sleepy Hollow now offers 35 km of cross-country skiing, and mountain biking and hiking in the summer. The renovated lodge now includes 8 guest rooms, and a sauna. The rehabilitated Butternut Cabin offers gorgeous view of Camel's Hump. The Round Barn Event Center, completed in June, 2006, and the Pavilion, built in the spring of 2008, were designed and built by Dave Enman. Sleepy Hollow now hosts numerous weddings and group events all year in the Round Barn, which is also the new home for the former Williston used bookstore, The Bookkeeper, that moved over to the round barn in 2006. The used and antique books include good old Vermont book collections that were often given to them. It is now mostly an online book store. Interestingly, it seems that this Used (recycled) Bookstore might have been the 'beginning' towards the Enman family's evolving path towards sustainability.

Snowmaking in action at Sleepy Hollow, December 2012

Eli Enman skiing in front of the 23.7kw solar array looking towards Camel's Hump.

Their first taste of Solar began in 2009, with an 8kW system from AllEarth Renewables, with AllSun Trackers. An installation of four Stiebel Eltron Solar Hot Water panels, in 2012 produces 50% of their Hot Water needs.

The Enmans realize, as more and more people do, that we must all do even more to reduce our dependence on fossil fuels and reduce our CO2 levels. Sleepy Hollow Inn Ski & Bike Center continues to take this task to heart.

An exciting new grid-tied 23.7 kW fixed panel solar array went online December 20, 2012. The 99 PV panels, of 240 W each, were installed by David and Eli Enman, with oversight by Peter Cassels-Brown of Green Mountain Renewables. They now proudly boast an installed total of 32 kW's of clean renewable solar power! This should produce 100% of their electric

Cont. on page 31

SUSTAINABLE ART

'Solart' - Conceived & Developed in the Catskills!

Creative Solutions for Solar Design in the Catskills

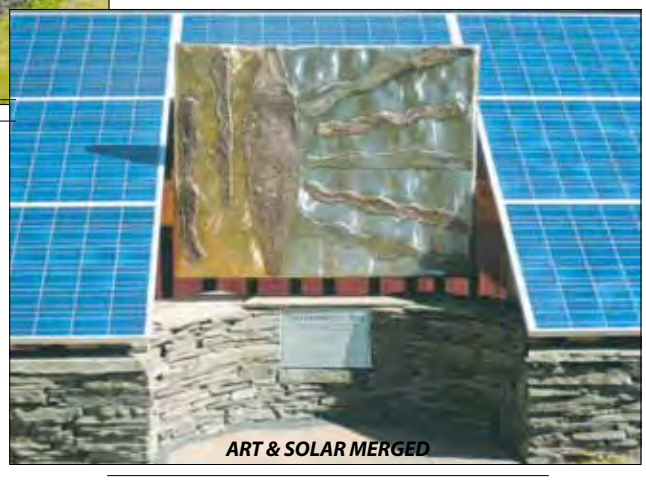
By N. R. Mallery

There are thousands of photovoltaic solar panels on hundreds of roofs and yards with most people being very happy, even giddy, about the prospect of making their own electricity from the sunlight that falls on their property rather than coal, oil, or natural gas.

Because some people have qualms about how solar panels look, Derek McConnell and Ed Millar thought that on the right property, with a little extra care taken to integrate the solar array into the landscape with stone and metal work, carefully chosen plantings, and unique construction materials – maybe even sculptural elements - a solar array could be something more than a utilitarian power plant that some see as an eyesore. It could be art. Solart.

This idea spurred Margaretville, NY resident and MARK Project board member, Gail Lennstrom to develop her vision of funding an artistic solar project at the Catskill Center for Conservation and Development in Arkville, NY. The site was ideal, due to the fact that the building was a community center that housed both an environmental non-profit (The CCCD) and the Erpf Art Gallery.

CCCD had already started a more traditional rooftop solar array on the barn. However, the space in front was still open for a Solart array. Alan White, director of the CCCD, wanted to use and promote more clean energy as an alternative to the fossil fuel sources that are widely believed to be harming the Catskill mountains.



ART & SOLAR MERGED

Most solar ground arrays are built on top of metal pipes. The CCCD's goal was to create something beautiful. Lots of people would be walking past this array every day, so it was important to find some way to frame the array in an aesthetically pleasing way.

Looking for artistic inspiration, sculptor John Sanders of Roxbury, NY was commissioned to work on a custom sculpture panel to fit the open space in the center of the solar array. Ed Millar created the beautiful stone work, framing the array with dry stacked bluestone that is so integral to the geology, economy, and history of the Catskills.

In the winter of 2012, Peg and Gail, and others at the MARK project, received a $5,000 O'Connor grant. The NYSERDA PV (solar) incentive money paid $1.50/W. The plan called for 13 additional 230W panels, or 2,990 watts.

The CCCD also wanted to use microinverters, which turn each panel's DC electricity into the same frequency & voltage AC electricity that is provided by NYSEG. This allows the building to use it when needed and to send it back to NYSEG, turning the meter backwards, when the solar arrays are producing more than the building needs at any given moment. The microinverters also generate a constant record of how much power they are producing, viewable online (at the CCCD's website) for potential educational purposes.

The goal of the "Solart" project is to make electricity-producing solar arrays that are not only useful, but beautiful.

This site, a nexus of environmentalism (the CCCD), art (the Erpf Gallery), and community building (the MARK Project) was an ideal site to create energy in a way that is visually appealing, is harmonious with the surroundings, and starts conversations about clean, renewable solar energy.

Just the first of many variations of the "Solart" concept, the possibilities are endless and exciting, depending on the unique features of each site and individual tastes -- by using eye-catching elements – stone work, boulders, barn beams or reclaimed barn wood, pilings, glass, metals, recycled materials – to accentuate the functional beauty of the glass and aluminum solar panels – and create unique, artful solar arrays.

Proudly displaying Art in the Catskills

SUSTAINABLE OFF-GRID LIVING

THE MAINE POTATO LADY IS POWERED BY SOLAR

Sweet Potatoes Organically Grown in Maine

By N. R. Mallery

Located in the foothills of Central Maine, the LaCourse Family Farm, home of The Maine Potato Lady™, has been in operation for 20 years. Their 100-acre Farmstead was once part of a 560-acre farm that dates back to the 1600s.

A custom-designed and hand-built home crowns the hill-top farm, which slopes up from a stream valley a mile down an unpaved country road. The stream feeds a cedar bog which provided the logs for their home. Stones that were gathered from field edges and their own milled lumber were used to finish the building, which has sheltered their family for many years. The LaCourse family loves living "off the grid. Lee Goggins from Lee Solar installed the 1400W PV system for electricity just 7 years ago, although they originally planned on using a wind turbine.

South-facing fields lend themselves perfectly, not only for their solar system, but they also provide them with rich, fertile, well-drained silt loam for their sustainable lifestyle. This includes a productive sugar bush, a cedar bog habitat with sphagnum moss and rare pitcher plants. This rural environment is also home to deer, moose, turkey, ravens, eagles and a variety of beautiful trees, plants, and birds.

The LaCourse's have primarily been seed growers, raising garlic, shallots, potatoes and onions as well as all of their own vegetables in their 4 large gardens. Their children are involved in the planning, the everyday work, the decisions, and the rewards. They were raised knowing and recognizing all of the types of vegetables and different varieties of what they grow. They are an integral part of this farm, and their joyful participation makes it all possible.

Ten years ago, Alison LaCourse, alias: The Maine Potato Lady, started her potato business which has grown to more jobs for other local growers, to keep up with the demand for certified organic potato seeds. Sweet Potato slips must be started in greenhouses in March by the sweet potato growers. Slips are shoots that are grown from a mature sweet potato, from which sweet potatoes vines will grow.

The LaCourse Family Farm's Solar

- 1400W PV system 8 - 175 W panels
- 4024 Trace Inverter
- Flex 60 Outback Charge Controllers
- 24V Battery Bank with Interstate 6V batteries
- 10,000W Hobart Welder Generator

The Maine Potato Lady is one of only a few organic sweet potato seedling companies around - especially here in the northeast, where it is becoming popular to grow them. As global warming increases, it will become easier and easier to grow them in the northeast.. providing there is not a drought. Alison made note that the growing zones have changed and become much warmer in the short 20 years that she has lived in central Maine. Beside the many varieties of potatoes, they also have a stock of onion sets, shallots, potato onions, garlic seed (Fall), cover crops, soil inoculants, and fertilizers for successful organic growing here in the northeast!

Alison will be sharing her "How to grow sweet potatoes in the northeast" instructions, in the April Issue of G.E.T. With The Maine Potato Lady's sweet potato slips, the publisher of Green Energy Times has been growing impressive sweet potatoes successfully for many years. Get your orders in early - they run out all too soon! You can reach them at 207-717-5451.

www.mainepotatolady.com

Custom-designed hand-built home crowns the hill-top farm.

The LaCourse's 1400W PV system in a garden of garlic

FUNDING SUPPORT FOR RESEARCH IN ENERGY AND AGRICULTURE

By George Harvey

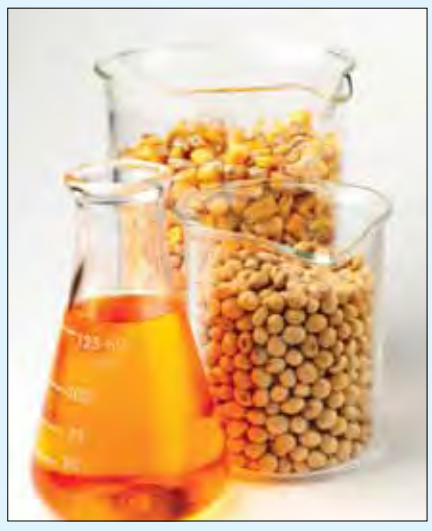
Whether we are researchers, like to hear about research projects, or just want to understand what our taxes pay for, many of us might like to know about grants from the federal government. A joint project of the Departments of Energy (DOE) and Agriculture (USDA) is one example.

These two departments of the federal government teamed up to support research with grants relating to breeding plants for biofuels. The grants were first awarded in 2006, and are still awarded annually. The DOE is working through its Office of Biological and Environmental Research, and the USDA through the Agriculture and Food Research Initiative.

The funds are granted to researchers who work on accelerating plant breeding programs or "improve biomass feedstocks by characterizing the genes, proteins, and molecular interactions that influence biomass production." The goal is ultimately to develop new biofuels derived from lignocellulosic materials – which are richly found in the inedible, fibrous parts of plants.

Fast-growing grasses, trees, and shrubs are of special interest. Specifically, the government wants those breeds that do well in marginal and surplus agricultural land, so they can be grown without taking up acreage that would normally be planted with food crops. The crops of interest are those that require little or nothing in the way of fertilizer or pesticides. A high energy output is desired, of course, but so is a lack of negative environmental impact.

This effort supports a number of different approaches to developing crops. It certainly does not exclude those who experiment with traditional breeding programs, but it goes past traditional programs to include genomic technologies. I can only take that to mean genetically modified organisms, and while I find this sad, because I think the safety controls over such programs are insufficient, I cannot say it is unexpected.



Beaker of golden ethanol and flasks filled with corn and soybeans. Image credit: Shutterstock

The time it takes an organization to develop a program to the point that it can make an application is not short. Typically, the underlying idea for a project is developed at least many months before a grant proposal can be fleshed out. Breeding programs have development times that run into several years, at least. The pre-applications applications for the 2013 grants were due last December, and those who wanted to apply were already at least envisioning a research project a year ago. I suppose that means that if you want to participate in the process for 2014, that there is no better time to start working on that than right now.

For those with research projects in mind on this or other programs, I would suggest starting at the general government grants website, http://www.grants.gov/.

Source: U.S. Department of Energy

SLEEPY HOLLOW IS DEFINITELY NOT SLEEPING!

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needs. In fact, it should provide enough power for the family's 3 houses on the property, as well. Hopefully, it will even produce enough to power the new snowmaking system -- another new addition to their long list of sustainable measures.

The new snowmaking system is designed to cover 700 meters of trails this year, and up to 1.5 km of trail in the next few years. The is an all electric design for their air compressors and water pumps will hopefully run one SV10 HKD Snowgun.

Other Sustainable practices at Sleepy Hollow Ski & Bike Center are:

- 10 loads of laundry/week are dried on wooden racks in the furnace room.
- Composting and recycling.
- Local foods for the Inn are purchased, organic when possible and include local eggs. Maple syrup is produced on site.
- The whole family drives hybrids, with four Prius's.

Eli Enman added one last thing, "We are really excited to see how much electric we are making over the course of the coming year, to see if we have met our goal to be 100% solar powered. You can watch their progress on their website. www.skisleepyhollow.com.

THE NEW NORMAL: GLOBAL WARMING AND THE HUNDRED-YEAR FLOOD

Devastation from 'Irene' - this is Route 4 west of Woodstock, Vermont

By George Harvey

City planners, insurance companies, and disaster agencies use the concept they call a "hundred-year flood" for their work. Just what is a hundred-year flood? A simple explanation is that a hundred-year flood is a flood so bad that it might be expected to be the worst that happens in any given place during any given century. Historically, it has had a 1% chance of happening in any given place in any given year. That, however, was history.

Two recent storms, Hurricane Irene and Hurricane Sandy, brought the concept of a hundred-year flood into clearer focus for most people. Each of these caused what we recognize as hundred-year floods, based on historic records -- but just one year apart.

On the New England Aquarium's website, the article Climate Change in New England states, "According to current estimates, Boston can expect a coastal flood equivalent to today's 100-year flood every two to four years on average by mid-century and almost annually by the end of the century."

While this statement focuses on Boston, it applies to the kind of weather we can expect in New England in the near future. Floods and extremes in weather conditions are becoming the norm now. Hurricane Irene one year, and Hurricane Sandy the next, will be part of a typical weather pattern, with low-lying farm fields scrubbed clean of their soil, roads washed out, electricity down, buildings destroyed, and lives threatened. This will be constant, and the damage will become normal.

Now, a moratorium to stop the progress of wind turbines and the benefits that they can add to the future of the fight against global warming as a clean renewable energy option, is threatening our own future. The stated reasons behind this moratorium seem trivial, compared to what is already happening from global warming.

One estimate from science is that global warming will render a million species extinct. I am moved to comment that if you consider wind turbines in the context of the damage being done by global warming, it becomes clear that any number of birds their detractors claim they will kill is trivial compared to the number they could have saved. All the trees in New England are under threat of pathogens encouraged by global warming, with the exceptions of oaks and hickories. We are almost certain to have large stands of dead trees in our mountain views, and most likely to have fall colors of uniform brown. When that happens, it might not be too late to see wind turbines as pretty additions to a view. But it will certainly be too late to return to the view we have loved to see in the past.

The damage that has already been done is beginning to show. Whole stands of spruce have already commonly died in Massachusetts, and the spread of such problems into Vermont and New Hampshire cannot be stopped by any means I have heard of. The same can be said of dozens of similar problems that are yet to be widely seen.

We know the new normal will not be what we want. We need to get our renewable energy infrastructure, including wind, solar, and hydro, along with energy efficient buildings and energy efficient transportation, in place as soon as possible so that the new normal will be something we can live with.

Global Warming means much more than just floods. Time is of the essence. We all need to take a strong hold, to do all we can to stop the rising emission levels into our atmosphere. It is no longer business as usual. There is a New Normal at hand.

It is imperative that a clean renewable energy infrastrucure be built Right Now!

The Global Warming Harvest: Certainly Small but Possibly Deadly

An article appeared in the January 15, 2013 Scientific American titled, "Fortified by Global Warming, Deadly Fungus Poisons Corn Crops, Causes Cancer." According to that article, last year's drought increased the spread of the mold, Aspergillus flavus, to the point that it was in 50% of the Missouri corn crop. It is so deadly that the presence of its spores at a rate of 20 parts per billion, the weight of 100 corn kernels in a truckload, is enough to consider it badly contaminated. It is so destructive to human life that Saddam Hussein considered using it as an agent for biological warfare.

The article can be found at: http://www.scientificamerican.com/article.cfm?id=deadly-fungus-poisons-corn-crops.

THE DOHA CLIMATE TALKS

By George Harvey

The Doha climate talks ended just as Green Energy Times was going to press in December, so we did not report on them in the last issue. There have been a number of questions from readers about what was accomplished, so we are giving coverage here.

The bottom line is that aside from rhetoric and things that were purely symbolic, there was no positive outcome. Those who wish to do so said the talks were not a failure, but they go on to refer to the rhetoric.

The Kyoto Protocol was extended, but without any real effect. The United States, the only major country that never signed the protocol, was joined at Doha by others that dropped out. Canada was one of these. New Zealand said it did not want to take a leadership role and also dropped out. Others that exited the protocol include Russia, Japan, and Ukraine.

The Green Climate Fund was supported actively by countries that need money from it, and a number of countries that are to contribute said they wanted to do so, but firm commitments were fewer than needed.

There was an issue that supporters consider progress. It was decided that the countries producing the most greenhouse gasses would compensate those that are producing the least for the damages they would suffer. This, however, did not get as much support as it needed from the very countries that would contribute the support, which did not commit to it. Most European countries supported it, but many outside of Europe did not.

There is a general agreement to decrease carbon emissions to 18% less than they were in 1990. This is rather like choosing very slow death over slow death at a time when the choice needs to be a commitment to life. It is clearly known that we need to reduce carbon emissions to 25% to 40% less than they were in 1990. There was lip service to the more aggressive goal, but only lip service.

There was a lot of hot air. There was a lot of talk. Personally, I think the talks were complete failure to make real progress. There were things accomplished, but they were nothing compared to what is needed. The conference did not end in complete disaster, but that is not a measure of success. The sad thing is that this happened at just the moment when success is most vitally needed.

Right now, the International Renewable Energy Agency (Irena) has its third annual conference underway in Abu Dhabi. Perhaps we can hope for better things.

IRENA'S CONVENTION IN ABU DHABI

By George Harvey

Thirty thousand people went to Abu Dhabi for the conference of the UN's International Renewable Energy Agency (IRENA). Just about every country and every large organization with an interest in renewable energy and sustainable living had representatives there.

Part of the focus of the conference was getting power to people who do not now have it. A panel of experts called for distributed power from renewable resources, partly for that reason. They also pointed out that distributed power is less expensive and more sustainable than current models.

The conference put emphasis on the low-carbon economy, advising investors that there is great potential for growth in low-carbon technology. One report said green energy options are rapidly becoming the most cost-effective available. Another said that renewable energy has entered into a new beneficial cycle of falling costs, increasing deployment, and accelerated technological progress.

A number of reports from IRENA did not mince words about problems, however. In an address to the IRENA conference, US economist Jeffrey Sachs said the work being done was not nearly enough, and the world needs an entirely different energy system in place within 25 years. IRENA's own head economist told the conference that renewable energy production is not growing nearly fast enough. Yet another report said the renewable portion of our energy has to double by 2030. We need to accelerate our work to achieve that.

Unlike the Kyoto Protocol, which is losing members, support from nations for IRENA is growing. China and Saudi Arabia announced they were joining.

WHAT IS CARBON SEQUESTRATION?

By George Harvey

Carbon can be sequestered, which makes it unavailable for release to the atmosphere as carbon dioxide. This can be done in any of a number of ways. I will provide examples.

One technique for sequestering carbon is called carbon farming. Farmers can operate with a specific view to carbon sequestration, and get carbon credits, which can be sold. One way to do this is to move cattle from one pasture to another before they graze down too close to the ground, leaving grass six inches long, so it can recover more easily. This produces much deeper roots, which put carbon compounds, made from atmospheric carbon, much deeper underground, where they are made unavailable for nature to cycle back into carbon dioxide for a very long time. A side benefit from this is that the farmers can actually use the same amount of land for more cattle, because the grass recovers faster.

There are products whose manufacture naturally sequesters carbon. When trees are cut for lumber, the carbon they have taken from the atmosphere is rendered unavailable, sequestered, for a long time. Bio-char, which is charcoal, is a more permanent product for sequestering carbon. Bio-char is used as a permanent soil amendment, with the added benefit of reducing the need for fertilizer. Plastics can be made from agricultural products, as can synthetic lumber. All of these things take carbon out of the natural loop, making up for some of our carbon emissions.

Another technique is used with carbon capture at a power plant. If we are burning natural gas, the carbon dioxide going out the stack can be captured for sequestration. This is not nearly as difficult as it sounds; I have seen costs cited at $7.50 per ton.

Unfortunately, once we have captured the carbon, the next problem is what to do with the carbon dioxide that we have captured. One idea is to store it in old mines; but it can leak back into the environment. Another idea is to store it deeply enough under the ocean waters that the carbon dioxide liquefies; since it is heavier than water, it sinks, but we do not know the environmental consequences.

Another idea is to react the carbon dioxide we capture with other materials to render it into a form that is safe for storage. A recent news item covered the idea of using nickel dust as a catalyst that will react the carbon dioxide with calcium ions, which are abundant in sea water, to produce a compound that is essentially chalk. This is how some aquatic animals, such as sea urchins, make their hard outer surfaces. The process is very inexpensive.

Another idea is to react the carbon dioxide with hydrogen to produce hydrocarbons, which could subsequently be used to make plastics, or which could be used as fuel. The reactions require a lot of energy, but it can be supplied with minimal startup, so it can be done when the demand for electricity is low, helping balance the grid.

The biggest problem we have with all this is not how to do it technologically, but how to work it economically. The United States produces a lot of carbon dioxide, about 5.95 billion tons per year. This comes to about 18.7 tons, or 37,400 pounds, per person. That is a lot to deal with.

We can reverse global warming, but not until we stop talking about it and act. A point comes when it will be too late, and that time is not far away. The amount of carbon we are emitting is so great, it would be impossible to make it all into products such as plastics, lumber, and bio-char. In fact it is a very large multiple of what we could use.

Sequestering carbon is a very important idea, and it can ultimately be used to reverse global warming, but not until we reduce our consumption of fossil fuels to a small fraction of what they currently are. To do that we need to conserve power, and install a lot of solar and wind.

POWER PARTNERSHIP LETS CUSTOMERS BUY RENEWABLE ENERGY

By Heikki Perry

Somewhat lost in the shuffle of businesses and governments trying to reduce energy costs, a government-initiated program that allows electricity customers to buy renewable energy — and save money — is gaining traction with the help of companies dedicated to green power.

The Green Power Partnership, a free, voluntary program of the U.S. Environmental Protection Agency, assists organizations in procuring electricity generated from renewable resources and promoting their green power leadership. Through the purchase of Green-E certified Renewable Energy Credits (REC's), customers can purchase 100% renewable energy.

Glacial Energy, with offices in Laconia, New Hampshire, is a good example of a company that helps customers participate in this program by purchasing and retiring REC's on the customer's behalf through its Glacial Green Product offering. Founded in 2005, Glacial Energy is one of the fastest growing retail energy marketers, selling electricity and natural gas in deregulated markets throughout the United States. It serves residential, commercial, industrial and institutional customers in more than 20 states and 50 utility markets. It maintains a competitive position by combining expertise, quality of service and wide range of products, allowing it to be flexible and cost-effective. It has 4,500 commercial customers in New Hampshire, and also purchases REC's for the towns of Troy and Meredith, N.H, along with over 1,300 other towns and cities across the country.

"We supply Easter Seal, Tanger outlets, hotels, motels, restaurants, convenience stores, manufacturers, and many others," says Rich Seeley, Glacial Energy's regional director for New Hampshire, noting that the firm's Laconia, N.H., office also has clients in Maine and Massachusetts.

The U.S. Environmental Protection Agency awards cities and towns that use REC's while manufacturers can get LEED status by buying renewable energy. Each REC represents the environmental attributes of one MWH (megawatt hour) of electricity generated from renewable resources. Customers get one LEED credit point for each REC they obtain. REC's provide direct financial support to renewable energy projects, and buildings seeking to meet LEED benchmark standards can receive various ascending levels of recognition— Certified, Gold, Silver, and Platinum.

In the short term REC's provide an ability to reduce greenhouse emissions and improve impact on the environment. Their long-term effect is to support renewable energy initiatives such as wind, steam, hydroelectric and tidal, helping to ease stress on the grid and allowing for the expansion of green initiatives to help meet future needs.

WHAT IS AN REC?

A Renewable Energy Certificate (REC) certifies that the holder owns credit for the fact that one megawatt of power was renewably produced. Such certificates can be sold.

State mandates requiring that utilities produce a certain percentage of their power from renewables might be unachievable, if the utilities themselves had to build massive renewable infrastructure. However, renewable power can come from large numbers of smaller installations from smaller investors.

Producers of renewable power can sell or use the power they produce, and separately sell its REC to reward their investment in renewable production. By paying for the credits, the utilities can show the required percentage of renewables in their portfolios, without making an immediate huge investment.

Since the state mandates increase with time, the utilities must close down old plants and replace them with renewables eventually; as a result the RECs do not allow old plants to stay open forever.

Glacial Energy is publicizing the Green Power Partnership program, because not all commercial clients realize it's there. "We're trying to raise awareness so commercial customers know they have that opportunity, and that they should look into it," Seeley says.

Glacial Energy (www.glacialenergy.com), is a business partner of Green Alliance (www.greenalliance.biz).

RUTLAND, VT - SOLAR CAPITAL OF THE NORTHEAST

Cont. from p. PB

merger of CVPS and GMP, with many more on the way. To be clear, while we will continue to build new projects ourselves, we also want to be a catalyst for development by others, and we are confident that we will be successful in getting others to develop all kinds of projects – from small to large – over the coming year or two.

Our first project, completed in December, is the 150-kilowatt Creek Path Solar Farm, approved by the Vermont Public Service Board barely seven weeks before it came on line. The project was built on a former brownfield and was completed two weeks ahead of schedule.

Creek Path Solar Farm, which was built by Same Sun of Vermont, Rutland, VT

It is nestled onto a GMP-owned 3-acre lot between West Street, Cleveland Avenue and East Creek, adjacent to Rutland's new Creek Path, for which the solar farm is named. The site housed an old coal-to-gas plant at the turn of the 19th Century, but had sat, contaminated and largely empty, for several decades. We cleaned it up in 2011 and it is now generating energy. The project was built by Same Sun of Vermont, a Rutland company, which won the bid over nearly a dozen other bidders.

We also purchased 99% of a 150-kW project on the city's former Poor Farm, just off Route 4 near the high school, which is also now on line. This project was built by All Earth Renewables under a contract with Green Lantern, which developed the concept and then sold us an interest as it neared completion.

GMP has negotiated a 25-year lease on the former city landfill on Gleason Road, where the company plans to build a solar farm of 2-MW or larger, which we will call Stafford Hill Solar Farm. The project is on a hill behind the Stafford Technical Center, which has worked on several solar projects for us, including the Creek Path Solar Farm.

We are in the early planning stages for this project, and are about to award a contract for the engineering and design. Given permitting and planning time requirements, our hope is to have the project on line next year.

Rutland will have the highest solar reliance per capita of any city in the northeast.

We are also planning to put solar on the roof of the new Energy Innovation Center. Exactly how much we'll be able to put there is still unclear, but it will be in the 10-kW range. The building will be heated with air-source heat pumps, with a biodiesel burner as backup, so we'll be fossil-free for heat!

In addition, we are looking at several other possible projects in the city ourselves, and in consort with other developers, that we will announce once we have reached agreement on various deals. We are aware of a half-dozen companies in various stages of negotiation or planning at multiple sites in the city, and we continue to encourage both project development and solar companies to open offices in Rutland.

Steve Costello is the Vice President, Generation and Energy Innovation, for Green Mountain Power.

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**

U.S. Department of Energy (DOE) Energy Efficiency & Renewable Energy: . Guide to energy efficiency - **www.eere.energy.gov/consumer**

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-**

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VERMONT DRIVING SCHOOL

Teaching Eco-Driving techniques to new Teen and Adult Drivers Teen Class starts March 25 in Hinesburg,VT. Richard Ritter, owner. 802-318-8140 email: vermontgreendrivingschool@gmail.com www.vermontgreendrivingschool.com. Vermont Green Driving School LLC P.O. Box 3071 Burlington, VT 05408

INVERTER FOR SALE

Schneider Electric Xantrex GT30 Grid-Tie Solar Inverter

This three-phase, bi-polar inverter delivers 120/208 Vac out of the box and can be used as a building block for larger systems. The Xantrex GT30, weighing in at only 165 lbs (75 kg), is a 30 kW high-performance inverter that makes utility-interactive installations easier and more cost effective. It features a transformerless design, superior PV energy harvest, easy installation, and an ultra-lightweight package.

Condition: New. Still in original packaging/crating; strapped on pallet and ready to ship! Transformerless, bi-polar inverters are highly efficient and considered safer by many due to far superior ground-fault detection. Extremely popular in Europe, and growing in popularity in the USA. This is a commercial, 3-phase inverter (208 VAC). Will let go for $7k, which is less than half the current value . Please contact Tom Mills with any further questions or inquiries! (603) 526-6899.

COMPOST POWER

"Compost Is HOT. CompostPower.org has figured out how to capture 100-140 degree water from a specially built compost mound for 12+ months. It works! FREE Design Guide for DIY at www.CompostPower.org. Or you can pay us to help you."

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Ingredient of the Month

By Larry Pleasant

TOPICAL ALCOHOLS

You may consider yourself an expert on alcohol and experiment with it daily. But did you know that TOPICAL alcohol must always be poisoned before it is bottled and used?

Recreational drinking alcohol or ethanol is a huge source of tax income for Federal and State Governments and is taxed accordingly. But when alcohol is for EXTERNAL use only, it is taxed at a substantially lower rate. External use ethanol is usually sold as Rubbing Alcohol.

In order to make sure that the alcohol cannot be used internally it must be poisoned first. This is called denaturing the alcohol, and the poison itself is called a denaturant.

"The main additive has traditionally been 10% methanol giving rise to the term "methylated spirit." Other typical additives include isopropyl alcohol, acetone, methyl ketones, and denatonium (aka Bitrex). The idea here is to make the stuff taste so bad and so bitter that no one will try to ingest it.

Putting poison on your skin is never a good idea. Only fifty years ago people still believed that it was fine to put petrochemical and solvent chemicals on our skin. It was believed that our skin was an impenetrable barrier that protected our blood from the outside world. People would even wash their hands using gasoline. Our skin is a highly penetrable membrane - why nicotine patches are used.

Methanol, which can cause permanent optic nerve and liver damage, penetrates easily through skin application, breathing the fumes, or from drinking it. In my book it is one of the "ubiquitous baddies" we can be exposed to in our day to day lives. Methanol is the main ingredient in Windshield Washing Fluid.

When alcohol penetrates our skin, we absorb not only the alcohol and the denaturant, but also any other water or oil based ingredients in the formula. Alcohol is an emulsifier, which means it can "hold hands" with both water and oil based ingredients like the toluene, the unnamed (trade secret protected) toxic solvent found in most fake scents. If you cannot tolerate a variety of artificial scents but are OK with most pure essential oils, toluene may well be the common molecule to explain your "scentsitivities".

Overexposure to methanol and to other chemicals commonly found with the methanol may be one way that broad based chemical sensitivities arise through over exposure.

The alcohols themselves can carry into your blood molecules such as scent or foaming agents that otherwise readily might not penetrate your skin. It is entirely possible that this may create chemically intolerant states in otherwise healthy individuals. As your liver attempts to filter out the chemical soup you throw at it each day, it "remembers" molecules that have caused it harm and "tells" your body to stay away from them through a variety of reactions including and especially through skin reactions and sensitivities.

Other solvents, especially petrochemical based solvents, may well be triggers for this reaction too. I am not claiming methanol is the only culprit. Regular readers will quickly recognize a common theme in these missives. I am constantly reminding thinking people that it is best take a Precautionary Principal when mixing chemistry (new technology building blocks) with biology (all living things).

If it is not found in nature, and we have not had endless generations to adapt to it, it is probably going to have long term negative effects on you and on the local biology (our ecosystem and your body).

This is not anarchist ranting. This is common sense. If you (the biology) ain't adapted to it (the chemistry), it is probably going to hurt or eventually kill you. Radical thinking? Maybe not. Perhaps it is the fouling of our planet with noxious chemical wastes that in fact is the radical notion.

This is the Soapman, urging you to keep it clean and natural.

Organic alcohol can be denatured with strong essential oils instead of the poisons listed above. Only a certified organic product is guaranteed to be petrochemical free.

This is the Soapman reminding you that natural is a process – not a result; and urging ya'll to Keep it Clean!

Allergies and Improving Our Indoor Air Quality

Even for those of us without allergies, poor indoor air quality is an often overlooked health issue. Recent research has shown that the air inside some buildings can be more polluted than the outdoor air in the most industrialized of cities. And since many of us spend some 90% of our time indoors, cleaning the air where we live and work might be one of the most important things we can do for our health.

The U.S. Environmental Protection Agency (EPA) lists three basic strategies for improving indoor air: source control, improved ventilation and air cleaners. Source control, whereby emissions from individual sources of pollution are eliminated or reduced—such as storing old paint and construction supplies outside of the home.

Bring in air from outside through better ventilation. "Most home heating and cooling systems, including forced air heating systems, do not bring fresh air into the house," the EPA warns. "Opening windows and doors, window or attic fans, or running a window air conditioner with the vent control open, increases the outdoor ventilation rate." Bathroom or kitchen fans that exhaust outdoors also remove contaminants and increase outdoor air ventilation.

Air cleaners (mechanical filters, electronic cleaners) can help reduce indoor air pollution. "Some air cleaners are highly effective at particle removal, but most table-top models are much less so," reports the EPA. "Air cleaners work best in conjunction with concerted efforts to remove the source." The agency's free online "Guide to Air Cleaners in the Home" compares the general types of residential air cleaners and their effectiveness in reducing pollutants including particles and gaseous contaminants.

Photo Credit: iStockPhoto
Poor indoor air quality is an often overlooked health issue. Recent research has shown that the air inside some buildings can be more polluted than the outdoor air in the most industrialized of cities.

Houseplants help to keep indoor air free of pollutants. Mother Nature Network reports that certain plants are known to filter out specific contaminants: Aloe removes airborne formaldehyde and benzene; spider plants scrub carbon monoxide and xylene; and gerbera daisies take the trichloroethylene left over from dry cleaned items out of your air. The EPA, however, warns that overwatered indoor houseplants can in and of themselves present a health hazard because damp soil may promote the growth of allergens.

Good housekeeping also can go a long way toward improving indoor air. WebMD reports that regular mopping and vacuuming (with a HEPA-filter-equipped vacuum cleaner), keeping interior moisture levels low, maintaining a smoke-free environment, and ditching chemical air fresheners are key to maintaining good breathing space inside. Test your home for radon, a radioactive gas found in soils that can penetrate cracks in a building's foundation and has been linked to lung cancer.

Contacts: EPA Indoor Air Quality, www.epa.gov/iaq/; WebMD's "Breathe Easy: 5 Ways to Improve Indoor Air Quality," www.webmd.com/lung/features/12-ways-to-improve-indoor-air-quality.

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

Green Tips

Welcome to greening the inside of your home!

By Deborah DeMoulpied, Bona Fide Green Goods

While LEED certification might seem like the be-all end-all for having a green home, it's like getting that formal dress and fur coat on (oops, not PC for sure) and forgetting the watch, jewelry, shoes, and hand bag. A green home is more than just the shell and core all spiffed up and sustainable; it's also about how you accessorize the inside – that is, how you decorate it. Welcome to greening the inside of your home.

Some things to consider are actually similar to LEED certification criteria. For instance, what are products made from, where do they come from, and is it from a renewable or recycled source? Are they natural fibers, locally or U.S. made, or reclaimed materials? Was the manufacturing process over-polluting? Were safe adhesives, coating, or finishes used in order to avoid VOCs? Can the product be easily maintained? Are they durable? Can it safely be disposed of or recycled?

Additional considerations for the interior of your home mostly center on chemicals and plastics. Are there flame retardants, stain repellants, or wrinkle-free chemicals on fabrics, upholstery, curtains, or carpets? Is vinyl or PVC being used as flooring, shower curtains, or furniture? Are the cushions, mattresses, and pillows made from foam or materials that do not break down, off-gas, or have flame retardants? Are there artificial fragrances found in air fresheners, candles, incense, and diffusers?

So what's an eco-warrior, home designer and accessorizer-wannabe to do? Here's a list of some tips to get you started:

Choose naturals fibers like linen, hemp, wool, or cotton that are naturally dyed and not chemically treated for curtains, upholstery, rugs, and bedding.

Consider natural, solid woods for furniture, avoiding pressed or particle board products.

Look for or use low VOC (volatile organic compounds) paints and finishes.

Scratch the flame retardants in mattresses, furniture, and other products.

Give the sniff test. Nothing should smell – not like a chemical, deodorizer, or fragrance. Never that "new car" smell.

Fill your home with plants that filter and clean the air. Just Google "top houseplants for clean air" to get you started.

Invest in antiques or collectables which were around long before the chemical industry took hold. Who doesn't love an old wool rug?

And finally, the 3 Rs – Reduce, Reuse, Recycle. Reduce – the amount of chemically intensive products within the home. Reuse – what you already have, with a new facelift if necessary. Recycle – what you have into something else or purchase recycled or reclaimed items.

So whether your style is sleek minimalists or warm country, traditional or eclectic, you may use these green tips to make your personal surroundings healthier and definitely more sustainable.

Deborah de Moulpied is owner/founder of Bona Fide Green Goods, an earth friendlily department store. Deborah is also faculty of the Anticancer Lifestyle Program designing and teaching patients about environmental toxins and healthier solutions.

Reducing Carbon Emissions by Reducing Consumption

By Jonathan Teller-Elsberg

We all have in mind reducing our direct consumption of fossil fuels. However, plenty of carbon is emitted indirectly on our behalf through the manufacturing processes for and transportation of the stuff we buy. As David MacKay calculates in his fantastic book, Sustainable Energy: Without the Hot Air (available in full online), roughly 31% of all energy in the UK economy goes to producing and transporting "stuff." I think it's safe to assume that the US isn't too different.

Those of us fortunate enough to have more than the bare necessities often idealize lives of reduced consumption. Less isn't always more, but sometimes it is. What follows are some suggestions for habituating to less.

Don't watch TV. I know, I know, we're in a golden age of actually decent TV shows. (So they tell me.) Well, you don't even need to be particularly frugal to watch them on DVD rather than via broadcast. TV = commercials, and if you think you aren't susceptible to advertising, you're as deluded as a climate skeptic. If you are human, advertising works on you. You might not buy the particular thing advertised, but you are being brainwashed to be discontented with your life and to see new stuff as the solution.

Choose one day per week as "consumer" day. With the rise of internet commerce, and as marketers devise new ways to trigger instant gratification (e.g., Groupon), whim shopping is easier than ever. Resist by allowing yourself to make non-grocery purchases on only one day per week. On other days, maintain a list of the things you think you want to buy—come consumer day, you'll have a chance to think twice about the things on your list.

Make—and keep!—a budget. Also, use cash. People are more careful about buying stuff with cash than with credit cards. As for a budget, the most successful version I've personally encountered is the "cash only envelope system" made most famous by Dave Ramsey (daveramsey.com). If his evangelical Christianity rubs you the wrong way, search the terms and find other explanations. Though this and similar budgeting systems are usually thought of as ways to deal with personal debt, the act of making and keeping a budget works well to reign in consumption regardless of your debt situation.

Create non-book libraries. Much of what we have consists of things we use only occasionally, like the dryer vent cleaner that sits in my barn 364 days a year. Why should any of my neighbors buy one of their own? Make your stuff available for borrowing by your neighbors, and vice versa. Talk with the staff at your local library to see if they might have space for non-book items, or find some other location—or create a local email list for loaner exchanges. Wikipedia lists tool-lending libraries and links to resources at en.wikipedia.org/wiki/List_of_tool-lending_libraries.

For more ideas on reducing consumption, and to contribute your own, visit www.wikihow.com/Buy-Nothing.

Jonathan Teller-Elsberg is a permaculture consultant in Norwich, Vermont, specializing in the design of edible landscapes for small properties in the Upper Valley. His website is www.TerraPermaDesign.com.

Interiors green Shots!
THE HOME AND LIVING STORE

Natural - Sustainable - Organic INDOOR DESIGN

By Jessica Goldblatt Barber

Your home should be your retreat – a place to escape to that reflects your lifestyle, personality and individuality.

Following these principles will help you achieve the desired results:

Reduce, reuse, recycle. This involves taking used items, antique and vintage and transforming them into new furniture or new uses. Why? This reduces the need for consuming new raw materials thus reducing energy use, landfill and lowering greenhouse gas emissions.

Low VOC's & non-toxic materials. Materials such as paints, stains, varnishes, carpets, new furniture and kitchen joinery can off-gas many, many chemicals producing poor air quality in your home. This can continue for years after the products and materials are initially installed. By selecting products that are non-toxic, organic, natural and low or no VOC you are improving the quality of your air within your home and reducing the effects of poor air quality on your health. It can be hard sometimes to wade through what will be truly non-toxic, durable and cost effective but with some research one can find many wonderful products on the market that will add beauty and health to your final design.

Made in the USA. By buying furniture, home-goods and finish materials buy made in USA when possible you are supporting local communities, maintaining creative skills and local craftsmanship and reducing energy consumption and green house gas emissions by avoiding overseas transportation.

Fair trade. Is the term given to a movement to promote a better financial relationship between producers, sellers and consumers. By buying fair trade products you area supporting farmers, their families and communities in receiving more stable and secure incomes and better working conditions.

By using natural, organic and recycled finishes like milk paints, natural paint, earth plasters, local or recycled wood flooring, natural cork, local stone, recycled glass and other products that take indoor air quality and the earth into consideration by Inviting Mother Nature into the home through home design is an exceptional way to get back to basics while infusing a house with warmth, color, purpose and practicality.

I support these principals in my shop, while I am sourcing products, materials and creating designs for my clients, as well as in my own personal life.

Jessica Goldblatt Barber is the owner of Interiors Green, The Home & Living Store, located on Main Street in Bethlehem NH, where you can be assured that she supports these principals when creating designs with these products and materials for clients. www.interiorsgreen.com

Sustainable Non-toxic House Cleaning

By Clare Innes

Many household cleaners contain dangerous, toxic, and flammable substances. Do we really need all that heavy artillery that endangers health and the environment just to do a little housecleaning? Absolutely not. These days, there are enough alternatives available in most grocery stores that won't threaten your health or that of the environment, yet still enable even the most picky housekeeper to keep the dangerous stuff out of their cabinets.

To handle many household needs, all it takes is a little vinegar, baking soda, or even regular old toothpaste to restore a squeaky-clean shine. Here's a list of ingredients - you probably already have most of them in your cupboard:

Baking soda (sodium bicarbonate): Excellent odor absorbent and mild abrasive.

Borax: Cleans, deodorizes, disinfects, softens water, great for cleaning wallpaper, painted walls, and floors. Considered toxic in its concentrated form. When used in small amounts in cleaning recipes, it is non-toxic.

Essential oils: Mostly used for deodorizing or scenting cleaners. Mint, eucalyptus, lavender, lemon, and tea tree offer pleasant scents. See precaution in the Borax description.

Glycerin: Found in pharmacies or health food stores.

Hydrogen peroxide: Use the household concentration (3%).

Lemon: A strong food-acid, effective against most household bacteria.

Liquid soap: Vegetable-based soap, sometimes referred to as castile soap. Dr. Bronners is a popular brand.

Liquid detergent: Vegetable oil-based detergents are less toxic than petroleum-based products.

White distilled vinegar: Removes soap scum, grease, and mineral deposits, and acts as a deodorizer.

Elbow grease: Applied by the appendages hanging from your shoulders; leaves behind a healthy glow.

Remember, before applying any cleaning formulations, test in a small, hidden area. Always use caution with any new product in your home and keep your formulas well-labeled and out of reach of children.

And now for a short stack of recipes:

Silverware & jewelry polish: Use an old, soft toothbrush or your fingers to rub the tarnish off jewelry. For big jobs, dissolve a tablespoon each of salt and baking soda, and submerge a 3-inch square of aluminum foil per cup of warm water. Soak your silver in the solution for 1 hour. Rinse, dry with a soft cloth. Evaluate your jewelry carefully to ensure that non-silver parts will not be damaged.

Fabric softener: Add 1-2 cups of vinegar to rinse cycle to deodorize and soften fabrics.

Air freshener: Dissolve 10-20 drops of essential oil in 1 tablespoon of rubbing alcohol, then add water and mix thoroughly. Pour solution into an atomizer or spritzer bottle.

Stainremover: Sprinkle surface with salt and squeeze lemon or lime juice over the area. Let sit and rub out. This can remove most rust stains if allowed to sit a few hours.

Scouring paste: Mix 2/3 cup baking soda with ½ cup of liquid soap or detergent. Then mix in 2 tablespoons of vinegar. Add water if needed to reach desired consistency. Keep in a container at the kitchen sink for scouring pots and pans - or the kitchen sink itself.

The internet is packed with recipes for greener homemade household cleaners. Here's a short list of sites containing more information: Earth-easy.com, Webmd.com, Care2.com, The DailyGreen.com

Clare Innes is the Marketing Coordinator, Chittenden Solid Waste District. For more information visit www.cswd.net, e-mail: info@cswd.net, or call the hotline: 872-8111.

Cleaner/Polisher for Soap Scum

Wood Ashes. If you sift your cooled wood or pellet stove ashes and put the resulting fine ashes into a shaker jar, they serve to do more than lowering the PH level in your soil! To use, simply wet a scrubbing pad and wipe that soap scum away. Rinse often. Water will bead up and you will get a brilliant shine. This tip was given to us from a reader in the NEK. Thank you Roger!

Enhanced Geothermal System

By George Harvey

One thing that has shown up in the news of late is the Enhanced Geothermal System (EGS) for generating electricity. Readers might want to be aware of it.

So far, I have avoided the subject, because it is a bit too complicated to be included in a general discussion. People have views on wind, solar, fracking, and other commonly discussed topics. Most people I talk to, however, do not remember ever hearing of EGS.

EGS is a technology in which at least two wells are drilled very deep into the crust of the earth, and rather close together. Cold water is injected into one well, and when it gets to the deep rocks at the bottom of the well, they contract unevenly, reopening old cracks that have long been clogged with minerals. The rocks slip in a process called hydro-shearing, opening cracks further, and allowing for sufficient flow from one well hole to the other. What comes up from the second well is very hot, and can be used as a power source or for heating.

Hydro-shearing is conceptually similar to hydro-fracking, because both open up cracks far underground. There are some important differences, and these should be understood. The differences arise from the fact that the two different systems are used for very different purposes.

Hydro-fracking is done in geological formations that are impermeable to fluids. The idea is to open up cracks where they had never been before, so the fluids trapped in or under them can be extracted. This leads to a big problem, which is that fluids, including oil, gas, and chemicals injected to open cracks, can find their own ways to get to the surface, polluting the ground, springs, and wells at the surface. One reported result is that when a tap is turned on, natural gas comes out along with the water, sometimes in sufficient quantity that the tap can catch on fire.

Hydro-shearing, by contrast, is done in places where there is no impermeable layer holding oil or gas. Instead, the cracks open where they had already been. The area is not widespread, but intended to bridge the space between two wells that are positioned close together. The damage is less extensive, and has much less potential for pollution.

There are certain problems both systems share. Foremost is the fact that both systems can cause earthquakes. So far, the earthquakes from hydro-shearing have been very minor, similar to what might happen when a cavern or mine collapses, and there is no known reason to think anything worse will come of it. Nevertheless, the earthquakes are enough that at least one project in Europe was shut down for fear they could get worse.

We might ask why this is important. Hydro-fracking is illegal in Vermont, but not in other states of the area. Hydro-shearing might be illegal in Vermont, depending on how the law is interpreted, but would not be in other states. Nevertheless this could turn out to be important, and if it is illegal in Vermont, laws might be changed to allow it, as its benefits become clearer.

The potential benefit of EGS becomes apparent when one reads the reports on renewable power from the DOE's Renewable Energy Laboratory (NREL). New England states have a rather small potential for EGS, compared with states in other parts of the country. Even so, Vermont has the potential to generate 35,617 gigawatt-hours (GWh) of electricity per year, according to NREL. That compares to 5,595 GWh Vermont uses. If we fully developed EGS in Vermont, we would have enough power and heat to supply all our electricity, power all our industry, power all our vehicles, heat all our buildings, and export more than we use.

EGS also has one advantage over other renewable resources. Unlike solar and wind, which are the other two potentially great resources, its power is constant. In that regard, it would almost certainly be better than hydro, which suffers in dry weather, and nuclear, which has to be shut down about 6% of the time for refueling.

One major drawback to EGS is that it might give the temptation to offer "power too cheap to meter," as the old saying on nuclear power went.

And so, as far as I am concerned, the jury is out on this one, and will stay out until more science is done.

Edible Landscaping Series - Part I

Growing Fruit trees in the Ecological Home Landscape

By Nicko Rubin

What is the ecological landscape? What does ecology really mean anyway? My computer's dictionary defines it: "The branch of biology that deals with the relations of organisms to one another and to their physical surroundings." By ecological landscape I mean a landscape that works with and encourages beneficial relationships between the various elements; from our soil to our neighbors. This creates a system with a great degree of stability, integrity, health, and beauty. This series of articles will focus on growing fruit trees, berry plants and maybe even a few nut trees in the context of the ecological landscape.

This first of three articles will cover the fundamentals of establishing your fruit trees or berry plants. Now is a great time to get planning.

First things first, where do we want to plant? The big relationships to consider here are between you, the plant, and the site. Plants appreciate our regular attention especially in the establishment phases. If we walk by a plant on a regular basis we are much more likely to notice any trouble before it gets too late. Consider how often you will want to visit the tree for harvesting or maintenance? Many berries are best picked fresh daily, while apples or pears may be harvested once or twice a week. When a tree or shrub is out of the way the fruit may be gone before you notice it, serving the wild animals willing to give it more regular attention. Some fruit creates a bit of a mess so be aware of walkways (or plan on keeping drops cleaned up). Many fruit trees or shrubs are beautiful and will also contribute to the aesthetics of the landscape. My favorite place for blueberries is always between the parking and the front door. I strongly recommend planting close to those areas you already inhabit the most.

That said, plants need space, and they will take it. Plant planning for the size of the mature tree or shrub, this can vary, but any reputable nursery should be able to give you a good idea. In addition to space, fruiting plants will need plenty of sun. With the exception of plants in the ribes family (currants and gooseberries) nearly all fruiting trees and shrubs for our northern climate need full sun to thrive and produce a full crop. Many will grow with a good bit of shade but produce little to no fruit. A crop of apples is no small feat, make sure your trees will have plenty of light. Sometimes this means cutting back or removing existing trees. Consider how the sun moves throughout the day and over the course of the year.

The other major site consideration is the soil. The most fundamental point of interaction between the plant and the site is within the soil. The soil serves as the digestive system for the tree, breaking down minerals and nutrients making them available to growing roots. This process depends on an amazing slew of soil critters (from microscopic bacteria and fungi, through to beetles and earthworms). Supporting this soil life is essential to supporting the health of the tree. Organic mater, water, and air are the basic essentials required for this life to thrive. Trees and shrubs, just like your vegetables, appreciate the best soils. In our very moist northeastern climate. I see lack of air far more often than lack of water hindering growth of new plantings. Wet soils, heavy clay soils, or soils compacted by machinery will not do an adequate job providing the air for your tree's roots and associated biology without some significant adjusting.

The next article will cover strategies for planting on challenging sites as well building long term mineral nutrition and fertility for your new plantings.

Nicko Rubin owns and operates East Hill Tree Farm, a nursery for fruit trees, nuts, and berries in Plainfield, VT. He also offers consultation and edible ecological landscape design and planting. narubin@gmail.com.

Even Carbon Dioxide can be Recycled

By G.H. Harvey

The Sabatier process was discovered by Paul Sabatier, who published the first paper on it in 1913. In the presence of somewhat elevated pressure and temperature (300°-400° C.), and in the presence of an appropriate catalyst, such as nickel, hydrogen combines with carbon dioxide to produce methane. The reaction is:

$CO2 + 4H2 \rightarrow CH4 + 2H2O$

This requires more energy than it produces, but it has the advantage of making it possible to store excess power generated by solar or wind power plant in the form of methane. The methane can be used in a gas-fired power plant, from which the carbon dioxide can be recaptured and reused.

If we have sufficient wind and solar power, they will often produce more power than we need. Using that excess to make methane from captured carbon dioxide turns gas-fired plants into what are, in effect, batteries to stabilize the grid. Alternately, the methane can be used as feedstock for making a wide range of other products, such as plastics or other fuels.

This becomes cost-effective in times of high energy production and low energy use.