ISSUE 27 AUG 15 - OCT 14, 2014

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CLIMATE CHANGE: WHAT HAVE WE GOT TO LOSE?

All cover photos are courtesy of EDF (Environmental Defense Fund). www.edf.org/FallFavorites

MOVING OUR MORAL COMPASS TOWARD ACTION ON CLIMATE CHANGE

By Johanna Miller

I don't consider myself a religious person. I don't affiliate with any particular ideology or attend church regularly. I do, however, believe in God, higher powers and the golden rule.

"Do unto others as you would have them do unto to you."

It's a commonsense, kind and unifying principle threaded throughout most religious beliefs. It's a principle my faith-led family has adhered to, and one upon which I have aimed to orient my interactions with others in this world — and the world itself.

That's why I have long been perplexed that, as a planet full of people rooted in faith and religious communities, we fail to apply the golden rule to the one mother we all share — our Earth.

We have built a civil society largely rooted in the extraction and pillaging of the world's natural resources, bankrolling abundance today but bankrupting families of the future.

Globally the quality of our air and water worldwide has worsened over time. We are also witnessing rapidly rising atmospheric carbon emissions and an increasingly acidified ocean.

These realities leave me thinking more than ever — especially now that I am a mother — what kind of world are we going to leave future generations?

I have been hoping since elementary school, when my concerns about environmental issues began, that the latest bad news or eco-tragedy would be the last straw and finally motivate our global society to stop taking from the planet without giving back.

Once again, I have been both terrified by the latest reports on climate change and buoyed by hope. The climate messages that have come out recently are more clear, unified and urgent than ever. It makes me optimistic, once more, that this news will force us to recognize the costs

cont'd on p. 14

FALL FAVORITES AT RISK!

By Heather Shelby

Is your favorite fall tradition threatened by climate change?

Every autumn one of the favorite parts of my childhood was to pile into the car and drive out to an orchard, where miles of forest stretched out all around us. There, we'd fill our bags with perfect ruby apples and go home to fresh apple pie, sauce, cider and more.

But thanks to climate change, this favorite fall tradition of mine is at risk. Is yours?

You know it as well as I do that the world is changing. Throughout the continental U.S., autumn has been arriving later and later, to the point where leaves are now falling off their trees about ten days later than they did twenty years ago.

These changes, along with the challenges of new, more extreme weather, are taking a toll on everything from football to foliage.

So as the leaves finally start to turn, we've pulled together our five favorite fall traditions that are at risk from climate change.

We all have our favorite fall traditions—but even they can't escape the devastating effects of climate change. Subtle seasonal changes and new, extreme weather combine to put all our fall favorites at risk, from football to foliage..

FOLIAGE AT RISK

Nothing more vividly signifies the coming of fall than the fiery foliage that heralds its arrival—but even these beautiful landscapes are at risk in a warming world. The awe-inspiring reds that are unique to the sugar maple are a direct result of cool fall nights. As temperatures fall, the ruby leaves may appear less vibrant.

APPLES AT RISK

There's no denying that the apple is the fruit of fall, but possibly not for long. Most varieties of the fruit trees require a winter chill to develop properly. Without it, the resulting fruit may lose its trademark crisp crunch, becoming overly mushy and overly sweet. Not exactly the autumnal treat we all know and love..

MAPLE SYRUP AT RISK

It's not just the maple's scarlet leaves that are at falling victim to climate change—the tree's sap is losing its sweetness, and its signature syrup might never be the same. Environmental Defense Fund's Chief Scientist, Steve Hamburg, has taken a particular interest in how climate change is affecting this staple of his New England home, and he's working with syrup farmers to get an inside look at what's happening..

BEER AT RISK

Football and beer go hand-in-hand—and together, they're facing an uncertain

Fall Favorites cont'd on p. 32

SOLAR IS THE SOLUTION: NO SUN AT NIGHT -- NO PROBLEM!

By George Harvey

New battery technologies are being developed continually, and some show impressive promise. One particularly interesting example was in an announcement from the University of Southern California (USC) of a new flow battery technology. A flow battery has two fluid electrolytes flowing in opposite directions with a membrane between them. There are separate reservoirs for fresh and expended fluids. Such batteries can be recharged electrically, or the electrolytes can be pumped out with fresh electrolytes replacing them. They are said to be suitable for grid and home use.

The USC battery is notable for three reasons. First, the electrolytes are organic compounds that are relatively non-toxic. Second, it is longer lasting than a lithium-ion battery. Third, it costs only a very small fraction of what a lithium ion battery does. This design is only one of many, interesting examples of the research that is being done in this field.

We do not need to depend on new technology to reduce the prices of batteries, however. There are economic developments that will reduce the prices for current technology to the point that they can transform the grid.

Elon Musk, CEO of Tesla Motors, announced plans to build a $5 billion

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GREEN ENERGY TIMES (G.E.T.)

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Thank you all for your help!

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

Our mission is to create Energy Awareness, Understanding and Independence - Socially Responsible Living.

Solar Power works! … anywhere! under the sun!

G.E.T. is published bi-monthly, Feb.15, Apr. 15, Jun.15, Aug. 15, Oct. 15 & Dec.15, by NRM Advertising Company. It is free and available throughout 90% of VT & 80% of NH: the Upper Valley-St.J.down to Brattleboro,Windsor-Ludlow, Barre-Montpelier-Burlington, Stowe, Mooretown-Waitsfield, Morrisville, Hardwick, Danville, NEK, Grand Isle, Woodstock-Rutland-Bennington; NH: Woodsville-Hanover-W. Leb.-Plainfield, Enfield-Claremont, Keene-Concord-Plymouth-La-conia, Littleton, & towns in between, Greenfield Center, MA. New: Rye & Portsmouth, NH

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

Thank you for reading G.E.T. Please send your comments & suggestions to: info@greenenergytimes.org

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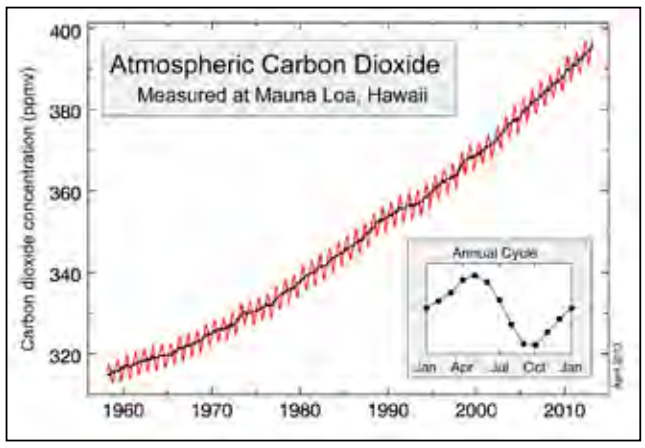
So What If the CO2 levels are 402.5 ppm?

I welcome the warmer temps….

"Carbon Dioxide Levels Just Hit Their Highest Point In 800,000 Years " Credit: Shutterstock

Originally posted and updated by Kiley Kroh on April 9, 2014 at thinkprogress.org, with the title ***"Carbon Dioxide Levels Just Hit Their Highest Point In 800,000 Years."***



Narayanese, Sémhur, and the NOAA [CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

The concentration of carbon dioxide, the greenhouse gas that drives climate change, hit 402 parts per million in April this year — the highest level recorded in at least 800,000 years.

The recordings came from the National Oceanic and Atmospheric Association's Mauna Loa Observatory in Hawaii, which marked another ominous milestone last May when the 400 ppm threshold was crossed for the first time in recorded historyCarbon dioxide (CO_2) levels spike every spring but this year the threshold was crossed in March, two months earlier than last year. In fact, it's happening "at faster rates virtually every decade," according to James Butler, Director of NOAA's Global Monitoring Division, a trend that "is consistent with rising fossil fuel emissions."

400 ppm, long considered a very serious measurement, is just a marker on the road to ever-increasing carbon pollution levels, Butler explained in an interview on NOAA's website. "It is a milestone, marking the fact that humans have caused carbon dioxide concentrations to rise 120 ppm since pre-industrial times, with over 90% of that in the past century alone. We don't know where the tipping points are."

When asked if the 400 ppm will be reached even earlier next year, Butler responded simply, "Yes. Every year going forward for a long time."

While atmospheric CO_2 levels never approached 400 ppm in the 800,000 years of detailed records scientists have, there is evidence that the last time the Earth experienced such high concentrations was actually several million years ago. Writing about the 400 ppm recording last year, climatologist Peter Gleick pointed to UCLA research "that suggested we would have to go back at least 15 million years to find carbon dioxide levels approaching today's levels."

But whether it's 800,000 years ago or 15 million years ago, Gleick emphasizes that "the more important point to remember is that never in the history of the planet have humans altered the atmosphere as radically as we are doing so now."

And this uncharted territory is something humans will have to navigate for quite some time because once its emitted, carbon dioxide remains in the atmosphere. In fact, Andrew Freedman explains, "a single molecule of carbon dioxide can remain aloft for hundreds of years, which means that the effects of today's industrial activities will be felt for the next several centuries, if not thousands of years."

So what if the CO_2 levels are over 402 ppm? Some say they welcome warmer winters and longer summers, and don't get what all the hype is about! Just why should I even care?

Remember the story about the old woman who swallowed a fly and then ate this or that to eat the thing before it and that until she actually died? Rising CO_2 levels are a lot like the fly which leads to the next consequential change, again and again… until it will affect the possibility of survival of humanity.

Rising temps mean much more than warmer winters and rising oceans. It means more than erratic weather that can cause terrifying destruction like floods and drought and hurricanes and more bugs that will kill many species of trees and forests, as well. Rising CO_2 levels will affect life starting at the cellular level. It will affect every living thing on this planet -- and not for the better.

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BUTTON UP VIDEO CONTEST LAUNCHED

(BARRE, VT) The Button Up Video Contest is coming! Capstone Community Action is looking for very short videos that inspire viewers to take action to lower their heating costs and do something positive for the planet. The competition runs September 2 to October 19, but contestants can start creating their videos any time. There is no entry fee and prizes will be awarded in several categories. Contest details and other background information are available at ButtonUpVt.org.

When people button up their coats, it keeps the cold air out and the warmth in. The same can be done with our homes and other buildings—making them cozier, saving energy dollars, and fighting climate change.

"We heat and cool our homes, work places, and schools to stay comfortable, but waste much of the energy in the process," explains Paul Zabriskie, Director of Weatherization and EnergySmart of Vermont. "Our buildings—old and new—allow too much air to stream through the ceiling, walls, and basement. It's like trying to keep water in a bucket full of holes."

It doesn't have to be this way. When done correctly, weatherization improvements do a great job of keeping the heat where it belongs.

"We are excited to sponsor this creative competition and encourage a wide variety of voices to enter and highlight the value of buttoning up our buildings," said Capstone Executive Director, Hal Cohen. "We believe these videos will motivate people to take steps that will make them more comfortable while using less energy."

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DIRTY FUELS COST MORE!

By Roddy Scheer and Doug Moss

The term "dirty fuels" refers to fuels derived from tar sands, oil shale or liquid coal. Just like their more conventional fossil fuel counterparts such as petroleum and coal, they can be turned into gasoline, diesel and other energy sources that can generate extreme amounts of particulate pollution, carbon emissions and ecosystem destruction during their lifecycles from production to consumption.

"Because tar sands [have] more sulfur, nitrogen, and metals in [them] than conventional oil, upgrading and refining [them] causes a lot more air and water pollution and greenhouse gas emissions,"

Environmental leaders are opposed to the proposed Keystone XL pipeline which, if approved and built, would transport tar sands fuels through the Midwestern U.S. to refineries in the Gulf of Mexico. Pictured: A Rainforest Action Network anti tar sands pipeline protest in front of the Canadian Consulate in Chicago. Photo: Rainforest Action Network

reports the Natural Resources Defense Council (NRDC), a leading environmental non-profit. "On a lifecycle basis —that is, extraction all the way through combustion—tar sands cause about 20% more global warming pollution than conventional oil," adds NRDC. "Oil shale and liquid coal are even worse, causing nearly 50% more global warming pollution and over double the lifecycle emissions of conventional oil…"

In North America, the majority of such fuels come from Canada's vast boreal forest, to where tens of millions of birds flock each spring to nest. "Tar sands oil development creates open pit mines, habitat fragmentation, toxic waste holding ponds, air and water pollution, upgraders and refineries, and pipelines spreading far beyond the Boreal forest," reports NRDC. "This development is destroying habitat for waterfowl and songbirds that come from all over the Americas to nest in the Boreal."

Beyond impacts at the extraction sites, dirty fuels cause pollution problems all down the line. For this reason, environmental leaders are opposed to the proposed Keystone XL pipeline which, if approved and built, would transport tar sands fuels through the Midwestern U.S. to refineries in the Gulf of Mexico.

"Refinery communities like Port Arthur, Texas...are already unable to comply with their air pollution regulations, so dirtier fuel is the last thing they need in their refineries," adds NRDC.

And while dirty fuels may reduce our reliance on oil from beyond North America, they won't help reduce gas prices as they are so expensive to produce that gas prices would have to be higher than they already are in order for them to be profitable. "They also can't help with stabilizing gas prices in the case of a disruption to oil shipments because each new tar sands project requires huge infrastructure and capital investments, so it takes years for new tar sands projects to come on-line—it's not as though there is loads of spare tar sands oil just waiting to be put through the pipelines," says NRDC's Elizabeth Shope.

"The fact is, we don't need these fuels," she adds. "We can reduce oil consumption by increasing fuel efficiency standards, and greater use of hybrid cars, renewable energy and environmentally sustainable biofuels. What's called 'smart growth'—how we design our communities—is also a very important element in meeting our transportation needs. North America stands at an energy crossroads [and] we now face a choice: to set a course for a more sustainable energy future of clean, renewable fuels, or to develop ever-dirtier sources of transportation fuel derived from fossil fuels—at an even greater cost to our health and environment."

Contact: NRDC, www.nrdc.org.

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

HAND MOTORS

ACHIEVING ENERGY EFFICIENCY IN MANCHESTER, VT

By George Harvey, staff article

Two brothers, Jim and John Hand, founded Hand Motors in 1971 in Manchester, Vermont. The dealership has gone a long way toward efficiency and use of renewable power in the last few years, achieving some impressive results. Jim Hand's son, Thomas, was a driving force behind this.

Thomas was a student at Middlebury College, and was very much aware of the environmental issues raised there by such people as Bill McKibben. In 2005, he came home from school and got his father interested in replacing all the incandescent lights in their home with compact fluorescent lights (CFLs). When this reduced the family's power bill by 28%, father and son approached the town manager of Manchester, Vermont with the idea of having as many people as possible make the switch.

The next step was formation of a town committee to wage a campaign, the Manchester Challenge, with a goal of getting 40,000 lights replaced, five times as many as the highest goal attempted in Vermont to that time. They contacted Efficiency Vermont, from which they got considerable help, and by the end of the campaign, the number replaced was actually 42,000. The people and businesses of Manchester were saving $281,000 and eliminating emissions of 8,000 tons of carbon dioxide each year as a result.

Jim Hand took the matter of saving energy a bit farther. He installed a 2.5-kW photovoltaic (PV) system at his home. This gave him some experience with PVs that he could use at Hand Motors.

Hand Motors had taken a prominent role in the Manchester Challenge, of course, replacing all their numerous old, inefficient electric lights with highly efficient fluorescent lights. Electric consumption went from 28,000 kWh to 15,000 kWh per year. Jim Hand gives a lot of credit to Efficiency Vermont for the help they provided in this, and one of the things he did was to ask them to be kept abreast of any new developments.

Replacing lights was only the beginning, however. Thomas Hand and his brother Jamie did an energy audit for the business, and found a lot of places where efficiencies could be achieved. One thing they found was that energy and money could be saved by adopting new shutdown procedures for the business at the end of the day. Unsurprisingly, insulation was another issue, and Thomas and Jamie, now out of school, took on the job of starting an insulating business so Hand Motors could benefit from that.

Jim and Thomas Hand got involved in founding a business, Hand and Sun. At first, this business provided solar thermal systems for dairy barns and restaurants, along with two at Hand Motors. In time, however, it started working on a PV system set up on rooftops for Hand Motors.

Solar array on a roof at Hand Motors in Manchester, Vermont.

The first PVs were installed in 2012 at Hand Motors on two flat rooftops. Since Hand and Sun was not set up to provide the grid interconnection, this was done by Dee's Electric, also of Manchester. These PVs, with a combined capacity of 44 kW, performed better than expected.

The solar system was extended the next year, with the addition of another 102 kW of PV capacity on another of Hand Motor's rooftops, a total of 583 panels. This brought the electric power consumption of the dealership down to the point that costs are in the range of $500 to $1000 per year. This is a reduction from annual expenses of $30,000 to $36,000.

Another issue that was addressed is heating. About a year and a half ago, an old oil-burning boiler was replaced with a far more efficient system powered by propane. This also resulted in cost reductions.

Jim Hand says, "I am always looking at the energy use hear. I keep pecking away, using efficiency to drive down energy use." The current thing is replacing all those CFLs installed in 2005, as they reach the end of their service lives, with new, more efficient, longer lasting LED lights. Improvement is an ongoing goal at Hand Motors.

Meanwhile, Thomas Hand has started another business, Glow Heat, selling heat pumps, starting with a challenge in Brattleboro. Hand and Sun is working on installing a set of PVs at the Dorset School. Both of these efforts are covered by articles in this issue of Green Energy Times.

Discover more about Hand Motors at www.handmotors.com

RIDE THE RING!

By Seth Wheeler, New Hampshire Electric Cooperative

A ring of new electric vehicle chargers in New Hampshire's White Mountains region will greet visitors to the ALT Energy Summit, to be held September 13 and 14 at the Mt. Washington Auto Road.

New Hampshire Electric Co-op (NHEC) is proud to be the presenting sponsor of the ALT Energy Summit, which has become a proving playground for all manner of alternative energy-powered transportation.

This year, attendees arriving by electric vehicle will have more publicly available charging stations than ever before, thanks to a partnership between New Hampshire Electric Cooperative (NHEC) and a group of its commercial members. NHEC has worked with its members in the hospitality industry to install EV charging stations in North Conway (Red Jacket Mountain View Resort), Woodstock (Woodstock Inn Station), Plymouth (Common Man Inn) and Lincoln (Indian Head Resort), Meredith (Church Landing at Mill Falls), and Jackson (Bernerhof Inn). Together, they create a ring of charging stations that are all within the range limits of most EV and plug-in hybrid vehicles.

Prior to the installation of chargers at the NHEC member locations, there were fewer than 20 Type II EV charging stations that were available for use by the public in New Hampshire, fewer than a handful of which were located north of Concord. The charging stations installed as part of the NHEC program will put some of New Hampshire's most scenic terrain, including the White Mountains and Mount Washington Valley, within range for most EV motorists.

By monitoring the use of the charging stations in the NHEC pilot program (both in total kilowatt-hours and number of vehicles), NHEC will analyze the use of and need for EV charging stations in its service territory. In the meantime, the chargers have been helping to attract new business to the participating locations. A number of hotel and resort owners say they have attracted out-of-state guests who have booked their stay specifically because of the availability of EV chargers.

Make your plans now to join NHEC and hundreds of alternative energy enthusiasts for this technology showcase that includes demonstrations and a ride up the Northeast's highest peak.

A ring of EV Charging Station surround the Mt. Washington Valley, such as the one this Tessla in using for the Mt. Washinton Auto Roac

NHEC is a non-profit electric distribution cooperative serving 83,000 homes and businesses in 115 New Hampshire communities.

Reducing Fossil Fuel Use - Saving Drivers Money

NEW EV CHARGING STATION GOALS IN VT

Governor Shumlin charges up.

The new public electric vehicle charging station with two chargers at the MiddleGround complex in Middlesex is also home to Red Hen Bakery, Zoombikes, Nutty Steph's and more. The chargers represent the latest in fast charging technology, while also helping to increase Vermont's energy independence and contribute to healthier air and lower carbon emissions.

"The new chargers are a great resource available to the public to help create clean and efficient transportation for Vermonters," said Mary Powell, President and CEO of Green Mountain Power. "Our goal is to help Vermonters save money and reduce fossil fuel use, while providing clean, cost effective and reliable power."

GMP now has 10 plug-in electric vehicles in its fleet through its Plug'N Go program and hopes to grow that number in the coming years as more infrastructure is developed to support clean transportation in Vermont. GMP partnered with Don Wexler of Strider Development, who is the property owner of MiddleGround, to install the charging stations.

"This is a great way to help the environment, and also to help businesses attract people to come inside and shop," said Wexler. "We are so pleased to be able to offer this option for customers."

As of April 2014, according to the Vermont Department of Motor Vehicles, there are more than 700 plug-in passenger electric vehicles across Vermont in 130 communities. GMP expects that number to continue to rise as facilities like the one at MiddleGround come online with new and efficient charging technology. Charging an electric vehicle is highly cost-effective and is similar to paying approximately $1 per gallon for gas.

"One of the biggest challenges in enabling drivers to choose electric vehicles has been the chicken-and-egg problem of establishing a network of charging stations where they are most needed. We are getting that done, and Vermont's fleet of electric vehicles has grown tremendously in the last two years," said U.S. Senator Patrick Leahy. "With more, and better, electric car models on the market each year and new charging stations like this one, we are well on our way to meeting the state's goals to build a strong market for zero emission vehicles."

With this new installation, there are now 33 charging stations across Vermont, a 30% increase over the past year, with more planned. This initiative is part of the state's goal, which GMP fully supports, to create a "green corridor" through Vermont and into Quebec, Canada to give electric vehicle drivers assurance they can charge their vehicles when needed.

"These charging stations are critical to increasing the use of electric vehicles in Vermont and reducing our greenhouse gas emissions," said Governor Peter Shumlin. "The charging stations also provide an important boost to the state's economy by saving money on gas and keeping dollars that would have been spent on imported oil right here in Vermont."

EV's cont'd on p. 6

Senetor Leahy, Governor Shumlin, Mary Powell (GMP), Don Wexler and his wife celebrate the new chargers.

VT PLANS FOR ZERO-EMISSION VEHICLES

Have you ever seen a zero-emission vehicle? You may be seeing a lot more of them over the next ten years. Following an announcement in May of an eight-state action plan to promote zero-emission vehicles, Vermont Governor Peter Shumlin released the Climate Cabinet's draft Vermont Zero-Emission Vehicle (ZEV) Action Plan for review and public comment in June. The draft Plan outlines state-specific actions and strategies to grow the ZEV market in Vermont, with the ultimate goal of having 3.3 million ZEVs on the roads in the eight states by 2025.

In Vermont, the transportation sector accounts for the highest share of both greenhouse gas emissions and energy use. Nearly half (46%) of Vermont's greenhouse gas emissions come from transportation, and transportation accounts for more than one third (34%) of Vermont's energy consumption . With an aggressive statutory goal to reduce Vermont's greenhouse gas emissions from 1990 levels by 50% by 2028 and state target of obtaining 90% of total energy from renewable sources by 2050, transforming Vermont's transportation sector away from fossil fuels is crucial to attaining our greenhouse gas reduction and renewable energy goals.

State-specific efforts encompass a variety of state agencies and committees, and include a number of actions and strategies aimed at boosting the number of ZEVs on the road. These include working with the automobile industry to increase availability of ZEVs and to provide creative financing, building infrastructure, adopting policies to increase percentages of ZEVs in state and municipal fleets, improving the ZEV experience through a variety of perks and incentives, and more.

The draft Vermont ZEV Action Plan can be found at www.anr.state.vt.us/anr/climatechange/ZeroEmissionVehicles.html.

IDLE-FREE VT INC.

No-IdlingTIPS

Have you ever noticed anyone pull up to a favorite convenience store and leave the vehicle running unattended while going inside to get that warm cup of coffee? Whoops! It's against the law to do that in Vermont. 23 V.S.A. § 1111. Unattended motor vehicle states that, "No person shall permit a motor vehicle to stand unattended without first stopping the engine, locking the ignition, removing the key from the ignition…".

How much does excessive idling cost?

INDIVIDUAL DRIVERS: Let's say you drive a typical Vermont car like a Subaru Outback. With gasoline at $3.75/gallon, 5 minutes a day of unnecessary idling will cost up to $65/year; 10 minutes a day will cost up to $130/year. A small compact will be nearly half the cost; a big pick up or SUV will be nearly double the cost. A hybrid? $0.

FLEET OPERATORS: Let's say you have a 10 vehicle medium-duty fleet. With diesel at $4.00/gallon, 10 minutes a day of unnecessary idling will cost up to $8,500/year; 15 minutes a day will cost up to $13,000/year. A 10 vehicle heavy-duty fleet will be nearly double the cost.

NOTE: costs do not include increased maintenance and shortened engine life due to engine wear caused by extended idling which can add half again to these costs.

Turn off the key and we'll all breathe easier.

To learn more, visit www.idlefreevt.org

Used with permission of Melinda Stanley

EV CHARGING STATION GOALS IN VT

cont'd from p. 5

One of the charging stations at the MiddleGround complex is a ChargePoint station (level 2) that provides 20 miles of charge per hour. The other is a Fuji DC charger (level 3) that provides approximately 80% of a battery charge in 45 minutes. GMP purchased and installed the charging stations for $26,800 and Strider will operate the stations. The charging units are available to the traveling public 24/7. Customers pay $2 an hour for the level 2 charger, or $5 an hour for the level 3 charger, using a credit card.

For more information about electric vehicles and charging facilities across Vermont, visit GMP's Plug'N Go page at: http://www.greenmountainpower.com/innovative/plug/about-plugn-go/ or http://www.driveelectricvt.com/.

SMART COMMUTING IN NH & VT

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

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

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

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

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

IN NEW HAMPSHIRE

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

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

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

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

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

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

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

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

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

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

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

IN VERMONT

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

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

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

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

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

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

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

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

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

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

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

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

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

COMMUNITY SOLAR IN NH

Strong demand for homegrown energy sources, and the benefits to the NH economy and environment

By Kate Epsen

There's a lot of buzz in New England lately around community energy projects. New Hampshire is no exception. Often discussed in the context of NH's relatively new group net metering law, community energy project opportunities include many different project types that engage groups of people in the successful deployment of renewable energy investment and benefits.

True community energy efforts can include several types of projects that do not involve group net metering. A community of people, businesses or non-profits can come together and invest in a system for a community-centered facility that fosters a wide range of overlapping benefits to the community itself – economic, educational and environmental. For example, consider a religious or educational institution where participants invest in a system to provide energy savings, show a commitment to environmental stewardship and enhance economic benefits by leveraging tax incentives otherwise unavailable to a non-profit entity. This is just one form of community energy that is under consideration.

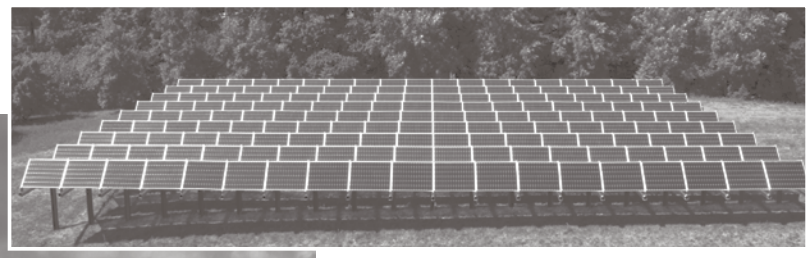
There are many additional options: a town hydroelectric system allocates the generation across its town hall, library, and school accounts; a resident-owned community (ROC) invests in a shared solar electric system to power the new air-source heat pumps on the homes of its residents; a local electric utility and a business co-invest in a wind facility to offer a "local clean energy" tariff to utility customers.

These examples are not hypothetical. A group of individuals in Keene, originally spearheaded through an Antioch College graduate student project, are working to form an LLC with local investors to build a small system (about 45 kilowatts) that may be sited on the new food coop. John Kondos, a leader of this pioneering effort, explains that in this version of community energy, "no group net metering will be needed—one scenario may have investors putting in about 60% of the capital, lenders could cover the remaining 40%, and the power will be sold to the host through a power purchase agreement. However, other debt[-to-]equity ratios are also entirely possible."

In North Hampton, NH, yet another type of model has emerged. NH Solar Garden, a project development and finance company, enlisted twelve family members to create group of aggregated electric load that will be met with supply from a 66 kilowatt solar electric system. Using group net metering, this project will return one cent per kilowatt-hour of each member's electric load back to that member, two times per year. According to the founder and president of NH Solar Garden, Andrew Kellar, this project is the first of many in the pipeline that are utilizing this model, with other larger projects underway in Lee, NH and elsewhere, on properties ranging from landfills, to wastewater treatment facilities, unused farmland, and housing authorities.

While the buzz continues to manifest itself in understandable and viable project options across New England and NH—from Plymouth to Peterborough, to Grantham and Littleton—it is no easy task forming the appropriate legal and financial structures to execute a successful project. The demand for homegrown energy sources, however, and the benefits to the NH economy and environment that will accrue from their deployment (not to mention sheer Yankee persistence and ingenuity) are all proving strong enough to meet and surmount the challenges of this worthy undertaking.

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



Owners Dieter and Dietrich Ebert will build a 66-kW, 7,000-s.f. solar array near their neighboring North Hampton, NH homes. The energy will be benefit 10 friends and family members in the area. The plan is possible because of the new net-metering rules that recently passed in the state and available at this point. This project in now fully approved at the local/utility/ state levels and is shovel ready for construction. Photo considerations courtesy of manufacturer, ten K solar.

Bernie Says it All! Will Capitol Hill Listen?

Sanders Backs EPA Curbs on Power Plant Pollution

WASHINGTON - At a news conference on Capitol Hill and in testimony at an Environmental Protection Agency public hearing on July 30, 2014, Sen. Bernie Sanders (I-Vt.) strongly endorsed an EPA proposal to limit carbon pollution from power plants to curb global warming.

"If we do not address this crisis, our children and grandchildren will look back on this problem and we will be judged by history in a very negative way," Sanders said.

The EPA hearings in DC and in Denver and Atlanta were held to take public comment on President Barack Obama's plan to address climate change by cutting carbon-dioxide emissions from electric power plants by 30 percent by 2030.

"We are facing a planetary crisis," said Sanders, a member of the Senate energy and environment committees. "The vast majority of climate scientists agree that our planet is warming, that human activities – especially burning fossil fuels – are the primary cause, and that climate change already is causing devastating damage across the world in the form of floods, droughts, wildfires and extreme weather."

Power plants are the largest source in the United States of harmful carbon pollution, accounting for roughly one-third of all carbon released into the air. Unlike other pollutants, there are now no limits to the amount of carbon pollution that a power plant can release.

The EPA wants to set state-by-state carbon pollution limits. By 2030, the standards are expected to reduce U.S. power plant carbon pollution by 30 percent compared to 2005 levels. That's equal to the annual emissions from more than 150 million cars, or almost two-thirds of the nation's passenger vehicles.

There are no coal-fired power plants in Vermont, but the state will collaborate with New England neighbors in a Regional Greenhouse Gas Initiative. Vermont also will continue to be a model for other states by aggressively encouraging the development of alternative energy sources and promoting energy efficiency. In proposing the new national rules, EPA singled out Efficiency Vermont as a model that states should look to in developing their plans.

According to new research for the U.S. National Climate Assessment, the average global temperature has increased by more than 1.5 degrees Fahrenheit between 1880 and 2012. According to the National Oceanic and Atmospheric Administration, temperatures in Vermont and New England have increased at least 2.5 degrees Fahrenheit in the past 30 years. By 2100, New England could be up to 10 degrees hotter.

"We are facing a pivotal moment in history. We must act quickly and boldly to dramatically cut carbon pollution, transform our energy system, and create good-paying jobs all over this country," Sanders said.

ButtonUpContest.org
VIDEO CONTEST

BUTTON UP VIDEO CONTEST LAUNCHED

cont'd from p. 3

The Button Up Video Contest is open to all ages and runs from September 2 to October 15, 2014. Teachers are encouraged to involve their students.

Videos must be two minutes or less and will be judged in three categories: 1) Most humorous; 2) Most likely to spur action; and 3) Most informative. All styles are eligible and the videos will be available for public viewing on the contest site.

The contest is leading up to this year's "Button Up Vermont Day of Action" on November 1st when volunteers throughout the state will be encouraging their friends and neighbors to use energy wisely and start saving money.

Visit ButtonUpVt.org or Button Up Vermont on Facebook for more information, or contact Michael Levine, Button Up Contest Director, bu@flywheelvt.com or (802) 225-1320.

GREEN ENERGY OPTIONS

Keene, New Hampshire

"Opening a Solar Store is my attempt at doing something personally meaningful, while making a difference in the world"

Left: Photovoltaics & Monadnock Mountain – a splendid combination. Bottom: Photovoltaics and Thermal Hot Water Combo

Green Energy Options is a Solar Store in Keene, New Hampshire. It is run by owner Pablo Fleischman, and provides a wide-ranging set of products and services.

Fleischman has a long history with efficiency and renewable energy. Shortly after moving to New Hampshire, he designed and built a house heated entirely by firewood and without any electricity at all. He and his wife, Valerie, wanted to have the smallest environmental impact possible. A growing family led him to install a small solar photovoltaic system with battery backup. Today, the kids have all grown up and left the nest, but Pablo and Valerie are still living off the grid.

A life without grid ties makes renewable energy a very personal issue for him. When the opportunity came that he could have his own solar store, he took it, and Green Energy Options opened in April of 2007. "Opening a solar store is my attempt at doing something personally meaningful, while making a difference in the world," Fleischman said. The time is right and people are finally seeing the ramifications of our energy use. I will be able to show them ways to make a statement, feel good about their contribution, reduce their energy 'footprint' and save money at the same time."

Not all their business is solar. Right now, the store is already getting people ready for winter, selling and installing wood stoves, pellet stoves, and pellet boilers. They sell wood stoves and boilers from at least four major manufacturers, along with high-quality pellet stoves and boilers. They also sell composting toilets and other items of interest for efficiency.

Solar PVs are, however, a major part of what any solar store does. Fleischman can deal with both solar PVs and solar thermal water systems, though the bulk of his sales are in PVs. He is both knowledgeable and happy to deal with off-grid installations and grid-tied systems with battery backups.

Discover more about Green Energy Options at www.geosolarstore.com. The solar store is located at 79 Emerald Street, Keene, NH. Phone: 603-358-3444.

NET ZERO RENEWABLE RESOURCES

Chester, Vermont

By George Harvey

Net Zero Renewable Resources, LLC, of Chester, Vermont, was founded in 2009. However, A. Lee Gustafson, its managing member, has green credentials going back much further. Originally a hydro geologist, he spent years studying sites to see how groundwater moved, where pollution might have come from, and consulting.

His interest in renewable power became more intense with passing time, and in the 1990s he started working on home projects, installing a small hydro system and sufficient photovoltaics (PVs) to power his house. Power outages while he had small children persuaded him that he should install a battery backup, and he was soon off-grid. He remains so today. His current home system has 900 amp-hours of battery storage at 48 volts, though he likes to limit use to 180 amp-hours to keep the batteries in good shape. This is tied to a 6000-watt inverter and powered by PVs.

Most of the work Net Zero Renewable Resources is in solar PVs. They passed the 100 kW mark for PVs in 2013, with systems ranging in size from 15 kW all the way down to 550 watts. Most of these systems were residential, but they also do commercial systems when the need arises.

"People are looking for any way at all to cut energy costs," Gustafson notes. That includes solar thermal systems heating water or building spaces. He is very upfront about costs, however, saying that such systems can be expensive. They do make economic sense in many cases, and he is willing and able to work on such projects.

One type of interesting and unusual project Net Zero Renewable Resources has worked on was a heat pump in a basement that served to cool the space in the summer, dehumidify it year round, and heat water for the house. This can be an ideal approach for the particular needs it addresses.

Gustafson's interests in energy seem to cover the complete spectrum of available technologies, including hydro and wind. He has worked on both types of systems, but stresses the need for practical solutions to the actual problems people have in residential and commercial situations. He does consultations, and is happy to discuss the best and most practical renewable solutions.

Net Zero Renewable Resources' phone number is 802.875.3654. The website is netzerorenewableresources.com

120 Homes Go Solar through Solarize Upper Valley

A Solar Source crew installs a three-kilowatt solar PV system at the home of Solarize Cornish-Plainfield volunteer, Nancy Wightman.

By Allison E. Rogers Furbish

The results are in, and they're pretty exciting: 120 homeowners across the Upper Valley are going solar this season, thanks to Solarize Upper Valley, an initiative led by Vital Communities to increase the rate of adoption of solar photovoltaic electricity generation in the region.

Homeowners in the spring 2014 Solarize Upper Valley communities of Thetford and Strafford, Vt., and Cornish, Plainfield, and Lyme, N.H., are adding 638 new kilowatts of renewable electricity generation capacity to the region – a reduction in greenhouse gas emissions equivalent to taking 116 cars off the road! While the population of these five towns may be small, with only 9,406 residents combined, together their dedicated volunteers and partner installers helped 11 percent of households to get a solar site visit and three percent of households to go solar in just 15 weeks.

"The results of the first round of Solarize Upper Valley surpassed our expectations – not only in the number of households going solar, but also in the commitment of the community volunteers who made the program a success," said Vital Communities Energy Program Manager Sarah Simonds. "We look forward to helping our fall Solarize communities achieve similar results."

With generous funding support from the John Merck Fund and an individual donor to Vital Communities, Solarize Upper Valley teams community volunteers with competitively selected solar photovoltaic (PV) installers for 15 weeks of outreach around small-scale solar energy, offering competitive prices, accessible resources, and a simplified process for solar PV installations.

"I know solar would have remained a 'someday' for us without all the work provided by [Solarize Upper Valley]," said one Solarize Cornish-Plainfield customer. "You made it possible for our someday to be today."

The Big Picture. Solarize Upper Valley is part of a larger network of Solarize programs aimed at catalyzing a very public and lasting increase in the number of new residential solar installations across New England

Solar UV cont'd on p. 11

Lyme Progress Meter: Solarize Lyme successfully catalyzed 51 homeowners going solar this spring through partner installer RGS Energy, adding a grand total of 273 new kilowatts of renewable energy capacity to the community.

BUSINESSES BENEFIT FROM SOLAR DEPRECIATION

Depreciation allows a business to write off the value of the system against its taxable income. This reduces its tax burden at the end of the year. Accelerated depreciation means that you can write down the value of the system to $0 within six years even though the solar system will last for 25 years and likely much longer.

Under the federal Modified Accelerated Cost-Recovery System (MACRS), businesses may recover investments in certain property through depreciation deductions. The MACRS establishes a set of class lives for various types of property, ranging from three to 50 years, over which the property may be depreciated. A number of renewable energy technologies are classified as five-year property (26 USC § 168(e)(3)(B)(vi)) under the MACRS, which refers to 26 USC § 48(a)(3)(A), often known as the energy investment tax credit or ITC to define eligible property.

Such property currently includes*:

- a variety of solar-electric and solar-thermal technologies
- fuel cells and microturbines
- geothermal electric
- direct-use geothermal and geothermal heat pumps
- small wind (100 kW or less)
- combined heat and power (CHP)
- the provision which defines ITC technologies as eligible also adds the general term "wind" as an eligible technology, extending the five-year schedule to large wind facilities as well.

In addition, for certain other types of renewable energy property, such as biomass or marine and hydrokinetic property, the MACRS property class life is seven years. Eligible biomass property generally includes assets used in the conversion of biomass to heat or to a solid, liquid or gaseous fuel, and to equipment and structures used to receive, handle, collect and process biomass in a waterwall, combustion system, or refuse-derived fuel system to create hot water, gas, steam and electricity. Marine and hydrokinetic property includes facilities that utilize waves, tides, currents, free-flowing water, or differentials in ocean temperature to generate energy. It does not include traditional hydropower that uses dams, diversionary structures, or impoundments.

30.0 kW Solar PV System at Filtrine Manufacturing, Inc., Keene, NH. Photo courtesy of the installer, Solar Source (Keene, NH).

The five-year schedule for most types of solar, geothermal, and wind property has been in place since 1986. The federal Energy Policy Act of 2005 (EPAct 2005) classified fuel cells, microturbines and solar hybrid lighting technologies as five-year property as well by adding them to § 48(a)(3)(A). This section was further expanded in October 2008 by the addition of geothermal heat pumps, combined heat and power, and small wind under The Energy Improvement and Extension Act of 2008.

Source: Dsireusa.org bit.ly/X5HglM

Solar Farms Continue to Sprout Up in VT

This 2.96 MW system on 15 acres at Meach Cove Farms is designed to provide 3,450,000 kWhs of energy each year, enough for 385 average homes.

By George Harvey

This year has brought new solar farms to Vermont. Two examples are an array in Shelburne, installed at Meach Cove Farms by groSolar, and one at Rutland, installed by NRG Energy.

Meach Cove Farms has extensive land devoted to certified organic soybeans, hay, wheat, rye, and corn. They also have three acres of wine grapes and 300 acres of productive woodlands. They are very interested in finding more productive ways to use their resources, especially if it reduces dependence on fossil fuels, and groSolar happened to be able to help them in this.

GroSolar is a nation-wide installer of solar photovoltaic (PV) systems, specializing in those in the range of one megawatt (MW) to thirty MWdc. The company seeks to be a single source for solar projects, providing financing, installation, operations, and maintenance. The Meach Cove Farm project's design and solar engineering services were done under the direction of L.W. Seddon, LLC of Montpelier, VT.

Meach Cove Farms and groSolar worked closely together to produce this 2.96 MW system on 15 acres at Meach Cove Farms. The system is designed to provide 3,450,000 kilowatt-hours each year, enough for about 385 average homes. Excess power will be sold on the grid under the Vermont Sustainably Priced Energy and Economic Development (SPEED) program.

Solar arrays provide a "crop" of solar electricity, giving farms an income without requiring a lot of attention. Without the use of fossil fuels or chemicals, they are perfectly compatible with organic agriculture. The combination of renewable power with organic farming is becoming more important as more farmers become aware of this.

Also this year, NRG Residential Solar Solutions (NRG) put up a solar garden in Rutland. In this case, the system has a capacity of 150 kilowatts, but it is not providing for a single customer. Instead, its power is ultimately going to fifty households that bought into the system.

The fifty households were able to take their stakes in the project without upfront investment. The financing is applied through the Green Mountain Power (GMP) billing process as part of their electric bills.

Power from the system is initially supplied to GMP, who is a strong supporter of the NRG system in Rutland. Under the net metering system in place in Vermont, the power is credited to the accounts of the fifty households that are involved. If the account has an excess of power produced over what is consumed, the excess can be rolled over to apply to the next month's bill.

Mary Powell, who is the CEO of GMP, made it clear that she wants the sort of relationship seen between GMP and NRG partnership to be repeated, saying, "We anticipate working together on additional projects in Vermont to further develop solar as a meaningful part of our energy future."

Rutland's mayor, Chris Louras, who is also a customer of the community solar project, is also quite pleased with way the project was developed. His comment was, "Whether a person owns their own home, rents their residence, lives in a shady area or cannot afford the upfront capital cost of their own solar array, through this project, they can have solar power and with it, the knowledge that they are helping the environment as they save on their electric bill."

L.W. Seddon's website is: lwseddon.com.

120 Homes Solarized in Upper Valley

cont'd from p. 9

and beyond. Solarize programs have been successful in Massachusetts and Connecticut and are now taking root in other parts of the country.

"The exciting results from Vital Communities' Solarize campaign continue to prove that the 'Solarize' community model is perhaps the most effective approach for expanding residential solar," said Brian F. Keane, president of SmartPower, a leading partner in the broader effort to expand and share the Solarize model. "This model works – whether in Vermont, New Hampshire, Connecticut, or anywhere across the nation."

Get Involved. Solarize Upper Valley's next campaign will begin this October in Hanover, Orford, New London, Andover, and Wilmot, New Hampshire, and Woodstock, Pomfret, Randolph, Braintree, and Brookfield, Vermont. Vital Communities is currently seeking solar photovoltaic (PV) installers interested in bidding to work with these communities. Bids will be accepted until September 12 at 5 p.m. For more information visit vitalcommunities.org/solarize.

NO SUN AT NIGHT -- NO PROBLEM!

Cont'd from p. 1

factory, what he calls a "gigafactory," for manufacturing batteries. The purpose was partly to be able to produce 500,000 lithium-ion electric vehicle (EV) batteries each year for Tesla's cars. The production was intended to supply batteries for other manufacturers as well as batteries for other purposes, including ones for both grid and home backup storage. In addition, space would be allocated for research and development of batteries of all types, both by Tesla and by other companies.

To get an idea of what this could mean, we might assume that each battery produced after the factory opens, at least a couple years hence, would hold 80 kWh of electricity, even though this is a very high figure for cars of today. It would mean that the total amount of electricity a year's production of Tesla batteries could hold if they were all charged would be 40,000 MWh.

This, roughly the output of 40 nuclear power plants running for one hour, is the amount of combined storage for Tesla cars that would be added each year. Many of these cars will be charged on a "smart grid," which could draw backup power from them, as needed. Of course, we cannot know how many cars might be available for the grid at any give time. Nevertheless, we can know that a huge amount of storage may be added to a smart grid each year, and this continually increasing amount can be used to store power from solar and wind farms.

EV batteries need to be replaced in time. When they are, they are still useful as grid backup batteries, and should have a service life of years ahead of them for the grid or for homes. As the car batteries age, these batteries will come on the market as good, used batteries, at a much reduced cost, in nearly the same numbers as the number of cars. Assuming that Tesla gets half the EV market, that would mean that sometime around 2025, a million or more of these batteries would become available as storage units for home or grid, the equivalent of 80 nuclear power plants for one hour being added each year.

Another development from Tesla was really astounding, however. The company released a large number of patents on battery technology so their competitors could use them freely. According to reports, Elon Musk decided to do this because he believes the future of humanity and the planet is more important than Tesla's bottom line, a rather unusual notion for an investor.

Solar PV panels at sunset at NRG's Blythe Solar Farm. Photo: Flickr/ Charlie Waterfall

Interestingly, just as Tesla was releasing its patents, General Motors announced they were planning on a large increase in the percentage of EVs in the cars they produce, saying that the current paradigm of automobile manufacturing is unsustainable (see the article on this on page 6 of the June issue of GET). This means that there was a potentially great value for GM in the patents Tesla was releasing.

The cost of large storage batteries for EVs has already declined sharply and is continuing to do so. As industry expands and the fruits of research come to market, it seems likely to continue that trend for quite a long time. Affordable Battery Storage is Coming.

George Harvey is the Senior Staff Writer for Green Energy Times.

Tesla, Batteries ... and Why Do We Care?

By George Harvey

New battery technologies are being developed continually, and some show impressive promise. One particularly interesting example was in an announcement from the University of Southern California (USC) of a new flow battery technology. A flow battery has two fluid electrolytes flowing in opposite directions with a membrane between them. There are separate reservoirs for fresh and expended fluids. Such batteries can be recharged electrically, or the electrolytes can be pumped out with fresh electrolytes replacing them. They are said to be suitable for grid and home use.

The USC battery is notable for three reasons. First, the electrolytes are organic compounds that are relatively non-toxic. Second, it is longer lasting than a lithium-ion battery. Third, it costs only a very small fraction of what a lithium ion battery does. This design is only one of many, interesting examples of the research that is being done in this field.

We do not need to depend on new technology to reduce the prices of batteries, however. There are economic developments that will reduce the prices for current technology to the point that they can transform the grid.

Elon Musk, CEO of Tesla Motors, announced plans to build a $5 billion factory, what he calls a "gigafactory," for manufacturing batteries. The purpose was partly to be able to produce 500,000 lithium-ion electric vehicle (EV) batteries each year for Tesla's cars. The production was intended to supply batteries for other manufacturers as well as batteries for other purposes, including ones for both grid and home backup storage. In addition, space would be allocated for research and development of batteries of all types, both by Tesla and by other companies.

To get an idea of what this could mean, we might assume that each battery produced after the factory opens, at least a couple years hence, would hold 80 kWh of electricity, even though this is a very high figure for cars of today. It would mean that the total amount of electricity a year's production of Tesla batteries could hold if they were all charged would be 40,000 MWh.

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George Harvey is the Senior Staff Writer for Green Energy Times.

Tesla Roadster (no longer in production).

Ravaged Land Repurposed

Farming Brimfield, MA's rocky field

We tend to think of tornados destroying parts fields of corn or sunflowers, leaving farmers with the job of replanting. Sometimes they tearing apart buildings and knock over trees, leaving people with the job of rebuilding. What happened in Brimfield, Massachusetts on June 1, 2011 was a bit more powerful than usual, however. That tornado ripped away all the topsoil from a large field, leaving the rocky subsoil that no crop would grow on. What do you do with that? The answer, as we can see, is to grow a field of solar panels, and enjoy the annual harvest they provide.

The 6.24MW Brimfield MA Solar Project is the largest ballasted ground system in Massachusetts. It was installed on land that was purchased economically due to substantial tornado damage. The System was built using GameChange Racking's Pour-in-PlaceTM Ballasted Ground System, 22,000 solar panels and ten 500kW inverters.

Shortly before 5pm the tornado moved through Brimfield MA where it reached a its maximum width of 0.5 miles.

The 2011 New England tornado occurred on June 1st, 2011. It was the worst in a century in the region.

The site was prepared with minimal grading. The local economy was boosted by using local labor and additional tax revenue

Due to rocky site conditions, the GameChange Pour-in-Place^{TM} Ballasted Ground System were selected as the most cost effective solution.

GameChange Racking used their Pour-in-PlaceTM Ballasted Ground racking system for the installation of the 6.24 MW of solar PV panels. The panels from Canadian Solar were installed by Prostar Electric.

Photos & info courtesy of GameChange Racking. Learn more at gamechangeracking.com.

Commercial-PACE financing moves forward in New Hampshire

By Laura Richardson

Commercial building owners in New Hampshire will soon have access to a financing tool that will help them significantly improve their bottom line through making energy-efficiency upgrades or installing renewable-energy projects.

Called C-PACE financing, for Property Assessed Clean Energy in Commercial Buildings, this enabling legislation allows municipalities to create PACE districts, and building owners to finance energy efficiency or renewable energy projects, repaying their loans through property tax assessments, similar to water, sewer, or sidewalk special assessments.

The Jordan Institute, a New Hampshire-based non-profit organization that focuses on improving the energy efficiency in buildings, has been the lead voice on C-PACE and is developing a statewide C-PACE program without public funds, ratepayer funds, or a "green bank."

Jordan Institute and its program partners will streamline this process, deploy best-practice standards and protocols, and bring together the necessary teams to develop and launch a sustainable program in the coming months. Pioneer C-PACE projects in the statewide program are expected to launch in late 2014 and early 2015, with a significant scale-up of projects anticipated in 2015 and 2016.

New Hampshire's 2014 legislature overwhelmingly supported improvements to existing but ineffective enabling legislation originally passed in 2010, and in statute under RSA 53-F. Many believe that House Bill 532, relating to energy efficiency and clean energy districts, will provide a much-needed tool for businesses to invest in energy efficiency and renewable energy projects.

Municipalities currently have various tools to woo and support businesses within their districts, recognizing that occupied buildings provide strong tax and employment bases, which provide public benefits in numerous ways. Furthermore, statute recognizes the potential impact to energy and greenhouse gas reductions that will come from the widespread adoption and implementation of C-PACE.

Unlike traditional bank loans, C-PACE financing is tied to the commercial building, not the building owner. Loans are paid back through the conduit of a municipal tax assessment and over a long enough period of time so that the projects are cash-positive – where the energy savings are greater than the loan payment.

Moreover, there is no up-front fee or down payment and loans do not accelerate at the time of ownership change or default. This allows the building owner to pay for the energy efficiency that they "use" and subsequent owners pay for those savings until the loan is fully paid.

Lien position is negotiated between municipality and lender to determine best comfort level for each project. Municipalities that adopt PACE typically receive a fee to cover their administrative costs. Projects that are financed by private entities and are in first lien position have no cap on the dollar size of the project. Those projects financed through municipalities are capped at 35% of the assessed value of the building and property plus any existing mortgages, or $1,000,000, whichever is greater. Additionally, municipalities that self-fund projects must have a loan-loss reserve which cannot be capitalized through their general fund.

C-PACE financing is completely voluntary. Municipalities or their voters choose to designate the district and adopt the tool, and municipal officials can nix a project; lenders determine if projects are viable and worthy of investment; building owners decide if C-PACE and the project meet their needs. If all three of these groups conclude that there is a 'win-win-win' fit, the project may proceed.

This financing tool is available for office buildings, hotels and convention centers, manufacturing facilities, small retail, malls, and big box stores, heated warehouses, historic buildings, health clubs and athletic facilities, agricultural buildings, restaurants, as well as buildings owned by non-profit organizations. Multifamily buildings of four or more housing units can participate. Publicly owned buildings and residential buildings of fewer than four units are not included.

Energy projects must demonstrate an energy-cost savings-to-investment ratio of greater than one, as determined by an independent third party through an energy audit. Projects should also include building commissioning and energy monitoring and verification to assure the lender that the financed project performs as designed. C-PACE projects can include:

- Heating, ventilation, air-conditioning (HVAC) Systems
- Controls and heat distribution
- Lighting
- Solar – photovoltaic, hot water, hot air
- Biomass heating -pellets or chips
- Air sealing and insulation – walls, basements, crawlspaces, attics, roofs
- Combined heat and power

Recognizing that many municipalities are stretched thin in terms of staffing capacity, HB532 allows municipalities to designate another entity to administer the C-PACE program. The Jordan Institute will lead this effort, thus significantly reducing the challenges of tying together financing, energy-project vetting, project management, and administration. Learn more at www.jordaninstitute.org,

Laura Richardson is the Executive Director of the Jordan Institute.

C-PACE NH	Old Way: Bank Loan	New Way: C-PACE Lien
Down payment amount	$52,500 (15%)	$0.00
Loan amount	$297,500	$350,000
Loan term	5 years	20 years
Interest rate	5.00%	6.00%
5-Year Net Cash Flow		
Annual debt service	$67,370	$30,090
Annual energy savings	$36,000	$36,000
Net annual cash flow	($31,370)	$5,910
Cash flow over 5 years*	($156,852)	$29,549
Down payment cash flow	($52,500)	$0.00
5-Year Net Cash Flow	($209,352)	$29,549

* Assumes no utility cost escalation or performance degradation in order to simplify the case study. Case Study is courtesy Energize CT.

A New Definition of SUSTAINABLE

Sustainable means that the people living in a given politically or geographically defined area do not live beyond the limits of the renewable resources of that area for either input (energy and matter) or output (food, material goods, and absorption of pollution). They purchase or trade from environmentally conscious sources for those necessities that cannot be locally satisfied. They live both in numbers and in a manner that allows present and future generations of all life in that area to enjoy a healthy habitat over the long term.

Adopted by the Executive Committee, VT Chapter of the Sierra Club on Apr11, 2014.

The same or very similar definition has also been adopted by: Vermonters for Sustainable Population, October 2013

dirty facts dirty power plants

- Existing power plants are the single largest source of carbon pollution. New limits may be the most effective action to curb climate pollution in our history.
- The worst climate change polluter: dirty coal plants.
- Dirty power plants are the single largest source of carbon pollution that is driving climate change. Right now, these plants are dumping as much carbon as they want into the atmosphere, and we and our children are stuck with the costs. It's time to adopt common sense limits on carbon pollution from power plants.
- With the clean renewable energy options we have today - and the related jobs that go along with them, there is no need to allow this pollution to go on. Take action to create a fossil-fuel free future that will sustain future generations.

Support strong limits to stop climate pollution now!

What Have We Got to Lose?

Cont'd from p. 1

of what we are doing to this planet and finally motivate us to take the essential action required.

Here's some of the latest news…

Two national security bodies released reports suggesting climate change will likely increase conflict across the globe.

In March the Pentagon released its Quadrennial Defense Review, drawing a direct link between the effects of global warming and terrorism.

Then in May, CNA Corporation Military Advisory Board — comprised of retired military elites formerly in charge of national security — issued its report National Security and the Accelerating Risks of Climate Change. Their conclusion: "Climate change is no longer a future threat — it is taking place now" and serves as "a catalyst of conflict in vulnerable parts of the world."

Also in May the White House's latest National Climate Assessment report summarized the detrimental impacts of climate change across regions of the United States. Here's some of what we can expect, depending on where we live: more heat waves, droughts, extreme precipitation events and coastal flooding.

The Vermont Climate Assessment study released earlier this summer warns of increased precipitation and more frequent catastrophic flooding. It's an unsettling forecast, since the tragedy of Irene still haunts us. That storm displaced thousands, made others homeless and, worst of all, cost some people their lives. It also carried a hefty price tag, costing Vermont nearly a billion dollars.

One of the many takeaways from the latest report by the world's leading climate scientists — the Intergovernmental Panel on Climate Change — is that the price of climate action today is cheap compared to what it will cost, if delays continue. They note that climate change is happening now, and no place is immune. Life as we know it on this planet is at stake. Building resilience — adapting to a climate-changed world — is essential to limiting risks. And seriously cutting heat-trapping gas emissions is critical, now.

I take these key findings as our planetary marching orders and our moral imperative.

Many well-mannered people often avoid certain topics in particular — religion and politics — because they can be so personal, complex and controversial. But we must have these hard discussions and move forward. We must channel our shared moral compass and do all we can to live by the golden rule — both in our interactions with each other, as well as in our relationship with the earth.

Johanna Miller, energy program director at the Vermont Natural Resources Council, may be contacted at jmiller@vnrc.org.

A ZERO NET ENERGY APARTMENT BUILDING IN BROOKLYN

'Bright n' Green' Produces all the Energy it Uses

By George Harvey, staff

We introduced Robert Scarano in the June issue with the article, "Green Epiphany." He is an architect in New York, who had once designed what he calls "energy hogs." After studying the specifications for the DOE's Challenge Home (now Zero Energy Ready Home) and passive house design, he went through an epiphany and started working on green building. Thus Bright n' Green, an apartment building he designed and constructed in the Brighton Beach section of Brooklyn, became a reality.

A zero-energy-ready home is precisely that – ready to be lived in with no energy use. Nor is this a meager standard, as the standard for living requires a high level of comfort. Scarano says, "It is a clearly achievable goal, without the huge cost some people might imagine."

"The most important thing," he says, "is air infiltration. It is more important to put attention on ventilation and air exchange than on insulation." To that end, Bright n' Green is equipped with impressive controls for dealing with both air temperature and impurities that might be in it.

Air purity is a basic, absolute requirement. With that in mind, the entire apartment building was constructed and finished with non-toxic materials. But since it is necessary to bring in fresh air, an entire system was designed and built to be certain the air is pure, even if the outside air is not.

The incoming air goes through a set of underground pipes that bring the temperature closer to what is wanted for indoors. It passes through a heat exchanger, so incoming air is warmed with the residual heat of outgoing air.

The air is constantly tested and monitored, automatically. It is dehumidified, scrubbed and ionized. Fresh air is delivered constantly to all apartments, with each having its on filters. These are so effective that Scarano says there should normally be no need for tenants to dust their apartments. There is also no need for humidity control.

Each unit is supplied with temperature and humidity controls. The heat is electric and comes from resistance heaters, which are warming floor mats in the bathrooms. The reason resistance heaters are used is partly because there is so little heat lost that the cost of a heat pump would be hard to recover.

The flooring is acoustically insulated with a membrane made from recycled rubber tires. The hardwood floors include a mix of white and red oak, which is all recycled; it was taken from blocks used for shipping pipes. Since it was never chipped or shredded, it could be planed and polished to have a beautiful grain (though Scarano admits to occasional small nail holes). It is finished with non-toxic tung oil to be as beautiful as a person might want.

Even the elevators were specified for their green characteristics. Hydraulic equipment was not allowed because of the possibility of leaks. Instead, smart elevators based on gearless technology were installed.

All of this is powered on site. The building has a 38-kilowatt solar array to provide for its six apartments. In this way, Bright n' Green produces all the energy it uses – a zero net energy apartment building.

The icing on the cake, perhaps, is the image Scarano produced to beautify and enrich the neighborhood. The small grounds are planted with native flowers and vines. The walkway to the building has a small orchard and rose garden. So even passers-by can find Bright n' Green a thoroughly satisfying experience.

GOVERNMENT BUILDS ZERO ENERGY OFFICE FACILITY

By Roger Lohr

DOE's NREL's office Building in Golden, CO is the nation's largest zero energy office building. It will generate as much energy as it uses.

According to the Department of Energy and an article on the New York Times Green Blog, construction of the nation's largest zero-energy office building has been completed. The Department of Energy's National Renewable Energy Laboratory (NREL) in Golden, CO is 222,000 square feet and more than 800 employees will occupy the facility in late August when it is due to open.

A zero-energy building creates as much energy as it uses. The new building cost is $259 per square foot and it is generally accepted that such construction costs 50% more than the cost of an average (energy inefficient) building. Imagine if it were ordained that all government facilities were required to be zero-energy buildings. Imagine if all government vehicles were electric. These concepts may not be that far-fetched as a government method to lead the way to a more sustainable world.

So what makes a zero-energy building? Start with extensive efficiency so that the building consumes less than half the energy of a building that is constructed to current commercial codes. And then generate power onsite with solar panels.

Passive and existing design techniques are a significant aspect to cutting energy needs. An east-west building orientation and a narrow 60-foot width bring more daylight into workspace in the offices. Energy costs for lighting a typical building run about 30% of the electricity. Operable windows are one of the building's "smart" features will notify employees in a message sent to their computers when they should open or close their windows based on temperatures.

The walls are concrete sandwich panels (layer of insulation between layers of interior and exterior concrete) to absorb heat during the day to keep the interior cool and release the heat at night when the indoor temperatures drop. Low energy radiant heating uses water pipes to circulate hot or cold water in concrete floor slabs to heat or cool the building. Corrugated metal panels cover the building's south exterior to capture and send solar heat to a concrete thermal labyrinth in the building's foundation. This

Cont'd on p. 24

FEDERAL

FEDERAL INVESTMENT TAX CREDIT

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

USDA RURAL DEVELOPMENT PROGRAM

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

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

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

BIOREFINERY ASSISTANCE PROGRAM

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

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

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

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

REGIONAL

NEW ENGLAND GRASSROOTS ENVIRONMENTAL FUND

MODEST GRANTS ARE AVAILABLE FOR COMMUNITY-BASED ENVIRONMENTAL WORK IN CT,MA,RI,NH,VT,ME

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

VERMONT

CLEAN ENERGY DEVELOPMENT FUND

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

SOLAR INCENTIVES – BASED ON RATED CAPACITY OF SYSTEM

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

Micro-Hydro

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

***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 electric, microturbines, and combined heat and power systems, this constitutes a 2.4% state-level tax credit. Any unused tax credit may not be carried forward.

EFFICIENCY VERMONT

Lighting (must be ENERGY STAR)

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

Home Efficiency Improvements

- improvements: air sealing, insulation and heating system upgrades - up to $2,100 in incentives - using participating* contractors
- limited time $500 bonus for projects completed by 12/15/2014

Appliances (must be ENERGY STAR)

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

Heating/Cooling

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

Residential New Construction

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

Other Opportunities To Save

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

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

NEW HAMPSHIRE

RENEWABLE ENERGY INCENTIVES OFFERED THROUGH THE NH PUBLIC UTILITIES COMMISSION

Commercial Solar Rebate Program

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

- Rebates for solar electric/thermal projects 100kW (or thermal equivalent) or less
- Solar PV = $0.80/Watt D/C up to $50,000
- Solar thermal = $0.07(or$0.12 for systems of 15 collectors or fewer) per thousand- Btu per year, up to $50,000

Contact Elizabeth.Nixon@puc.nh.gov

Commercial Bulk Fuel-Fed Wood Pellet Central Heating Systems

- 30% of the heating appliance(s) and installation cost, up to a maximum of $50,000. An additional 30% up to a maximum $5,000 is available for thermal storage. Systems must be 2.5 million BTU or less

Residential Solar PV Rebate Program

- $0.75/watt capped at $3,750 per system, whichever is less. Systems must be under10kW. Subject to funding availability.

Contact jon.osgood@puc.nh.gov

Residential Solar Water Heating Rebate Program

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

Contact barbara.bernstein@puc.nh.gov

Wood Pellet Boiler or Furnace

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

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

LOCAL INCENTIVES

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

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

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

RENEWABLE ENERGY INCENTIVES OFFERED THROUGH THE NH ELECTRIC CO-OP

Commercial Solar Thermal (Hot Water)

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

Commercial Solar PV

- $0.50 per watt up to the lesser of 15% of installed cost or $20,000

Commercial Fossil Fuel Program

- Incentives of 35% up to $15,000

Residential Solar PV

- is 20% of the project cost up to $2,500.

Residential Solar Hot Water

- is 20% of the project cost up to $1,500.

Heat Pump Water Heaters

- is 50% of the project cost up to $1,000.

Heat Pump Conversion

- is 35% of the project cost up to $10,000 for Geothermal Heat Pumps.
- is $450-$900 per system based on SEER rating for Ductless Mini-Split Heat Pumps.
- is 35% of the project cost up to $3,500 based on SEER rating for High Efficiency & Hybrid Central Heat Pumps.
- is 35% of the project cost up to $25,000 based on SEER ratings for Commercial ground or air source heat pumps and ERV's.

PAREI

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

WWW.NHSAVES.COM

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

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.

2014 ENERGY STAR® RESIDENTIAL HEATING, COOLING, AND WATER HEATING EQUIPMENT REBATE

Rebates of up to $1,500 on high efficiency Furnaces and Boilers, $200-$500 rebates on Mini Split Heat Pumps, up to $800 rebates on water heaters, rebates on programmable and Wi-Fi thermostats

Program details and application at www.NHSaves.com/heatingcooling

OTHER NH ELECTRIC UTILITY PROGRAMS

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

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

Business Programs

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

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

NH Weatherization Assistance Income-Eligible Programs

Home Energy Assistance and NH community action Weatherization Assistance Program. Financial assistance paying fuel bills, and free weatherization improvements for qualified applicants. Funding from U.S. Dept. of Energy, NH utilities.

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: $75/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 residential rebate = $3860 including • Adder for moderate home value or for moderate income. MA State Tax Credit (use only once) = $1000, Federal Tax Credit (30% system cost) = $3000, Net Cost = $2100 **Visit http://www.masscec.com/programs/commonwealth-solar-hot-water**

MASSSAVE HEAT LOAN SHW

Through this loan program, customers may borrow at 0% interest the costs of a Solar Domestic Hot Water and/or Thermal Heating system. Apply through receiving the MassSave Energy Audit. You can borrow up to $25,000 at 0% interest for a 7 year term.

Efficiency

After conducting a free residential Energy Audit, residential customers are eligible for up to $25,000, commercial loan up to $100k at 0% interest heat loan with terms up to 7 years to cover the following energy efficiency improvements: atticwall-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 provides rebates for homeowners and businesses in Massachusetts who install solar photovoltaics (PV). Rebates are granted through a noncompetitive application process for the installation of photovoltaic (PV) projects by professional, licensed contractors at residential, commercial, industrial, institutional and public facilities. For Block 19 funding, in addition to the base incentive (.25/W), further incentives ("adders") are available for installations using components manufactured in Massachusetts (.05/W), for individuals with moderate income or home values (.40/W), and for those who are rebuilding in the wake of a natural disaster (1.00/W).

For all systems, rebates are calculated by multiplying the per watt incentive (base incentive plus adders) times the nameplate capacity of the system, up to 5 kilowatts (kW); projects are eligible for rebates only if their total capacity is under 15kW. Commonwealth Solar II program will sunset at the end of 2014.

Further eligibility requirements apply, and potential rebate recipients should read the full program documentation.

http://www.masscec.com/programs/commonwealth-solar-ii

DEPARTMENT OF ENERGY RESOURCES

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 Data Acquisition System monitoring must be utilized for PV systems >10kW in order to qualify to sell SRECs.

MA State Income tax credit for residential solar hot water or pv systems are eligible for a one time 15% off system cost, capped at $1000 max tax credit.

No sales tax on residential solar hw or pv systems.

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

NEW MASSACHUSETTS SREC POLICY

Massachusetts' new version of its Solar Renewable Energy Credits Program is informally being called SREC II.

Under the earlier version, which expired last year, credits were given regardless of where the solar system was installed. SREC II prioritizes sites, however, by using an SREC factor based on the type of installation. The credits provided for energy produced by a system are calculated by multiplying the factor times a full credit value.

Full credit is given for residential, parking canopy, emergency power, or community-based systems, or any other system of less than 25 kW. Larger systems get a factor of 0.9, if they are building-mounted or at least 67% of the power produced is used at the site. If a larger system meets neither of these criteria, but is built on a landfill or brownfield site, or if it is less than 650 kW, then it gets a factor of 0.8. Systems that qualify for none of the foregoing get a factor of 0.7.

Information can be found at http://bit.ly/Mass_SREC_II

AFFORDABLE SOLAR & ENERGY IMPROVEMENTS AVAILABLE

Customers of Green Mountain Power (GMP) can now choose to repay home energy efficiency loans on their monthly GMP electric bill, thanks to a partnership with NeighborWorks of Western Vermont.

"We are so pleased to partner with NeighborWorks to make it possible for customers to make energy improvements to their homes with this unique partnership," said Mary Powell, President and CEO of GMP. "Helping customers make their homes more efficient with renewable and alternative energy technology is an important step forward as part of our mission to provide a reliable, clean and cost-effective energy future."

The on-bill service allows GMP customers to make energy improvements to their homes with the help of an affordable loan from NeighborWorks and make their monthly payments when they pay their GMP bill. The program is available to all GMP customers in Vermont.

"It doesn't get any easier," said Ludy Biddle, NeighborWorks executive director. "We have adequate capital, a simple loan application and an affordable loan product that customers can now repay on their electric bill."

Loans may be for thermal and electric efficiency measures, renewable energy and other services that advance the Vermont energy plan. Mark & Sara Borkowski recently used the GMP and Neighborworks bill repayment program to pay for two air source heat pumps for heating and cooling each floor of their Rutland home, a new heat pump hot water heater, and weatherization improvements.

"Like many Vermonters, we live in an older home and we really wanted to make our home more efficient, use less energy and save money," said Mark Borkowski. "Having the option to re-pay for these great improvements on our GMP bill over time made it affordable and possible to make these exciting changes to our home."

Any GMP customer who owns a home or apartment building, up to four units, may participate. Loans are up to $15,000, with up to 10 years to pay back. Monthly payments on a ten-year loan of $15,000 are approximately $161/month, with an interest rate of 5.25% and APR of 5.618% and application fee of $250.To get started, GMP customers anywhere in Vermont may call NeighborWorks. NeighborWorks can also help connect customers with qualified contractors operating within Efficiency Vermont's Home Performance with ENERGY STAR program for energy audits and access to Efficiency Vermont's incentive program.

To apply for a low interest loan or connect with NeighborWorks H.E.A.T. Squad toll-free, visit www.nwwvt.org or call 1-877-205-1147 x 227.

UNH Names Innovative Composting Facility after Sustainable Agriculture Pioneer

Technology Advanced by Josh Nelson Used at NHAES/UNH COLSA Organic Dairy Research Farm

The facility produces high-quality compost and heat capture, thereby reducing the use of fossil fuels on the farm.

By Lori G. Wright, Information Coordinator at NH Agricultural Experiment Station

The University of New Hampshire has named its high-tech composting/energy capture facility at the Organic Dairy Research Farm in honor of the sustainable agriculture pioneer who advanced the technology -- the Joshua Nelson Energy Recovery Compost Facility. The facility is the only one of its kind at a land-grant university.

Recently members of Nelson's family and his former colleagues at Agrilab Technologies of Enosburg Falls, VT, gathered at the Organic Dairy Research Farm (ORDF), a facility of the NH Agricultural Experiment Station at the UNH College of Life Sciences and Agriculture, to honor Nelson, who passed away in 2012. The system was installed in 2013 and made possible by a $550,000 gift to the college. The facility produces high-quality compost and captures generated heat, thereby reducing the use of fossil fuels on the farm.

"Having this facility honoring Josh is absolutely amazing. It recognizes his entrepreneurialism and his desire to educate and provide a foundation for change. I feel really pleased that UNH is inheriting that mission, and I look forward to seeing the growth and students who will go out into the world and make change," said Beth Nelson Meachem, Nelson's sister.

Nelson's daughter Dana said her father was very excited about the UNH composting facility. "He was so excited to get this started. He was on the hill thinking about this all of the time, and I am so grateful to have this. This is beautiful," she said.

The system developed by Nelson and his former colleagues at Agrilab Technologies uses fans to actively aerate compost and pull hot vapor from the bottom of an aerated compost pile or an in-vessel composting system. The active aeration system makes it possible to produce compost on a commercial scale with minimal mechanical turning because the system actively aerates the material throughout the process. Vapor from hot compost is pulled into the Isobar® heat exchange system, where the thermal energy is transferred to a water tank. The heated water can be pumped to reservoirs and used for wash water, provide pre-heated water for a boiler, or be used in hydronic heating systems. At the ODRF it is used to pre-heat the water used to clean and sterilize the tank and tubing in the milk room, which is a significant energy requirement on dairies. The Isobar® heat transfer technology was patented by Acrolab, Ltd. of Windsor, Ontario, which worked with Nelson and Brian Jerose, president of Agrilab Technologies who founded the company with Nelson, to bring the system to the United States.

UNH is the only university in the nation using the cutting-edge energy recovery composting system.

"We are so honored to have Josh's name on a building that symbolizes what he stood for – sustainability and the environment. The research that is conducted here will have an impact on our environment for generations to come, and Josh's name will be connected to that research and the outreach that comes with it."

-- Jon Wraith, NHAES director and UNH COLSA dean

"I was very inspired by Josh as I think a lot of us were. He had a vision of where this fit, not just as a practice but how this fit into the larger picture of sustainability, food systems, waste management, and making a difference for the future," Jerose said.

Since the system was installed, NHAES scientists have conducted a number of research projects on composting, including best practices regarding aeration, compost recipes, fertilizer applications, irrigation methods, whether or not to cover the compost, loading methodology, composting in winter, and heat production. For more on the

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Whelen Engineering Handles their Energy Requirements

New boiler system reduces costs by thousands!

By George Harvey, staff

Whelen Engineering was formed in 1952 with the idea that equipping aircraft with good beacons would make flying safer. From that point, Whelen expanded into all sorts of safety lighting and warning devices. Brian Boardman, the General Manager at Whelen's Charlestown Division in New Hampshire, says of the company's product lines, "We are proud to manufacture safety and warning devices that ship across the world."

Whelen employs about 850 people at its Charlestown facility, making the company a major employer in the Connecticut River Valley area of Vermont and New Hampshire. Since the company tries to manufacture most of its own parts, there are many different kinds of processes in the plant's two largest buildings. Injection-molding machines are important, but the company also makes circuit boards and other types of parts, which are used in the same plant to make such finished products as beacons, lightbars, and lighting systems.

The array of manufacturing processes produces its own set of unusual energy requirements. Equipment used in some areas produces enough heat that they heat the space they are in until outside temperatures go down to close to zero. Other areas, of course, have very different needs.

In their most recent building addition, they covered the exterior surfaces of concrete and block walls with thermal board to R-30. The ceiling insulation was also brought to R-30, with the insulation inside. The insulating boards were installed in layers of two-inch-thick boards, with both air intrusions and thermal bridges eliminated in the process.

They installed four large Frohling TX Model 150 Biomass Boilers, with a 4000 gallon buffer tank. Fuel infrastructure is adjacent to the boiler room, and both it and the boilers are adapted for use of either wood chips or pellets, providing better fuel source security. Existing oil boilers were retained as well, providing more backup, if needed. The whole heating system is tied to a new forced air water distribution system installed by Froling Energy, based in Peterborough, New Hampshire.

The wood storage capacity is 144 tons of pellets or 250 tons of dry wood chips. The annual fuel use should be about 450 of pellets or 562 tons of dry chips. This is expected to save 58,000 gallons of oil per year and reduce heating costs by $90,000 to $132,000.

The commitment to sustainability is reflected in other Whelen operations. There are two aspects of this that particularly deserve mention.

In an effort to conserve resources, Whelen has reduced waste for some operations to zero discharge. One example is a process which has all wastewater captured; all particulates in the water are removed. Whelen is then able to reclaim and recycle content from the particulates.

Another aspect of sustainability that this exemplary company incorporates into their standards is the relationship between the company and the employees. The company's website says, "The pride and commitment of its work force, [whose] average employment longevity is 22 years, is rewarded by sharing the Company's benefits as share holders in the tradition established by the founding Whelen's fifty-six years ago."

www.whelen.com.
www.frolingenergy.com.

Whelen Engineering's Charlestown Division in New Hampshire

DEE'S ELECTRIC

50 year History includes installing Heat Pumps -- since 1973

By George Harvey, staff

Celebrating the 50th anniversary at Dee's Electric

Dee's Electric is celebrating its fiftieth anniversary this year. The company was founded by Arthur "Dee" Kilburn in 1964. Now Dee's son, Mike Kilburn, is continuing the family business traditions.

Interestingly, one of the family traditions is working with heat pumps. In fact, it is hard to imagine anyone in Vermont having a longer tradition with the product. Dee's Electric took on heat pumps as a standard line in 1973. In those days, General Electric was promoting heat pumps as a way to heat buildings that were able to take advantage of low electric rates during low demand periods at night and on weekends.

The heat pumps of those days were nowhere near as efficient as today's models, some of which will deliver heat at temperatures down to -15° F and are reasonably efficient well below 0°. In those days, the lower efficiency was not as much of an issue, because the world was experiencing a gas crisis and people were looking for alternatives to oil. The old models were discontinued when oil prices went down and anxieties faded, but they had given Dee's a lot of experience that would come in handy in the fullness of time.

In the 1990's, Dee's took on a new kind of system, a type Mike Kilburn says is a type of water- source heat pump. This is not a system that would normally be used in a home, but one in which heat can be pumped from one part of a building to another, as might be beneficial in many industrial or commercial buildings. A closed loop of circulating water is heated or cooled by local heat pumps, with outside heat or cooling applied from a variety of sources.

This means that a manufacturing plant with operations that give off excessive heat could have those areas cooled by pumping heat into the circulating water, while an office, for example, could extract heat from the same water as it goes through. In a time of year in which the entire facility needs heat, any sort of heat source, including a heat pump that gets heat from the outside air or ground, could provide it to the loop.

The turn of the century brought a new sort of heat pump business to Dee's, in which the customers were typically homeowners and small commercial operations. Dee's installs ground source heat pumps when they are needed, but does much more work with air-source units. Mike Kilburn has focused on the Mitsubishi, which he believes is a reliable, high-quality unit.

We might point out that Dee's Electric is not just about heat pumps. The company's primary business line is general electrical contracting, including tying solar systems to the grid. For this purpose Dee's partners with other businesses that specialize in solar PV installations. But for those who need a heat pump, which may include just about anyone who does not have one, it is hard to imagine a company with more experience than Dee's Electric.

Happy 50th Anniversary to Dee's Electric.

GMP EXPANDS HEAT PUMP PILOT PROGRAM

-- in support of Net Zero Montpelier

COLCHESTER, Vt. …. Green Mountain Power is expanding its groundbreaking heat pump pilot program to Montpelier as part of the city's major initiative focused on making Montpelier the first net zero capital city in the country.

"We are so pleased to be able to offer Montpelier residents the opportunity to heat their homes with air-source heat pumps, which will save them thousands of dollars each year and help Montpelier reach its goal of reducing the use of fossil fuels in the city," said Mary Powell, President and Chief Executive Officer of Green Mountain Power.

"This is a significant milestone in our work to have Montpelier meet all its power needs through renewable energy sources and efficiency by 2030," said Montpelier Mayor John Hollar. "A coalition of organizations is committed to making this vision a reality and we appreciate Green Mountain Power stepping up with a program that will bring real savings to help us make progress towards our goal."

Green Mountain Power has been running what is believed to be the first utility-sponsored heat pump rental program in the country today, a pilot effort centered in Rutland and intended to save customers money and demonstrate the comfort air-source heat pumps can provide in a cold-weather climate.

Tim Shea, Chair of the Montpelier Energy Advisory Committee, said, "Montpelier is poised to change how we meet our energy needs, and Green Mountain Power's commitment will help us succeed."

"Combined with the City's new biomass district heating system, cold climate heat pumps will make Montpelier's heating more efficient and further reduce use of traditional heating oil," added Andrea Colnes of the Energy Action Network.

Cold climate heat pumps, also known as mini-split heat pumps, are ductless heating systems that also provide air conditioning during hot weather. Installed in less than a day, a heat pump includes an outdoor unit that works as a heat exchanger, like the compressor in a refrigerator, and is connected with copper tubing to a small interior unit.

Under the pilot program, GMP will pay

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Best Ways OFFICE EMPLOYEES can REDUCE their CARBON FOOTPRINT

...and why they should care

By Ryan McNeill

If you're the kind of person who showers in solar-heated water and drives a Prius (but only when you really can't take your bike), you might think you're doing your part for the planet. But what about your carbon footprint at the office?

Many of us spend half our waking hours at work, so it makes sense to be as environmentally vigilant there as we are at home. The catch is that our co-workers and bosses may not be as eco-savvy as we are — and may actually be skeptical of our office-greening efforts.

Trying to get everyone at the office to share your green views may be futile. But that doesn't mean you can't get them to switch to eco-friendlier habits. The trick is to persuade them by showing the benefits they can reap. You can often link environmentally-friendly changes to personal benefits You will almost certainly get the attention of your office manager or company owner when you show how much they can save with simple changes in procedure and equipment.

Here are some good ways to get everyone in your office to reduce their carbon footprint, along with reasons they should care (beyond saving the planet):

Bike or walk to work: Cycling and walking are great exercise and let you start work feeling energized, plus it lets you blow off work-related tension on the way home. They're also great ways to lose weight. If you let your commute take the place of a before- or after-work workout, it won't even take extra time out of your day.

Carpool: Everyone loves to save money on gas, so starting an office carpool could even turn you into a hero. An added benefit is employees who carpool get to know each other better.

Telecommute: While not every job lends itself to working off site, working part or all of the time at home is a popular option for those who can. It saves commuting expenses, offers a more relaxed working environment, and allows employees to be productive even when they're not feeling well or have to stay home with a sick child. Need to convince your boss? Point them to the research. Many studies have shown that telecommuting actually boosts productivity and employee retention.

Choose energy-saving technology: When purchasing new equipment, go with Energy Star-rated computers, energy-efficient bulbs, and other efficient devices. To maximize savings, set computers to hibernate after 15 minutes of inactivity. Office managers can also encourage employees to turn off desktop monitors when leaving for a break.

Power down equipment when not in use: The typical office can realize significant savings by turning off equipment — including computers, printers, lights, and coffee machines that won't be used for a few hours. Plugging multiple machines into a power strip can make it easy for the last person out to shut down with a single flick of the switch.

Reduce printing: The price of ink alone may be enough to get your manager to agree to go paperless. It will also reduce paper costs and having to store and retrieve bulky paper documents. Another little known fact:-Old paper can be highly irritating to the lungs, so going paperless could significantly improve the air quality in your office.

Next time you find yourself cringing at the wasteful practices you see at work, speak up! Hopefully, your concern for the environment will be enough to get your co-workers to change. If it isn't, ask yourself these two questions: who can change this, and why should they care? If you can present the right people with reasons they actually care about, you'll be amazed how fast things can change!

Ryan McNeill is the president of Renewable Energy Corporation (renewableenergysolar.net) and is an expert in the solar and alternative energy industry.

Source: U.S. News.com bit.ly/1tVeUbj

The Green Office Challenge is Met.

How does your office rank?

Green Energy Times Staff

An office of the international engineering firm, Thornton Tomasetti's was been ranked among the top 10 most sustainable offices in the Chicago area in the 2013 Chicago Green Office Challenge. The competition was stiff, as 267 Chicago companies vied for the top honors.

Among their areas of focus, Thornton Tomasetti does investigation and analysis of projects of all sizes and complexity. They look at building structure, building skin, and construction support services with a view to building performance and the full life cycle of a structure. This put the competition in their area of expertise.

The ICLEI – Local Governments for Sustainability partnered with the city of Chicago to found the Chicago Green Office Challenge in 2008. ICLEI is an association whose membership includes more than 1,100 local governments whose interests it represents at the United Nations, international policy forums, and elsewhere.

They created the Green Office Challenge to encourage friendly competition among companies to create and display ways to reduce environmental impacts of the offices.

Thornton Tomasetti's Chicago office focused on improvement in several areas of performance. They started with an energy audit so they could find energy hogs and eliminate them. They started a composting program. They spread the word on efficiency and sustainability to employees, who began recycling paper, plastic and electronics. In addition to learning about the environmental costs of these products, employees were brought to understand the issues with commuting, so the environmental impacts of travel could be reduced.

Rachel Michelin, a senior project architect and one of the Chicago office green champions at Thornton Tomasetti, said this of the company's efforts, "Thornton Tomasetti prides itself on being at the forefront of sustainability, both in our offices and on our projects. The Chicago Green Office Challenge was a great opportunity for the Chicago office to showcase the firm's commitment to practicing in the office the same techniques we put into reality through our Sustainability practice."

Learn more about The City of Chicago Green Office Challenge at www.chicagogoc.com or www.ThorntonTomasetti.com. Start your own Green Office Challenge, and let us know how you have reduced your business's carbon footprint: info@greenenergytimes.org.

Biking to the Moon and Back!

Biking to Work Saved Riders $8,682,251 ...

By George Harvey , staff

May was National Bike to Work Month, an event that has happened each year since 1956. This year, the National Bike To Work Challenge was set up to get 50,000 registered riders to ride bikes for their trips to and from work. The registered riders log each day they ride over one mile, and the number of miles ridden. The miles could be applied from biking to the riders' communities, employers, or schools. Points accumulate from the beginning of the challenge, on May 1, until the end of September 30, 2014, when awards are determined.

According to the Challenge website, as of August 5, there were 44,302 registered riders nationally. They had ridden 15,366,816 miles, the equivalent of 32 rides to the moon and back. The riders burned 1,157,147,642 calories and saved $8,682,251 by using bikes for transportation. They also saved 14,291,139 pounds of carbon dioxide from being released into the atmosphere.

National Bike to Work Day was Friday, May 16, 2014. On that day, there were commuting events in most states designed to encourage biking, walking, carpooling, using transit, or telecommuting, instead of driving to work. On the Green, in Lebanon, New Hampshire, and King Arthur Flour, in Norwich, Vermont, offered free light breakfasts to people

who were biking to work. Employees of the Dartmouth Hitchcock Medical Center in Hanover, New Hampshire who biked to work were also given free breakfast in the cafeteria. Massachusetts had the 2014 Boston Bike Week Festival, a repeating event that will be held again on August 29, 2014. There were many other events in Massachusetts.

New Hampshire produced biking maps, which are available at nh.gov/dot/nhbikeped/maps.htm. The Windham Regional Commission, the planning group for Windham County, VT produced a set of biking maps for southeastern Vermont, at windhamregional.org/bikemap. MassBike maintains a set of biking trails -- see massbike.org/resourcesnew/pathstrails.

We at Green Energy Times want to encourage all to reduce use of gas-powered vehicles as much as possible. Not only is it good for the environment, it is good for our pocketbooks. Using bikes or walking to eliminate a second car can save thousands of dollars each year. It also promotes good health for the riders and cleaner air for all. We wish to encourage all work places to support employees who ride bikes to work. One way to do this is to provide a secure place to park bikes.

The National Bike Challenge website is at nationalbikechallenge.org.

Transportation is one of the largest contributors to the carbon emissions in the atmosphere. Biking to work is a great way that you can help to reduce your own addition to it. The earth, your body and your wallet will thank you in return for your efforts. Biking is fun!

the ECO-friendly OFFICE

By George Harvey

Many office workers don't think about the ecological effects of what goes on in their offices. Why? Maybe it is because they think of pollution as coming from diesel trucks, industrial plants, chemical companies, and coal-burning generating stations. They know what smoke is - and when they see it, they know it is pollution. They do not see it in their offices, so they naturally think the office is relatively non-polluting. "This is a clean environment! Nothing wrong here! No flies on my face!"

Wrong!

Just out of curiosity, where do you think all that paper comes from? What about the many components in the laptop computer? What about the chemicals in the copy machine, the plastic foam container for the take-out lunch, the mouse pad, or fluorescent tubes in the ceiling? Everything, absolutely everything, has an ecological price.

What about the leaky valve in the office toilet? That valve passes water at a rate so slow you barely notice. But it does it all the time, 24/7, year-round. It relentlessly takes water, which some chemical operation sanitized so it would be assuredly safe, and discharges it into the sewage treatment system, where it undergoes more treatment. If it drips away at half an ounce per minute, then it loses 1.875 pints per hour, 5.625 gallons per day, over 2000 gallons per year. At the cost you pay for water, replacing the valve is cheaper.

It might not seem like much has gone wrong when an employee using the copier makes ten copies for a meeting with nine people. But that extra sheet of paper being printed required that trees be cut down, logs transported, wood shredded, pulp chemically treated, wood fibers filtered out of waste water, and paper packaged and trucked to the store. Toner was manufactured, another chemical operation; the paper that was not used is (we hope) recycled, which requires more transportation and more chemicals, rather than going into a landfill. Each sheet is just a tiny problem, but the extra sheet can be a habit many people have, as relentless as the dripping water.

Everything we do has environmental effects. We can do better by managing resources better. This means using less of some things like paper, pencils, paper clips, and pens. It means turning machines and lights off when they are not needed, especially at night and over weekends. It means using some equipment, such as computers, longer before they are replaced.

These are not hard things to do, but a consistent approach to doing them, one tiny step at a time, can produce big results. It is like stopping the drip. You can get information on waste and materials from the EPA at bit.ly/get-epa-wast-and-materials.

An important tip is to get everyone to agree to act wisely and together. One of the saddest and most foolish stories we have heard about waste has to do with a company in Wisconsin that went out of business because of it. The owner worked in an office he liked to keep warm. The employees liked the manufacturing areas to stay cool. The entire plant had only one thermostat for the heat, which the owner locked in place because the employees kept turning it down. But the air conditioning units were set independently and the employees slyly set them on their own. Finally, a bill came for a month when the heating thermostat was set five degrees higher than the AC thermostats. It was over $50,000 for the one month. And by the way - this is not fiction.

The story puts the huge environmental problems that can develop with heating and cooling into perspective. Of course, we should note that people perform best when they are comfortable. We should also note that heating can use a huge amount of energy, even in an office. If the owner of the business had thought about the problem he (he in this case) had for a few minutes, he could have realized that he could heat his office with an electric space heater and turned down the heat in the rest of the building. Better yet he could have discovered the remarkable concept of having multiple thermostats in different heat zones. Instead, he went broke.

Many offices, like many homes, can benefit from an energy audit. If insulation is needed, it should be installed. Possibly more important, if there is a need for air sealing, it should be done. Windows can potentially benefit from a variety of treatments, especially in older buildings. Shades should be added to keep the hot sun out in summer and the heat from radiating away in winter.

Lighting has consequences just as heating does. Replacing lights with LEDs can save a lot of money over the long term. LEDs also have a far lower environmental impact than older lights, such as the mercury vapor in fluorescent lights.

Fortunately for the office manager or owner, there are incentives for offices, just as there are for homes. We can recommend the following links as resources:

Efficiency Vermont's business incentives web page: bit.ly/get-evt-business-incentives

New Hampshire incentives, including business incentives: bit.ly/get-nh-incentives

US Small Business Administration's energy efficiency tax credits: bit.ly/get-sba-energy-tax-credits

An Organization called Ceres -
Investors for a Clean Renewable Future

This level of corporate interest may give us all hope.

By George Harvey

Every once in a while, a news story comes up about a relatively little-known non-profit group in Boston called Ceres. We have mentioned in before in Green Energy Times, and perhaps it is time to explain better what it is.

Ceres is unique. Ceres was founded by investors after the Exxon Valdez oil spill in 1989, with the intention of preventing further environmental mishap as much as possible. As a result, it is devoted to a combination two things, sustainability and investment. Sustainability, of course, includes environmentalism.

The people of Ceres were not content to be just another investor group that identifies companies with good records, then to praise or even invest in them. What they wanted to do was to persuade companies to be environmentally responsible.

It is not easy to persuade companies to do what is right for its own sake. For example, when Ceres' representatives suggested to managers of investor portfolios that they put money into the growing renewable power market, they found that the managers were guided by mission statements that excluded anything that might be considered risky, and renewables were mostly considered risky.

After a little over ten years, the people at Ceres came up with a brilliant idea. It was to ask investors and corporations whether they had analyzed the risks associated for their businesses from climate change. The businesses were obliged, by the same guidance that had prevented them from investing in renewable power, to consider any risk they might become aware of. And so, in the period of 2002 to 2003, Ceres started promoting an understanding of "climate risk," a term they coined.

As business and financial people, representatives of Ceres were able to walk into the boardrooms of businesses and tell the members of the board how they could increase profits by operating sustainable businesses. By doing this, they formed a coalition of network of major businesses that work with them, including such members as Allstate Insurance, Bank of America, Ben & Jerry's, Best Buy, Bloomberg, Citi, Coca-Cola, conEdison, Dell, Ebay, Exelon, Ford, Gap, General Mills, General Motors, JPMorgan Chase & Co., Morgan Stanley, Nike, Northeast Utilities, PepsiCo, PG&E, Prudential Financial, Seventh Generation, Sprint, Time Warner, Virgin America, Walt Disney, Wells Fargo and many others.

Using the same approach, they formed an equally impressive group called the Ceres Coalition. This group is largely made up of organizations managing pension funds, investment organizations, and treasurers of various states, but also includes environmental organizations, church groups, advocacy groups and others. They also formed a coalition of investors, who are willing to take part in some of Ceres activities.

Ceres and their various affiliates get very active at local levels across the country. When a proposed law or policy comes to their attention, for example, they have professionals who are qualified and ready to testify before legislatures about environmental impacts and their effects on business. The members can operate in a large variety of situations, as they have a large variety of skill sets.

Ceres President Mindy Lubber with Robert Rubin and Tom Steyer at the Ceres' 2014 Investor Summit on Climate Risk at the UN in New York. Photo courtesy of Ceres.

Today, Ceres can motivate businesses and investors who have come to appreciate the risks of climate change to consider more closely the advantages of putting investment into renewable power. They have started the "Clean Trillion" campaign, which aims at getting global investment in renewables to a trillion dollars per year, about four times the current level. Christopher Fox, Ceres' Director of Special Projects commented on the prospects of achieving this goal, saying, "I think the transition to a cleaner economy is inevitable. The question is whether we will invest enough soon enough to limit human suffering."

When investors of Ceres' network met at the UN last January, they called for the fossil fuel industry to assess the risks of climate change. The investors making this call had $12 trillion behind them.

Seeing this level of corporate interest may give us all hope.

THE LOW-HANGING FRUIT

THE CASE FOR MAKING ENERGY-EFFICIENCY IMPROVEMENTS IN YOUR HOME.

-- A Series: Part II

By Mark Boudreau

Why is improving the efficiency of your home a "no brainer"? Simply put: Efficiency pays.

We New Englanders are a practical lot, so let's talk practicalities. Efficiency improvements pay in at least three ways:

1. They pay directly to your wallet

We have done many audits over the years and find that one of the driving factors for people wanting to improve the efficiency of their homes is the ever-increasing cost to heat and cool their homes.

For example, let's take a standard 30-year-old, 2-story, 2000 square foot home:

A house like this might cost $3000 per year to heat. A reasonable goal might be to improve the efficiency of a home like this by 30%. A quick calculation illustrates the costs and savings (note that this is hypothetical and based on average results – your actual mileage will vary).

Current Cost to heat this house per year: $3000

Investment to make energy improvements (if you hire a pro): $4500

Potential savings per year (30%): $900

Years of energy savings to pay the initial investment back: 5 Years ($900 per year times 5 yrs)

Money back in your pocket after 10 years: $4500 ($900 per year from year 6 to year 10)

You can save even more if you do the work yourself. You might spend half the costs in making energy improvements by doing it yourself and see the return of your investment that much faster.

There are cash incentives, too. Most New England States have programs that support energy efficiency through education, cash incentives, and low cost loans. They are wonderful resources to help get you started. Contact your state efficiency organization. You can simply Google your state name along with the words "energy efficiency programs."

Energy efficiency improvements just make good financial sense.

2. Efficiency improvements pay by giving you greater comfort.

It is pretty hard to be uncomfortable on a beautiful sunny August day so let me take you back to early February. It is dark at 4:30. We are only half way through winter. It is 8º outside and the wind is howling. You are paying the utility bills at your desk. Your nose is cold. You are wearing 5 layers topped by a thick wool sweater. Your spouse is mocking the fact that you haven't taken your wool hat off in the house since New Year's Day and your feet are numb despite the fact that four Canadian geese contributed to your slippers.

You pay that month's $400 oil bill pausing to wonder why the house is still only 64º.

You have a couple options to get warm: Take a 30 minute hot shower (too expensive and indulgent for this Yankee), do 1000 push-ups in the living room (more like the Yankee my parents raised), go outside for a ski in the darkness (like the modern, hip Yankee I wish I were).

They are all strategies for making the best of winter in New England for sure, but sometimes we just don't have that 'get up and go' – we just want to be warm! My kids used to collect behind the wood stove all in a row getting their 'fix' of heat before sprinting upstairs to do more homework. We improved our house and all of this stopped. My shoulders are no longer around my ears, my nose doesn't run all over my desk and people are genuinely more cheerful around the house. Really!!!

Let's face it. Winter is long and cold. I like the cold but I like to be able to leave it outside where it belongs. We hear all the time people reporting how fantastic their homes and lives are after they have done energy efficiency in their homes. It's true!

3. Efficiency improvements pay to the environment by lowering fuel consumption, reducing strains on our infrastructure, reducing greenhouse gas production and improving air quality.

It is true that a few people want to debate the existence of climate change and environmental decline in this country, but we can leave that aside. It is indisputable that lowering our use of heating fuels of all kinds reduces our environmental footprint. There are many factors that bear

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GREEN BUILDERS ... IN OUR MIDST

LEWALLEN BUILDERS

By George Harvey

Home in Eastman, New Hampshire. left is the finished building and right is the building under construction, showing the angular framing.

"My goal and dream," says Michael Lewallen, "is to be a different kind of builder." He tells of learning much of his trade from a man who believed that a building should be finished the same way good furniture is, with attention to every inch of the product. That is the different kind of builder Lewallen wants to be.

He started out in Memphis, Tennessee. His first exposure to building came when he worked as a volunteer for a theatrical company building sets. He found he loved working with wood and wanted to learn as much as he could about the subject.

Trips to the local library were one source of inspiration and knowledge. He read about things most builders of his area had never dreamed of, such as passive houses. Fascinated with the idea of creating structures that required no energy, he pushed on.

Deep roots in the environmental movement that are found in New England is what led Michael to make his move to Perkinsville, Vermont.

Interest in creative, efficient building led to his working with Geobarns, a unique construction company that is based in White River Junction, Vermont. Michael's experiences here gave him a new understanding of the building trade. Geobarns builds strong, durable, and unique timber-framed barn style structures, with diagonal framing that adds rigidity and beauty. The buildings do not generally have interior support, and this provides great flexibility in how the building is finished.

Lewallen took an interest in the finishing construction that Geobarns allows, and set out on his own venture, Lewallen Builders, in Perkinsville, Vermont. His new company often takes on projects where Geobarns leaves off. This means that Lewallen starts with a completed shell and manages the remainder of the construction, managing jobs like the insulating, wiring, plumbing, and actually doing the finish woodwork.

Geobarns' unusual buildings require special skills. David Hamilton of Geobarns says, "For this reason, we absolutely need someone like Michael Lewallen who can deliver high-quality finish carpentry, but who also understands the unique character of these building shells (he's built them in the past), and who comes with the project management skills to coordinate the ballet (or monster truck rally, pick your analogy) of subcontractors and finish work that make our buildings into homes."

Since this is all done just as the customer wants, specifics of insulation, lighting, and efficiency vary from one project to another. The buildings all attain a high level of sustainability because of the nature and quality of construction. A building that is long lasting spreads its embodied energy, the energy it took to build it, over a long time.

A home built in Eastman, New Hampshire provides a good example of a collaboration of Geobarns with Lewallen Builders. The photo shows the angled studs clearly. Working with this structure requires skills beyond those used in ordinary construction for a number of reasons, not the least of which is electrical wiring. Insulation in these buildings is similar to what a conventional structure of the same wall thickness would have. Extra insulation can be added, if the customer wishes, and applying rigid foam boards to the exterior of the home provides improved air sealing, as well.

Michael Lewallen is constantly learning and expanding his horizons. He wants to move his business more in the direction of complete structures, and he wants them to be outstanding. Lewallen's passion is to meet the future as a Green Builder -- to build Energy Star certified homes with a focus on super-efficient passive and net zero energy homes. Another is to provide deep energy retrofits to bring older buildings up to the same high standards. He wants to maintain the high standards of craftsmanship, however, and will happily do historical renovations for both residential and commercial applications.

Find Lewallen Builders at www.lewallenbuilders.com, or 802-280-5848.

AIR DUCTS: OUT OF SIGHT, OUT OF MIND

The unsealed ducts in your attic and crawlspaces lose air. Uninsulated ducts lose heat -- wasting energy and money.

Air ducts are one of the most important systems in your home, and if the ducts are poorly sealed or insulated they are likely contributing to higher energy bills.

Your home's duct system is a branching network of tubes in the walls, floors, and ceilings; it carries the air from your home's furnace or central air conditioner to each room. Ducts are made of sheet metal, fiberglass, or other materials.

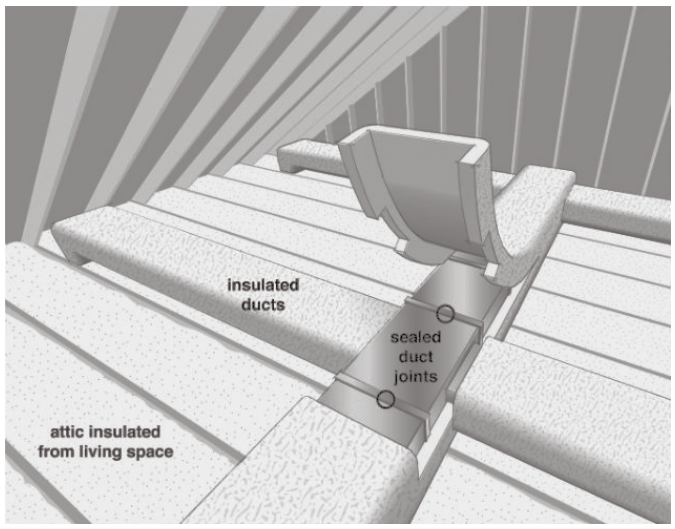
Ducts that leak heated air into unconditioned spaces can add hundreds of dollars a year to your heating and cooling bills. Insulating the ducts in unconditioned spaces is usually very cost-effective. If you are installing a new duct system, make sure it comes with insulation.

Sealing your ducts to prevent leaks is even more important if the ducts are located in an unconditioned area such as an attic or vented crawlspace. If the supply ducts are leaking, heated or cooled air can be forced out of unsealed joints and lost. In addition, unconditioned air can be drawn into return ducts through unsealed joints.

Although minor duct repairs are easy to make, qualified professionals should seal and insulate ducts in unconditioned spaces to ensure the use of appropriate sealing materials.

Minor Duct Repair Tips

- Check your ducts for air leaks. First, look for sections that should be joined but have separated and then look for obvious holes.
- Duct mastic is the preferred material for sealing ductwork seams and joints. It is more durable than any available tape and generally easier for a do-it-yourself installation. Its only drawback is that it will not bridge gaps over one quarter of an inch. Such gaps must be first bridged with mesh-type drywall tape or a good quality heat approved tape.
- If you use tape to seal your ducts, avoid cloth-backed, rubber adhesive duct tape -- it tends to fail quickly. Instead, use mastic, butyl tape, metal-foil tape, or other heat-approved tapes. Look for tape with the Underwriters Laboratories (UL) logo.
- Remember that insulating ducts in the basement will make the basement colder. If both the ducts and the basement walls are not insulated, consider insulating both. Water pipes and drains in unconditioned spaces could freeze and burst if the heat ducts are fully insulated because there would be no heat source to prevent the space from freezing in cold weather. However, using an electric heating tape wrap on the pipes can prevent this. There may be some pipes more prone to freezing than others, due to their location. Generally speaking, do not bury pipes in insulation in the basement. Check with a professional contractor.
- Hire a professional to install both supply and return registers in the basement rooms after converting your basement to a living area.
- With cooling ducts, be sure a well-sealed vapor barrier exists on the outside of the insulation on to prevent moisture condensation.
- If you have a fuel-burning furnace, stove, or other appliance or an attached garage, install a carbon monoxide (CO) detector to alert you to harmful CO levels.
- Be sure to get professional help when doing ductwork. A qualified professional should always perform major changes and repairs to a duct system.



Unsealed ducts in your attic and crawlspaces lose air, and uninsulated ducts lose heat -- wasting energy and money.

Install a Carbon Monoxide Detector

Carbon monoxide (CO) detectors are required in buildings in many states. They are highly recommended in homes with fuel-burning appliances such as natural gas furnaces, stoves, ovens, water heaters, and space heaters. An alarm signals if CO reaches potentially dangerous levels.

Learn more about minimizing energy losses in ducts and insulating ducts and other areas of your home at energy.gov/energysaver/articles/tips-air-ducts.

Source: www.energy.gov

Montpelier, Vermont will be the nation's first net-zero capital in the nation, where all energy used for heat, electricity and transportation is produced or offset by renewable sources. Photo: Flickr VTcity-charlieon-theradio

GMP EXPANDS HEAT PUMP PILOT PROGRAM

-- in support of Net Zero Montpelier

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to install heat pumps in customers' homes and small businesses, and rent them to the property owners for $44 to $53 per month. GMP estimates customers can save 25% to 50% of their home heating costs.

Customers interested in enrolling in the pilot, or who would like more information, may call the heat pump team in the Energy Innovation Center at 802-229-7902 or email heatpump@greenmountainpower.com.

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

THE LOW-HANGING FRUIT

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on the environmental impacts of various fuels, such as their extraction, processing and delivery to our homes. Simply put, if we use less of those fuels we are having a smaller impact on the environment. Most of us can agree that having a smaller impact on our home and environment is good for us, for our communities, and for our children and their children.

Mark Boudreau is Co-owner of Lewis Creek Company, a full-service design-build company consisting of both trades-women and men located in North Ferrisburgh, VT. They create homes that integrate a holistic approach to new building and renovating weaving together people, homes, the environment, beauty, economy, and performance.

ZERO ENERGY OFFICE FACILITY

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stored heat feature can be used when additional heating is needed in the winter.

Recycled materials were used in building construction such as reclaimed steel natural gas pipes for structural columns and wood recovered from Colorado pine trees that were destroyed by a bark beetle.

As time passes, we will see if the building operates as projected. The Department of Energy plans to share information about the building design through a published manual at the Energy Laboratory's Web site later this year.

ROTTING MATTERS!
FOSSIL-FUEL FREE ENERGY

Book Review by N. R. Mallery

THE COMPOST-POWERED WATER HEATER

How to Heat your Greenhouse, Pool or Building with only Compost!

by Gaelan Brown, The Countryman Press, 162 pages, $16.95

Gaelan Brown and I connected a number of years ago because of compost-powered heat, after we ran a full-page section about the Jean Pain Mound, in Green Energy Times. Jean Pain was a pioneer of sustainability, whose lifestyle in France led us towards a more responsible life on this ailing planet.

Following that initial connection, Brown and Green Energy Times together published many examples of his work, showing how well compost works to heat hot water in your home or to create heat in a greenhouse for the winter. Examples included the University of Vermont as well as at a number of other locations around Vermont and New Hampshire, built as a result of his expertise in this field.

As a fellow Vermonter, Brown is the founder and inspiration behind Compost-Power.org. He has developed new ways and methods of generation to make hot water and energy from his well-designed and tested compost systems. He is also on the management team of Agrilab Technologies, the world's leading compost heat-recovery company.

Many locals agree this book is a valuable resource that is critical to adopt as an accepted practice for our future. From Bill McKibben (350.org) to Paul Comey (Green Mountain Coffee Roasters), to Marshall Webb (Shelburne Farms), to Dr. Richard Foley (Professor, Sustainable Product Design and Innovation at Keene State College, NH) or Ben Falk (Whole Systems Design), all agree that Gaelan's book is a must-have asset for one's library. This technology should be considered as we move towards a sustainable future.

As Carl Smith, the editor in chief of Green Technology wrote, "Organic materials make up about two-thirds of the solid waste stream. Gaelan Brown's book will add momentum to the growing -- and vital -- movement to treat this waste as a valuable resource. As he demonstrates through a range of fascinating case histories, composting offers more than the most earth-friendly solution for feeding crops -- it can also be a source of energy…".

A specialist in the field of compost heat-recovery, the author has written about a practical, useful, new-to-most, technology that works. You can actually generate your own reliable heat and hot water from compost.

The book is a guide. It is an instruction manual. It is an inspiration that not only shows pitfalls and how they were overcome, but also how to avoid them. Excellent examples include detailed plans for building a DIY system using wood chips and sawdust. The instructions include step-by-step illustrations and photos that can guide you through the construction process -- complete with calculations to help you estimate the heating capabilities for different compost heat-recovery systems.

You very well may find that you want to build one yourself. You probably have a space in your bookshelf, waiting to be filled with this valuable resource.

N. R. Mallery is the publisher of G.E.T.

The Story of Wenzday Jane
A REVIEW OF POWER TO THE PEDALS

-- a documentary by Bob Nesson

By George Harvey

Bob Nesson's Power to the Pedals is a thirty-minute documentary video that functions on many levels. Each of them has its own merits and its own power.

It is an inspirational the story about Wenzday Jane, a young woman who grew up in poverty in Boston. As a child, her parents collected bottles and cans to get money, and she was teased because of it. Later, she had very different learning moments, including one she calls an epiphany. It came because she learned how to weld. She suddenly realized that she could take two pieces of metal and unite them to form a single object of her own design. Eventually, this led to building pedal-powered trucks and a business called Metro Pedal Power. Now she employs a number of other people, using pedal-powered trucks to provide pickup, delivery, and other services.

Pedal Powered truch picks up and delivers goods for community-supported agriculture. Inset: Wenzday Jane and friend. Photos courtesy of Wenzday Jane

Anyone interested in starting a small business might do well to study this story. It tells of a small business finding its niche, dealing with much larger businesses by being competitive. Without the costs of purchasing, fueling, and maintaining heavy equipment, the human-powered venture is able to function at an attractive cost. Instead of an expensive dump truck running on fossil fuels, Metro Pedal Power has a larger number of small, very light vehicles, powered by human beings, carrying loads up to five hundred pounds each. When the city of Cambridge, Massachusetts asked for bids for the contract to collect material in recycling bins in public places, it was Metro Pedal Power that won.

It is a story about ecology and environmental practice. One lesson of that is that fossil fuels can be replaced, even in a modern urban setting, by employing more human beings. But the lessons go beyond that. Metro Pedal Power reduces carbon emissions by providing a place where farms can deliver goods for community-supported agriculture. Some customers come by to pick up the goods, but others get them delivered by pedal-powered trucks. Metro Pedal Power also collects food waste for composting, sometimes to returning it as compost it to the same people whose waste was picked up.

It is a story about social leadership. It is about Wenzday Jane's homegrown philosophy of how community and commerce can be reconciled into a new and healthier culture, in which human beings have great value and nature is respected. It is about a culture capable of undergoing change for the better. And it is a story about hope – a very believable hope, because it is clearly manifesting now, in the real world.

Power to the Pedals can produce many hours of productive discussion. It is simple enough to be understood by school students, deep enough to get to a lengthy discussion in public meetings, and inspirational enough to be preached. It is a video for all of us.

For more, visit powertothepedals.org. Bob Nesson's website at www.nessonmedia.com. Metro Pedal Power's website is metropedalpower.com.

YOU DON'T ALWAYS GET WHAT YOU PAY FOR
HEATING EFFICIENCY SUCCESS STORIES

Prepared by the Vermont Natural Resources Council, *20 pages – free*

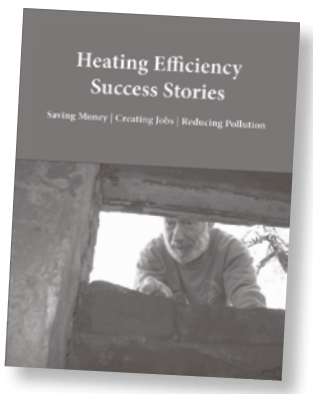
Review by George Harvey

As many readers of Green Energy Times are aware, the old saw, "You get what you pay for," is not always true. Sometimes you pay nothing and get something very valuable. Such is the case of VNRC's pamphlet, Heating Efficiency Success Stories. A download can be obtained for free at www.bit.ly/VNRC_success_stories.

This pamphlet is exactly what it claims to be, a set of case studies for different Vermont buildings that were given successful heating efficiency makeovers. It starts by stating some very impressive general facts, such as this:

"Vermont currently exports almost $1 billion out of our economy annually to pay for energy. A real commitment to heating efficiency as well as helping Vermonters switch to renewable heat will keep our dollars local and grow thousands of new jobs."

It then moves to a set of very brief descriptions of example cases, one on each page, from page 3 to page 15. Clearly, they were carefully chosen for the lessons they illustrate. On each page, there is a description of a real set of problems with real buildings that were inefficiently heated in some way. On each page there is a description of the actions taken, and the success of those actions in terms of money saved.



Each case study explains what resources homeowners or communities were able to bring to bear, getting help with projects. Each also has a list of tips it exemplifies, all of which could be of great value to many people. A few examples of these that could be used to illustrate their value are as follows:

"Regional planning commissions can be excellent sources of funding and guidance in exploring opportunities for financing."

"Get the most out of your audit by having it done while it's cold outside. It will provide better information about how your home might be losing heat."

"Efficiency Vermont's DIY program can help save money on the labor costs of home improvements—if you're willing to do the work."

"Working with a Home Performance with ENERGY STAR certified contractor qualifies homeowners for ENERGY STAR incentives. The average incentive for homeowners in 2012 was $2,000."

"If you can't afford all of the improvements at once, consult with your certified HPwES contractor to obtain advice on making the most strategic, cost-effective improvements first."

The last page of the pamphlet includes a complete list of all the resources mentioned in the text, with all necessary contact information.

This is valuable, and it is free. Every homeowner whose energy bill is too high should GET it.

1827 TIMBER FRAME MEETS ENERGY EFFICIENCY

Multiple Rebates Available in the State Helped Reduce Costs

By Melissa Elander

New Hampshire offers many energy efficiency rebates and incentives for residences. Garland Mill Timberframe of Lancaster, NH, took advantage of these energy efficiency rebate opportunities in completing an ambitious remodel of an 1827 timber frame home in Lancaster, New Hampshire. The home is a beautiful example of transforming a home with character and history into a model for the new standard in energy efficient construction. The 2,698 square foot home is an Energy Star home that costs roughly $550 per year to heat.

In 2012, Lancaster resident Harriet Beattie purchased the 1827 timber frame house and contracted Tom Southworth of Garland Mill Timberframe to complete a top to bottom renovation. Southworth put many years of experience with timber frame homes and energy-efficient construction into recreating this historic home to be a model of energy efficiency and comfort.

The home's exterior walls and roof were opened and the existing insulation was removed. The home was enrolled in the Home Performance with Energy Star program through PSNH. J. Myers Builders, Inc. of Lisbon, NH, completed an energy audit and insulated the home, and Beattie received a $3,322.47 rebate for basement and exterior wall insulation through the Home Performance with Energy Star program. New Hampshire homeowners may qualify for a 50% incentive, up to $4,000, to help pay for energy efficiency improvements including lighting upgrades, water conservation measures, air-sealing, and insulation through the Home Performance with Energy Star program. Homeowners can find out more about the Home Performance with Energy Star program by contacting their local utility company or at www.energystar.gov/homeperformance.

Attention to detail was put into creating a thermal barrier that far surpasses current energy codes and common building standards. A vapor barrier was installed over the dirt floor in the basement crawl space in order to prevent moisture from entering the home from the soil in the crawl space. The walls of the crawl space and the basement were insulated with closed-cell spray foam to R-27. The exterior walls were insulated with five inches of rigid foam board installed on the exterior. The rigid foam board was taped at all seams, transitions, and joints to eliminate air leakage and insulate the exterior walls to R-38. The vaulted ceiling on the second floor of the Cape-style home was insulated to R-54 using a combination of rigid foam board and dense packed fiberglass installed over top of the original roof. By installing insulation on the exterior side of the original roof, it was possible for the character-rich beams to be exposed on the interior of the home.

The home is heated using a Fujitsu air-source heat pump and a small wood stove. The homeowners were comfortable during the long winter of 2013 -- 2014 using only the heat pump and one cord of firewood. Domestic water is heated by a 40-gallon electric storage tank. New triple-glazed windows were installed. Total annual energy costs for the home are $1,561.00. Of the total energy costs, heat accounts for 34% or $534, hot water for 41%, and lighting and appliances for 58%. ReVision Energy of Exeter, NH, installed a 3.8 kilowatt photovoltaics solar array, which produces roughly 16 MMBtu of electricity per year, or $662.00 worth of electricity. The New Hampshire Public Utilities Commission offers a rebate or $.75 per watt up to $3,750, or 50% of the total facility cost. In addition, the homeowners received a 30% federal tax credit on the total cost of the solar installation. Homeowners can learn about rebates for renewable energy in New Hampshire by contacting the

far left: The siding was removed leaving the barnboard sheathing. Above: top: The ZIP System sheathing with the seams taped. middle: The roof is built up using TJI roof trusses in order to install dens-packed fiberglass and rigid foam board. Bottom: New roof installed over ZIP System roof sheathing.roof work tji's. Photos courtesy of Fletcher Manley. www.fletchermanley.com

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Public Utilities Commission, or at www.puc.state.nh.us.

A blower-door test was completed at the completion of the project. A blower-door test measures the amount of air leakage through the building envelope of the home to determine the tightness of the envelope. The blower door can indicate the location of air leakage and measure the frequency of air exchange in the home; homes that are more air-tight have less air exchange than homes that are drafty and "leaky." During the renovation Southworth had a goal of 600 cubic feet per minute (at 50 pascals pressure) for the final blower-door test; the actual final test measured 591 cubic feet per minute. This converts to a natural air change rate (ACHn) of 0.12, which is substantially lower than the standard target of 0.35 ACHn set by the American Society of Heating Refrigeration, and Air-Conditioning Engineers, Inc. (ASHRAE). Due to the anticipated level of air-tightness in the home, a balance energy recovery ventilator (ERV) was planned for and installed. The ERV supplies fresh air for the home by exchanging indoor air with passively heated outdoor air at a constant rate. Air is exhausted from the bathrooms and fresh air is supplied to the bedrooms.

The home is Energy Star certified with a rating of 31, meaning that the home uses 31% of the energy used by a home that is built to minimum energy codes. In taking advantage of multiple rebates available in the state -- Home Performance with Energy Star and the photovoltaics rebate available through the Public Utilities Commission -- a historic home has been repurposed for the future.

Melissa Elander is an energy auditor for J. Myers Builders, Inc. for the Home Performance with Energy Star program.

SOLAR PHOTOVOLTAIC SYSTEM STATS
Harriet Beattie Residence, Lancaster, New Hampshore

The 3.84kW System includes:

- 16 240W Monosilicon Canadian Solar PV panels
- 1 Solectria PVI4000 Grid Tied Inverter
- The PV system is designed to annually produce 3,778 kWh of clean, renewable energy, to offset roughly 4,911lbs of CO_2 emissions. It will cover 100% of their electricity needs.
- **Installer**: Revision Energy, who noted, that they were honored to help bring the Beattie's sustainable goals to fruition.

** Revision Energy is located in Exeter, NH, Liberty and Portland, ME. www.revisionenergy.com.*

The completed Beattie home with the solar panels on the garage.

UNIQUE PASSIVE-TYPE DESIGN
stands strong against the test of time

By George Harvey

Dick Walker is the proprietor of Dick Walker Sawmill in Fair Haven, Vermont. The mill makes shaped and trimmed logs for custom designed houses. The company motto, "If you can dream it, we can do it," basically tells the story of the company mission.

He is also a bit of an experimenter. Thirty-eight years ago, he designed a very different sort of log house. The house is round. While there have been many historical round houses, there have not been many made of logs. In order to produce that shape, the logs are placed vertically, instead of horizontally. Now he is offering the same home to customers.

The house is 38 feet across, giving it a floor area of about 1134 square feet. It is a single story, and has its roof supported by the outside wall and an interior core in the middle of the living area. The house is open, aside from the core, and can be divided however its owner likes. It rests on an insulated concrete slab. The roof is made of 2-inch tongue-and-groove board, which will support just about any snow load, providing extra insulation.

Walker says there are two good options for insulating the roof. One is spray foam covered by rubber. The other is spray foam covered by three coats of silicone. In either case, the roof has insulation of R-5.5 per inch of foam, plus the insulating value of the wood and whatever snow accumulates.

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HARLOW FARMS - Organically Certified since 1985

Harlow Farm's new solar photovoltaic array powers the farm. Photo courtesy of Soveren Solar.

GET staff

Harlow Farm, in Westminster, Vermont, is one of the oldest organic farms in the area. It received its organic certification in 1985. Today, it is still going strong, growing the same sorts of healthy products. These are sold in the farm's own farm stand, farmers' markets, through the farm's Customer Supported Agriculture (CSA) program, and through the Putney, Brattleboro, and Monadnock food cooperatives. Harlow Farm also has its dining spot, Café Loco.

Farm products include vegetables, fruits, berries, poultry, eggs, beef, lamb, and pork. Harlow Farm also has its own kitchen producing its own line of jams, pickles, salsas, pestos, and fresh baked goods. These are sold at the farm stand, farmers' markets, and winter CSA. Also sold at the stand are frozen vegetables from the farm, along with some foods that are not locally produced, such as olive oil and spices.

The farm stand and CSA also sell products of other farms, both organic and conventional, and other food-producing organizations, such as cheese makers, orchards, and an apiary. By inviting other producers into the market, it supports local agriculture and localvore customers from area communities.

Winter may seem far off, perhaps, but it is not too soon to prepare for it. Registrations have opened for the 2014-2015 winter market. Fresh Vermont-grown greenhouse vegetables, storage vegetables, meat, eggs, and a variety of quality products from a variety of nearby producers will be available throughout the coming winter to CSA members. Somehow, the idea of locally grown greens fresh from the farm in the middle of winter is very enticing. CSA goods are delivered to many locations, and new locations can be arranged for by groups of ten or more customers.

Harlow Farm is based on a philosophy of environmental sustainability. That being the case, it is hardly surprising that the farm has had a solar array installed. It is a 60 kW ground-mounted photovoltaic array, big enough to supply power for refrigeration, greenhouses, washing, food preparation, housing, the café, and the farm stand. It was installed by Soveren Solar of Putney, Vermont.

Learn more about Harlow Farm at harlowfarm.com or 802-722-3515 (The farm stand) or 802-376-9626 (Café Loco).

More about Soveren Solar can be found at soverensolar.com or at 802-869-2500.

Shop Farmers Markets

A farmers market is a physical retail market featuring foods sold directly by farmers to consumers. Farmers sell fruits, vegetables, meats, and sometimes prepared foods… Farmers' markets add value to communities as a benefit to both the farmer and the consumer. Supporting local saves energy, money, time, and the planet. *Support your local Farmers Market!*

Dorset, Vermont. Dorset Farmers Market. May 4 - October 12th. Sundays. 10 am-2 pm. Rain or shine. HN Williams General Store, Rt.30, Dorset, VT. (802) 768-1325. Email: marketmanager@dorsetfarmersmarket.com

Warner, New Hampshire. Warner Area Farmers Market. Town Hall Lawn, 5 E. Main St. **Saturdays, May-Oct.**, 9 am-1 pm. Vegetables, fruits, flowers/plants, maple, baked goods, dog treats, soap, crafts. Spring into Warner, May 19; Christmas Market in December. Rain or shine. (603) 456-3724, suzbohman@gmail.com.

The Farmers Market of Keene, NH. Offering a wide variety of locally produced farm fresh produce, dairy, meat, delicious baked goods, maple syrup, plants, unique crafts, and more! Located at Gilbo Ave. behind Margarita's restaurant. **Open 9 am-1 pm Tues & Sat. May-Oct.** Residents on federal food assistance (SNAP/Food stamps) can get $20/week free through Double Up Veggie Bucks to spend at the Farmers' Market of Keene & at the Walpole Farmers Market. Double Up Veggie Bucks doubles the money spent using EBT cards - by spending $20/week from their EBT cards, shoppers receive tokens allowing them to bring home $40 worth of fresh fruits, vegetables, meat, milk, eggs, and bread from the Farmers Market. More info: keenefarmersmarket@gmail.com. http://harvesttomarket.com/farmers-market/Keene-Farmers-Market-NH.

ELMORE ROOTS' Permaculture Tips Know-How

OH NUTS!

By David Fried

Korean Nut Pine (left) and American chestnut (right) at Elmore Roots. Photo by D. Fried 2014

I felt like someone was watching me, even though it was so quiet on our hill.

A wind brushed the hairs on my neck and then I saw him looking at me.

It was that red squirrel again! The pesky, persistent one that sings "get away, get away" in northern squirrel dialect whenever I forget and wander innocently under one of our black walnut trees.

I did my best to ignore him and walked on.

We have two large black walnut trees. They don't look like much and their form is not straight or graceful. But every year they make so many nuts that we have plenty to eat, plenty to plant and plenty to sell. This is after the squirrel gets his share. I was telling a customer today at our nursery that their life depends on getting enough nuts. For us, we just WANT to have nuts for our enjoyment, but it is one of many things we like.

In the fall, when a few start to fall, the squirrel is sitting on a high branch, chewing through the nut, or whatever they do to get to it and watching me through the corner of his eye.

Then there is a windy night or a cold night, and a lot of them fall until they cover the ground. I go out first thing in the morning with my nut wizard -- not a Gandalf type -- but a tool that you hold and roll across the ground, and nuts fill it up. You release about 30 at a time in to a bucket or box. No more bending over to pick them up! We get a lot harvested this way. We step on the husks in our driveway and rinse the black coating off them and dry them, out of the reach of the squirrel. We rotate them at room temperature, so they don't mold and will keep for years. You can grow your own high protein -- high-oil food and it does not take a lot of work. Plant black walnuts in deep earth and to the north of other shorter orchard trees, so the walnuts won't shade the others.

Hazelberts will begin making nuts in two or three years. They have orange red fall color and are self-thickening-they send up shoots which become trunks or branches and make a great wind-break, hedge or screen, eight-to-10 feet high. The secret to harvesting them before the blue jays and squirrels is to look within their husks-when they begin to turn tan from white, you can pick them, husks and all, and bring them into a protected place where they will turn to the nice dark brown we are looking for. Both black walnuts and hazelnuts need two or three trees for pollination.

We also grow pine nuts. They are an evergreen and you harvest the cones or wait until they drop.

Each "petal" of the ripened cone will have a pine nut peeking out from it. I bring the whole cones inside and remove the nuts during winter when I have more time. As with all nuts, only crack the shell for as many as you are going to eat that week, They keep without refrigeration in the shell, but not once they are opened.

The pine nuts are inside the cone!

We also grow shagbark hickory, butternuts, American chestnut, Ashworth bur oak and buartnuts.

These are all exciting and unusual and look great on any Vermont hillside.

A Northern Vermont Hazelbert with a nut in its husk.

Full disclosure: the squirrel promised to leave me some large tasty nuts this fall if I would write this article, probably hoping that all his relatives would have big festivals if more people in Vermont would plant these very useful, easy- to-grow trees…

David Fried owns Elmore Roots Fruit and Nut Nursery, located in Elmore, Vermont. This is their 34th year! fruitpal@elmoreroots.com.

HOW TO GROW GARLIC

Garlic is an excellent herb to grow in your garden. It is a relatively carefree plant and has few pests or diseases.

Because the bulb is located so close to the surface, only shallow cultivation can be practiced.

Plant in an area as free of weeds as possible. A mulch of leaves or other free of weeds seeds will help to garlic grow hassle free.

Planting is generally done in October. Garlic planted too late in the fall will not have good root growth and will get off to a slow start in the spring.

The site where the garlic is planted should be in full sun and in a light, humus-rich soil that drains well.

Dig well, add compost (lots of it if your soil is heavy) and do not compact it by stepping on it.

Fertilize with organic fertilizer when spring growth starts.

Water as needed. **Keep weeded.**

The soil should not be too acidic or too fertile. Too much nitrogen causes heavy top growth and, especially in the spring, delays bulb formation. If your PH is below 5.5, the addition of wood ash or dolomite lime helps.

How to plant. Break apart the bulb without peeling off any of the skins. With the pointy side up, plant the individual cloves 4" apart and about 4-6" deep because garlic likes moisture. In good soils, this should result in fatter, larger bulbs. Largest cloves will make largest bulbs.

Scapes. In early summer, garlic sends up a flower stalk known as a "scape." To maximize bulb size cut off the scapes (the curling tip) just as they begin to curl during in summer. (Garlic scapes are tasty and edible, and can be sauteed or made into pesto, dried and powdered and are great with eggs and in soups).

Garlic matures between the end of July and early August. Avoid overwatering for a few weeks before harvest to allow the bulbs to cure.

Harvest when ½-¾ of the leaves have turned yellow (depending on the variety). Try to avoid puncturing the bulbs when digging them out. Remove any dirt by hand, leaving as much of the skin intact as possible.

Cure the bulbs in a single layer in a warm spot for 1 week to 10 days. Then clean them off again and cut off the stems and leaves of the hardneck varieties. If you are going to braid the leaves of the softneck, clean them up now.

Store in a cool, dry, well-ventilated space. DO not store in the refrigerator. This will induce sprouting, changing the garlic's texture and flavor.

Set aside your best bulbs for planting in the fall. Use any damaged bulbs first and store the best.

White Rot. Some gardeners have been hit with White Rot that causes black spots and decay on the bulbs. It is spread in infected soil and water and is very persistent in the soil. Flooding the bed for 4 weeks in the spring may kill it. The best way to avoid it is not to leave decaying alliums in the ground and by using a strict 4 year rotation.

Courtesy of West Coast Seeds www.westcoastseeds.com

(1) Planting Garlic. 4000 cloves took about 2 hours with 2 people. (2(Garlic is covered. Notice the Brussel Sprouts still growing along the side. Photo 1 & 2 credits: Dwight Sipler from Stow, MA. Wikimedia Commons. (3) Garlic, late spring. Bradford, Vt, Photo: N.R. Mallery. (4) The harvested garlic, Photo: dailypea.com

"The Rainy Day" by Vermont Artist Peter Huntoon. This painting is from his 'A Day in Vermont' collection that celebrates the beauty of Vermont through art. Subscribe today at www.ADayinVermont.com to see his newest creations in Peter's free weekly email newsletter.

MID-SEASON SEED SAVING

STEPS YOU CAN TAKE NOW TO SAVE SEEDS FOR NEXT SEASON

By Sylvia Davatz

Tomatoes have been very late to ripen this season, but they are just beginning to color up—either red, orange, yellow, pink, multi-colored, or the so-called "black" You have already made sure that you are growing open-pollinated varieties, now you want to choose the best fruits from each plant. Think about what qualities you are selecting for. Great flavor? Disease resistance? Choose the fruits you save seed from accordingly.

Tomatoes seeds are easy to save, but they benefit from fermenting, a process which mimics what happens in nature when ripe tomatoes plop to the ground and rot. The gel surrounding seeds in a mature fruit contains compounds that inhibit germination. Fermentation breaks these down and kills any seed-borne diseases.

Squeeze or scrape the seeds and their gel into a shallow dish. Deli containers are perfect.You should have no more than about 1/4 inch of seeds in each container. Don't add water unless there is not enough moisture to keep the seeds wet during fermentation. Place the container in a well-ventillated spot, out of direct sunlight, for a couple of days until a layer of mold forms on the surface. Now tip the seeds into a strainer and rinse under running water. The gel will have dissolved, making cleaning the seeds very easy. Dry the container—which you have carefully labeled with the name of the variety!—and tip the seeds back in, separating any clumps so they dry quickly. Put them back into a well-ventillated spot until dry.

Peas are coming to the end of their season now. To save pea seeds simply leave them on the vines until the pods are crisp and dry. Best to harvest after a day or so of bright sunshine. If rain is forecast, pick pods early to prevent mildewing. Dry them down thoroughly, thresh, removing any seeds that contain weevils.

Bush bean seeds will not be ready until later in the season, but now is a good time to select plants from which you will save seed. For snap beans, simply stop harvesting fresh beans and allow the pods to fill out and dry down. For dry beans all you have to do is wait until the beans are at the eating stage and reserve some of them for next year's planting.

Remember to always label seed carefully with the variety name and year of harvest, then enjoy anticipating planting your own seed next year!

Sylvia Davatz has been saving seed for 20 years. She helped start the 'Upper Valley Seed Savers Group' and has served on the steering committee of the recently founded Grassroots Seed Network for the exchange of open-pollinated seed. You can reach her at sdav@valley.net.

Ripe tomatoes. Seeds ready for fermenting.

Fermented tomato seeds ready for cleaning.

Pea pods drying down

Italian cannellini beans and their dry pods

EMERGING FRONTIERS IN BIOENERGY

CAN CONSUMERS GROW SUNFLOWERS FOR BIODIESEL?

By Sarah Galbraith, program manager of the Vermont Bioenergy Initiative

Farmers in Vermont are making their own biodiesel from sunflowers, and maybe you have wondered: Can I do that? (Check out the video "Growing Sunflowers for Biodiesel" at www.vermontbioenergy.com/oilseeds.) You may be interested in increasing self-sufficiency, replacing fossil fuel with a renewable, or saving $2.00 per gallon on diesel fuel. But can the average landowner grow his or her own biodiesel?

Land is the first thing needed to grow sunflowers. But most homesteaders or homeowners are not likely to have the equipment required for producing their own biodiesel, like a combine for harvesting the sunflowers, an oilseed press for extracting oil and a processor for converting the oil to biodiesel. These are expensive pieces of equipment that require a good deal of know-how, and the payback just isn't there for the small-time producer.

Processing can be done, however, at some on-farm facilities in Vermont, including Borderview Research Farm in Alburgh, Stateline Farm in North Bennington and other private farms, or in conjunction with other farms growing oilseeds like Woods Market Garden in Brandon and Ekolott Farm in Newbury. Growers located near these farms could consider growing oilseeds on their land and bringing them to a nearby facility for processing into biodiesel.

Those wishing to purchase locally-grown biodiesel can also look to Full Sun Company in Middlebury (http://www.fullsuncompany.com/), who will be providing to consumers biodiesel fuel made from recycled cooking oil produced at their Vermont mill and made from locally-grown oilseeds like soybeans, canola and sunflowers.

For growers that do have the land available for oilseed production and a place to process their seed, the growing manual "Oilseed Production in the Northeast" by Dr. Heather Darby at University of Vermont Extension is a useful resource. Those considering the economics of this endeavor should download the "Oilseed Cost and Profit Calculator" produced by Chris Callahan PE at UVM Extension. For these resources and more, including videos, image galleries, reports and helpful links, visit www.vermontbioenergy.com/oilseeds.

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

B100 fuel is being produced on Vermont farms, but can consumers grow their own biodiesel? Photo: Vermont Bioenergy Initiative

DORSET SCHOOL, VT-
THE KIDS ARE GOING SOLAR

By George Harvey, staff article

The school board of the Dorset School, in Dorset, Vermont, began studying the possibility of powering the school with solar photovoltaics (PVs) in the spring of 2013. It was easy to see how the school could benefit from such a system. It was even easy to see a likely place to put the system. What was difficult was finding an organization that could provide a plan the school board was entirely comfortable with.

The school provides education for kindergarten through eighth grade. Even so, there are people among its graduates who feel a sense of loyalty to it. One of those people is Thomas Hand, whose activities are discussed in two other articles in this issue of Green Energy Times. One of these is the article on Hand Motors, and the other is on Glow Heat.

When the Dorset School's board felt stymied on the issue of PVs, Jim Hand, Thomas' father, got together with his sons Thomas and Jamie and proposed that Hand and Sun, their energy company, help the school out. This led to the installation of a solar system, which is being installed as this article is being written.

The problem the school board had was that they felt they needed price stability for power purchases, but were unable to put down an initial investment out of their budget. Other financing options did not allow for the combination. Hand and Sun, however, gave them a deal that did not require a down payment, guaranteed the price of electricity at 90% of what they had been paying, and gave the school the option of buying the system at a fair market value after seven years. The school's system is 114 kW, and should provide most of the electrical power the school needs. It is mounted on the school's roof.

Jim Hand commented on this, saying, "We are not doing this to make money. We are doing it because the kids went to school there."

"We are taking a chance," Thomas Hand said. "If the market for electrical power goes the wrong way, we could suffer for it, but probably not much. It would have to go badly wrong for us to get burned."

There are other energy projects the school might undertake. The heating system burns 15,000 gallons of oil each year, and one of its three boilers is getting to the point that it needs to be replaced. Thomas Hand has done a walkthrough to see what the costs and benefits of air-source heat pumps might be. Typically, heat pumps are as inexpensive to operate, in terms of heat delivered, as cordwood or wood pellets. They are also cleaner, in terms of emissions, if they are powered by renewable power, which in this case they can be.

He says his initial suggestion will probably be that the one old boiler should be used only as a backup for below zero weather, with day-to-day heating done by heat pumps. This would allow the school board to get comfortable with the equipment and how it operates, including the costs, before committing to installing more heat pumps to provide for most of the heating load. They would be able to project the budget based on real data taken in the school itself, and make their decision on future changes accordingly.

Each step of the way, the Dorset School is setting an example other schools could follow, reducing its energy use, its energy bill, and its carbon emissions.

ENERGY EFFICIENT
GREEN CAMPUS RENTALS

By George Harvey, staff

We have two good examples of green off-campus student housing in Plymouth, New Hampshire, courtesy of the Plymouth Area Renewable Energy Initiative (PAREI). Both have taken advantage of PAREI's services to decrease their costs and carbon footprints and to increase comfort levels, and rated them highly.

Don Stoppe runs Campus Edge Apartments Plymouth, formerly Stoppe Management. His reasons for working with renewable energy and efficiency are many. The first thing he said about this was, "I want to vote with my wallet. Even if it costs a little extra, I will go with renewables because that is where the world has to go." But it is not just a matter of his work. He says it is also his hobby, and he is putting a lot of effort into understanding problems and solutions. In fact some of his solutions are his own designs.

He has some tips that could be useful for others. One is to provide a weather wrap for buildings, which he says has excellent payback. In one case, he got a 12% reduction in heating costs in a building by improving the insulation. Later, he put a weather wrap on, with an R-value of 1, at much lower expense, but because it provided a barrier to wind, it reduced his heating costs by 18%.

Another tip has to do with heating basements and protecting pipes from freezing. He says if there are crawl spaces through which pipes run, they should have their own heat zones, separate from the rest of the basement. That way, the basement can be kept at 40°, and vulnerable pipes will get their own heat when temperatures go low.

Micah McLane, who operates Off Campus Rentals, is passionate about renewable energy and efficiency. He is also conservative about business finance and careful of his tenants' comfort, so he starts most projects with test cases.

When he wanted to find out about air-source heat pumps, for example, he did the research and then had them installed in two buildings – his own home and his parents' home. This year, he is testing how students like heat pumps. Next year, he might just start installing them rapidly in the rest of the fifty-five units he manages.

He is already putting water system heat pumps into buildings. They can replace the heating elements in electric water heaters at moderate cost, and cost much less to run.

"They do take a little heat out of the basement," he says, "but that is more than compensated for by the dehumidifying they do." They save money every year because the heat pumps do both jobs at once for a fraction of the cost to heat water with resistance elements.

Off Campus rentals is also installing photovoltaic systems (PVs) at the rental units. One apartment building has 13 kW of PVs on the roof. Other systems are in or going in. Asked whether he would like to have a larger ground-mounted system on land outside of Plymouth, he said, "Oh, I would really like to do that!"

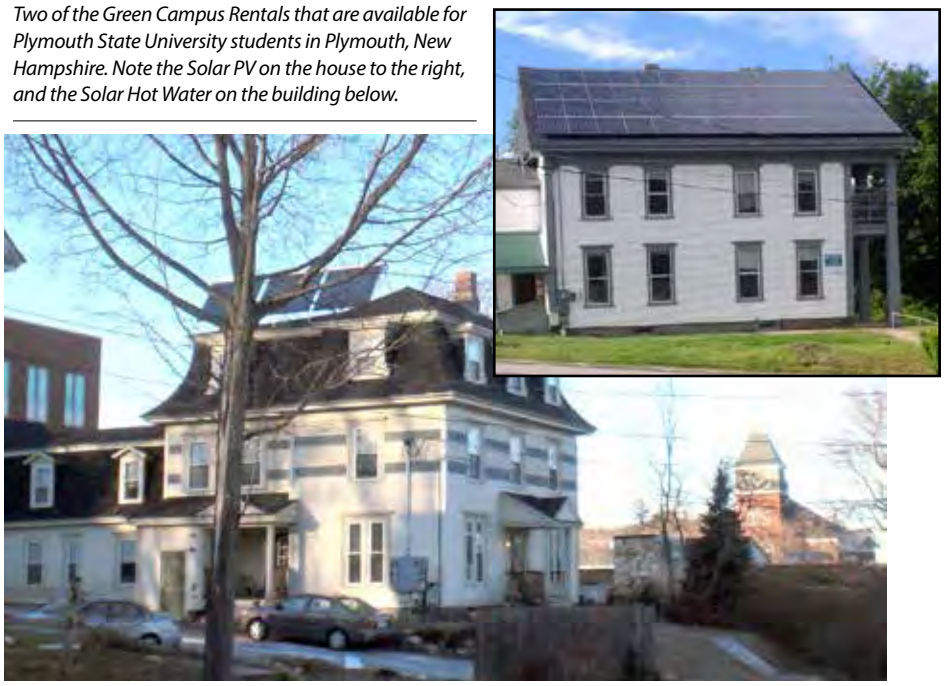
Much more has been done, of course. Insulation, sealing, and lighting are continuing high priorities.

Campus Edge Apartments is at stoppemanagement.com, phone 603-536-1197.

Off Campus Rentals is at www.plymouthoffcampus.com, phone 603-536-1223.

PAREI is at www.plymouthenergy.org.

Two of the Green Campus Rentals that are available for Plymouth State University students in Plymouth, New Hampshire. Note the Solar PV on the house to the right, and the Solar Hot Water on the building below.



VT'S CHANGING CLIMATE

"Climate is what you expect, weather is what you get."

Projected Trends

Warming Temperatures: Vermont's temperatures are projected to rise by another 2-3.6° F by 2050 and 5-5.4° F of warming by 2100 according to computer simulation models by the IPCC based on low to high global emissions of greenhouse gases (IPCC– Christensen et al. 2013).

Increasing Precipitation: Precipitation will continue to increase over the next century in Vermont, with the largest increases occurring in mountainous regions. In the near-term over the next 25 years, much of this precipitation will fall as snow in the winter. As temperatures continue to increase winter precipitation will shift to rainfall in the next 50 years and beyond.

Weather Extremes: The chances of record-breaking high temperature extremes will continue to increase. High nighttime temperatures are increasingly common. Warmer nighttime temperatures threaten snow and ice cover for winter recreation and will cause increased demand for cooling in winter and summer, respectively. An increase in high-energy lightning storms is projected to continue, threatening infrastructure and transportation systems.

The Jet Stream: Vermont's short-term weather is delivered by the jet stream that moves from season to season. Recent "blocking" or quasi-stationary patterns in the jet stream have led to prolonged periods of intense rainfall (e.g., June 2013), dryspells (e.g., August 2012), or intense cold (e.g., Polar Vortex 2014). Blocking patterns will be more common as they are due to loss of Artic Sea ice and will bring Vermont unseasonably high or low temperatures and/or precipitation.

The Vermont Climate Assessment

The Vermont Climate Assessment was created by a unique team at the Gund Institute for Ecological Economics at the University of Vermont. Led as a graduate course consisting of students with expertise in forestry, water resources, agriculture and farming, economy, community development and planning, energy and climate change science. Lead authors of each chapter garnered support from partners including the National Weather Service, state agencies, climate experts, and Vermont farms and businesses. All lead authors consulted, co-authored, or were reviewed with/by external experts in the subject matter. The leads collected data and subject matter from literature, interviews and observational data.

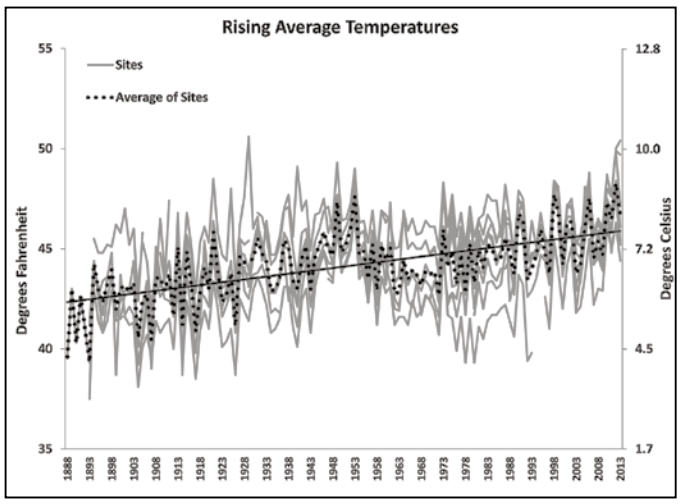
Why the VCA

The Vermont Climate Assessment seeks to address three main goals focused on the state of Vermont: 1) further scientific understanding of global change trends using local, historical data; 2) develop a deeper understanding of future impacts of climate change using simulations of future climate, and 3) communicate the current state of knowledge on global change impacts on Vermont, focusing on agricultural production, forests, water resources and recreation industries.

VERMONT CLIMATE ASSESSMENT

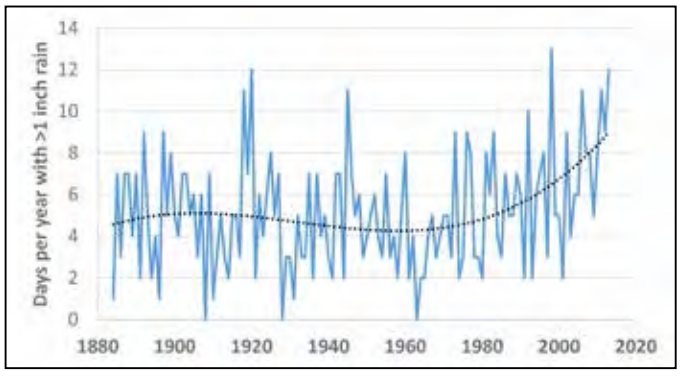
vtclimate.org/vts-changing-climate

RISING AVERAGE TEMPERATURES



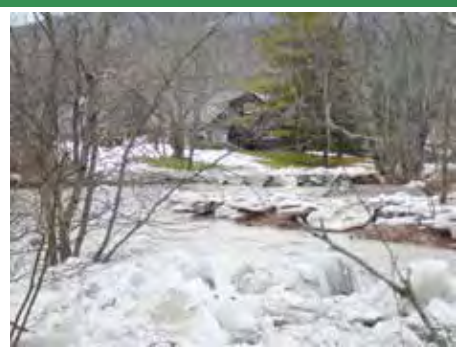
Rising Temperatures: Average annual temperature in Vermont has increased by 1.3° F since 1960; 45% of this change is since 1990. Winters are warming twice as fast as summers. Warmer temperatures have caused later "first-fall freeze" and earlier "last-spring freeze". Over the past 40 years, the freezing period has shortened by 4 days each 10 years and the growing season has lengthened by 3.7 days every 10 years.

INCREASING PRECIPITATION



** Note that the precipitation figure is the number of days per year with greater than 1" of precipitation (BTV weather station).*

Increasing Precipitation: Precipitation has and will continue to increase, particularly in winter months. Since 1960, average annual precipitation has increased 5.9 inches; almost half (48%) of this change in rainfall has occurred since 1990. The greatest increases are in the mountainous regions. Heavy rainfall events are becoming more common, posing threats to development in floodplains and to water quality as the historical legacy of fertilizer use in agricultural areas supplies high levels of nutrient run-off into rivers and lakes.



Ice jam on the Lewis Creek in Charlotte floods the Lewis Creek Road and Spear Street Extension and adjacent residence during a January 2010 thaw. Photo credit: Kristen Underwood

FALL FAVORITES AT RISK!

cont'd from p. 1

future. Extreme weather puts crops like barley and hops at risk, threatening some of beer's most important ingredients. The quality and yield of Saaz hops—the key to brewing the famous Czech pilsners—may be particularly susceptible to climate change. And the Saaz hop-growing industry will either have to relocate, quickly develop new varieties or face declining production. American breweries are equally affected. Jenn Orgolini, sustainability director for Colorado's New Belgium Brewery, says that their "growth depends on clean water and quality barley and hops." She adds, "If you drink beer now, the issue of climate change is impacting you right now.""

FOOTBALL AT RISK

Fall is nearly synonymous with football,

as the game takes over TV's across the country on Sunday and Monday nights. But hometown football is facing new challenges in a warming world. High schools have noticed a dangerous trend: more and more players are suffering from heat-related illnesses and even dying from heat exhaustion during summer practices.

Courtesy of Environmental Defense Fund. www.edf.org (bit.ly/1szVatn).

DINING ... IN THE GREEN

COLATINA EXIT - BRADFORD, VT

By Alyvia Covert

"Mangia Bene, viva bene!" Translated, "Live Well, Eat Well" is not just a motto to refer to the menu at The Colatina Exit — it also applies to the environmentally friendly practices this restaurant carries out to ensure that living well and eating well includes the welfare of the earth as well.

Recognized as a "Green Restaurant in the Green Mountain State", The Colatina Exit, owned by Vincent and Angela Wendell, has achieved this sustainable title through an organization called the Vermont Business Environmental Partnership.

The motivation to become certified as a green restaurant began as a suggestion from Peter Crawford, one of the VBEP organizers. Vincent Wendell said Crawford, a customer of The Colatina, recognized the potential for the restaurant to become certified as a green organization.

"Becoming certified didn't require a whole lot more effort than what we were already doing," Wendell said. "The purpose of getting certified is to let the community, other organizations and even other restaurants see the effort we're making, and it feels like that helps to drive the whole initiative."

VBEP is a voluntary program, which recognizes sustainable efforts made by businesses

throughout Vermont, and is divided into four different sectors, including the Green Restaurant sector.

The organization encourages environmental awareness within businesses by setting a list of eight sustainable standards and practices. The incentive for businesses is to become an environmental partner or leader associated with VBEP after meeting or exceeding these eight guidelines. The guidelines can be found online at this website: http://www.vbep.org/vbep/standards.html

Seen in the restaurant's mission statement about sustainability, The Colatina Exit is dedicated to "protecting the environment, the health and safety of our employees, and the community in which

we conduct our business. We [The Colatina] are committed to pollution prevention, continual improvement, and meeting or exceeding all environmental regulatory requirements."

As a green partner of VBEP, The Colatina has made efforts such as energy efficient lighting and insulation to more extensive endeavors like composting and local food sourcing to meet the green designation and follow their own mission statement.

Wendell said he noticed the amount of waste produced from the restaurant in a week resulted in an overflowing Dumpster within seven days, which led to an effort to cut back the amount of waste in the dumpster by recycling.

In addition to recycling, composting is one more way The Colatina works to reduce waste in the dumpster. Biodegradable wastes are saved and delivered to Sandberg Farm in East Corinth, VT, where it is then turned into topsoil.

"[In many restaurants] so many things come in containers that just get thrown away," Wendell said. "It makes sense that we just can't keep living that way, just consuming." The effort to buy local and fresh foods also lends itself to a reduction in packaging wastes.

Supporting the local food scene is one of the most important details of sustainable dining, and The Colatina works to support many area farms, breweries, musicians and other businesses within the area. Some of these include Robie Farm, Slack Maple Farm, Four Corners Farm, Rock Art Brewery, Switchback Brewery, and many more.

"We try to do our part by just having our own localized economy, Wendell said. "I feel like it's important to sustain the communities that sustain us."

Wendell said off that renewable energy may be a part of future plans for the sustainability of the restaurant. Hydro or solar power are both potential energy options.

"it seems like we used to be focused on things in the business that keep you chasing, and it's not very fulfilling," Wendell said. "Looking at what we have now, we want to do things in a way that is meaningful to us."

Alyvia Covert is a student at Ithaca College majoring in journalism. She lives in Piermont, New Hampshire.

AUGUST FIRST BAKERY & CAFÉ
BREAD ON WHEELS

By Alyvia Covert

"Bread for sale! Fresh bread!" rings through the air in downtown Burlington, VT, as goods from August First Bakery are sold along the streets. However, this delivery is a bit unconventional as the freshly baked goods arrive on bikes. It all started with cargo bikes, five years ago, on August 1st.

Phil Merrick and Jodi Whalen opened the bakery together in 2009. It has since grown into a welcoming café located in a renovated garage in downtown Burlington.

Whalen said the idea for the cargo bike sales came from her childhood in Pennsylvania. "When I was a little girl, a local bakery man would come by our house with a really neat display shelf he would bring into the kitchen and pop open. It was just magic for me as a little girl -- these things were arriving to me, at my house, and I would get to pick out a little treat every time."

Whalen decided to bring some of this childhood magic to Burlington with the bread bike deliveries. "When we opened the bakery, we wanted to figure out a way to deliver bread to our customers," Whalen said. "People are busy, they don't always have time to swing by the bakery, so we took the idea and made it a lot more environmetnally friendly."

August First Bakery makes afternoon runs in Burlington neighborhoods through the months of May through to September. Every year since these routines began, two bikers have towed trailers loaded with bread through the city, delivering up to 150 loaves daily. The seven grain, sourdough, baguette, whole wheat, and other specialty loaves are all home made, with all natural and organic ingredients.

In addition to neighborhood bread runs in the summer months, bread is delivered 365 days a year by bike to the City Market Food Co-Op, Waggy's Convenience Store, and a sandwich shop called Stacks.

Delivering bread to the people in the neighborhood was similar to that of an ice cream truck. Rather than making deliveries from orders, Whalen said the true charm of the bread bike came from its spontaneity.

"We've been approached by other grocery stores that want our bread, but they're outsde of town, and you have to consider how long it would take to bike there," Whalen said. "We dont want to put another truck on the road, so we stick to places that are within biking distance."

Since their beginning, the bakery and café has grown from five employees to eighteen. With the growth, the bicyclists have begun pulling trailers with their own bikes offering their fare throughout the city. This reduces the deliver infrastructure costs to almost nothing, and transportation costs are minimal. It also fits well with the bakery's environmental concerns.

The name "August First," was inspired by the poem "August First," written by Vermont poet, Hayden Carruth. Merrick and Whalen decided the title would double well as a name for the bakery and café, since they opened this amazing Bakery and Café on August 1st. They are now celebrating their fifth anniversary.

August First Bakery is centrally located at 149 S Champlain Street. Stop in and see this great sustainable operation yourself, learn more about them at augustfirstvt.com, or give them a call at 802-540-0060.

Alyvia Covert is a student at Ithaca College mjoring in journalism. She lives in Piermont, New Hampshire.

RESOURCES

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

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

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

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

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

Clean Power Estimator: www.consumerenergycenter.org/renewables/estimator

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

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

Dsireusa.com: www.dsireusa.com Renewables & Efficiency. Find state, local, utility, & federal incentives for renewable energy & energy efficiency.

Efficiency VT: This is a must go to site for immeasurable amounts of info. **www.efficiencyVT.com**

Energy Efficiency & R/E Clearinghouse (EREC): eetd.lbl.gov/newsletter/CBS_NL/nl6/Sources.html

Energy Efficiency & Renewable Energy Clearinghouse (EREC): eetd.lbl.gov/newsletter/CBS_NL/nl6/Sources.html

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

Energy Star Federal Tax Credits: www.energystar.gov/tax credits.

Federal Energy Regulatory Commission (FERC): www.ferc.gov

Federal Energy Regulatory Commission(FERC): www.ferc.gov

Find Solar: www.findsolar.com

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-**

Greywater Info: www.oasisdesign.net/greywater

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

Home Power Magazine: www.homepower.com

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

National Association of Energy Service Co. (NAESCO): www.naesco.org

National Renewable Energy Laboratory (NREL): www.nrel.gov

National Solar Institute: www.nationalsolarinstitute.com

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

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

Renewable Energy World: www.renewableenergyworld.com

Renewable Energy VT: www.revermont.org

SEIA/ Solar Energy Industries Association: The SEIA Tax Manual to answer your solar related tax questions. **www.seia.org**

SmartPower: www.smartpower.org

Solar Components: www.solar-components.com

Solar Living Source Book: realgoods.com/solar-living-sourcebook

Solar Store of Greenfield, MA Stock & install a wide variety of solar & environmentally friendly technologies. **SolarStoreofGreenfield.com**

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

The Energy Grid: www.pvwatts.org

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**

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

Vermont Energy and Climate Action Network (VECAN): works to start and support town energy committees as a powerful, people-powered response to realizing a clean energy future. www.vecan.net.

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**

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

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

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

www.susdesign.com/tools.php Online info for solar benefit with house design. i.e. window overhangs, sun angle & path…

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WORM-BIN CONSTRUCTION WORKSHOP

Wanted: townspeople and composters who would like to join us for a Worm Composting Basics Workshop, instrucetd by Ben Goldberg from the Ben's Bins and Phoenix Composting Toilets. We are aiming for a Sept. 6 or 13 confirmation. Sliding fee. Will be held rain or shine at an off-grid solar-powered homestead near Bradford, VT. If interesteded, please send email to info@greenenergytimes.org or call 802.439.6675 or ben@composting toilet.com. Call Ben at 413-237-7060 or 406-862-3854.

UNIQUE PASSIVE-TYPE DESIGN

stands strong against the test of time

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He likes the slight roof overhang he put on his original house, because it shades the windows when the sun is high on hot days. A shade can be drawn on west-facing windows in the summer evenings to keep things cool. But all windows are set with a view to thermal gain in winter.

He says that his home has no additional insulation in the walls, beyond the 6.5-inch cedar logs. For his own comfort, he feels that it really does not need any. This is very possibly true, as he likes the space to be warm in winter, but uses only two cords of wood each year.

Of course, if you dream of building a net-zero ready home, the round design might easily be a good basis for it. And if you can dream it, you might like to talk about it with Dick Walker.

Learn more about Dick Walker's Sawmill at 802-747-7900 or dickwalkersawmill.com.

GUIDE TO ADVERTISERS:

Ingredient of the Month

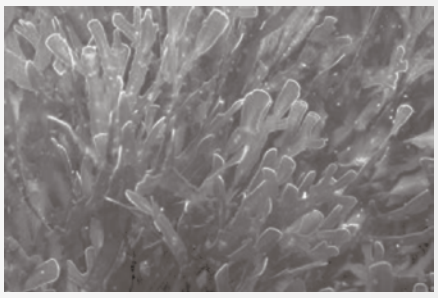
By Larry Pleasant

SODIUM ALGINATE

One of my personal top-10 favorite molecules for health and longevity is sodium alginate, aka algin. Faithful readers may recall my mention of it in past articles, and because it is so useful, cheap and nontoxic, I finally had to dedicate an entire column to it.

Extracted from brown seaweeds, algin is used in baking to make hard shell custards and long lasting food decorations. It soothes upset tummies and helps to firm up loose bowels. I have never known anyone to react to it negatively. Pharmaceutical companies use sodium alginate in the prevention and treatment of high blood pressure, to lower cholesterol levels and to soothe irritated throats. Its most common source in the US is in miso soup. Two cups of miso soup a day will have profound effects on your health and you will not need to supplement with pills under normal conditions.

Most important, sodium alginate is proven to reduce the buildup of toxic metals in your body, including excessive levels of manganese, zinc, strontium, barium, tin, cadmium, and even mercury. Algin works best as a metal detox when it is already present in your body at the time of exposure. Strontium, for example, binds like calcium. If you already have algin built up in your body, many toxic metals will bind with it instead and it will pass on out without harm.



Kelp - a brown seaweed from which algin can be extracted.

Even if you are exposed before it is built up in your body, algin will clean you out over time. Six pills a day for six weeks are recommended for a real detox, but even three caps a day can have a positive effect. Repeat the treatment yearly for best results. I leave some caps on the kitchen table so I at least take some once in a while throughout the week.

Sodium alginate binds with some good stuff too, notably calcium and lucapene. It is best to take your algin with a different meal than one containing calcium and lucapene. Lucapene is what makes tomatoes red so get your algin when you are not eating Italian style!

Algin is of special benefit to people opting for conventional treatments for cancer like chemotherapy and radiation treatment. Once the treatments are done almost killing you, sodium alginate will help to get the poisons out, potentially hastening the healing process and the return to normality.

This is the Soapman reminding you that Nature is the source of all healing and that plants are chemical factories with a billion years of practice fighting viruses, fungus, bacteria and cancer. We humans learn to concentrate and even synthesize these same plant molecules to fight back against those same "opportunivors."

All of nature and physics seeks balance. Why is it so hard for us humans to do the same?

Larry Pleasant is a writer, philosopher, part-time farmer and soap maker living and working in the Green Mountains of Vermont. Learn more at www.vermontsoap.com.

BEYOND BAD EATING ...

Chemicals in everyday products are contributing to the obesity problem.

by Roddy Scheer and Doug Moss

Exposure to certain chemicals collectively known as "obesogens" may be contributing to the growing obesity epidemic, because exposure has been shown to interfere with the way we metabolize fat. Culprits include some pharmaceuticals, including antidepressants, as well as nicotine, many household cleaning products and air fresheners. Photo: Tylor Long

Obesity is a huge problem in the U.S. and other industrialized countries. According to the U.S. Centers for Disease Control and Prevention, obesity rates have doubled for American adults and tripled for kids and teenagers aged six through 19 since 1980. Today, 31% of American adults and 15% of youngsters are classified as overweight.

The rise in obesity and related health problems like diabetes is usually attributed to an abundance of high-calorie food coupled with the trend toward a more sedentary lifestyle, but there is more to the story. A growing number of researchers believe that certain chemicals collectively known as "obesogens" may be a contributing factor to the growing obesity epidemic. Exposure to these chemicals has been shown to interfere with the way we metabolize fat, leading to obesity despite otherwise normal diet and exercise.

Bruce Blumberg, a biology professor at the University of California at Irvine, first coined the term "obesogen" in 2006 after discovering that certain tin-based compounds known as organotins predisposed lab mice to weight gain. In the intervening years, hundreds of research studies have found similar connections between weight gain in humans and exposure to organotins as well as several other common chemicals found in everyday consumer products, agricultural pesticides and even some drinking water.

The National Institute of Environmental Health Sciences (NIEHS) reports that as many as 20 synthetic chemicals—from the BPA in plastic food storage containers and the lining of cans to phthalates used in the manufacture of non-stick coatings to the parabens in many personal care products—have been shown to cause weight gain in humans, mostly from exposure in utero or as infants. These early effects can last a lifetime, permanently altering one's metabolic "set points" for gaining weight. "If you have more fat cells and propensity to make more fat cells, and if you eat the typical high-carbohydrate, high-fat diet we eat [in the U.S.], you probably will get fat," Blumberg tells the journal Environmental Health Perspectives.

Adult exposure to obesogens has also been shown to trigger weight gain and other endocrine issues while exacerbating the effects of earlier exposure. Certain pharmaceuticals (including some of the most commonly prescribed antidepressants) have been found to be particularly egregious in this regard. Meanwhile, nicotine, air fresheners and many household cleaning products also contain obesogens. Also, soybeans (consumed by both humans and the livestock we eat) contain a naturally occurring obesogen.

There may not be much we can do about the damage already done, but avoiding obesogens, whether from natural or synthetic, might be the best thing we can do to prevent making our obesity, hypertension, diabetes and other health problems that much worse. Says Blumberg: "Eat organic, filter water, minimize plastic in your life…If there's no benefit and some degree of risk, why expose yourself and your family?"

Of course, avoiding obesogens alone won't keep people from getting fat. Eating a nutritious diet and getting regular exercise are as important as ever to keep one's weight and overall health in check.

Contacts: NIEHS, www.niehs.nih.gov; "Obesogens: An Environmental Link to Obesity," Environmental Health Perspectives, www.ncbi.nlm.nih.gov/pmc/articles/PMC3279464/.

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THE MAKER MOVEMENT

By Steve Goldsmith

The early days of our modern technology were full of bring-it-home and put-it-together opportunities. Many of us remember receiving catalogs full of great do-it-yourself projects from Heathkit. These included everything from electronic test equipment to television receivers, amateur radio equipment, and just about any other type of electronics you can imagine.

Somewhere along the road we lost the ability, and maybe the desire, to build things ourselves. Maybe it was when discrete components disappeared and were replaced by extremely dense integrated circuits that couldn't be identified. Or maybe we just got blinded by just how much easier it is to use a computer now than it was in the early days, and by how many more colors computers have today than when computing was young.

In the 1980s, home computers began to change from something that you assembled yourself and wrote your own software for, to mass produced commodities with standardized operating systems and packaged software. Then consumerism took over - "Eat it all, Wear it out completely, Make it do or do without," was replaced by "Buy it, Use it, Throw it out."

Heathkit went out of business, and our educational system started "teaching technology," but it focused on how to use computers and software and not how to create computers and software. Public schools cut arts, theater, and shop programs, stifling creativity and innovation, replacing them with standardization and testing.

When we stopped understanding and building the technology, we lost something. Humans have always had the desire to create. After decades of consumerism, a lack of creative outlets and the resulting pent up demand produced their own outlet. But the desire for do-it-yourself, build-it-yourself, creativity, and innovation found a home. And today, the Maker Movement is helping us find again the things we have lost.

A few years ago, the Arduino and other small single board computers began to appear. People all around the world have started discovering that they can easily create computer and electronics projects, learn programming, and make new things with their skills. This has revolutionized the way they interact with technology and enabled an entire new generation of hardware and software innovation. Now, we have an "internet of things," new materials, digital clothing, and rapid prototyping with 3D printers. Now, the Maker Movement is changing the world.

Makers often rely on recycled or repurposed materials and minimize waste. Projects aim to improve the way we grow, transport, prepare, and cook our food. One example is called "precision agriculture." The Maker Movement is finding it has a lot of common ground with the sustainability community.

"Makerspaces provide a vibrant, intellectually stimulating community where people can collaborate, learn and have access to tools that they might not otherwise be able use," says Doug Webster, the founder of the Champlain Mini Maker Faire® and president of CMF, Inc., a nonprofit working to grow a renewed culture of innovation. "They have gained tools like 3D printers, large sewing machines, laser cutters, CNC mills, woodworking, metalworking, welding, jewelry making and other prototyping and fabricating equipment. Oftentimes these tools are too expensive or too big for individuals to own, but Makerspaces provide training

cont'd on p. 38

Green Tips

SUSTAINABILITY IN THE WORKPLACE

TEN TIPS TO GO GREEN -- AND SAVE GREEN

By Deborah DeMoulpied

You are in business, usually to make some kind of money, certainly not to lose money. As in the home, "going green" in the workplace actually saves you money and increases your bottom line. Sustainability also means creating a work environment that is supportive to your staff. Having good staff who stick around awhile also increases the bottom line – think efficiency, less turnover, and less time and money in training new staff.

So here goes - ten workplace sustainability tips:

1. The 3 Rs. You've heard it before, the base for all green behavior. Reduce consumption of anything can. Reuse anything you can. Recycle everything you can. In that order.
2. Lighting and Electricity– Increase natural lighting. Change your lighting to better efficiency; invest in LED lighting. Choose light-colored walls. Use timers or motion sensors. Use "smart strips" or power strips. Power down or off at night or when not in use.
3. Water – Change to low flow and motion sensor faucets. If your toilets are older models, put in new ones; install ones with the dual flush feature. Create landscape that does not need watering (except from rain.) For indoor plants, have a grey water container for unused water collection.
4. Heating - Aside from making sure your workplace is button-up tight, and you have a newish heating system that is well maintained, a programmable thermostat is a must. Workplaces are typically overly cold in the summer and too hot in the winter. Remind staff to dress less in the summer (be careful how you say that) and bring sweaters to work in the winter. Jimmy Carter was right.
5. Printing - Besides avoiding printing (think documents online; back them up), begin by reaching for used paper when possible. Copy to the backside of documents or use destined-for-the-recycling-bin mail for notes. When you have to be a little bit more formal, print both sides of 100% recycled paper (unreal how this is still not done), narrow your margins, reduce your font and print on 'draft' option. Look for refillable ink cartridges.
6. Recycling and Composting – Assuming you have exhausted the first 2 Rs, recycle and compost everything you can. You might be shocked by how little you actually have left. Approaching zero-waste is a noble goal.
7. Business Travel – After trying to keep this to a minimum (try Skype or the like), then consider over-all impact. Are you using public transport? Most efficient cars? Car -pooling? Car rentals? Bikes? Walking? Do you purchase carbon offsets? Encourage this for commuting practices as well.
8. Cafeteria or Common Eating Room – Invest in reusable plates and utensils. Whether large scale or small, the same 3 Rs apply. Supply a microwave for efficient heating of food and water. Encourage staff to use reusable containers. Supply towels instead of paper. Tap water is good stuff! People can bring water from home. No need to supply bottled anything.
9. Green Cleaning – Use safe, non-toxic cleaners from companies committed to the environment. Nough said.
10. Team Work – Create a "green team" to foster ideas and behavior awareness. Make it fun but accountable. Watch the improvement and the bottom line grow! Participate in local and national environmental events. Remember – we're all in this together.

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

The History of additive free paints

Interiors green Shots!
THE HOME AND LIVING STORE

By Jessica Goldblatt Barber

One may think that using milk to paint with is a very strange concept. But think of this -- just try drinking a glass of milk and then leaving the glass on your bedside table or next to the kitchen sink. The next morning the milky residue has hardened and is not easy to remove. Milk is a strong binder, especially when mixed with crushed limestone, the basic binder in one of the world's earliest paints, milk paint. Some of the oldest painted surfaces on earth, including cave paintings in France and items in King Tutankhamen's tomb, were colored with a simple composition of milk, lime, and earth pigments.

Because the original formulas for milk paint were so simple to make and use, milk paint was for thousands of years a durable, major form of decoration throughout the world. Formulas varied greatly, and produced varied results, but it was always a combination of milk protein (casein), lime, clay and pigments used. The colors on those early cave paintings in France, even though exposed to the open air for centuries, are as vivid today as they must have been all those years ago.

In Colonial America, itinerant painters roamed the countryside, carrying pigments with them, which could be mixed with a homeowner's own milk. Practically every household had their own cow or goat, and each community had its own lime pit. Even though many examples of early American furniture painted with some form of oil paint exist, the look associated most widely with the country homes and furniture of the 17th, 18th, and 19th centuries is that of the soft, velvety, rich colors of milk paint.

This scene doesn't change much until after the Civil War. In 1868, the first patent was given for the metal paint can with its tightly fitting top, and the commercial paint industry was born. For the first time, paint could be manufactured in great mass, packaged in the new patented cans and shipped to stores throughout the country.

But this kind of operation does not lend itself to the use of milk paint. Made from natural milk protein, it can spoil just like whole milk. Therefore, from the very beginning of the commercial oil paint industry, up until 1935, the only paint sold commercially was oil-based paint, to which lead, mildewcides, and other poisonous additives were added. Latex paint followed, which also contained additives

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An early Taunton milk-painted chest, that Charles Thibeau made and daughter, Anne, painted (in the late '70's or early '80's). Courtesy of The Old Fashioned Milk Paint Co.

cont'd from p. 36

and preservatives, along with oil that commonly contained lead and mercury..

When Charles Thibeau was researching old milk paint formulas in the early 1970's to provide an authentic finish for his Colonial- reproduction furniture, he came up with a formulation that remained true to the natural ingredients found in these old recipes, using the milk protein in a powdered form. He found that he could simply add water to the mixture and just mix up what he needed at the time, eliminating the need for preservatives or other chemicals to keep the paint fresh. This was especially important when, after being interviewed for a Yankee Publications' book on about the forgotten arts in 1974, Thibeau's phone started ringing off the hook with requests for this old fashioned milk paint. And thus, The Old Fashioned Milk Paint Company was born and Thibeau was able to ship his formula far and wide in a convenient powder form. Not only does his milk paint provide the warmth and colors of Colonial America, it remains all-natural, 100% biodegradable, with no harmful volatile organic compounds (VOC's).

Today the milk paint company is run by Thibeau's daughter, Anne, and there are over 400 dealers worldwide selling Old Fashioned Milk Paint and the company's newer SafePaint wall formula.

Jessica Goldblatt Barber is the owner of Interiors Green -- the Home and Living Store at 2021 Main Street in Bethlehem, NH, where you can find these products.

Universal Recycling & Composting in VT
Mandates Include Businesses

By Michele Morris

Way back in 2012, the Vermont legislature unanimously passed what is widely known as the Universal Recycling and Composting Law, Act 148. How time flies. On July 1 this year, Act 148 mandates started kicking in. "But I thought we were already recycling!" many of you are saying. Well you're right -- sort of.

Some parts of Vermont, including Chittenden County, have had broad mandatory recycling requirements for residents AND businesses for years, even decades. Other areas of the Green Mountain State have not been measuring up, so the Legislature decided it was time to raise the bar for everyone by mandating recycling across the state, and including a new landfill ban on food leftovers.

Here's an overview of what's here, what's coming, and what you need to do to get on board with the new landfill ban.

In solid-waste-speak, food scraps and food manufacturing or processing by-products and residuals are all known as "organics." Restaurants, hospitals, hotels, prisons and schools generate tons of organic waste. But it also includes residuals and byproducts from the creation of foodstuffs ranging from infant formula and baby food to ice cream, cookies, coffee and even beer and cider.

When buried in a landfill, organics decompose very, very slowly. As they do break down, they generate methane, a greenhouse gas that's at least 21 times more effective than carbon dioxide at trapping heat in Earth's atmosphere. Though Vermont's only operating landfill is capturing methane to generate electricity, studies by the Environmental Protection Agency (EPA) and others show that some of that gas still escapes and is a major contributor to climate change.

Besides that, consider the vast quantities of resources invested in the production of those organics. The National Restaurant Association reports that 25% of all U.S. freshwater use and 4% of total U.S. oil consumption goes toward producing and transporting food that never gets eaten. Vermont has decided that after reducing the food waste that's generated in the first place, we should keep what's left out of the landfill. Here's the recommended hierarchy for "closing the loop" on all of those resources and energy:

- Feed your neighbors by donating quality leftover food to food banks.
- Donate or sell scraps and residuals to farmers for animal food (follow Department of Agriculture guidelines for food fed to swine).
- Create soil-enriching compost in your backyard or send scraps and residuals to a commercial composting facility or anaerobic digester.

Whatever method you choose, Act 148 requires you to keep organics out of the landfill. That landfill ban phases in on this schedule, depending on how much organic leftovers you generate:

- July 1, 2014: 104 tons/year, or about 12 68-gallon carts per week.
- July 1, 2015: 52 tons/year, about 6 carts per week.
- July 1, 2016: 26 tons/year, about 3 carts per week.
- July 1, 2017: 18 tons/year. Businesses that pick up trash and recycling must offer curbside food scrap pickup by this date.
- July 1, 2020: all food scraps are banned from landfill-bound trash - including those generated by households.

As for those recyclable cans, bottles, paper and plastic containers? Statewide requirements kick in July 1, 2015. But remember, your local area may have already set a higher bar for recycling and landfill-banned material. Contact your town to find out what's required in your neck of the Green Mountains.

Michele Morris is the Business Outreach Coordinator for the Chittenden Solid Waste District.

Meet Luci

A Product Review by N. R. Mallery

Luci is a neat new micro solar powered LED lantern. It is waterproof, re-chargeable, durable, sustainable, convenient, versatile, bright and can even be stylish.

I came across this unique light at Solarfest this year. The more I learned about it, the more I realized how amazing they really are.

Ideal to take in a backpack, while hiking, camping, in a kayak, these lanterns are portable, functional and fun. It was great to see them spinning around while the music played at the event, but later to see them lighting the way to the campsites, in the tents or en route to the outhouse….

I am really taken by this simple product. When not in use, it can be deflated, so it would easily fit on the dash of your car, a windowsill, on top of your tent, backpack, or on a sunny windowsill to be charged up by the sun. When night comes, you're all set - even if that happens when you are out in the middle of a lake. Did I mention that they are waterproof?

Luci is easy-to-use, as a lantern and task light. She's elegant, light-weight, and maintenance-free.

One 8 hour charge gives you twelve hours of light. With climate change and the uncertainty due to the storms - here is a solution to keep your world lit up.

Keep it in an emergency kit and in your car.

There are 3 models: the Aura, the Lux and the Outdoor version.

The Aura is a color changing, versatile lantern with a bit of a romantic ambience to it.This inflatable solar lantern has seven changing colors that are fun in the pool, at a barbeque, or even on a kayak or boat at night.

The Outdoor version is the best for camping, backpacking and all rugged activities. Again, this one also has 3 options built into it - bright, brighter and blinking. Just think if you were lost in the woods and needed a way to signal for help!

The third choice is the Lux version, which is actually my favorite, since it's the best one for reading, is good outdoors and also on a boat, and for when you really need to see your way - bright, yet warm with the frosted finish. It also has a button for bright, brighter, or blinking.

All this and yet It still g.e.t.s better: The MPOWERD Company is a mission-based small team that is out to light up the world and bring light where it has never been before.

For safety, for fun, for work and play - this fun LED lantern is a must-have for me. As part of an emergency kit or during the cleanup from a disaster or to read by in your tent out in the deep wilderness. I think they could even be used on a bicycle!

So, help light up the world with clean renewable lighting! Check them out at mpowerd.com or give them a call at 1 844-MPOWERD.

Olympians Take Stand about Climate Change

By Roger Lohr

Andy Newell, US Ski Team and Olympic competitor in cross country skiing, created "Athletes for Action" before he set off for the Sochi Olympics. The idea was to coordinate athletes to encourage definitive government action on climate change. "We're expecting more out of Washington and from world leaders," he commented.

Newell recently was joined by fellow Olympian Alex Deibold, (snowboard-cross bronze medalist from Vermont) on a visit to the US State Department to speak with Todd Stern, the US special envoy for climate change, and he wants to work with other athletes from around the world and have them address the leaders in their countries, too.

Newell would like to welcome athletes from the summer Olympics and non-Olympic athletes such as NFL and MLB players to participate in Athletes for Action.

Newell recognizes that as a world-class athlete who travels around the world to compete, his carbon footprint is probably larger than most, but he opined, "We compete outdoors every day, so we're in tune with the environment and I feel that it's our responsibility to speak up." Before the Olympics, Newell rallied 105 athletes from the US and other countries to sign a letter to world leaders calling them to action on climate change.

After returning from Sochi, other Olympic cross country skiers from Vermont recently joined the cause including biathletes Hannah Dreissigacker and Susan Dunklee and Nordic racers Liz Stephen and Ida Sargent. They saw poor snow conditions while racing in Europe at many races last winter. The Olympians recently spoke with VTDigger.com about their views on climate change.

Dreissigacker commented, "We need to put a price on carbon emissions." Liz Stephen said that the majority of her races this year were on narrow tracks on machine-made snow that was slushy and colored brown with rocks and dirt. While it is true that Vermont had much better snow conditions last winter compared to Europe, Sargent said that Vermont should model Europe's action on carbon emissions such as driving smaller cars, using public transportation, and installing solar panels. She also supports the Kingdom Community Wind Project in Lowell, VT, a project that has stirred an emotional debate on the state's energy future.

Biathlete Susan Dunklee voiced her concern about the Montreal-Portland Pipeline, which brings crude oil from South Portland, ME to Montreal and could be reversed to transport heavy Canadian crude oil to the Maine coast. "We're enabling a system that's depending on fossil fuels and we need to be finding more creative solutions."

Newell would like to welcome athletes from the summer Olympics and non-Olympic athletes such as NFL and MLB players to participate in Athletes for Action. "I'd like to see it grow to where athletes from all disciplines and multiple countries are involved."

Roger Lohr is a freelance writer and the founder of XCSkiresorts.com.

UNH Composting Facility

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research, visit www.aberlab.net/.

"The research that takes place in this facility is thanks to a generous donor who wishes to remain anonymous but whose passion for what the college is doing to improve sustainable approaches to agriculture will have a direct impact on producers and other rural residents of the region. Their investment is recognition of the college's exceptional teaching, research, and outreach opportunities that ultimately improve people's lives in practical and affordable ways while simultaneously maintaining the health of the environment," said Jon Wraith, director of the NH Agricultural Experiment Station and dean of the UNH College of Life Sciences and Agriculture.

"We are so honored to have Josh's name on a building that symbolizes what he stood for – sustainability and the environment. The research that is conducted here will have an impact on our environment for generations to come, and Josh's name will be connected to that research and the outreach that comes with it," Wraith said.

Agrilab Technologies (AGT) has developed patented renewable energy technology to capture reliable base load thermal energy from the composting process. AGT designs, builds and sells composting and thermal energy-capture systems for farms, commercial composters, universities, municipalities, and zoos that have existing or new composting operations. Several successful projects in commercial operation demonstrate that the economics of compost heat recovery are strong without the need for subsidies. The technology can be used to heat greenhouses, buildings and meet demands for hot water or process heat while producing valuable compost for sustainable agriculture. Visit www.agrilabtech.com for more information.

Founded in 1887, the NH Agricultural Experiment Station at the UNH College of Life Sciences and Agriculture is UNH's original research center and an elemental component of New Hampshire's land-grant university heritage and mission. We steward federal and state funding to provide unbiased and objective research concerning diverse aspects of sustainable agriculture, aquaculture, forest management, and related wildlife and natural resources. We maintain the Woodman and Kingman agronomy and horticultural farms, the Macfarlane Greenhouses, the Fairchild Dairy Teaching and Research Center, and the Organic Dairy Research Farm. Additional properties also provide forage, forests and woodlands in direct support to research, teaching, and outreach.

Lori Wright is the Communications Coordinator NH Agricultural Experiment Station.

Read more at: http://bit.ly/1oHK2YG.

THE MAKER MOVEMENT

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and access to these important tools, so that you can let your creativity loose."

Webster has been helping to encourage the development of Makerspaces throughout the region, and recently has helped bring one to northern Vermont. Generator Vermont opened its doors at the end March in the basement of Burlington's Memorial Auditorium. Nearly 1,000 people came for the grand opening to learn about the new space and tour the facilities.

Along the Upper Connecticut River Valley in New Hampshire and Vermont, CMF is working with the Upper Valley MakerSpace to build two Makerspaces. One is in downtown White River Junction, Vermont; another in downtown Claremont, New Hampshire. The Upper Valley MakerSpace will be a combination of artist studio, classroom, and business incubator focused on the act of making things. The effort has already attracted nearly 500 interested people, and the two spaces hope to open in the winter of 2014.

A big component of all of these Makerspaces is education. Envisioned regular classes include precision metal machining, electrical fabrication, welding, woodworking, sewing and fiber arts, sculpture, robotics, LED arts, lamp-working, jewelry, computer-aided design, 3D printing, and more. The curriculum is meant to encourage and support the Do-It-Yourself, mechanical, electrical, digital, computer, art, and craft communities.

Want to learn more about the Maker Movement or get involved? The Champlain Mini Maker Faire® will happen October 4th and 5th at Shelburne Farms (www.champlainminimakerfaire.org). And the big one, The World's Maker Faire® in New York, is on September 20th and 21st and features more than 600 makers and over 50,000 attendees. (www.makerfaire.com). Check out a Maker Faire® and find out why they are the Greatest Show (and Tell) on Earth and learn how you can get involved in the Maker Community.

Steve Goldsmith is President of Twin-State MakerSpaces and is working to bring the Upper Valley MakerSpace and the Claremont MakerSpace to life.

G.E.T. OUTDOORS!

By-ways & Waterways

Are Pathways to the Environment

By G.E.T. Staff

Summer is a wonderful time for water fun, if you know where to go and what to do there. There are literally hundreds of sites with various activities in New Hampshire and Vermont, far to many to print in this publication. What we can do for our readers instead is to provide a list of online resources for swimming, boating, and other water-related fun in New Hampshire and Vermont.

Both New Hampshire and Vermont have great parks, and many allow water activities. A list of New Hampshire's 23 state parks, 41 state forests, one national forest, and one national wildlife refuge can be found at bit.ly/get-nh-parks. It has links to web pages on each park, giving information on what resources are there, along with location and contact information. (Please note that bitly links have to be entered exactly as given, including capitalization. We have made things as easy as we could by putting everything in lower case.)

A web resource for state parks in Vermont, with links to information on specific lakes and more links relating to different types of boating can be found at bit.ly/get-vt-parks. Special information on swimming in Vermont's state parks can be found at bit.ly/get-vt-parks-swimming. It has links to pages on various parks, along with links to sites telling where to go for special purposes, such as places where you can bring your pet with you.

The sites on parks do not cover all lakes and rivers. Information telling the size, locations, and other information about specific lakes can be found online. A tour guide list of lakes in New Hampshire can be accessed at bit.ly/get-nh-lakes. Two resources for Vermont's lakes, with links to pages on specific lakes, are at bit.ly/get-vt-lakes-1 and bit.ly/get-vt-lakes-2. Again, these have links to pages on the specific lakes.

Good resources for rivers in Vermont and New Hampshire are articles in Wikipedia. These have extensive list of rivers in the two states, organized in some cases by watershed. Many of the rivers and streams listed have their own separate articles in Wikipedia. Also, there are links provided to other resources at many Wikipedia articles. The article for rivers in New Hampshire can be found at bit.ly/get-nh-rivers. The article for Vermont's rivers is at bit.ly/get-vt-rivers-1. A second resource for Vermont's rivers is at bit.ly/get-vt-rivers-2.

We want to remind people that while fishing is a great outdoor activity in New Hampshire and Vermont, most of the water in these states has been polluted by mercury and other toxins from industrial plants and vehicles in the states and provinces to the west of us. It is very important to check the levels of pollution in the individual lakes, rivers, ponds, or streams that you want to fish in, if you intend to eat the fish. Some waters, even pristine-looking streams and ponds, are polluted so badly that the fish really should not be eaten at all. Others are safe, if the amount of fish from them is limited. Information on fishing in New Hampshire can be found at bit.ly/get-nh-fish-safety. Information of fishing in Vermont can be found at bit.ly/get-vt-fish-safety.

The publisher's two Newfoundland Dogs swimming in a local lake near her home in Vermont, at sunset.

Hiking and swimming in a naturally beautiful setting is popular in the northeast … plus it's all free! Photo by inbetweenblog.

TIPS FOR SAFETY -- AT THE SWIMMING HOLE

Summer is here, and with temperatures rising, many Vermonters will be seeking out the sweet relief of a cooling dip at their local swimming hole. While there are many managed beaches and swimming areas throughout Vermont (including at many state parks), others will invariably look to the respite of hidden falls, quiet ponds, river shallows and potholes like the one pictured at right.

While swimming holes offer wonderful recreational opportunities, swimming at an unmanaged location comes with risks. Good decision-making, and a little bit of planning, can often avert a tragedy. Here are nine tips for everyone swimming in natural bodies of water this summer:

Remember that water is wild: Complacency is the enemy of preparedness, and it is easy to be lulled into a sense of safety by all the good times had, and happy memories made, at your local swimming hole. Remember that water is wild, and always changing. Heavy rains, floating or lodged debris, or even extended periods of heat and drought can change currents, affect depths and alter the underwater structure of a wild body of water. ALWAYS exercise caution when swimming in natural water bodies.

Don't swim alone: One of the most basic safety tips is to bring someone with you. If one of you gets into trouble, there will be someone there to assist. Drowning only takes a few minutes, and emergency responders may be 15 to 20 minutes away. Swimming alone is never a good idea, but especially not in natural water bodies.

Know the conditions: Has it rained heavily in the last several days? Swollen rivers and fast-moving currents can create dangerous conditions for days after a heavy rain. Make a habit of checking the weather. If there have been recent heavy rains, conditions may be dangerous, even if it is a clear, sunny, calm day. Be smart, and make alternative plans if there have been heavy rains or recent flooding.

Observe your surroundings: When you arrive at the swimming hole, take a look at the currents. Listen for the sound of unusually loud rushing water. Observe the path that debris takes as it floats downstream. Swimming in natural water bodies means that you must use good judgment. Observe conditions and don't take unnecessary chances.

Swim sober: Drugs and alcohol can dull your senses, impair your judgment and slow response time. Safe swimming is sober swimming.

Bring a rope: Most natural swimming holes are not equipped with safety or rescue equipment. Saving a life could be as simple as adding a long, sturdy rope to your beach bag for the day. If conditions are bad and someone is struggling, don't get into the water with them. Instead, throw them a rope and pull them in from shore.

Beware of slippery rocks: Many deaths at swimming holes in Vermont are caused by falls from wet, slippery rocks. Exercise extreme caution when climbing or maneuvering on wet rocks.

Don't swim above, or under, waterfalls: Heavy currents can wash people over falls, and undertows can trap swimmers underwater. Avoid swimming above, or directly beneath waterfalls.

Be realistic about your own abilities: A part of responsible outdoor recreation is understanding your own limits, and not putting yourself or others in danger by taking risks recklessly. Be honest with yourself about your own strength, abilities and shortcomings. Don't over-extend yourself, and don't assume that rescue is always an option.

Outdoor recreation may well be the sweetest fruit of summer, but it always comes with inherent risks. "G.E.T." outside, but be responsible, be safe, and take care of yourself and your friends and neighbors. Respect nature, use good judgment, and understand that water is wild and ever-changing. If you follow the guidelines above, you will have a better chance of avoiding tragedy and enjoying an uneventful summer of fun and great memories at your favorite swimming hole.

A Swimming Hole Safety Committee has been working with Vermont State and private partners, including the National Weather Service and the media, to provide advanced warnings when swimming conditions may be unsafe. http://healthvermont.gov/news/2014/070314_swim_safety.aspx

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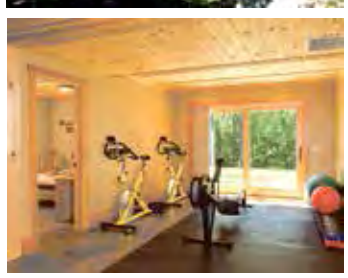

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