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'HARVEST, HOLIDAYS & WINTER ON THE HORIZON' ISSUE

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DON'T LET WINTER BREAK YOU!

By N.R. Mallery and Thaddeus Rumple

Now is the time to prepare for winter. There is still time to prepare for this winter. If you wait until spring, it is time to prepare for next winter.

The easiest place to start is with efficiency. Air intrusions are among the biggest villains around, when it comes to making people cold. A search for them can lead to the discovery of missing, broken, or ill-fitting storm windows. Inside storm windows, or window inserts, can be great DIY projects that make a real difference, and if you have good insulation, the difference can be huge.

What about your insulation? Even if you cannot get needed insulation right now, if you need it, it is a good time to plan for it. You can start working on this right now, by checking our weatherization and other efficiency programs on page 14.

You might think about a new heating system. Masonry heaters are wonderful, especially if you are inclined to be romantic about fireplaces. Heat pumps can also be wonderful, as they cut both costs and pollution.

There are more than a few smart people in this world who have discovered that Jimmy Carter was right, when he told us we could save money and stay comfortable by turning down the thermostat and wearing a sweater. Flannel sheets and an extra blanket are also mandatory if you

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Mill Pond Way in Portsmouth, NH

This home's design is based generally on the European passive house model. It is highly insulated, south facing and as air tight as possible. There is a heat recovery ventilation system which lets in fresh air while the solar hot water panels provide for the domestic hot water load and the solar electric panels provide close to 5,000 kilowatt hours of electricity annually. While most of the home is heated by the sun, stored in thermal mass of the concrete floor, there is a heat pump in the small apartment and the main house has a small propane fireplace. This incredibly energy efficient home utilizes sustainability in it's yard as well. The yard is half vegetable, flower, butterfly shrubs and small fruit gardens.

SOLAR FARMS MOVE US CLOSER TO VERMONT'S ENERGY GOAL

366 solar trackers and 8,784 JA Solar modules at Claire Solar in So. Burlington, Vt., the largest solar installation of its kind in North America.

By George Harvey

Since the last edition of Green Energy Times went to press, we have seen two more large solar arrays put online in Vermont. Both are in the state's Sustainably Priced Energy Development (SPEED) program, in the Standard Offer Program, which offers a guaranteed price advantage. Each has a capacity of about 2.2 MW, the maximum eligibility limit for the standard offer.

One of the projects went online in South Burlington in August. It was developed by Claire Solar Partners and AllEarth Renewables. The project has 366 AllSun Trackers, which follow the sun on both vertical and horizontal axes, maximizing the output of the photovoltaic (PV) panels used in the system. The solar panels were provided by JA Solar.

The other project went online just north of Brattleboro in September. It is the largest solar project in southeastern Vermont, with an output equivalent to about 8% of the electricity used in Brattleboro. It was developed by Winstanley Enterprises LLC on land it owns off Technology Drive. It is visible, though not obviously, from Route 91. Integrated Solar, a local company in Brattleboro, worked with REC, a California company, to provide the installation.

Vermont used 5,554,501 MWh of electricity in 2013, according to the US Department of Energy (DOE). The total output of these two new projects should be about 5,588 MWh, roughly 0.1% of the state's electric demand. This may seem small, but remember that other projects are also being developed.

Vermont's SPEED program was started as a result of legislation passed in 2005. The goal was to increase the amount of renewable energy generated in the state to reduce dependence on both fossil fuels and nuclear power. To do this, some rather impressive goals were set. The one that is most talked about is 90% renewable, by 2050, for our electricity, heating, and transportation combined.

Vermont also has interim goals relating to SPEED and generating electricity. One is to have 20% of the state's electric retail electric sales through SPEED by January 1, 2017. Another is to have the program's capacity

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SAVE MONEY – SAVE THE WORLD

By George Harvey

The widely respected International Energy Agency (IEA) has come up with a figure for the cost of converting the world to renewable power by 2050 and bringing climate change to a halt. The figure is $44 trillion.

That might sound like a lot of money, perhaps an impossibly great amount. But the IEA did not just calculate at the cost. They also figured out how much money would be saved by not buying the fossil fuels we would otherwise, and that comes to $115 trillion. It does not take a lot of math to combine these figures and see that by switching to renewable power, we can save the world $71 trillion over the next thirty-five years.

Reviewing these figures and comparing them with things we can find easily available, we find them unsurprising. About a third of the largest companies on Earth deal in fossil fuels. The largest twenty-one oil and gas companies had a combined annual gross income of well over $4 trillion per year. The hundreds of smaller oil and gas companies, the coal mining companies, and the fossil-fuel-burning utilities are all in addition to that. We might guess that $4 trillion is less than half of the total we spend each year on fossil fuels.

One thing the IEA did not address is the external costs that we might save. They did not consider the costs of peripheral or resulting damage.

The World Health Organization, an agency of the United Nations, estimates that air pollution from fossil fuels kills over three million people each year, and many millions more have chronic health problems. The costs of health care required because of our use of fossil fuels come to an estimated $128 billion per year in the US alone, and over $1 trillion worldwide.

Another external cost is dealing with damage caused by climate change. This is a harder figure to pin down, but the International Panel on Climate change

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Thank you all for your help!

ABOUT G.E.T.

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

Solar Power works! … anywhere! under the sun!

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

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

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

LETTER TO THE EDITOR

To the Editor,

My wife and I picked up copies of your publication last night while waiting for a pizza to be made, and we both had the same reaction - your paper is inflammatory in the extreme. While the situation of world climate change certainly is a biggie, there is a large element of 'preaching to the choir' in your paper that turns off people who have already done as much as they reasonably can do to limit their impact on the environment. The fact is, the environment is already damaged in ways unrelated to climate change, but strongly related to human population growth, and THAT is the PROBLEM. Since I perused your front page yesterday and now, the world population has grown by approximately 100,000 people. If all the people in Vermont dropped off the face of the earth today, their numbers would be replenished in less than 7 days time. Understanding that fact casts a blurry haze on the importance of me buying a light bulb that saves 25 watts an hour. We cannot fix this problem with technology that we have today. When the technology is available, it will be deployed by the public service companies, not individuals in their back yards, individuals who have an extra $40,000 laying around looking for a project. Thank you for considering my comments.
-- Steve Reynolds, Cornwall, Vt.

Mr. Reynolds;

Thank you for your letter. I must say I was a bit taken aback by the idea that Green Energy Times is "inflammatory in the extreme." Reviewing the issue you were reading, I could see why you might feel this way. I think you need to balance views on the dangers of climate change with what is understood about current technology to deal with the problem.

To begin with your last point, it is not necessary to have anything remotely close to $40,000 to get a solar system for a household. We have pointed out repeatedly that for Vermont residents it is not necessary to have much more than the ability to pay a monthly electric bill. Green Mountain Power and NeighborWorks of Western Vermont are working together to make it possible for many people to purchase a system on credit and have the payments on the same electric bill with credits for electricity fed into the system. The immediate net effect is a reduction in payments, which will eventually go to nearly zero. There are a number of other organizations that offer similar financial packages both in Vermont and elsewhere.

Next, the consensus is that we actually do have all the technology we need to deal with climate change. And we do not have to wait for utility companies to act. You need not take this on the word of the Green Energy Times editors. Such financial institutions as UBS, Barclays, and Morgan Stanley have given warnings on US utilities because the market is changing so fast that they may not be able to stop "grid defections" as people find it less expensive to go off grid. This is a situation they see developing in the next three to four years. Other organizations with similar views include Lawrence Berkley National Laboratories, the University of Delaware, Lazard, and Navigant. We have seen projections from such organizations that our civilization could be 100% powered by renewables as early as 2040, based on current technology alone.

We agree that the population is too large. That is, however, not an area of our expertise, and we know that climate change and energy are too important to ignore. We do what we can.

George Harvey, G.E.T. staff

WINTER BREAKS YOU

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still live in a cold house. But, buttoning up your building is a long term solution that will result in immediate savings, comfort and warmth.

Winter is a great time to plan a home, business or community solar project. And now is the time to start on it, because the sooner you get your solar system in, the sooner you start saving money. You can plan a system to be financed so that it pays for itself, including the financing, bringing your electric bill down instantly. And some of the power companies, like Green Mountain Power, will actually help.

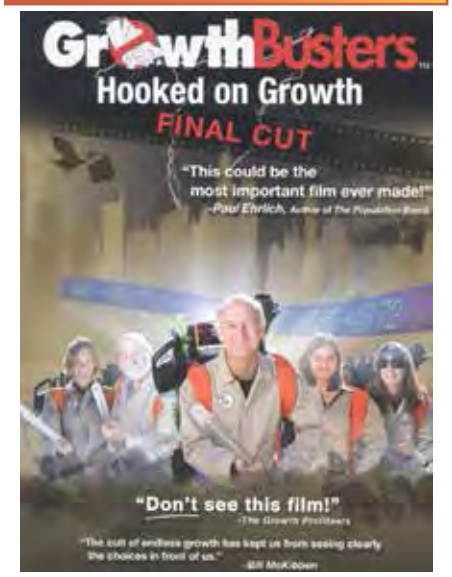
If you have time, you might even plan to have that solar system generate all the power for a net-zero ready home. Today, even old houses can be made sufficiently highly efficient to rely on solar as the only source of energy for most of the time.

Winter is also the time to think about planting a garden. Seed catalogs will help with planning -- remember to plan to plant vegetables for next winter's storage vegetables, such as winter squash, pumpkins, turnips, beets, potatoes, onions, and carrots. Think permaculture and about planting fruit and nut trees in the spring, for future winter's storage. And certainly, it is time to consider such vegetables as leeks and Brussels sprouts, that you may actually be harvesting now and until the snow gets too deep.

Perhaps you might plan for a home or community greenhouse to keep fresh local veggies available year-round… For now, growing herbs and lettuce on a windowsill is rewarding, as are nutritious sprouts from seeds -- to give you fresh vegetables even in winter.

Lastly, think about driving less. Think about x-c skiing more…. Winter is on the horizon!

SEE THIS MOVIE



FREE ADMISSION
WEDNESDAY, OCT 29, 7:00 PM.
The Fletcher Free Library
235 College St, Burlington, VT

After the showing (54 minute movie), there will be question and answer period with a panel of experts.

Increased population leads to more CO2 production and global warming, more pollution, less green space, less biodiversity, and faster depletion of non-renewable resources. Improper economic growth leading to greater use of fossil fuels per person also increases global warming, whereas growth of solar and wind energy industries slows global warming.

To arrange a showing of this extremely important cultural change movie in your community, email: plumb.george@gmail.com

Sponsored by Vermont Sierra Club Sustainable Population Committee; Vermonters for Sustainable Population (VSP)

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A BIG WIND PROJECT

If things go as planned, the Wyoming wind farm will have a 2100 MW capacity. Photo by David Jolley, found at Wikimedia Commons.

By George Harvey

We just got news of a renewable power project in the West that is intended to supply enough power for about 1.2 million households. The project is budgeted at nearly $8 billion for a project with major sites in Wyoming and Utah, to deliver power in the Los Angeles area.

The developers include Pathfinder Renewable Wind Energy, which will build, own, and operate a wind facility in Wyoming; Magnum Energy and Dresser-Rand, which will take part in a power storage facility in Utah; and Duke-American Transmission, who will have a proposal before the Southern California Public Power Authority in early 2015 and hope to finish the project within ten years.

If things go as planned, the Wyoming wind farm will have a 2100 megawatt (MW) capacity. It will be located in Platte County, about 40 miles from Cheyenne. The facility is expected to cost about $4 billion. Please note that this is not the same as another project that appeared in the news recently, with a wind farm of slightly greater capacity, which is intended to deliver its power through a transmission line to the San Diego area, and which is currently under development.

As planned, the newly announced wind farm will deliver its power through a new transmission line, 525 miles long, to the storage facility in Utah. There, it can be used to compress air to be stored in four huge caverns in a salt dome. The air can be used to drive generators with an output of 1200 MW. The total storage at the site will be 60,000 megawatt hours (MWh). The cost of the storage facility is projected to be $1.5 billion.

In Utah, the power, whether generated at the site's storage facility or just passed through it from the wind farm, will be put onto existing transmission lines. These lines ultimately go to the Los Angeles area, for which the power is intended.

While this is all rather far from New England, it does have some points that may be of interest in the local area. We may not have a place for a wind farm of a size even remotely close to 2100 MW, and we may not have a handy salt dome full of caverns. Nevertheless, the vision of energy storage and transmission can be applied here.

Those who make economic projections on electric power backup systems have ideas about the cost at which a technology can become disruptively competitive with old grid technologies. If the price of a battery gets low enough, the cost of it and the renewable resources necessary to charge it become sufficiently low that they compete successfully with grid power, forcing changes in how the grid operates. At such a point, renewable resources have the advantage of needing no fuel and, if they are small, can be installed by consumers. The price most quoted for such a highly-competitive battery system seems to be about $200 per kilowatt hour (kWh).

Please remember, we are not considering the price of electricity here, for which 15¢ per kWh might be a little high. We are considering the price of the equipment to store it. An automotive starter battery might cost $80 per kWh, but it is not of sufficient quality to be charged and discharged repeatedly as needed for grid power.

What we are seeing in the new proposal, however, includes a storage facility that is said to cost $1.5 billion for 60,000 MWh. This is $25 per kWh, or about an eighth of the price the pundits say is disruptive. (In shock over the price, I have recalculated it three times. I keep coming up with the same figure. Someone, please correct me, if I am wrong.)

The fact is that you do not need a salt cavern to store massive amounts of air under intense pressure. A bit over a year ago, a slightly different technology was put into use in the UK for a grid-tied power storage pilot program. In that system, heavy-duty pumps compress air, which is then fed into a heat exchanger, where the heat of compression is removed and retained to be used elsewhere. This causes the compressed nitrogen in the gas to condense into a liquid, which is stored in a large steel tank. The oxygen-and-argon mixture left as gas is released. The liquid nitrogen is allowed to boil as needed, driving an electric generator. When this happens, it absorbs heat, and its cooling action is used in refrigeration equipment. We will doubtless hear more about this when the report on the pilot project is released. Also, we should keep in mind that there are many, many storage technologies under development.

We can do things similar to what is being done out west right here in New England – and perhaps even do them better here. We can use so-called intermittent power to keep our lights on "24/7," as they say. And that new paradigm may be coming soon, delivering round-the-clock electricity from a compressor near you.

GMP IS DEVELOPING MICROGRIDS

By George Harvey

Most readers of Green Energy Times may know that Green Mountain Power (GMP) has been working to make Rutland the solar capital of the northeast. Their effort has been extended, however, into the development of microgrids. They are partnering for this effort with NRG, which has developed both equipment and software.

A microgrid is an area with its own generating capacity, capable of supplying itself with power. It typically has some backup power or storage if the generating equipment cannot supply power around the clock. It may consist of a single building, or it could encompass an entire community. It is usually grid-tied, sending excess power to the grid or drawing electricity as needed. It is intended to be independent in the event of general grid failure.

The pilot project is being established in Rutland, but GMP has a clearly-stated intention of establishing microgrids throughout the state of Vermont. There are important implications of this.

Community microgrids make it possible for communities to have their own generating equipment, as they see fit. Generating power locally means keeping local money to cover power costs in the local economy. This can decrease costs because the community owns the equipment and the fuel for solar and wind power is free. Since the generating equipment may pay taxes, it can ease municipal financial burdens. It can also create local jobs.

One very important aspect of a community microgrid is security of the electricity supply. In the even of a grid failure, a microgrid can usually come online more quickly than the grid. If local infrastructure is not damaged, it can come online almost instantly. Without microgrid capabilities, a community would have to wait for the grid to be reestablished, and this can mean delays of weeks, as happened in New Jersey and New York after hurricane Sandy. Also, people who are not in the microgrid system can benefit from it; the initial microgrid in Rutland includes Rutland High School, which is an emergency shelter for the entire community.

GMP and NRG are providing more to customers in the microgrids than just security. Personal energy management

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THE WORLD'S 7 GREENEST VEHICLES

By Lindsay Wilson

According to Wikipedia a 'vehicle' is "a mobile machine that transports passengers or cargo. Most often vehicles are manufactured, such as bicycles, cars, trucks, buses, motorcycles, trains, ships, boats and aircraft. But somehow a 'green vehicle' is a "road motor vehicle that produces less harmful impacts to the environment than comparable conventional internal combustion engine vehicles running on gasoline or diesel."

Don't get me wrong, I LOVE Wikipedia, but I do find it a little ironic that 'green vehicles' are pigeonholed as cars. On a full lifecycle emissions basis cars really aren't that green compared to other options.

Here's my take on the world's seven greenest vehicles.

7: The Nissan Leaf

A huge chunk of global passenger kilometers are covered by automobiles. Better cars are hugely important for the future. The Nissan Leaf is the leading all-electric car in Japan, the US, UK, and Norway. Using low-carbon electricity, electric car emissions are down around 50 g CO2e/pkm (passenger kilometer), almost all of which comes from the manufacturing of the vehicle.

6: The Intercity Coach

It may surprise you, but the typical diesel bus can often have lower emissions per passenger kilometer than the best electric car. Intercity buses travel at efficient speeds on highways, have decent occupancy and tiny manufacturing emissions as they are spread over so many passengers. Studies range from 35-85 g CO2e/pkm.

5: The School Bus

Even more surprising, school buses typically have quite low emissions. This is not because they are super-efficient, or that they do smooth highway miles, but simply because they have such high occupancy. Emissions per passenger kilometer are typically in the 20-50 g CO2e/pkm range.

4: High Speed Rail

High-speed rail can be very low carbon, particularly with the right juice. We've taken the Eurostar and French TGV from London down to the Pyrenees a couple of times, and emissions are about a tenth of what they would have been from a flight. The largely nuclear electricity in France means emissions of 17 g CO2e/pkm on their high-speed network. Typically emissions are from 10-60 g CO2e/pkm depending on fuel source.

3: Light Urban Rail

Any form of electric train can provide very low carbon miles if it has the right juice. Busy trams, metro or light rail systems can also have low emissions. The example below is from Bergen in Norway, where hydro power is dominant. Lifecycle emissions can range from 10-50 g CO2e/pkm depending on fuel source, efficiency and occupancy.

2: The Electric Bike

There are 200 million electric bikes in China today! Almost 30 million e-bikes will be sold in China this year alone. That is about half the number of passenger cars globally. In coal-reliant China an electric bike has average lifecycle emissions of 22 g CO2e/pkm. Depending on fuel mix they are typically in the range of 5-30 g CO2e/pkm.

1: The Flying Pigeon Bicycle

The 'Flying Pigeon' is the most popular vehicle of all time. More than 500 million have been produced since 1950. Based on the 1932 Raleigh Roadster the popular model came in black, with one speed, 28-inch (710 mm) wheels, a fully covered chain, sprung leather saddle, rear rack and rod brakes. This is an old-school classic. In China, where the diet is relatively low carbon and electricity carbon intensive, this bike edges the eBike at around 10 g CO2e/pkm.

Read more at shrinkthatfootprint.com or http://bit.ly/Rs2Yx3

Read more about electric car emissions at: http://bit.ly/1dSCqj9 .

SMART COMMUTE PROGRAM SEEKS TOWNS for Round Two

By Bethany Fleishman

Vital Communities' Smart Commute Home Edition program is recruiting Vermont towns interested in helping residents lower their transportation costs by driving alone less. The White River Junction, Vt.-based nonprofit was recently awarded a grant by The High Meadows Fund to implement a second round of its newest transportation program.

Smart Commute Home Edition launched last spring in partnership with Bradford, Hartford, Norwich, and Windsor, Vermont. Modeled after Vital Communities' successful workplace-based program, Smart Commute follows a three-step process to survey town residents, develop an action plan, and help towns implement new projects to better meet commuters' needs.

Want your town to partner with Vital Communities to promote biking, walking, transit, carpooling, telecommuting, and high-efficiency vehicles to residents? Proposals are due October 31 from Vermont towns in the Vital Communities service area to participate in the second round of Smart Commute. Interested communities can attend an information session either on Wednesday, October 8, or Tuesday, October 14, both from 7 to 8 p.m. on the second floor of the Upper Valley Food Co-op, 195 North Main Street, White River Junction, Vermont.

The Smart Commute request for proposals is available at vitalcommunities.org/smartcommute/sche_apply.cfm.

Results from Round One

Smart Commute surveys in Bradford, Hartford, Norwich, and Windsor yielded some findings common to all four towns:

- People want to organize carpools online, but many are unfamiliar with Go! Vermont, an easy-to-use ride-matching tool. There's even an emergency ride home program if you can't get home via your carpool due to an emergency. Check it out at connectingcommuters.org.
- People want more frequent and convenient bus service.
- People want more sidewalks and bike paths.

Although the surveys showed similarities among the four towns, each town has its own strengths and opportunities. Here's some of what's happening this fall in each town:

Bradford: Vanpools can help you save 60% on commuting costs and let you catch up on sleep, get work done, or socialize with your neighbors while you ride. Smart Commute Bradford is hosting a pizza party on Wednesday, October 15 at 7 p.m. at the Bradford Public Library to set up vanpools among people who commute at least 20 miles from the Bradford area.

Hartford: Smart Commute Hartford is looking at the feasibility of a small downtown car-share and promoting the recent schedule expansion of the Advance Transit Green Route bus.

Norwich: Smart Commute Norwich and Dartmouth College are hosting a bike-car-bus race on October 21 to test the fastest way to get from Norwich across Ledyard Bridge to the college during morning rush hour. Stay tuned for results!

Windsor: The Hartland-Windsor park-and-ride is scheduled to re-open this month, and Smart Commute Windsor will celebrate by hosting carpool meet-ups on Monday, October 20. Arrive a few minutes before 7:30 a.m., 8 a.m., or 8:30 a.m. to enjoy free coffee and pastries, meet neighbors who work with or near you, and form a new carpool! Already have a carpool? Come by and invite others to join your group.

Complete action plans for the participating towns are available at vitalcommunities.org/blog/index.php/town-transportation-plans.

If you live in Bradford, Hartford, Norwich, or Windsor and want to get involved, e-mail uvtma@vitalcommunities.org or call (802) 291-9100 x111.

A cyclist and Stagecoach bus in Norwich, Vermont.

A fall foliage leaf peeping excursion with my e-bike on an early October evening, near Bradford, Vermont. Photos by N.R. Mallery

FALLING FOR E-BIKES

Adapted from information courtesy of GMP

E-bikes are fun for leaf-peeping, exercise, and going to town on errands. You can ask our editor, Nancy Rae Mallery, about this. They can be peddled up hills nearly as easily as on level roads, they have a 40-mile range, and they can be charged for pennies. Ever since she got her e-bike, it has been hard to keep her back.

Nancy Rae is not the only one benefiting from e-bikes, however. True to its commitment to alternative energy sources, Green Mountain Power purchased two-state-of-the-art electric bicycles for staff to use around the city. This made biking just got a little easier for Rutland-based employees of Green Mountain Power.

"We have roughly 300 employees in Rutland on two campuses and we are constantly traveling back and forth between the two," said Jenn Cortez, Innovation Champion. "Additionally our staff is always out and about off to meetings and running errands. We're hopeful that many of our co-workers will choose to travel using the electric bikes rather than by car."

The bikes are made by EVELO, based in Cambridge, MA. They are supplied and maintained by Zoombikes, of Middlesex, VT. The bikes have 250 watt motors powered by 36-volt lithium-ion batteries. The bikes are pedal-assisted which means they have to be pedaled to activate the motor. "You get exercise and you don't use a car," Cortez said. "That's good for the individual and for the environment."

Electric bikes are beginning to gain acceptance in the United States. Last year, according to Navigant Research, about 55,000 electric bikes were sold across the country. That is much fewer than Europe, where electric bikes are everywhere. In fact, 10% of all bikes sold in Europe are now electric, according to Navigant.

"Electric bikes are a great tool for Vermont," said Larry Gilbert, owner of Zoombikes. "They make it possible for the average person to get up hills. Many people have given up on biking because of the challenging terrain. E-bikes make biking fun. GMP should be congratulated on embracing this new technology and introducing it to frontline workers. I think we're going to see more and more people who are looking for alternative transportation start looking at electric bikes."

TAILPIPES, SMOKESTACKS & OZONE

Mobile sources are the greatest contributor to American air pollution.

The U.S. Environmental Protection Agency (EPA) points to mobile sources (trains, planes and automobiles) as the greatest contributors to American air pollution, but industrial sources such as power plants and factories are not far behind.

Photos: Tailpipe: JT/Environment Blog; Smokestack: Pascal Kammer

By Roddy Scheer and Doug Moss

The main threats to local air quality across the United States (as well as almost everywhere else) remain smog and particulate pollution, which combined or acting alone trigger millions of hospital visits and health complications for people every year. The American Lung Association (ALA) has reported that almost half of all Americans live in counties where air pollution routinely reaches unhealthful levels and can therefore make people sick or exacerbate existing health conditions.

The U.S. Environmental Protection Agency (EPA) points to mobile sources (trains, planes and automobiles) as the greatest contributor to American air pollution, but industrial sources such as power plants and factories are not far behind. Regardless of which kind of pipe pollution comes out of, the result is consistently bad air quality in the nation's 22 largest metropolitan areas and beyond.

"Ozone develops in the atmosphere from gases that come out of tailpipes, smokestacks and many other sources," reported ALA. "When these gases come in contact with sunlight, they react and form ozone smog." Breathing in smog, while inevitable in certain urban and industrial areas, can irritate the cardiovascular system and cause other health problems.

As for particulate pollution, it too comes from a wide range of both mobile and stationary sources. "Burning fossil fuels in factories, power plants, steel mills, smelters, diesel- and gasoline-powered motor vehicles (cars and trucks) and equipment generates a large part of the raw material for fine particles," according to the ALA. "So does burning wood in residential fireplaces and wood stoves or burning agricultural fields or forests."

Chronic exposure to particulate pollution has been linked not only to cardiovascular issues but also to cancers and reproductive problems—and has been shown to contribute to premature death.

Fortunately, the Clean Air Act has gone a long way toward cleaning up the air we breathe across the U.S., reducing key air pollutants over all by a whopping 68 percent since the Act first became law in 1970. A recent study by EPA researchers showed that, in 2010 alone, the Clean Air Act prevented more than 160,000 premature deaths, 130,000 cases of heart disease and 1.7 million asthma attacks, not to mention 86,000 hospital admissions and millions of respiratory illnesses.

But even though four decades of Clean Air Act programs have already done a lot to improve our health, environmental leaders and public health advocates alike would like to see lawmakers put in place even more stringent rules to reduce pollution of all kinds and put our economy on a cleaner, greener path over all.

As for what you can do, ALA recommends protecting yourself and your family by checking air quality forecasts in your community and avoiding exercising or working outdoors when bad air quality is expected. Also, steps you can take to improve local air quality—driving less, using less electricity, turning the thermostat down, etc.—will have the positive side effect of helping mitigate global warming. Who knew that reducing your carbon footprint could actually also help you breathe more easily too?

Contacts: ALA, www.lung.org; EPA, www.epa.gov.

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

WINTER BIKING - STUDDED SNOW TIRE SENSE

Green Energy Times Staff

Proper snow tires are important for those riding bicycles through the New England winter. The sorts of tires usually found on mountain bikes will not quite do. They are fine on many surfaces, but we have to plan for ice. Snow tires for bicycles should have studs. Our expert friends say this is best.

Fortunately, studded snow tires for bicycles are not all that difficult to find. Many bike shops carry them. They come in a variety of sizes, as one might expect, but also in different price ranges. The expensive ones are much better quality. The best snows for bikes may be the ones with tungsten carbide studs. While these might cost twice as much as the ones with steel studs, they will last many times longer.

Moisture always accumulates between the studs and the rubber. Road moisture in the winter often has salt in it, and when it is trapped next to steel, the studs rust very quickly. Once they start to rust, they get loose and can pop out. It is possible for a bicycle to start losing studs from its tires during their first season.

Tungsten carbide does not rust. It is also very hard and does not wear easily. A set of snows with tungsten carbide studs can last for years and may be a really smart investment for anyone who will ride a bike through the winter.

For more, visit peterwhitecycles.com/studdedtires.asp

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**

Solarizing the Upper Valley

ROUND TWO LAUNCHED FOR TEN NEW TOWNS

Volunteers and community members celebrate the success of Solarize Cornish-Plainfield. Photos courtesy Vital Communities.

By Allison E. Rogers Furbish

Residents and small businesses in 10 towns will have the opportunity to participate in Vital Communities' successful Solarize Upper Valley program this fall and winter.

Volunteers in Andover, New London, Wilmot, Hanover, and Orford, New Hampshire, and Randolph, Brookfield, Braintree, Woodstock, and Pomfret, Vermont, are spearheading outreach campaigns in their communities to make it easier for neighbors in town to go solar – and less expensive, if they do it by January 31, 2015.

Interested residents are encouraged to attend the Solarize launch event in their community to learn about the program, meet their partner installer, and talk with friends and neighbors who are also considering solar energy.

Solarize Upper Valley is a program of Vital Communities aimed at making residential and small business solar photovoltaic (PV) energy more accessible across the region. The program teams up local volunteers with solar PV installers for a 15-week outreach campaign to help residents go solar.

With resources and support from dedicated community volunteers and a trusted partner installer, Solarize makes it easy for homeowners to take the first step – request a free site visit. And through Solarize Upper Valley's tiered pricing structure, the cost goes down for everyone as more people sign contracts to go solar with the community's partner installer.

In the inaugural round of Solarize Upper Valley, which ran from March through June 2014, 120 homeowners added 638 kilowatts of solar capacity in Thetford and Strafford, Vermont, and Cornish, Plainfield, and Lyme, New Hampshire.

Vital Communities recently released its Solarize Upper Valley Round One Report, summarizing the program, its results, and lessons learned. The full report and details about Solarize Upper Valley are available at VitalCommunities.org/Solarize.

Nancy Mogielnicki was a core volunteer for Solarize Cornish-Plainfield last spring. She and husband Peter also went solar through the program.

Solarize Upper Valley Launch Events

- **Solarize Hanover, NH**
  Thursday, Oct. 23, 6:30 pm
  Hanover High School
- **Solarize Kearsarge** (Andover, New London, Wilmot, NH)
  Saturday, Oct. 18, 10 am
  Colby-Sawyer, New London
- **Solarize Orford, NH**
  Saturday, Oct. 18, 1 pm
  Rivendell Academy
- **Solarize Pomfret-Woodstock**
  Thursday, Oct. 16, 7 pm
  Artistree Community Arts Center, Pomfret, VT
- **Solarize Randolph-Brookfield-Braintree, VT**
  Tuesday, Oct. 14, 7 pm
  Randolph Union High School

Learn more:
VitalCommunities.org/Solarize
or (802) 291-9100 x109

OUT TO SAVE THE WORLD

A WORLD-CLASS PHYSICIST AND A HIGH SCHOOL STUDENT TEAM UP.

By George Harvey

Dr. Steve Reucroft is a group leader at CERN, the huge international particle physics laboratory in Switzerland. As such, we could say he is a world-class physicist. Alex Fay is a Boston-area high school student about to enter his junior year. He is a would-be physicist. The two of them have entered into an interesting collaboration. Their goal is to render all nuclear waste harmless.

The process by which they think this can be done uses a type of nuclear reactor that has yet to be built, though the design is over 25 years old. It is called an Energy Amplify (EA) or Accelerator-Driven System. The original design of the EA was the result of an assignment given a CERN team by Nobel laureate Carlo Rubbia. His assignment was to design a reactor that could not melt down under any circumstances, could not be used to make bombs, and could not produce long-term nuclear waste.

The EA that Rubbia's team developed was originally intended to use thorium as fuel. It turns out that it can use spent nuclear fuel as fuel just as well. The waste it produces has short-lived isotopes in it, but scientists who have investigated it say it is about as radioactive as coal ash after 300 years. While it is not safe to handle straight out of the reactor, 300 years is a whole lot better than the tens or hundreds of thousands of years over which current waste remains dangerous.

One might ask why no such reactor has ever been built. That is an interesting question, largely because there is no answer from the point of view of science, technology, or economics. Reucroft and Fay believe that there is no reason not to try to get rid of nuclear waste, especially as all the underlying science has been tested and found to work. Also, the system would not only get rid of nuclear waste, it would produce power in the process.

So now, the world-class physicist and the high school student want to start the ball rolling and find a solution to one of the world's pressing problems. They have started a Kickstarter campaign to raise $100,000, a modest sum in the world of nuclear power, to hire scientists to study solutions to proceeding with a greater project. The campaign is titled, "Destroy Nuclear Waste." Anyone wishing to help with the project can find it by doing a web search on the title and "Kickstarter." The project is hosted by ThinkIncubate, Inc. The web site is www.kickstarter.com/projects/300224948/destroy-nuclear-waste.

Nuclear dry storage containers last a hundred years. The waste lasts hundreds of thousands. We must find a better way. NRC photo.

BRATTLEBORO TIME TRADE

Using Community Currency

By Abigail Mnookin

Brattleboro Time Trade's mission is to create strong networks of support by connecting people who use their energy, time and talents to help each other and their community. The time banking model allows for the exchange of "Time Credits," a type of community currency that anyone can earn by helping another member of the Time Trade.

Each hour of service provided to another Time Trade member earns one Time Credit. Members can spend their Time Credits on services provided by any other member of the Time Trade. All services are valued equally, regardless of the market value. An hour that a teenager babysat is treated the same as an hour of wiring completed by a retired electrician.

While I've been home part-time with my daughter, I've become increasingly involved with the Time Trade. As a Time Trade member, I've provided rides to the bus station, weeded gardens, loaned my kayak and food dehydrator, and baked sweet treats for fundraisers. I'm now one of the coordinators. In return for these services, I've had curtains sewn, a chair re-caned, firewood stacked, and my dog walked. I've received childcare, borrowed a pick-up truck, obtained a carpentry consultation, and soaked in an outdoor hot tub.

The Time Trade brings people together from different walks of life. It provides an alternative to day care centers, senior centers, after school programs and fee for service exchanges. Because there is substantial research that shows the correlation between social support and health, it can be said that the Time Trade grows healthy communities.

The Brattleboro Time Trade is accepting new memberships to their current 300-member list, from Windham County and beyond, extending to a 30-mile radius from Brattleboro.

Join online, or learn more at www.brattleborotimetrade.org, stop by our office at 15 Grove St (M 9-6, W 12-6, F 9-4) or call 802-246-1199. . . Together, we can make our community stronger, more equitable, and better connected. Happy trading!

Abigail Mnookin is a co-coordinator of the Brattleboro Time Trade. Listen to her VPR Commentary about the Time Trade online at http://digital.vpr.net/post/mnookin-time-trade

COMMUNITIES ARE GOING SOLAR

By Green Energy Times staff

Solarize Upper Valley has had some results. In the inaugural round running from March through June, 120 homeowners added 638 kilowatts (kW) of solar capacity.

The breakdown for the towns in Round One is as follows:

· Plainfield, New Hampshire: 9 households, 46.5 kW

· Cornish, New Hampshire: 14 households, 68.415 kW

· Lyme, New Hampshire: 51 households, 273.35 kW

· Thetford, Vermont: 33 households, 188.5 kW

· Strafford, Vermont: 13 households, 61.54 kW

There are ten more towns in the area working on Solarize movements. They include Andover, New London, Wilmot, Hanover, and Orford, New Hampshire, and Randolph, Brookfield, Braintree, Woodstock, and Pomfret, Vermont. Neighbors working together with neighbors can reduce costs and make the entire process easier. Current campaigns are for the fall and early winter, with an ending date of January 31, 2015.

Contact Allison Rogers Furbish, allison@vitalcommunities.org.

Craftsbury Goes Solar with Good Neighbor Funds

Provided by Green Mountain Power

A new solar tracker in Craftsbury funded by Good Neighbor Fund payments provided by GMP is helping the town go green and generate its own power. The ribbon cutting is September 11th at 5:30 pm at the Craftsbury Town Garage, and GMP will attend to honor the launch of this important community project,

In March, Craftsbury residents voted overwhelmingly to use its Good Neighbor payment from the Kingdom Community Wind Project to pay for a Solar Tracker. The 10-kilowatt solar electric system was installed in August and is generating enough power to cover approximately one-third of Craftsbury's municipal electric needs.

"This is such an exciting project for our town," said Lisa Sammet who serves on the Craftsbury Energy Committee. "GMP's Good Neighbor Payment helped residents make the decision to build this clean energy project that is already providing a great benefit to taxpayers."

The payment is part of GMP's commitment to give back to surrounding communities by sharing with them the benefits of Kingdom Community Wind through the Good Neighbor Fund.

Payments are made annually. Thanks to strong power generation at the Kingdom Community Wind Farm, five Northeast Kingdom towns received more than $126,000 in January of this year. Albany received $41,262, Eden $45,711, Craftsbury $19,986, and Westfield and Irasburg, each received $10,000. The Good Neighbor Fund provides benefits to the five towns within five miles of the project and is based on the amount of power produced.

"We are thrilled to be able to provide this payment from one clean energy project to help power more clean energy projects," GMP Spokesperson Kristin Carlson. "GMP is committed to being a good neighbor and sharing the value of Kingdom Community Wind with residents in surrounding towns."

The communities will continue to get Good Neighbor payments for the first ten years the 21-turbine plant operates. Kingdom Community Wind began generating power in November 2012.

Here are just a few examples (not all inclusive):

Town of Ashburnham, MA:
4 MW Community Solar Farm

North Hampton, NH:
6.5 MW's of Solar PV - to be built in Spring 2015

Putney, Vermont:
144kW Community Solar Garden

Westford, VT:
17.5kW Coyote Ridge Community Solar

Rutland, Vermont:
2.5MW Stafford Hill Solar Farm

Craftsbury, Vermont:
10kW Municipal Installation

Solarize Upper Valley:
638kW for 120 Homeowners - Many homes went solar in each of the inaugural round one communities of Thetford and Strafford, Vt, and Cornish, Plainfield, and Lyme, NH: Cornish-Plainfield: 23 homes, 114.915kW; Plainfield: 9 homes, 46.5kW; Cornish: 14 homes, 68.415kW; Lyme: 51 homes, 273.35kW; Thetford-Strafford: 46 homes, 250.04kW; Thetford: 33 homes, 188.5kW; Strafford: 13 homes, 61.54kW.

AN INNOVATIVE SOLAR COLLECTIVE

By George Harvey

Eric Shenholm, founder of Saxtons River Solar Electric, in Saxtons River, Vermont, has developed a new type of solar collective that some people might like to know about. It is the sort of thing that many people might use profitably, and which could be replicated easily.

Shenholm has had a lot of experience in the solar business. In the 1970s, he was one of those who installed solar thermal heating systems. Though the business model that most installers of the time used did not survive, he always kept thinking about the advantages of solar power.

A few years ago, as the market started catching up with his thoughts on the subject and businesses started to open for a new round of installations, he thought about business models. He says, "I wanted to create a model that would give more people access to solar electricity and allow them to own their solar systems, even if they didn't have the ideal conditions on their own properties. I also wanted to help reduce the initial costs of installing a system so more people would enjoy the long-term benefits of going solar."

In 2008, Shenholm and his wife, artist Michele Ratté bought an eight-acre farm in Saxtons River, a village in southeastern Vermont. The land included a pasture with an unobstructed exposure for a solar system, and he began getting serious about putting up a system on the property. Once more, however, his thoughts turned to the question of how he could benefit other people around him. The more he thought about it, the more he saw that the solution lay in a novel business model.

Other people had addressed the same problem. They had come up with a variety of solutions. Shenholm, however, wanted to maximize the investment potentials of all people involved. The tax incentives offered by the federal government were not available to the customer under some business models. Some systems had an owner selling power to friends and family.

This member owned innovative collective has a combined rated output of 27.54 kW. The cost per member was less than $3.42 per watt and the project has room for over 200 more panels.

"I wanted to find a way for me and my neighbors to put in a system that would make power for all of us, but would also allow us to individually benefit from the tax breaks available," Shenholm says.

Shenholm started talking with neighbors, and found several were interested in forming a collective with framework for members to own their own panels, but with some things owned in common or leased, depending on what made best sense. The legal and financial issues were all ironed out with attorneys and accountants, so there would be no unexpected issues at a later date.

Members owned their PVs and mounts individually, which meant that they could get tax credits for themselves. The most efficient way to interface with grid power was through a small number of inverters, so that equipment is held in common. Group net-metering is used to deal with production and consumption billing. The property on which the panels sit is Shenholm's south-facing pasture, and individual PV owners lease very small plots of land on the property from him at low rates.

The initial purchase of PVs was made in October of 2013. Five individual systems, with a total of 108 panels, were installed, but since they were sited together, a lot of the labor and equipment was shared. They have a combined rated output of 27.54 kW, and cost a total of $94,000 to install. The cost of slightly less than $3.42 per watt is very low, but reflects the fact that the members of the group did as much as they could with their own labor, leaving only those parts of the work that had special requirements to the professionals.

The project has worked out well. One solar collective member said, "For years I've wanted to install solar PV panels at my home, but a large and beautiful tree made it impossible. Eric's solar project has allowed my dream to come true, even to the extent of taking out my furnace and fuel tank and heating my home with a groundwater geothermal system. Finally my home is off fossil fuels!"

Since the project was finished, two additional members have joined, adding 48 panels. Anyone living in the Green Mountain Power territory could join the project, and Shenholm says there may be room for over 200 more panels.

ANDOVER, NEW LONDON AND WILMOT, NH

Solarize Upper Valley 'Launch Event'

MARK YOUR CALENDAR for Oct.18, 2014!

Solarize Upper Valley's next campaign is off to a great start. After the success of the first 140 homes going solar in round one, it will be interesting to see how many more homes go solar for this new round of towns that are involved.

If you live in the towns of Andover, New London or Wilmot, be sure to come out to the Solarize Kearsarge launch event on Saturday, October 18, beginning at 10 a.m. in the Ivey Science Center at Colby-Sawyer College in New London. The event is open to the public and will feature an illustrated presentation on how photovoltaic systems work, their economic and environmental advantages over non-renewable energy sources, the variety of rebates, incentives and discounts available, various financing opportunities, and the reasons to act during the 15 weeks of the Solarize project.

To enjoy the discounts available during Solarize, all systems must be contracted out by January 31, 2015. In the weeks until then, ReVision Energy and the Solarize team will be conducting numerous events, free solar site evaluations, and providing information on the special tiered pricing available for Solarize participants (the more projects booked, the bigger the discount!).

Details on the SOLARIZE KEARSARGE LAUNCH EVENT can be found on Facebook at: on.fb.me/10T0Y5Q

The Solarize volunteers in Kearsarge (Andover/New London/Wilmot, NH) are really gung-ho and made hundreds of Solarize cookies for their weekend event. The cookies were made by Maria Glorioso and Vicky Mishcon, both members of the Andover Energy Group.

SAVE THE WORLD

Cont'd from p. 1

estimates it was about $1.2 trillion per year in 2012. As climate change worsens, this figure would increase.

There are also other external costs. Among them is the price of national and international security resulting from problems associated with climate change, peak oil, and declining resources. The US Department of Defense says that climate change is one of the greatest threats to national security. Also, there are the increased costs of health care not related directly to air pollution, as invasive diseases spread. Other costs come from drought and unstable agricultural conditions.

So the good news is really good. We can avoid many of these costs, which could come to well over $100 trillion over the next 36 years, by switching to renewable power. And while we can do that, we save trillions of dollars each year by not having to pay for fossil fuels.

Right now, we have all the technical resources we need to switch. The cost of renewable power has gone down so low that it is cheaper for many ordinary ratepayers in New England to buy solar panels for power than to buy the same amount of power they would produce from the grid, even including financing costs. A big deciding factor on this is the question of group net-metering. It is also less expensive for a utility to buy power from wind turbines than from any other resource, even considering the costs for

backup power when the wind turbines are not generating. I

We should all know that the costs of solar power are only a small fraction of what they were only a few years ago. What many people do not know is that the costs of windpower and battery backup have both been halved in less than a decade. The costs of currently available technology are still going down. The costs of many technologies we see being developed are even lower.

In fact, the only bad news about climate change and limited fossil fuel resources is that it will be painful for humans and nature alike if we fail to do what clearly needs to be done. Speeding our response to climate change will prevent a lot of suffering.

Even for those people so unscientific as to deny that human-caused climate change is happening, there is good, simple reason to switch to renewable power. Every dollar spent on renewables saves more than two we do not spend on fossil fuels.

Solar Source is on Top of It!

Keene, New Hampshire…

5.5 kW PV system on a house in Cornish, NH. Photos courtesy of Solar Source.

By George Harvey

In 1952, Bob Therrien bought the Melanson Company, which had been in the roofing business in Gardner, Massachusetts for about twenty years, and moved it to Keene, New Hampshire. The company has continued in the roofing business, operated by members of Therrien's family ever since.

The Melanson Company has changed quite a lot since 1952, however. For one thing, it expanded, opening new offices in other places, notably Bow, New Hampshire; Rutland, Vermont; and Bennington, Vermont. It also went into other lines of work, though all were related to things that are "on top" in much the ways roofs are. It has branched into work on dropped ceilings and acoustical tiles. It also branched into HVAC, leading to branching into precision manufacture fabrication and machining to support installation of ductwork.

A 127.7 kW solar PV system on Keene State College's TDS Center Building (Keene, NH)

Meanwhile, John Kondos had founded and run a solar installation company, also in Keene. He had started working in solar energy in the 1970s, and was intimately knowledgeable on just about every aspect of the trade. He was well aware of the problems associated with poor quality equipment manufactured in the early days, and spent time working on improvements. He already had decades of experience when Solar Source was founded in 2005, both in photovoltaics (PVs) and solar thermal water heating.

Since solar PVs are so often installed on rooftops, it was one of those things that was "on top," making it interesting to Rob Therrien, son of Melanson's founder. And so he acquired Solar Source, making it a division.

Solar Source is a system designer and installer. Rooftop installations require a certain amount of understanding of roofs, which puts Solar Source into a perfect position to do work with an eye to the best overall system possible, including the roof on which the system sits. Solar Source has installed systems ranging from 2 to 128 kilowatts. The company still works on solar thermal installations, as well.

Craig Bell, the general manager of Solar Source, likes to point out that Solar Source has relationships with customers that go beyond what is necessary or usual. For one thing, the company is still maintaining is ability to install thermal collectors and heaters. Many companies have moved away from this side of their work because it requires a different set of skills from what PV installers have and the market is not as large.

A 5.0 kW solar PV system on a barn in Cornish, NH

Another thing that sets Solar Source apart is that the company takes an active interest in heat pumps. This is not just providing for extra electricity to drive the heat pumps, but managing the heat pump installation, for which Solar Source calls in experienced electricians and plumbers as needed.

The one aspect of the company that is perhaps most impressive is the degree to which customers are directly involved throughout the entire process of installation. Bell says, "We are customer service driven, responding to inquiries in the most timely fashion." During all stages, during planning, including addressing the issues of rebates and incentives, through other planning and design process, and throughout installation, the customer is kept informed and questions are answered.

Bell is very hopeful about the future of solar for residents of New Hampshire. While the state had net metering for some time, not many people could take advantage of it, because it required the solar panels to be on the same land as the meter that was being credited with their output power, and it restricted them to 15 kilowatts. In 2013 the state enacted a law providing for group net metering. This allows a utility customer to band together, building a solar garden of up to 100 kilowatts, at a common site remote from their meters. This has the advantages of making it possible for people without a good site to get one and of providing reduced costs because of a common installation.

The Solar Source's phone number is 603-352-4232. The website is www.solarsourcene.com.

Solar Works Great in the Winter!

By G.E.T. Staff

Image: Shutterstock

We all know that solar photovoltaic (PV) cells work much better in Arizona than they do in New Hampshire or Vermont. Like many other things we have always known about, however, the real story is a bit more complicated than that.

One of the problems with PVs in the desert Southwest is that they overheat, and when they do, their efficiency goes down. How much it goes down depends on the specifics of the PV and the temperatures to which it is exposed. The important thing, however, is that many or most PVs work better in cold weather than in hot.

Another aspect of this problem is that while PVs degrade very, very slowly, they degrade at a speed that is somewhat related to the temperatures at which they have operated. Hotter temperatures produce more damage.

The result of this is that solar PVs make good sense in northern latitudes, even though there is less sunshine. The cloudiness of a New England afternoon may slow them down, but not necessarily as much as a hot afternoon in the desert.

As it happens, Nancy Rae Mallery, the publisher of Green Energy Times, has some experience with this, because she has lived for years in an off-grid house provided with 100% of its power by sunlight. Her 3.8kW solar system, a ground-mounted array, produces a good deal more energy than her household needs, and her batteries are just about always at full charge. That is true in the summer, when the days are long and warm. It is also true in the winter, when the days are short and cold. Asked how the two compare, she says, "I have never noticed much difference. The sun always shines before the batteries get too low and charges them back up. It is true that there are fewer hours of winter sunlight, but that doesn't mean you can't produce plenty of electricity. The generator has not needed to come on to help in over three years. It feels great to be energy-independent and not have to rely on fossil fuels for my electricity."

COMMUNITY SOLAR
Sharing Solar is for Anyone

SunShot Initiative Helps Make Solar PV Cost-Competitive

By Jeff Brehm

While the cost of rooftop solar photovoltaic systems has decreased, a recent U.S. government survey found that only about 25% of residential rooftops provide acceptable locations for effective PV systems due to shading, building design and other issues.

Community solar offers a way to share the benefits of solar, even if the panels won't work on an individual building. Residents, municipalities, companies and utilities are organizing projects that provide renewable energy and financial benefits to local participants. And in many cases, they're using sites unsuited for traditional development.

The growing popularity of solar is thanks in part to hundreds of workshops on the subject provided by the Solar Outreach Partnership, part of the U.S. Department of Energy's (DOE's) SunShot Initiative, a national collaborative effort to make solar energy cost-competitive with other forms of electricity by the end of the decade.

"Solar PV is becoming much more cost-competitive … and the market has grown pretty substantially here in the last few years," said Andrew Belden, director of state and city programs for Meister Consultants Group, which is part of the SunShot Solar Outreach Partnership. "What was a small, niche application five years ago is now a multibillion-dollar-a-year industry. There's been an exponential curve in PV installations in the U.S. in the last few years, and all indicators are that this trend will continue."

That's caught the attention of a lot of consumers, but many of them can't install PV systems on their homes.

"There are a significant number of people who rent or own a condo … who don't have access to the roof or the land around it," said Kathryn Wright, a Meister consultant. "Community solar is a way to overcome this barrier."

The National Renewable Energy Laboratory (NREL) defines community solar as "one solar-electric system that provides power and/or financial benefit to multiple community members."

The Brewster Community 346kW Solar Garden has 50 members of the system, who are guaranteed $1,400 in annual energy cost savings. Photo courtesy of GameChange Racking.

Unlike group purchase programs like Solarize, or crowd funding programs such as Solar Mosaic, community solar projects can be developed by a special-purpose entity (owned by the participants or a third party) or can be sponsored or managed by a local utility. More than 40 are already established across the U.S., with 14 of those in Colorado.

"In participant-owned projects, individual community members invest money to develop a solar installation and they receive the net metering credits, so they benefit from the electricity," Wright said. "In some cases they also receive renewable energy credits and investment tax credits, but this is legally complex and there can be local nuances.

"A third-party owner usually already has internal expertise with these kinds of issues, and handles any operations and maintenance," she explained. "But the third party might take any direct credits for themselves … and they usually require a higher return on investment."

In projects with utility-sponsored ownership, the utility owns the system or retains a third party to own and manage it. The utility allows its customers to purchase rights to the benefits of the PV system, such as net metering credits or "green power" purchases. More than 20 of these projects already are underway, with the majority administered by municipal utilities.

Wright and Belden provided three community solar case studies.

• EcoVillage in Ithaca, N.Y.: A condo association installed a 50-kW ground-mounted PV system, using a 15-year loan from residents and other incentives. Operational in April 2011, the $300,000 system serves 55% of the load of 30 homes. A new metering system allows owners to monitor electricity use and enables the system to accurately allocate credits.

• Brewster (Mass.) Community Solar Garden: In this 346 kW brownfield installation, a municipal lease was awarded to My Generation Energy. Of the 50 members of the system, who are guaranteed $1,400 in annual energy savings, more than half are unaccredited investors. Brewster gets lease payments and use of the vacant land; My Generation Energy gets renewable energy credit revenues and ownership payments.

• A Kit Carson Electric Cooperative project in Taos, N.M.: Under an agreement with Clean Energy Collective, a 98.7kW solar canopy system was installed in 2012 at Taos Charter School. The co-op benefits from a 20-yr power production agreement; Clean Energy Collective receives revenues for panel energy production, and utility customers get net-metering credits.

Belden also provided a "Solar 101" overview of technologies and market drivers.

"Germany has far less solar resource than just about anywhere in the continental United States. It's working there, so it can work just about any place here," he said. "And as solar prices keep coming down (from as much as $12/W in 1998 to as little as $3/W today), a lot of local governments and utilities are trying to figure out what to do as their customers are seeing the value solar can provide."

Incentives are another driver. They range from federal investment tax credits and accelerated depreciation for eligible owners (for-profit companies) to state and utility rebates, solar renewable energy credits (SRECs) and net metering, which allows solar system owners to export excess power to the grid in exchange for credits. The latter group varies widely in availability and amounts, which can create confusion, but the SunShot Solar Outreach Partnership offers free technical assistance services that can help.

"Some of my colleagues in Europe asked me, 'What's the solar market like in the United States?' " Belden said. "The answer is, there isn't a solar market in the United States – there are 50 solar markets. The rules and regulations and incentives in states are all different."

Community solar also offers land-use value because it can be installed on sites with limited development potential, such as closed landfills, Belden said, adding "I was involved with a project in New Bedford, Mass., where they took a Superfund site that was completely useless, land that was kind of a burden to the city, and installed a 1.75-megwatt ground-mounted PV system that's producing power for the community and also generating tax revenue."

cont'd on p.17

Southeastern Vermont's largest solar array. The 2.5 MW Winstanley Solar Project is located in Brattleboro. Photo by Katrina Wilson, ISASolar.com.

Getting Closer *cont'd from p. 1*

increased at a fixed rate to 55% by 2035. Note again, however, that these are retail sales and include neither small net-metered nor off-grid power. Progress in the SPEED program is easy to follow by visiting the website, vermontspeed.com.

Currently, five years after the introduction of the feed-in tariff, projects in the SPEED program deliver about 892,200 MWh per year. This means that the projects in the program are producing about 16% of Vermont's electricity, which is in striking distance of the 20% we should have by 2017.

The two new solar projects are said to be the largest in the state. We might be more accurate about this. They are tied with eight other solar projects of the same size. There are also eighteen other solar projects of smaller size, for a total of 33,078 MW capacity from solar.

While there has long been hydroelectric power in Vermont, very little of it is part of the SPEED program; what does accounts for 39,479 MW. Other renewable projects that are part of the SPEED program include farm methane, with a total capacity of 34,579 MW; landfill methane, with a capacity of 102,878 MW; and biomass, with a capacity of 153,410 MW. By far, the greatest contributor to the SPEED program is five wind farms, whose capacity is 528,777 MW.

Converting capacity figures to power delivered is not simple, because each different type of power has amounts of capacity that vary through time, according to conditions. It is also not easy to get the latest data on net metering programs, and it is next to impossible to get an accurate assessment of how much off-grid power is generated.

We can look at some good general estimates from the US Department of Energy, however, which runs the Energy Information Administration. They give us data on how much power comes from what sources, and how much power is used. By doing a little math on what they give us, we can find that hydropower, nearly none of which is in the SPEED program, gives us about 1200 GWh per year, or about 17% of what we use. Other renewables account for a bit over 700 GWh. We are not to the 2017 goal yet, but we clearly can get there with some effort.

Programs 4 Energy Efficiency Are there for YOU!

REGIONAL AND NATIONAL:

- New England Weatherization's website has assistance pages for Maine, Massachusetts, New Hampshire, and Vermont. Links to the page are in the column on the left side of the home page, near the bottom. newenglandweatherization.com
- The US Department of Energy has a map to information on Energy Efficiency and Conservation Block Grant Program projects by state. eere.energy.gov/wip/project_map
- We should remember that valuable general information on incentives and policies that support renewables and energy efficiency in all states is maintained at the Database of State Initiatives for Renewables and Efficiency. dsireusa.org

MASSACHUSETTS:

- The Low-Income Home Energy Assistance Program has links relating to a large number of programs in Massachusetts. liheap.ncat.org/profiles/Mass.htm
- MassResources.org has a page on weatherization resources. massresources.org/weatherization.html
- A quick rundown of the Massachusetts Weatherization Assistance Program is available from benefits.gov. benefits.gov/benefits/benefit-details/1860
- A page of resources for Massachusetts residents is available at the US Department of Housing and Urban Development, including links to information for specific utilities. bit.ly/HUD_Mass_info (Please note that bitly addresses are capitalization sensitive.)
- Mass Save has a web page on rebates and incentives for weatherization. mass-save.com/residential/offers/weatherization

NEW HAMPSHIRE:

- New Hampshire's Office of Energy and Planning has a Weatherization Assistance Program. nh.gov/oep/energy/programs/weatherization
- Southern New Hampshire Services, Inc has weatherization information, which can be found on a web page. snhs.org/programs/energy-programs/weatherization
- Public Service of New Hampshire has a Homes and Renovations page that includes a link to a page on Home Energy Assistance. psnh.com/homerenovations
- The Low-Income Home Energy Assistance Program has links relating to a large number of programs in Vermont at liheap.ncat.org/profiles/NH.htm
- Tri-County CAP of Berlin, New Hampshire has branch offices in the northern part of the state. They maintain an Energy Programs page. tccap.org/energy_programs.htm
- The Plymouth Area Renewable Area Initiative (PAREI) has a general resources page with many links on many subjects, including weatherization. plymouthenergy.org/resource.html
- NHSaves has a page with information and links. bit.ly/NHSaves_saving_energy (Please note that bitly addresses are capitalization sensitive.)

VERMONT:

- Vermont's Weatherization Program is designed to help lower income residents — particularly older Vermonters, people with disabilities, and families with children — to save fuel and money by improving the energy efficiency of their homes. dcf.vermont.gov/oeo/weatherization.
- Efficiency Vermont has a web page with links to Vermont's Weatherization Offices. bit.ly/EVweatherization (Please note that bitly addresses are capitalization sensitive.)
- The Low-Income Home Energy Assistance Program has links relating to a large number of programs in Vermont at liheap.ncat.org/profiles/Vermont.htm
- The Vermont Natural Resources Council has a weatherization page with general information. bit.ly/VNRC_weatherization (capitalization sensitive)
- The Neighborworks Alliance of Vermont has numerous resources available through their offices throughout the state, including assistance with weatherization and energy. vthomeownership.org
- Capstone Community Action Weatherization has an easily viewed table of Vermont state-wide assistance guidelines. bit.ly/CCA_guidelines (capitalization sensitive)

MICROGRIDS

Cont'd from p. 3

is being offered to customers. This makes it possible for a consumer to control household power remotely. Electric vehicle charging stations are also made more possible, as are small multi-purpose generators developed by NRG.

The microgrid being developed also enables demand response, which is almost certain to be very important in the future. In a demand response system, a piece of equipment that uses large amounts of power, such as a water heater, can be programmed to use power when it is available at low cost and not when the price is high. An electric vehicle in a demand response system can even charge at low rates at night and sell power back to the grid during the daytime. In a test of this in Delaware last year, a Tesla made $150 per month just because it was responding to the prices of power, buying low and selling high, automatically as the prices changed.

The initial pilot program should be in operation in 2015.

Thoughts ON Windpower

By George Harvey

Wind power is an issue in the current election campaigns in New England, but without understanding the context, it is nearly impossible to tell fact from fiction.

Practically all information on the subject is tainted by the misleading information from the fossil fuel industry. The overwhelming evidence from science blames fossil fuels for climate change, which threatens every part of the Vermont ecosystem and could cost us up to 70% of all higher species if left unchecked. The WHO says fossil fuels are killing over three million people per year through pollution. The UN is asking all governments to stop the subsidies the fossil fuel industry gets, which are over $525 billion per year in direct subsidies alone. And "distributed" power (from spread-out power generation), largely wind and solar, is a real, growing threat to those invested in fossil fuels.

Supporters of the fossil fuel industry like to say wind cannot support baseload power and needs backup power. In reality, large traditional plants need backup power, too. In fact, on a unit basis, the cost of backup power for large power plants is about three times that of wind and solar power. On top of that, the price of batteries is dropping so quickly that Barclays, an international finance bank, has downgraded the bonds of all US utilities because distributed power and batteries are becoming less expensive than grid power for increasing numbers of Americans.

The fossil fuel supporters say that wind power does not provide steady jobs. This is not true. Turbine maintenance requires steady work. Wind turbines are typically serviced on a weekly basis.

They say that without government incentives, windpower would not exist. That can only be true if the fossil fuel and nuclear industries keep getting subsidies while windpower gets none.

They say wind power is expensive. The DOE says the average wholesale cost of contracts for electricity from wind in 2013 was 2.5¢//kWh - easily the least expensive power source in the US. Even adding the 2.3 cents per kilowatt-hour wind turbines were getting in incentives, it is still less expensive than power generated by natural gas.

They say windpower drives down property values. None of the ten peer-reviewed papers I was able to find says wind farms do drive down property values. Some say wind turbines may even increase them. The largest of these was from Lawrence Berkeley National Laboratories and the University of Connecticut, which studied over 130,000 real estate transactions in Massachusetts and showed modest increases.

They say windpower makes people sick. The position paper from the Australian Medical Association clearly blames the symptoms of wind turbine syndrome on a placebo effect resulting from "scare tactics" (their words) of anti-wind activists.

They say birds and bats are being killed. What they do not mention is that for each bird killed making a gigawatt of power from wind, 35 to 40 are killed making the same amount of power from fossil fuels.

They say mountain habitats are destroyed by wind farms. The Vermont Agency of Natural Resources says the forests in those mountain habitats will be "nearly eliminated" in this state because of climate change caused by fossil fuels.

We need to act rationally, based on science. The fossil fuel interests do not want us to do that.

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

WWW. NHEC.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, & 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. ***Ends Dec. 2014.***

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**

There will be a new residential loan program for solar PV to be announced in November, 2014.

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

NH's Final State Energy Strategy Released

The NH Office of Energy and Planning released the Final State Energy Strategy, which can be found at nh.gov/oep/energy/programs/SB191.htm. The ten-year strategy highlights the need for more investment in energy efficiency, local renewable energy, and smart transportation policies, among other recommendations. As the opening summary aptly states, "The time for action is now."

VT'S NEW ENERGY EFFICIENCY FINANCING

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 technnywhere 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.

cont'd fom p.12

Sharing Solar

The growing number of solar parking canopies also are particularly exciting, he said, since "communities typically have massive amounts of parking space; you can turn that under-utilized space into a solar generating facility."

Both consultants agreed the future looks sunny for community solar.

"It's starting to drive conversations at the state policy level and we're seeing more and more efforts to support legislation," Belden said.

"If utilities get behind it, I think we'll see a lot more community solar in the future," Wright also said. "It doesn't have the same problems they have with multiple distributed generators in terms of getting back their fixed costs."

And no one should ever underestimate consumer demand.

"I think there are going to be a lot of calls for this from customers who don't have any other way to take advantage of solar," Belden added. "As they start to see their neighbors benefitting from this technology, there's going to be pretty significant pressure from constituents to adopt these programs, and utilities and governments are going to have to be responsive to this."

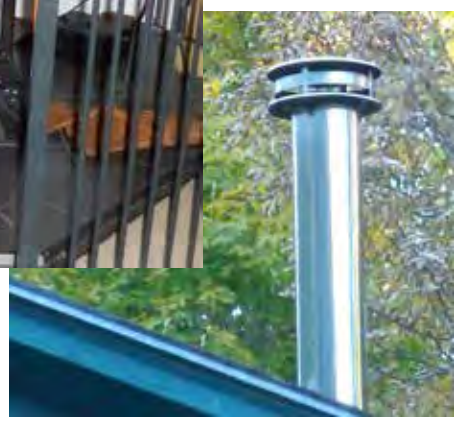
Courtesy of Sustainable City Network. Learn more at: sCityNetwork.com.

Contacts: SunShot Solar Outreach Partnership solaroutreach.org; National Renewable Energy Lab (NREL) nrel.gov; Solarize Guidebook nrel.gov/docs/fy12osti/54738.pdf; Solar Mosaic joinmosaic.com.

Keeping Our Air Clean & Our Hearths Warm

By Mike Minchin

"Burning wood cleanly and efficiently is in everyone's interest."
Photo: Mike Minchin



Winter in New England brings with it memories of sitting around a woodstove, sipping hot chocolate or warming cold toes. The scent of wood smoke can stir fond memories or serve as a reminder of the hard work of splitting and stacking cordwood. Wood can provide a satisfying and efficient way to heat a home. But wood smoke, which contains a variety of toxic chemicals, isn't good for our lungs, and smoke rolling out of chimneys indicates wasted energy.

The 2010 US Census showed wood was the fastest growing heating fuel in the country, so it's more important than ever that we do it responsibly. Fine particles from wood smoke are harmful, especially for people with heart and lung conditions, children, and the elderly. The Environmental Protection Agency (EPA) says, "short-term exposures to particles (hours or days) can aggravate lung disease, causing asthma attacks and acute bronchitis, and may also increase susceptibility to respiratory infections."

Still, most of the roughly twelve million woodstoves in use in the U.S. are older, polluting models, which send an estimated 336,000 tons of emissions into the air each year. Modern, EPA-certified woodstoves, which are designed to burn smoke before it ever hits your chimney, are up to 90% cleaner than older models, and they are up to 50% more efficient, saving a lot of fuel.

The current EPA emissions limit is 7.5 grams per hour. There are already stoves on the market, some produced right here in New England, that produce less than 3 grams per hour. Recently, the EPA proposed a gradual tightening of their standards to reduce smoke emissions for all new woodstoves to 1.3 grams per hour. Older (pre-EPA) stoves, however, can emit a shocking 50 grams of smoke an hour. So possibly the most effective way to reduce wood smoke emissions is to replace those older stoves.

Replacing old stoves is not always easy, as it can cost a few thousand dollars to replace a woodstove, prohibitively expensive for many owners. Help is available, however. In 2009, the Vermont Burn Clean Woodstove Change-out Program gave out $450 vouchers to help support the purchase of a new, EPA-certified woodstove. About 200 woodstoves were replaced.

Massachusetts's very successful Commonwealth Woodstove Change-Out Program gave vouchers of up to $2,000 to replace non-EPA-certified woodstoves. The vouchers could be used at a number of woodstove retailers, and over 750 older woodstoves were replaced.

Without federal or state dollars, it may be up to individual communities to fund and initiate change-out programs. Some towns, like Keene, New Hampshire, have done just that, since Keene had a particularly bad wood smoke problem.

Even if you have an EPA-certified woodstove, it needs to be operated properly to work efficiently. To check, just go outside when your stove is running and look at your chimney. If it is smoking, you are paying for fuel that is being lost as pollution. The stove may be to blame, or the chimney, the wood, or possibly technique. Modern woodstoves should emit no visible smoke, except for a few minutes when they are being lit or reloaded. With good technique even that smoke can be minimized or eliminated. You may see steam on the coldest days, but you should not see thick smoke rolling from the chimney.

Dry wood can go a long way to helping you achieve a clean burn. Ideally, wood that is about 20% moisture. If you have any doubt judging dryness, consider using a wood moisture meter (around $20). They are simple to use and more accurate than eyeballing cracks in your cordwood. Just split a piece open and take a reading from the center, not from the surface that has been exposed to air.

Burning wood cleanly and efficiently is in everyone's interest, and it may be the best way to avoid a future of regulations regarding woodstove use. Some states already have laws restricting smoky chimneys. Washington State allows a maximum of 20% opacity for smoke exiting chimneys, except for lighting and reloading, making it illegal to smoke out your neighbor's yard day after day.

We have the technology to burn wood efficiently. We owe it to our neighbors to utilize that technology properly. It's up to us to keep our air clean, our communities healthy, and our hearths warm.

For more on wood heating issues, the author recommends www.woodheat.org.

Mike Minchin is a cardiovascular technologist, writer, and woodstove enthusiast. He earned his MFA in writing from Vermont College of Fine Arts. His fiction has received Honorable Mention in Glimmer Train. His poetry has appeared in the journal Avocet. He lives in Bethel, Vermont with his family.

Photo: Mike Minchin

HEAT PUMPS EXPLAINED
Air Source & Geothermal

By George Harvey

In physics, Gay-Lussac's law says gasses expand as they are heated and contract as they cool. It explains why hot air rises. It also explains why a heat pump can work.

An air conditioner is a type of heat pump. Its compressor takes gas, typically at room temperature, puts gas under pressure, which increases its temperature. Next, the gas is pushed into a heat exchanger, which is outside the house. While the air outside is hot, it is not nearly as hot as the compressed gas, so the gas cools off. Next, the gas is depressurized, which cools it off. Since it had already lost its heat, it winds up being much colder than it originally was. It absorbs heat from inside the building, and is then ready to go through the cycle again. Put succinctly, it moves heat from inside a building to outside, even though the inside is relatively cooler and the outside is hot.

Some other heat pumps, such as those in refrigerators, are very familiar. Many people are unfamiliar with the heat pumps that can heat houses, however. They can extract heat from outside air, even when it is cold out there, and release it inside the house. Modern heat pumps are so efficient that they can do this even when it is very cold out.

The new heat pumps people are getting for their homes are not all alike, however. While they all can provide heat, and many can also provide efficient air conditioning, they should be understood before they are purchased so people get what suits them best.

One way to run a heat pump to heat and cool a building is to move the heat to or from the ground. This is the ground-source heat pump. The temperature of the earth is fairly stable, when you go more than a few feet below the surface. In most of New England, the temperature down there is about fifty degrees Fahrenheit. Heat dissipates through the ground. The earth is heated in summer and cooled in winter from above, but it is usually just heated from below, and the farther down you go, the warmer things usually get. So a simple way to run a ground-source heat pump is to put a heat exchanger consisting of a long section of pipe down a well. One variation on this is to do a relatively shallow excavation to put the pipes in a horizontal area a few feet below the surface. Another puts the pipes into a lake or river.

Another way to run a heat pump is to use the outside air as a heat source. Even cold air, sometimes below zero Fahrenheit, can be used as a heat source by a modern heat pump designed to do the job.

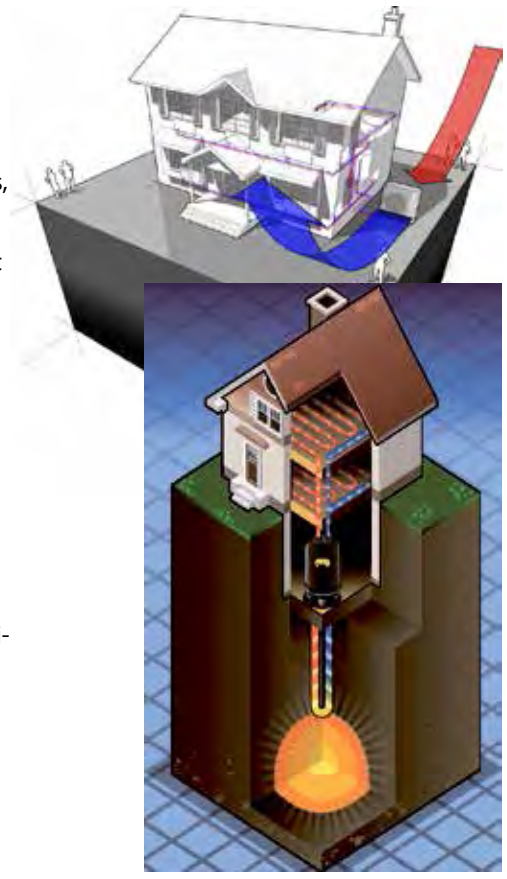
Which type of heat pump to use for heating a building depends on circumstances. The ground-source heat pumps are much more costly to install because they require drilling a well or excavating the land. Their advantage is that they are very much more efficient in terms of the amount of heat delivered per unit of electricity.

By contrast an air-sourced heat pump is very much less expensive to install but more expensive to operate. In some cases, the higher installation costs would be hard to recover from the differences in efficiency. So deciding which type of heat pump is better requires some thought.

We should note that there are other types of heat pumps, with other reasons to use them. One, sometimes used in industrial plants, takes heat from areas where processes create a lot of waste heat, and pumps it to other areas where heat is needed. An example of this would take heat from a place where ovens are being operated and move it to an office. Another type can move heat from a cool damp basement into a water heater, with the side benefit that the heat exchanger in the basement air can act as a dehumidifier.

Of course, backup heat should always be planned for. An ordinary wood stove might go for a long while without being used, but prove very valuable if the electricity goes out.

Heat pumps might seem like the latest gadgets in heating, but that does not make them expensive to run. The heat they provide is about as inexpensive as anyone could get today.



Top: Air Source Heat Pump. Belw: Ground Source Heat Pump.. Photo: Shutterstock.

Harvesting the spirits
AT SHELBURNE VINEYARDS

By George Harvey

The thoughts that come up when we consider Vermont agriculture include dairy products, maple syrup, apple cider, and vegetables from small farms. One thing that does not come readily to mind is grape wine. Perhaps that will change, as we have the exemplary Shelburne Vineyard to teach us.

Shelburne Vineyard started on three acres Ken Albert leased and planted with grapes in 1998. It was not his first experience with grapes. He had already been growing them for about two decades as a hobbyist. As an IBM engineer, he often had gone to Quebec, and became convinced that Vermont could have an industry using similar grapes and viticulture techniques.

In 1999, he leased another three acres and planted more grapes. The following year, he took on Scott Prom as a partner. Prom was also an engineer, but had years of experience making wine in Washington State. Together, they produced their first vintage in 2001. Since then, the vineyard expanded to17 acres.

The winery was built to LEED standards, though it is not yet certified. There are eight inches of insulation in the building. Ventilation is carefully designed for heat retention. The lighting in the processing area is all from fluorescent fixtures with motion detectors, so the lights shut off automatically when no one is in the room. The building was designed to take advantage of natural lighting, however, so the lights are often not needed. Hot water is produced in highly efficient on-demand heaters. Materials were chosen based partly on where they are from; the bar in the wine-tasting room is from a nearby woods, and the fixtures are the product of local craftsmen.

The University of Vermont's Sustainable Agriculture Program named Shelburne Vineyard "Sustainable Farm of the Year" in 2009.

Ken Albert's intention was that Shelburne Vineyard be organically certified. That proved to be impossible because all of the country east of the Rocky Mountains has enough humidity to support the black rot mildew, for which there is no organically acceptable treatment. Cornell University has a very strict protocol, however, which allows for a very narrowly focused treatment for the mildew, and is quite possibly the best solution available for vintners who would be certified as organic. That protocol is what Shelburne Vineyard follows.

The grape varieties Albert uses at the vineyard were those developed to be grown in cold places like Quebec and Minnesota. They are hybrids of American and European stock, though he carefully explains that they are not of the species of American grapes people call "foxy." The wine tastes more like European wines and not at all like Concord grapes.

Some of the grape varieties that are used are rather unusual. One of these is the Arctic Riesling. The grapes are very sweet and can stay on the vine into cold weather. They are harvested at 15° F, at which temperature much of the water in the grape is frozen, concentrating the sugar into what remains. The grapes are pressed while frozen, and this is used to create a sweet product called, "ice wine."

The grapes are grown using practices that are as sustainable as possible. The rows have enough room between them that a tractor can pass, pulling a special hoe that cuts weeds down an inch below ground level. This causes as little disturbance as possible to the soil and eliminates the need for herbicides.

To make the wine, the vineyard uses only traditional yeasts of the same natural species used for centuries for beer, wine, and mead. During fermentation, the natural heat of fermentation is closely controlled to produce the highest quality wine. The stainless steel fermenting tanks have cooling jackets wrapped in insulating blankets to save on electrical energy consumption.

Bottles used in the vineyard are of types chosen because they are light. This means that less glass is used, so the embodied energy is reduced. Less weight also means that shipping the bottles uses less fuel. The corks are chosen to produce the highest quality wine while being as environmentally friendly as possible. Solid cork is used for the top and bottom, with a composite for the middle section. This optimizes the use of the cork bark. The cork comes from sustainably raised cork-oak trees in Portugal, whose bark regrows and can be harvested from the same tree on a 9 year cycle through generations.

top: Shelburne Vineyard and Marquette grapes as harvest approaches. left: Dispensing the netting to protect ripening grapes from Birds. bottom: Shelburne Vineyard Tasting Room with Bar crafted from a local cherry tree, copper fixtures crafted by a Charlotte craftsman and floors formed from polished concrete infused with local stone. Courtesy Shelburne Vineyard.

Shelburne Vineyard has about 17 acres of grapes, with about 804 vines per acre. They produce 40 tons of grapes each year, for 3000 cases of wine. The wine is available at the vineyard and at selected retailers throughout Vermont and New Hampshire. The vineyard also sells products of other farms, including cider and mead.

The owners of the vineyard are proud of the support they give to the local Chittenden Emergency Food Shelf. Each year they host a benefit wine tasting for which people are invited to donate non-perishable food or cash instead of paying for wine tastings. The donations are the equivalent of 2000 to 3000 pounds of food. This year, the event is on Saturday, November 8 from 11:00 a.m. to 5:00 p.m.

The Shelburne Vineyard is in Shelburne Vermont. The number is 802-985-8222, and the website is shelburnevineyard.com.

Winter Harvest Squash for Thanksgiving

Use any winter squash that you may have grown -- such as *Delicata, Butternut, Acorn*… or this one that was our 'Mystery Squash', that appears to be a cross between Delicata and a Pumpkin. … We are calling them *Pumpinatas*.

Cut in slices, tossed with olive oil and salt. Cover and roast in a 350º oven for 40 minutes our until done. Leave cover off the last 20 minutes to brown, if desired. Yum!

Recipe and pic courtesy of Larry Gilbert.

EAT LOCAL THIS THANKSGIVING

With Thanksgiving and the holiday season on the horizon, now is the time to stock up on all of your holiday goodies. Farmstands are overflowing with goodness. Enjoy sweet fall storage veggies, crisp greens such as kale and collards, brussel sprouts, beets, and carrots. Choose from fresh and local cheeses, meats, and eggs. Many variety of apples are grown in our region - perfect for apple pies, and ice cream from local creameries.

Bring something new to your Thanksgiving table this year, such as our Winter Squash recipe on p. 20!

Your freezer may include your own frozen peas, corn, green beans, broccoli, and blueberries from this year. You can often also get frozen organic veggies at coops.

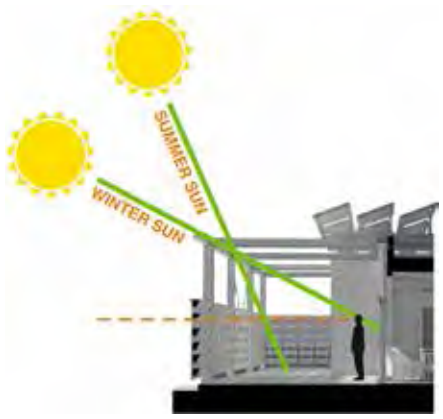
We are fortunate to live in VT where genetically modified organisms (GMOs) must now be labeled, so we can feel confident to get better foods for the holidays here. Be sure to shop local!.

There are a number of farmer's markets that still operate throughout the winter. Order a locally raised Turkey or farm-raised meats. Consider a vegan, plant-based holiday. There are many recipes and ideas on the internet to get your creative juices flowing.

And if you choose to eat out, there are many nearby restaurants that support local and organic in our region. Each issue of Green Energy Times features different places that we recommend in our *Dining …in the Green* section.

Happy Harvest Season and be sure to enjoy a healthy, happy Thanksgiving and holiday season! -- *G.E.T. Staff*

LOW ENERGY WINDOWS



In the northern hemisphere, the path of the sun is lower in winter and higher in summer. Source: urbaneden.uncc.edu

From the US Department of Energy

Before selecting new windows for your home, determine what types of windows will work best and where to improve your home's energy efficiency. It's a good idea to understand the energy performance ratings of windows so you'll know what energy performance ratings you need for your windows based on your climate and the home's design.

For labeling energy-efficient windows, ENERGY STAR® has established minimum energy performance rating criteria by climate. However, these criteria don't account for a home's design, such as window orientation.

Windows are an important element in passive solar home design, which uses solar energy at the site to provide heating, cooling, and lighting for a house. Passive solar design strategies vary by building location and regional climate, but the basic window guidelines remain the same—select, orient, and size glass to maximize solar heat gain in winter and minimize it in summer.

In heating-dominated climates, major glazing areas should generally face south to collect solar heat during the winter when the sun is low in the sky. In the summer, when the sun is high overhead, overhangs or other shading devices prevent excessive heat gain.

To be effective, south-facing windows should have a solar heat gain coefficient (SHGC) of greater than 0.6 to maximize solar heat gain during the winter, a U-factor of 0.35 or less to reduce conductive heat transfer, and a high visible transmittance (VT) for good visible light transfer. See Energy Performance Ratings[1] to learn more about these ratings.

Windows on east-, west-, and north-facing walls should be minimized while still allowing for adequate daylight. It is difficult to control heat and light through east- and west-facing windows when the sun is low in the sky, and these windows should have a low SHGC and/or be shaded. North-facing windows collect little solar heat, so they are used only for lighting. Low-emissivity (low-e) window glazing can help control solar heat gain and loss in heating climates.

In cooling climates, particularly effective strategies include preferential use of north-facing windows and generously shaded south-facing windows. Windows with low SHGCs are more effective at reducing cooling loads.

Some types of glazing help reduce solar heat gain, lowering a window's SHGC. Low-e coatings—microscopically thin, virtually invisible metal or metallic oxide layers deposited directly on the surface of glass—control heat transfer through windows with insulated glazing. Tinted glass absorbs a large fraction of incoming solar radiation through a window, reflective coatings reduce the transmission of solar radiation, and spectrally selective coatings filter out 40% to 70% of the heat normally transmitted through insulated window glass or glazing, while allowing the full amount of light to be transmitted. Except for spectrally selective, these types of glazing also lower a window's VT. See Window Types[2] to learn more about glazing, coatings, tints, and other options when selecting efficient windows.

If you're constructing a new home or doing some major remodeling, you should also take advantage of the opportunity to incorporate your window design and selection as an integral part of your whole-house design—an approach for building an energy-efficient home.

[1] bit.ly/window_ratings [2] energy.gov/energysaver/articles/window-types. For more information and links, visit energy.gov/energysaver/articles/energy-efficient-windows.

WEATHERIZATION IN NEW HAMPSHIRE
Easy and Affordable

Rebates totalling $1,758.94 will save the owners of this home in Lyman, NH $718.31 annually.

By Melissa Elander, J. Myers Builders, Inc.

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 going to www.nhsaves/save-home/, or by contacting their utility company.

J. Myers Builders, Inc., an insulating company in Lisbon, NH, has been a contractor for the Home Performance with Energy Star program since 2009. Working with the utility companies, they help reduce energy use with audits, improvements, and rebates. Here are two examples:

Jacob and Michelle own a home in Lyman, NH. The home is post-and-pier construction and is heated by a kerosene furnace and a wood stove. Jacob and Michelle enrolled in the Home Performance with Energy Star program through Public Service Company of New Hampshire.

During the initial energy audit, the blower door test in the 1,190 square foot home measured 5,541 cubic feet per minute (CFM50) of air flow. After air sealing and insulation improvements were completed, the final blower door test measured 3,800 CFM50. This is a substantial reduction in uncontrolled air leakage and heat loss in the home.

The floor of the home was under-insulated and was a large source of air infiltration. The floor was air-sealed using spray foam and insulated with dense-pack fiberglass insulation. On the interior of the home, a crawl space at the eaves had spray foam insulation installed on the underside of the roof, to insulate and prevent heat loss at the soffits. According to Jacob and Michelle, "we could tell the difference in the heating after the first day, before the crew was even finished! I think the biggest difference was the insulation under the house, specifically under the bathroom, and that attic space."

In addition to insulation in the floor system and crawl space, a low-flow showerhead was installed, six CFL light bulbs, hot-water-pipe insulation, a CO monitor and a dryer vent. With a rebate of $200, an inefficient refrigerator was replaced with an ENERGY STAR, reducing consumption from 1401 kwh/year to 652 kwh/year. "The audit was thorough and clearly explained. The best part is that they explained all the things we could do to improve the efficiency of our home, and what each renovation would entail. We were then allowed to pick and choose those improvements we felt would be best for us and also coincide with our budget."

The total project cost was $4,465.06, reduced to $1,758.94 by the rebates available through the

Home Performance with Energy Star program. The projected annual savings are one cord of wood, 77 gallons of kerosene, and 1395 kWh of electricity. This is also projected to reduce carbon dioxide emissions by 3,581 pounds per year and save the Jacob and Michelle $718.31 annually.

Kelly Smith of Lancaster, NH, enrolled her home in the Home Performance with Energy Star program through Public Service of New Hampshire. The home is heated by a propane furnace and propane fireplace. The home was very cold and electric space heaters were used to supplement the forced-hot-air heat.

J. Myers Builders, Inc. insulated the exterior walls of the home using dense-pack cellulose, as well as the floor of an overhanging floor system. The band joist (sill area) and concrete foundation walls were air sealed and insulated with spray foam insulation. A large chase in the attic that was a significant cause of heat loss was air-sealed and additional insulation was added in the attic.

The original blower door test measured 3,763 CFM50 for the 1,962 square foot home. After insulation was added and air sealing was completed in the basement, attic and around interior trim board, the final blower door measured 2,314 CFM50. The insulation work was completed in February and Kelly immediately noticed that the house felt warmer.

The showerheads were replaced with low-flow showerheads and six CFL bulbs were installed. A digital thermostat, which can more accurately detect the temperature of the room, was installed to replace the dial thermostat. The total project cost was $5,087.04, reduced to $2,085.78 by rebates. Kelly applied for the 0% interest financing through PSNH, which breaks down the $2,085.78 into monthly payments that are incorporated into her monthly electric bill. The insulation improvements are projected to save Kelly 521 gallons of propane annually, and reduce carbon dioxide emissions by 6,809 pounds.

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

Energy efficiency improvements made possible through financing incorporated into Kelly Smith's monthly electric bill are projected to save her 521 gallons of propane annually. Photos: Melissa Elander

IMPACTS OF CLIMATE CHANGE

POLICY & COMMUNITY DEVELOPMENT

Vermonters value climate change action and generally support current legislation to reduce greenhouse gas emissions 50% by 2028 and source 90% of energy from renewable sources by 2050. Closer to home, every single county in the state of Vermont announced FEMA disaster declarations in response to flooding events in 2011. This vulnerability is exacerbated by the state's mountainous, rural geography and small communities with limitations existing in transportation routes and communication systems.

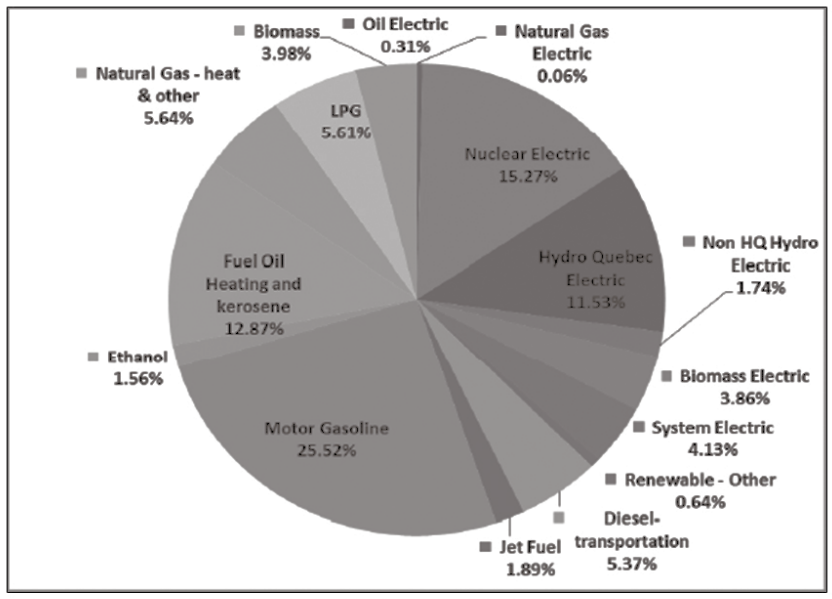


Figure 4.1 *Total energy use in Vermont, divided by fuel type. Source: Vermont Comprehensive Energy Plan, 2011.*

Total energy use in Vermont, divided by fuel type. Source: Vermont Comprehensive Energy Plan, 2011.

ENERGY

Net energy demand is expected to increase .7% annually through 2030. The increased use of air conditioning will likely outweigh the reduced energy demand for winter heating. An increase in major storm events threatens both Vermont's energy infrastructure (e.g., energy outages) and supply of fossil fuels from coastal regions. To strengthen Vermont's energy system, two things must be pursued simultaneously—the increase in use of renewable, local energy sources and gains in energy efficiency and conservation through behavioral change.

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

WATER RESOURCES

Vermont's waters and snowpack are thawing earlier as spring temperatures arrive earlier. Annual average stream flows are increasing as precipitation increases. There is an 80% increase in the likelihood of high stream flows (and flooding) in coming decades, particularly in the winter months as snow shifts to rain or freezing rain. In contrast to other New England states, Vermont rivers have sustained flow over recent decades in summer months, however, climate projections show increased potential for short-term dry spells this century.

Hemlock woolly adelgid (HWA; Adelges tsugae), a scale-like insect introduced from Japan, has attacked and caused widespread mortality of eastern hemlock trees (Tsuga canadensis) in North America. Milder winters will allow more infestation of HWA in Vermont. HWA kills trees within 6 years.

Courtesy of : vtclimate.org/vts-changing-climate

Hemlock woolly adelgid (HWA; Adelges tsugae), a scale-like insect introduced from Japan, has attacked and caused widespread mortality of eastern hemlock trees (Tsuga canadensis) in North America. Milder winters will allow more infestation of HWA in Vermont. HWA kills trees within 6 years.

FORESTS

The lengthened growing season will increase the geographic range suitable for certain Vermont tree species like oak, hickory, and red maple, but decrease suitable range for cold-tolerant species like spruce and fir. The early growing season results in earlier bud burst and flowering periods that make certain trees more susceptible to pests and pathogens. Wetter winters and extended summer dry spells will place more stress on important species such as sugar maple and red spruce that have already experienced periods of decline.

LENGTHENING GROWING SEASON

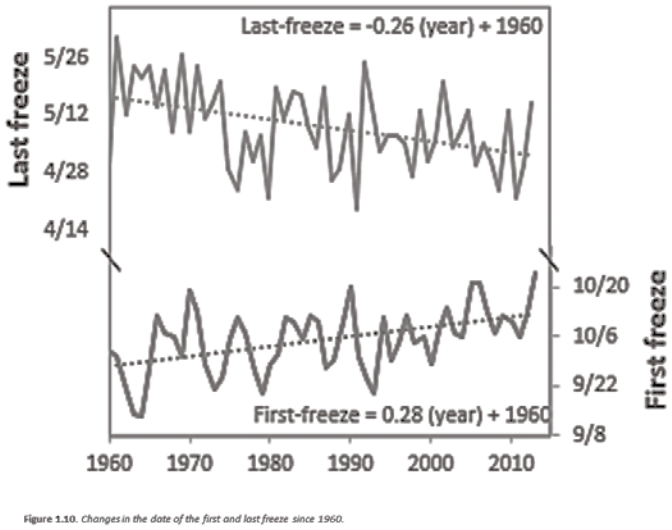
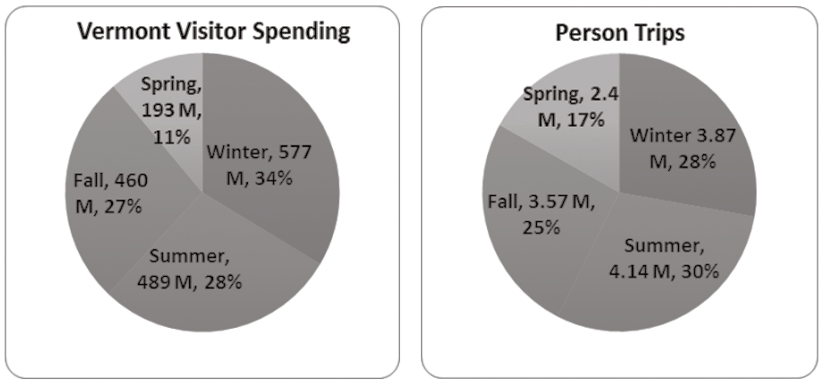


Figure 1.10. *Changes in the date of the first and last freeze since 1960.*

As the time between last and first frost lengthens, so does the growing season. Source: VCA 2014, NWS 2014

AGRICULTURE

An extended growing season will increase overall crop productivity and create new crop opportunities. Increasing CO2 in the atmosphere may enhance crop growth to some extent. Conversely, these conditions can increase weed growth, disease outbreaks, and pest infestations. For Vermont livestock operations, enhanced growing conditions could increase pasture and forage productivity although this may be offset by small decreases in livestock productivity due to summer heat stress and increasing costs of production inputs (e.g., feed, energy).



Vermont visitor spending (US$ Millions; left) and Person Trips (Millions; right) in 2011 (Chmura Economics and Analytics 2011).

RECREATION AND TOURISM

Over the next 25 years, snowfall in mountainous areas may increase with increasing winter precipitation (a climate change "sweet spot"), bringing a positive impact on winter-related recreation and tourism. Within 30-40 years, most winter precipitation will fall as rain and result in shorter-lasting snowpack and snowfall. There are opportunities to compensate for winter losses—1) more tourists are expected as the summer season lengthens and states to the south experience increased temperatures combined with higher humidity; and 2) fall recreational and tourism opportunities will lengthen with extended warmer temperatures.

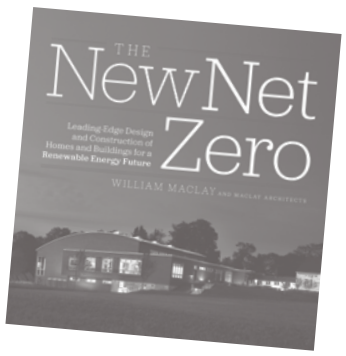
Building(s) for our Future

Book Review by N. R. Mallery

The New Net Zero

Leading-Edge Design and Construction of Homes and Buildings for a Renewable Energy Future

by William Maclay and Maclay Architects, Chelsea Green Publishing, 553 pages, $90.00



Bill Maclay's expertise as an architect for our future -- as a leader and example for the right way to build for our future -- is absolutely clear in this new book. I believe it will be held as the bible for sustainable building going forward.

We have reported on many of Maclay's energy efficient projects in the past, starting with the Putney School's Field House, in Putney, Vermont. I have seen it first-hand and can attest to the fact that this is a net-zero masterpiece. The Field House, incorporates building efficiency, energy efficiency, renewable energy (solar photovoltaics), composting toilets and ecological design, all in a healing, inviting environment.

Maclay's goals were met, and the results from the project were quickly proven successful. Green Energy Times proudly covered the story of this accomplishment and printed a copy of the building's first electric bill after the construction was completed. Don Cuerdon, the director of communications of The Putney School, excitedly shared the bill with us, to print on the front cover of the May 4, 2010 Issue, of Green Energy Times. The $69.72 credit on the invoice from Green Mountain Power evidenced the achievement of this net-zero school project.

This is the way we need to build, on every scale, small and large. This is how we reduce your energy needs. This is how we reduce the greenhouse gas emissions that are being leaked into our atmosphere, adding to the already dangerous CO2 levels we are dealing with today. This is what we need to leave for our children and future generations, as they rebuild with sustainability in mind.

In The New Net Zero, architect Bill Maclay outlines the path to energy independence for our future. Nearly 40% of our country's total fossil fuel usage is in buildings. The book enticingly explains and charts the net-zero field of study, with information on buildings that have achieved high performance and affordability goals. He explains materials, integrated design practices, including renewable energy options, practical construction details, case studies and more. Institutional buildings, commercial buildings, residential, new construction and renovations of historic buildings are all covered in detail. Considerations for air, water, insulation, vapor barriers, embodied energy, materials, costs, monitoring, and commissioning are all discussed thoroughly.

A few local examples of ecologically impressive facilities include the Renewable NRG Systems, Inc. in Hinesburg, VT, George D. Aiken Center home of The Rubenstein School of Environment and Natural Resources at the University of Vermont ,and The Coastal Maine Botanical Gardens. The UVM facility is a "living building" design that includes a solarium and an Eco-Machine™ for treating waste

The book clearly explores the building enclosure. It also covers such heating and cooling systems as air- and ground-source heat pumps that have had great success in net-zero and net-zero-ready buildings. Windows and doors, along with proper installation and sealing for new and existing buildings are discussed in detail. Building sites and orientation to maximize benefits from the sun, views, lighting and functionality are also discussed.

I found myself reading it into the wee hours of the morning, eager to learn more. It is written for both professionals and nonprofessionals, anyone eager to learn what options are available. It will be valuable to communities and individuals alike. Ideas, examples and strategies with beautifully efficient results powered by clean, renewable energy are professionally discussed on the pages.

Maclay's offices in Waitsfield, Vermont, and his home both speak well of an author who "walks the talk." He has been committed to creating a fossil-free future since 1970. This award-winning architect developed, designed and built one of the first renewable communities in the country here in Vermont. Today his architecture and planning firm specializes in ecologically oriented and net-zero design.

The New Net Zero really leaves nary a stone unturned. If there is one book that really covers how to achieve a built environment that will sustain us, this is it.

Green Energy Times highly recommends this book.

N. R. Mallery is the founder and publisher of Green Energy TImes.

Above: Stone House. Photo by Carol Stenberg. Below: Coastal Maine Botanical Gardens, GardenView. Courtesy of Robert Benson

David Blittersdorf's **View from the Top**

'Graduating' to Energy Awareness

Occasionally I have the opportunity to speak to young people about our relationship to energy. In mid-August, I had the honor of speaking at the summer commencement ceremony for Wentworth Institute of Technology in Boston — a school from which I earned an associate's degree in Mechanical Design Engineering Technology in 1977. Some of what I had to tell the graduating class might resonate with Green Energy Times readers. Here are some excerpted comments that focus on the need for our society to reevaluate the big picture of modern energy use, and also on the need to generate the will to change that picture.

"Some of you parents in the audience might remember the 1970s energy crisis. I was a teenager in the early 70's during the Arab oil embargo, the start of a rush to nuclear power and the beginning of the environmental movement. When I first got my driver's license, I waited in long lines to get gas for my car. Sometimes, I'd wait for hours only to reach the head of the line and find the gas station's tanks were empty. I realized firsthand that our modern world was entirely dependent on energy to function.

"My dad brought me to the top of a nearby mountain to see the foundations of the world's first large wind turbine to generate electricity to the grid. I got hooked — I began to dream about renewable energy. I wanted to have a career in wind power. I wanted to be part of a different energy future. The future I wanted was not one of polluting finite fossil fuels and dangerous nuclear power. I didn't know it at the time, but fossil fuels are a one-time gift, a one-time prize.

"Think about it for a second, because too often we don't take the time: we burn by the ton and by the barrel, fossil fuels that are a creation of millions of years of geological forces acting on organic matter — the plants and dinosaurs of ages ago. We are taking, at a rapid rate, what the earth spent millions of years to create. Our modern society will probably deplete these finite fossil fuels in this century, and they are not replaceable. We've left you with a terrible problem. I have to stand here today and apologize to you, our next generation, for our lack of knowledge, prudence and foresight in creating this dilemma. And now I look to you to move quickly.

"Energy is the defining issue of our times. We need to switch now to renewable energy, otherwise we will fail as a civilization. Being green is a great start, but our times call for lifestyle and policy changes on a grand scale that go beyond just recycling, or driving a Prius.

"As you make choices, here are three things you can do:

- Live near where you work.
- Stop relying on cars — walk, bike, take the bus or train.
- Know where your energy comes from, and support renewables. Join or create a large energy movement.

"Today, our world desperately needs change. We've left you a planet and an economy that is in shambles — we've robbed you of finite resources and handed you the bill. Your opportunity is to turn all that around, using your hands, your head, and your heart — your considerable talents, your ingenuity, your passions, and your education.

"So, be bold, go forth, and change the world. Make it yours."

David Blittersdorf is the President/CEO of AllEarth Renewables in Williston, VT — a company that specializes in the design and manufacture of the grid-connected AllSun Tracker solar energy system. He founded NRG Systems in Hinesburg, VT, and is the managing partner of Georgia Mountain Community Wind. The full version of David's speech may be viewed online here: https://www.youtube.com/watch?v=bC4RW0C7D48

GREEN BUILDERS

LEWIS CREEK COMPANY
& Yandow Green Builders

By George Harvey

Lewis Creek Company and Yandow Green Builders have shared a lot over the years. They have been run by longtime friends, Mark Boudreau and Tim Yandow. They have both been very much into green building for many years. They work in the same areas of New England. Now, Lewis Creek Company and Yandow Green Builders have some news about a new commonality. They have merged!

Mark Boudreau, co-founder of Lewis Creek Company says the merger was a natural evolution because the two companies occupied slightly different niches in the market. Lewis Creek has tended toward doing deep energy retrofits to make existing homes more efficient, including some historic ones two hundred years old. Yandow Green Builders has specialized more in new construction of the highest standards of sustainability and efficiency. "We fixed great old buildings that were broken," he said. "They built buildings that were outstanding right from the start."

Lewis Creek Company is assuming all of the management and operational responsibilities of both companies. They have also been able to provide positions for all staff from Yandow Green Builders. The two brands are being maintained in the marketplace. It is a really fine fit. "The transition has been both a challenge and a pleasure. It has given us the opportunity to look at our respective systems to see where we can improve to provide even better value to our clients and to our staff," says Boudreau.

New Net Zero, High Efficiency home in North Ferrisburgh VT. Photo by Chris White.

Goals will certainly include building homes with net-zero energy use. That, however, is just one goal. Another is creating beautiful, comfortable spaces to live in. Yet another is to provide customers with homes that reflect their individual visions and achieve their unique intentions.

A key to attaining these goals is to start with a clear process, engaging clients to learn about them, as individuals, and understand their desires. Boudreau says, "We listen deeply to what our clients tell us, we ask a lot of questions. This is not only to get at what kind of house they want. We want to know who they are, what is important to them, what elements of their life give them the greatest joy, purpose, and sense of meaning. A home is a powerful base from which we can grow into our lives" Great buildings start with a thorough understanding of the people the buildings are for. The designer's job is to interpret that understanding in the light of an architect's artistry and the builder's knowledge and wisdom. By combining these, a goal can be achieved of providing the customer with a building that goes beyond being merely highly efficient, or even "net-zero," to being an organically determined reflection of that person.

The client is not shut out of the process while it goes on, but is maintained within it as much as possible. "Sustainable building," Boudreau says, "requires complete transparency. The customer should always know what is happening and how it fits into their goals, and their budget." Regular consultations on costs are not merely allowed, they are encouraged by the builder.

Their level of involvement goes further, perhaps even to a level some builders would shy away from. Does the client like to be included in the action? Perhaps, does she like the feeling of swinging a hammer to drive nails that will hold her house together? Or does he get a sense of relaxed accomplishment out of sanding and painting during the final construction stages, making that home truly beautiful?

Award winning New High Performance Home in Charlotte Vermont. Photo by Tim Yandow.

Many people take pride in saying, "I had this house built." How much better they might feel if they can say "I worked on building this house myself." Lewis Creek offers just such involvement.

It is an approach to building and remodeling that Boudreau says is very holistic. Considering the people involved in the businesses, this should not be a surprise. Mark Boudreau and Lewis Creek's other co-founder Amy Judd both share a love of teaching, sharing knowledge and experience. Perhaps this is a part of the foundation of that holistic approach. Tim Yandow is a biologist by training, who sees the problem of building a home from a rather different, but entirely compatible, equally holistic point of view.

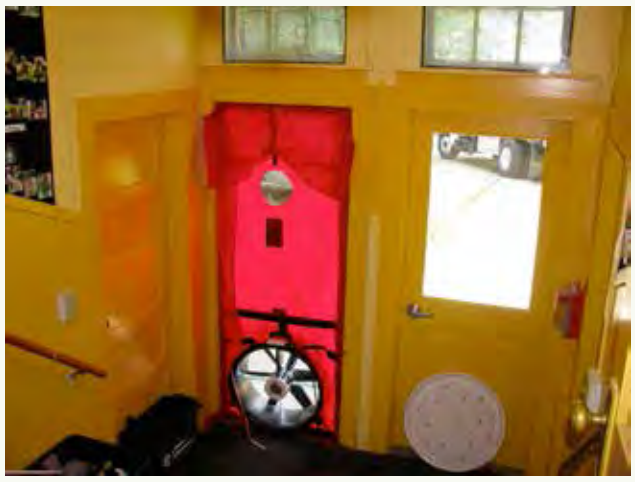
The experience of having a great home has to include a good deal more than just the experience of commissioning its construction or restoration. It includes a deep understanding of the structure, its merits, and its functionality. It includes an understanding of physical well-being, on the one hand, and economy on another. And, perhaps not even finally, it includes an appreciation of beauty.

Lewis Creek Company's website is www.lewiscreekcompany.com, and the phone number is 802-999-6942. Yandow Green Builders website is www.timyandowbuilders.com.

THE LOW-HANGING FRUIT
HEAT LOSS
-- A Series: Part III

By Mark Boudreau

What is an energy audit, why is it important and why is it the starting point for any upgrades you make?



A Blower Door Tests Air Leakage. Photos courtesy of Mark Boudreau.

Your house loses heat in a way similar to how your body does. Here is the analogy, explained.

The thick sweater you wear under your shell or windbreaker is insulation. In the nerdy building science world we call it the "thermal boundary." It traps heat near your body. Your house's thermal boundary is the insulation that you have in your walls and in your attic. Sometimes this is fiberglass, cellulose, foam, newspapers in older houses or mineral wool. Houses can have many different types of insulation in their walls depending on when they were built. Some homes have no insulation at all.

On your body, your windbreaker is the air barrier. It stops the wind from robbing the heat your body worked so hard to produce. We also call this "air- sealing" or "air leakage." Imagine your windbreaker is full of holes. It will feel drafty and uncomfortable especially where the holes are. The air barrier in your house stops the heat from passing through the thermal boundary and escaping to the outside. The windbreaker (air-sealing) in your house can be made of many materials. Sheetrock, plastic, paper, as well as some very green and high tech air barriers that allow water vapor to pass through but very little air to escape. When we do audits we regularly find MANY holes in the air barrier in a home. This holds true for historic 200 year old homes as well as brand new homes.

What the Audit Does

The energy audit identifies how well the house's "sweater" is working and how many holes the house's windbreaker has in it. It also evaluates the efficiency of your heating and cooling systems, electrical efficiencies, indoor air quality, ventilation as well as moisture and mold issues.

The audit locates the areas that need improvement and gives you a way forward toward a better performing and less costly "winter coat."

The audit is the starting point for making any informed decisions regarding home performance and energy efficiency. The audit takes a holistic approach to looking at your houses efficiency. It is the point at which we collect all the related data the house has to offer and synthesize it into a format that helps us identify the ways that the various pieces of the house are working together or are creating problems for the house and you. With it we can develop a complete and comprehensive picture of how it can be improved. We can predict how adding something or taking something away will have a ripple effect through the whole system of your house.

We look at every assembly of the house from the basement to the attic. We look at windows, obscure assemblies and things called "thermal bypasses" that you might not expect would be sources of heat loss. These are areas such as house connections with chimneys, porches and garages. Based on this list of observations we come up with recommendations on improvements.

The audit starts with a site visit that lasts for up to six hours and is completed after another several hours of energy modeling and report-writing in the office. It also includes infrared imaging on the house which will help us pinpoint specific areas of the house where heat loss and air leakage is happening. At our company we provide a very detailed report discussing how the house is currently operating, what measures could be undertaken and how much they would likely cost. Most Building Performance Institute-certified auditors provide these reports.

Testing a Heating System's safety and efficiency.

After the audit you will have the information you need to take the next step with heating systems, insulation and any other items that might be on your audit report. The audit should include some energy modeling that shows you how each change you make will have an impact on the performance of your house as well as predict cost savings from that measure. In essence we can show which improvements are going to be the "lowest hanging fruit" in terms of maximizing the return on your investment. The modeling is a key component in helping you focus your resources on the biggest impacts in improving the efficiency of your home.

Some states have special incentive programs which pay you incentives for making energy improvements. In Vermont, Efficiency Vermont administers many of these programs via partner contractors who are specially certified and vetted to perform these audits. Check with your state to see what yours has to offer in terms of financial incentives.

Audits generally cost between $200 and $500 depending on the auditor and the thoroughness of their examination. Some auditors offer the audit for free if you hire them for your work. Those generally have a cost structure that factors the cost of their time to do the audit in their quotation for their weatherization work.

A key point. Don't

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DOE ZERO ENERGY READY HOME CASE STUDY

NEAR ZERO MAINE HOME

Vassalboro, Maine

Source: Energy.gov, Office of Energy Efficiency & Renewable Energy. Photos courtesy of Thomas Fullam

On a recent consulting project, Fullam showed the homeowner how the energy-efficiency measures he suggested would only add $4,000 to the cost of building his new home, compared to one built to local code. Except that the home no longer needed a boiler and a chimney, which costs about $13,000 installed, so the super-efficient home was actually projected to cost $9,000 less than a home built to code. "When my client saw this, he said 'I'm building it your way,'" said Fullam.

BUILDER PROFILE
Thomas Fullam, Vassalboro, Maine
tfullam@roadrunner.com.
207-266-4436
www.nearzeromaine.com

FEATURED HOME/DEVELOPMENT:
Project Data:

- Name: Near Zero Maine II
- Location: Vassalboro, Maine
- Layout: 2 bedrooms, 2 baths, 1 floor
- Conditioned Space: 1,200 ft2
- Completion: October 2013
- Climate Zone: IECC 6A Cold Climate
- Category: Affordable

Modeled Performance Data:

- HERS Index without PV: 35
- HERS Index with PV: 11
- Builders added cost over 2006 IECC: $4,800
- Projected total annual energy cost savings (compared to a similar house built to the 2006 IECC): without PV $1,533, with PV $2,587
- Projected annual utility costs: without PV $1,054, with PV $320
- Annual PV production revenue: $734
- Annual energy savings: without PV 15,218 kWh, with PV 19,536 kWh; 393 gallons of oil
- Annual PV production: projected 4,204 kWh, actual 5,400 kWh

"It can't be done." Those words were enough to motivate Tom Fullam of Vassalboro, Maine, to build his first high-performance house, which earned him a 2011 silver Energy Value Housing Award from the National Association of Home Builders Research Center. It was soon followed by a second, even higher performing house, the first home in Maine to meet the requirements of the U.S. Department of Energy's DOE Zero Energy Ready Home certification.

Fullam, a building science educator and construction consultant, had been running load calculations to determine sizes for heating systems and started wondering "what would it take to build a house so efficient you wouldn't need a boiler?" This is a big question in a state where 70% of homes have oil boilers - a higher share than any other state in the union.

Fullam plugged in some aggressive insulation and glazing values and got a 1,500 ft2 home in his central Maine climate, with a projected heating load of under 10,000 BTUs. Since this is in the International Energy Conservation Code's (IECC) zone 6, none of his local builder friends believed it was even possible. So Fullam decided to build one.

The first home, started in 2008, was a 1,250-ft2 single-story home with an enclosed porch and unheated basement. It achieved a HERS of 38 before photovoltaic (PV) panels were installed on the roof; this is compared to standard construction of HERS 100. His home had double-wall construction with 8.5 inches of dense packed cellulose and 3.5 inches of fiberglass batt in the wall cavity, for an insulation value of R-40, and blown cellulose covered the ceiling deck to a settled depth of 18 inches for an R value of R-60. These far exceeded local practice of R-19 for walls and R-30 for ceilings. Triple-pane windows provided an insulation value of R-6, where R-2 to R-4 is common. A solar water heating system provided for radiant floor heat and domestic hot water. Fullam also added 2.9 kW of PVs on the roof, bringing the HERS down to about 15.

Fullam wanted to do better by showing he could make the costs of such buildings comparable to code-minimum construction. "Maine has the oldest housing stock, oldest population, and highest heating oil dependency in the nation," he said. "My goal is to reach the $170-180,000, turnkey market for older people on a fixed income. They want a house that is two bedrooms and two baths, with a garage. I want it to be high-efficiency, high-quality construction, fully handicapped accessible, and low cost."

He built a second home with a HERS score of 35 without PVs, or 11 with them, based on projected PV production. It turned out the home's 3.9-kW photovoltaic system produced a surplus of 1,100 kWh the first year, meaning the home a true net-zero energy building.

Blower door tests for whole house air leakage were conducted on both homes. A typical older home in Maine might have air leakage of 12 to 30 or more air changes per hour at ACH 50 (50 Pascals of pressure). ENERGY STAR for Homes (Version 3) and DOE Zero Energy Ready Home require air leakage rates of less than or equal to 4.0 and 2.0 ACH 50, respectively, in IECC climate zones 5 through 7. Fullam's first home tested at 1.25 ACH 50, and the second home tested at 0.49 ACH 50. This is below

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One minisplit heat pump provides all of the heating and cooling the 1,200-ft2 home needs. A heat recovery ventilator (HRV) provides needed ventilation for the super-air-tight home. The HRV and its ducts are installed above a second ceiling in the utility closet, keeping the HRV in conditioned space and leaving the primary ceiling air barrier intact. The HRV brings in fresh air, which is warmed by the heat exchanger, then further warmed as it enters the living space near the heat pump. Stale air is drawn from return vents in the bedrooms and baths, which help pull the conditioned air through the home.

WALL CONSTRUCTION SEQUENCE

1. Install outer wall.
2. Install ceiling joists and foam block.
3. Install vertical batts in outer wall.
4. Tack horizontal batts to outer wall studs.
5. Tape wall vapor barrier to ceiling joists & foam.
6. Attach top plate of inner wall to ceiling joists with vapor barrier laid over top plate and draped to floor.
7. Lay bottom plate over bottom end of vapor barrier. Pull barrier taut and tape to floor slab. Screw bottom plate to slab.
8. Construct inner wall of studs and 2nd top and bottom plates. Install between 1st top and bottom plates.
9. Tape top and bottom plate-barrier joints.
10. Attach ceiling vapor barrier with tape (no staples) to joint tape.
11. Install foam floor pad and tape to floorwall joint tape.

even the super-airtight 0.6 ACH 50 requirement of the Passive Haus program. Fullam attributes the incredibly low air leakage rates to the floor-to-ceiling air barrier layer he incorporated in the double-wall shell used in both homes. Following guidance published by Building America research partner Building Science Corporation for cold climates, he installed a polyethylene fiber vapor barrier on the outside face of the inner wall using tape so there were no air holes from staples. This vapor barrier, connected to the ceiling and floor vapor barriers, completes a continuous air barrier for the entire building envelope (see figure and sidebar for construction sequence). All wiring went through the inner wall and plumbing went through the slab to avoid holes in the air /vapor barrier. (Note vapor barriers are not recommended in the mixed or hot climates.)

Fullam chose mineral wool to

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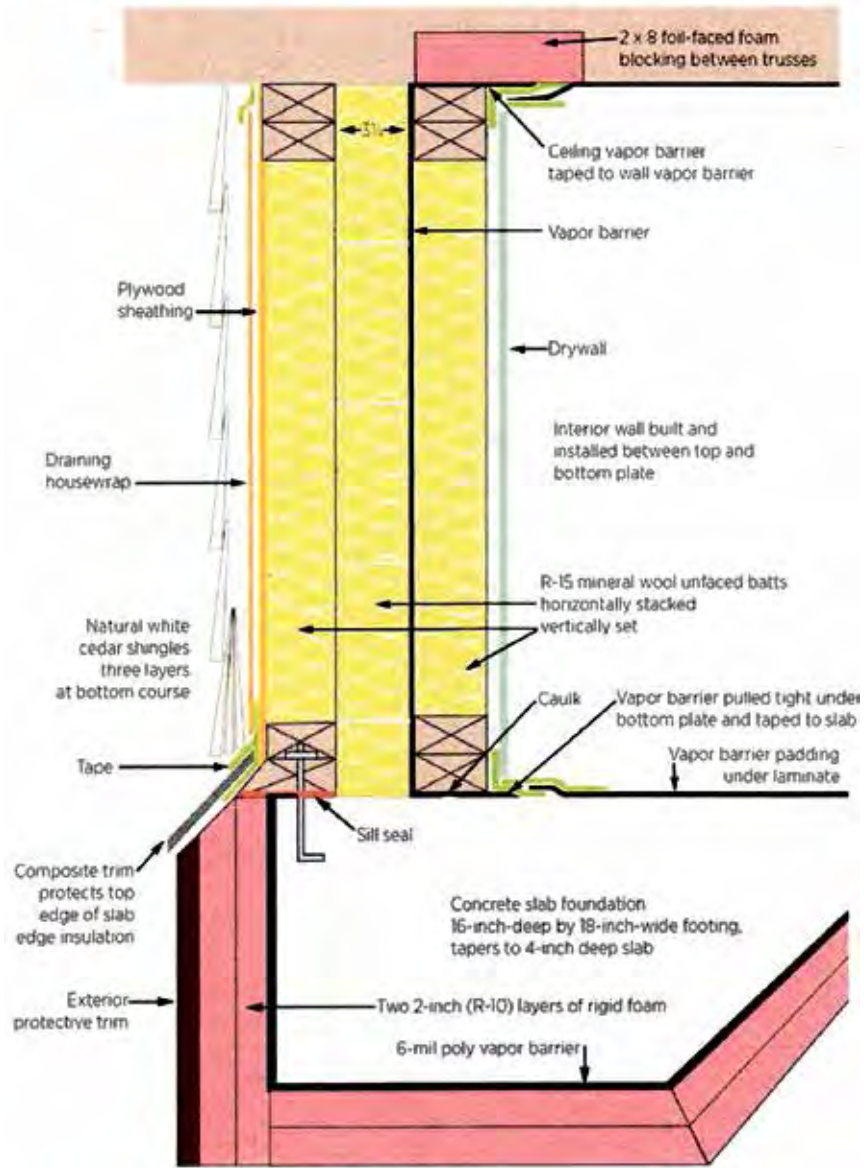


Coming in December:
'Deep Energy Retrofit' by Michael Goetink of Snowdog Construction, Ltd.

ELMORE ROOTS'

Permaculture Tips

EXOTICS!

By David Fried

Unique fruits you CAN grow in the northeast!

Northern kiwi fruits. Photos courtesy of David Fried

So you always wanted to grow unique and unusual delicious fruits in the north, but didn't know if you could? Here is an introduction to what we can grow all over the northeast. Like early pioneers, adventurous growers have been testing all kinds of fruits and berries with very promising results. We have been seeing and tasting northern kiwis, quince, seaberries, bush cherries, haskaps and paw paws. What fun!

The kiwis are in long clusters and ready to eat when slightly soft. Plant a male and a female of the same species (of which there are many). You will need a strong arbor or pergola as they wrap around it and grow a lot of vine up it. They need well drained earth, half- to full-day sun and about 10 to 20 feet in between plants. The larger the plant you start with, the better it will do and you could be eating northern kiwis in about three to five years!

We could not grow quince successfully for years, but someone brought some back from Russia and they have fruited in Elmore now for two years in a row. You can eat them out of hand or make into sauce or jelly. They are self- fruitful (do not need a pollinator), but if you plant more than one, space them about 15 to 20 feet apart. They fit in nicely with other fruit trees and need sun and well drained earth.

Seaberries are all the rage right now. You can grow your own orange juice in northern Vermont! The large bushes have thorns and can take most soils and like sun. Plant about eight feet apart. They make berries quickly. Some people will cut a branch of berries and strip them off later, rather than trying to pick the berries among the thorns. They reportedly grow back with a lot of fast new growth. The fruit is very tart and you will want to mix the juice with apples or sweetener to your optimum tartness preference.

The joy bush cherry does not get very tall (about six feet), yet it makes full size sour cherries. It makes them in September, when birds think cherry season is long over (usually July), so they don't seem to bother the fruit. The bushes have a nice graceful shape with pink and white flowers in the spring. They are self-fruitful and need sun, good air flow around them and well-drained soil.

Haskaps have been grown in Japan and Alberta, Canada for quite some time. Some refer to them as honeyberries, but I don't believe in hype, and they do not taste at all like honey. They are very easy to grow, preferring well drained soil and sun. They usually grow to about three to five feet tall, so it is easy to find a place in the landscape for them. They are in the honeysuckle family, flower early, but are not invasive. The fruit ripens in early summer and is the first fruit for songbirds flying back from the south. Cedar waxwings sometimes cover our bushes and give us a rock concert as they rock back and forth on these fine bushes. You need two different varieties to make fruit. The half- inch long berries look like stretched oval shaped dark blueberries, with a subtler flavor.

Haskaps are the1st fruit of the season

I ate my first paw paw this week. A fellow grower heard I had never had one and had his friend send some up from Pennsylvania. Wow! The flavor is somewhere between the best plum you ever had, fresh jackfruit, and tapioca pudding. We ate some sliced and some with a spoon. The world will never be the same. We have been growing paw paw trees for about six years. Our largest are about seven feet tall. I saw some with fruit in Bristol,Vermont. You need to plant them in well-drained soil in partial shade. The leaves are huge and it is worth it to grow just for the exoticness of the way these small trees look! The paw paw is one of the only truly American fruits, native to the east coast. They are worth a try in your most protected spot.

Elmore Roots Nursery has been growing these exotics for years in northern Vermont, so chances are , you can too…

David Fried owns Elmore Roots Fruit and Nut Nursery, located in Elmore, Vermont, for 34 years. fruitpal@elmoreroots.com.

Paw paw leaves and fruit. is one of the only truly American fruits, native to the east coast.

KEEP YOUR COMPOST (BIN) WORKING...

Does composting STOP in the winter?

By Clare Innes

Fall. When it comes to naming this cool, crisp season, that word says it all, doesn't it? The red line in the thermometer gets lower and lower. Apples drop from the trees. Leaves swirl to the ground. It's a time of transition everywhere - including your compost pile!

That's right - compost happens all year long, even in the depths of winter. Sure, it slows way down, but if you keep those hard-working microbes happy, you'll be that much closer to having black gold next year.

Here's how to set yourself up so you can keep making compost at home all winter long.

1. Make 7 billion new friends. Grab a handful of compost. Give it a smell - it should offer a rich, heady aroma of growth potential. Take a squint at it. In that one handful, there are more microbes than there are people on the planet - and there are 7 billion of us humans! Consider what it took to get there: the right mixture of food, air, water, critters, and time.

2. Consider those billions of hard-working microbes your pets. Here's a refresher on what keeps those critters happy.

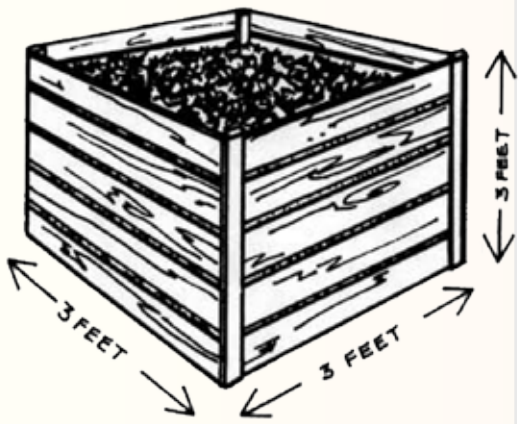
Air and water: Just like you and me and your pets, they need the right amount of air and water to live. A compost pile should be about the consistency of a wrung-out sponge. Not too wet, but not too dry, either. Make sure your bin has plenty of ways for air and water to enter. Keep a pitchfork or stick of some kind by your bin. As often as you can remember, stick it in the pile and wiggle it back and forth to open up new channels for air and water to get in to different places in the pile.

Food: They need the right mixture of nitrogen (food and green plant matter) and carbon (dry, brown leaves, straw, hay, sawdust, paper towels, etc.). Whenever you dump a pail of fresh food scraps (nitrogen) into your bin, be sure you add at least as much (and a little more, if possible) dry, brown leaves (carbon) on top. This ensures that they'll have the mixture they need and the dry, leafy layer on top helps keep aromas down.

3. Check out your bin. Do you need to shore up the sides? Is it just about full? Then maybe it's time to let it cook and start a new bin nearby. Find plans for building a compost bin, from a three-section Taj Majal to a simple structure made with wired-together shipping pallets, at the Green Mountain Compost website.

Find out more about what is compostable and how to keep right on composting all winter long at www.GreenMountainCompost.com<http://www.GreenMountainCompost.com>, or give the compost gurus a call at 802-660-4949.

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



A wooden box bin can be built inexpensively using pallets or lumber to make a nicer looking bin.

Winter Composting Tips

- Have enough dry/brown material all year round: During leaf-raking season, fill a couple of garbage cans with dry leaves, wood shavings, or small chips, then close the lid tight and keep them by your compost bin. Throughout the winter, you'll have a ready supply of carbon on hand to cover your latest contribution to your compost pile.
- To make sure your pile has a good amount of helpful microbes, save a bucket of finished compost or soil from your yard. Each time you add your food scraps, toss in a handful or two of microbe-rich soil or compost. Cover it all with the leaves or sawdust (see above). Don't worry if your food scraps look like a frozen mass during the coldest part of winter. Down in the center of the pile, there's usually still enough activity to keep things going, ready to burst forth again during the occasional thaw or in spring.

Want more tips on keeping food scraps out of the landfill? Compost at home, school, work, and at your events, conferences, and parties! Find out how easy it is to compost at cswd.net/composting.

Harvest Your Seeds

By Sylvia Davatz

Containers of seeds drying in the living room

Photos courtesy of Sylvia Davatz

Flats of pepper, bean, and salsify seeds

The gardening season is drawing to a close, and by now the downstairs living space of any self-respecting seed saver is carpeted with flats and dishes of drying seeds awaiting final cleaning, sorting, labeling, and storing, so full of promise for the coming season.

All seeds need to be dried down after harvest to eliminate excess moisture that might cause molding during storage. Larger seeds will require more time, but a good rule of thumb is at least two weeks for all seeds, out of direct sunlight, in a well-ventilated spot. Keep seeds with similar appearance separate in order to prevent contamination from "jumps."

Once the seeds are dry you can test germination. Beans and other large seeds can be counted and spaced evenly in a flat of potting mix. Smaller seeds can be sprinkled over the surface. Or you can fold the seeds into a damp paper towel tucked in a plastic bag. Check daily. Calculate your germination rate based on the number of seeds that sprout.

Store seeds in a cool, dark, dry spot. Either paper envelopes, glass jars, or small Ziplocs work well. Be very sure to label the packets carefully with the exact name of the variety, year of harvest, and, ideally, your original seed source.

For more advanced seed savers, this is a good time to begin planning your rotations for next season. If you grew any cross-pollinating varieties, you'll need to research isolation methods and distances or decide which varieties need growing out for fresh seed. Pay attention to the plant population size you'll need for optimal genetic diversity. Isolation needs and population size requirements vary among

Packed and labeled seeds ready for storage

crops. For instance, if you are maintaining two pepper varieties you'll want to separate them by at least 300 feet in the garden. If space is tight, grow only one variety per year. You'll need six to twelve healthy plants from which to harvest seed.

Keep accurate records, designing a system that lets you capture the information you are most interested in collecting. Planting dates, harvest dates, yield sizes, weather data, observations about pollinators or plant characteristics such as disease resistance, hardiness, or flavor are all possibilities.

Then stoke the woodstove, pull up a chair, and hone your skills by reading one of the best books to come out recently on seed saving in the home garden: The Manual of Seed Saving, by Andrea Heistinger.

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.

EMERGING FRONTIERS IN BIOENERGY
SUNFLOWERS CROPS
An Emerging Source of Renewable Energy

By Rachel Carter

Sunflowers are grown on several Vermont farms and then harvested for their oilseeds, which are then converted to biodiesel and livestock feed. Sunflower or oilseed biodiesel helps farmers lower fuel and feed costs, explore feed and fertilizer co-products, be more self-sufficient, and rely less on fossil fuels.

State Line Biofuel Farm in Shaftsbury and Ekolott Farm in Newbury are growing a combined 30 acres of sunflowers for Green Mountain Power. Once the sunflowers wilt this fall, they will be harvested, dried, and pressed. The raw oil will be converted into biodiesel, or B100 and the nutrient-rich meal is then fed to farm animals. The fuel will be used in Green Mountain Power's vehicle fleet and to help heat buildings. Depending on the crops' success, the cost of fuel to Green Mountain Power could be up to one dollar less than current B100 prices.

"Projects like this really help support Vermont farmers, plus it's beautiful to see the fields of sunflowers and even more beautiful to realize it will provide a clean and local power source," says John Williamson of State Line Farm Biofuels.

Over the years, State Line Biofuel Farm and Ekolott Farm have been working closely with UVM Extension for technical research, analysis, and support, and the Vermont Bioenergy Initiative for infrastructure development to increase their energy self-sufficiency and develop financially sustainable oilseed-to-biodiesel processing business models.

"Several pioneering farmers in Vermont now have the necessary infrastructure to produce sustainable biodiesel," notes Chris Callahan, UVM Extension Agricultural Engineer. "This is a unique model: local production for local use. The partnership with Green Mountain Power means more gallons will be made which means lower cost for everyone."

Green Mountain Power President and CEO Mary Powell states, "the goal is for local biodiesel production to both shave fuel costs for our customers while helping to develop new markets for locally produced liquid fuels. We see this benefitting local farms and customers as we work together to provide more clean cost-effective and reliable power."

The Vermont Bioenergy Initiative partners with UVM Extension to support research, technical assistance, and infrastructure development in emerging areas of bioenergy and coordinates with the Vermont Farm to Plate Initiative to support energy crops grown alongside food production.

More information at www.VermontBioenergy.com.

Rachel Carter is the Communications Director at Vermont Sustainable Jobs Fund.

State Line Biofuel Farm in Shaftsbury, VT and Ekolott Farm in Newbury, VT are growing a combined 30 acres of sunflowers for Green Mountain Power. Photo courtesy of Vermont Sustainable Jobs Fund.

NEAR ZERO MAINE HOME

cont'd from p. 29

insulate the walls of the second home because of its higher R value and resistance to fire, moisture, and pests. The attic floor was covered with R-70 (26 inches settled to 20 in.) of blown cellulose. He used advanced framing techniques like two-stud corners and insulated headers. He pre-drilled the inner wall studs with a hole at 24 in. from the bottom plate to run wiring.

After wiring was installed in exterior walls and before any interior partition walls were built, the entire ceiling and perimeter walls were sheet rocked. This provided a complete fire break and a second unbroken air barrier. "There is no waste when you do this," said Fullam. "The sheet rockers can come in with the largest sheets they can handle (4'x14') and there is little to cut around so it goes up fast."

Wiring for ceiling fixtures ran up through exterior walls to the attic. Fullam put the attic access on the outside wall on a gable end of the house then ran an 18-inch-wide gangplank on top of the insulation from the attic access door to the other end of the house. Any wiring routed through the attic went to junction boxes labeled by room name and fixed to a board running along the trusses within easy reach of the gangplank. "Electricians love it," said Fullam.

The home's only heat source, a ductless mini-split heat pump, is well suited to the home's low 6,600-BTU winter heating load. Solar thermal water heating panels provide 77% of the home's hot water needs. To reduce hot water consumption, Fullam installed low-flow plumbing fixtures and designed a compact plumbing layout where all hot water fixtures are within 10 feet of the tank and hot water is distributed through a central manifold with direct PEX tubing from the tank to each faucet.

Fullam estimated the second home cost about $4,800 more to build than a home built to the 2006 IECC, including purchase and installation of the PV and solar water heating systems. The HERS rater projected annual energy cost savings of $2,587, for a total projected annual utility bill of $320 when the PV production was included. However, as noted earlier, the PV has actually been performing better than projected and Fullam saw PV production revenue of $734 for the first year based on utility credits for the surplus power.

The exterior wall's center layer of mineral wool batt extends between the inner and outer wall framing to stop thermal bridging at the windows. The vapor barrier (a translucent mesh fabric) covers the outer face of the inner wall and is wrapped around the framing and taped to the inside face of the inner wall with a rugged air sealing tape. A plywood and drywall box is constructed to line the window opening after the triplepane windows are installed. This drywall and plywood box is less expensive than solid wood, has less cracks in the corners from expansion and contraction, and fits into a preformed pocket in the window frame to form an airtight seal around the window.

Fullam is recommending DOE Zero Energy Ready Home to all clients. BThe building's history and the third-party verification that is a mandatory part of DOE Zero Energy Ready Home proves "that it can be done."

BURR AND BURTON ACADEMY'S HILL CAMPUS

MOUNTAIN CAMPUS BOASTS SUSTAINABILITY

MANCHESTER, VERMONT

By George Harvey

Burr and Burton Academy is an independent coeducational secondary in the Manchester, Vermont area. Most of the school's 700 students are from towns in the Manchester area. Founded in 1829, Burr and Burton has a long history. Today, it has a very diverse range of academic courses. The facility is on three campuses, of which the Upper Campus has the original school buildings. The Lower Campus has many more modern buildings devoted primarily to athletics and arts.

The Mountain Campus came last, and is by far the smallest, but in some ways it is extremely interesting. The school has been using it for the past two years as part of a special program in sustainability. It is not so much a place where students learn from teachers as a place that is itself a teacher.

A goal of the instruction is to have the students focus on a question, "What does it mean to live well in this place?" The building is intentionally a model for how to live sustainably, a model of our environment. The building provides two classrooms along with multiuse spaces, dining, and cooking areas for about 30 students in the tenth through twelfth grades. The program taught at the campus is a single semester long and is considered to be challenging.

The energy-efficient Burr and Burton Academy's Mountain Campus boasts sustainability. Designed and built by Bensonwood, Walpole, NH. Photos from: burrburton.org

While maintaining basic courses, the curriculum at the Mountain Campus curriculum is integrated in such a way that the building, its features, and the environment around it are all part of what is to be learned. The students are instilled with a sense of the possible. The result is hoped to be that the whole experience makes those who attend classes in the building effective agents of positive change.

This is not merely a theoretical education. The students do much of the work needed to maintain the building. This includes such physical work as cutting and splitting firewood. It also includes tracking use of electric, water, and cordwood resources. The building is heated with a masonry heater and a single heat pump, but between the efficiencies of those and the building itself, the students probably get more understanding of how little needs to be done, rather than how much, for heating. Although it is 4000 square feet and has high ceilings, it has taken only two cords of wood to take it through the winter.

One of the important aspects of the education at the Mountain Campus is the food. The very few students who work and study there also eat there. The food they eat is prepared there. The waste is also composted there, and the students take part in that operation as a learning experience.

The mountain campus interior and masonry heater, which was built by Peter Moore.

The Mountain Campus was designed to support a challenging one-semester academic program for 10th, 11th and 12th grade students focusing on community, sustainability and place. The Academy building is highly insulated and features locally-sourced finishes.

In September, 2013, Bensonwood received an Award for Merit from Engineering News-Record of New England for the design and construction of the Mountain Campus.

Burr and Burton Academy's Mountain Campus in Peru was awarded the prestigious Leadership in Energy and Environmental Design (LEED) Platinum certification, recognizing best-in-class building strategies and practices, awarded by the U.S. Green Building Council.

The Mountain Campus was built by Bensonwood, of Walpole, New Hampshire. Like all Bensonwood buildings, it was built in pieces inside a factory, where the temperature and humidity are closely controlled. In this way, wood can be crafted with precision equipment and fitted into modules that are dimensionally stable. The modules are then moved to the construction site and joined together with the least possible impact on the local environment.

The Mountain Campus, like most other Bensonwood buildings, was individually designed by architects. The insulation, windows, orientation, roof overhangs, and all other design elements were specified with the intention of creating a beautiful building that was very energy-efficient and would be long-lasting. The materials in the building are locally sourced. The Mountain Campus was specifically designed to take advantage of the unique features of its location. The windows are not only large resources for passive solar heating, they are windows to an environment that is worth watching and studying.

Clearly, this is a different kind of educational experience, for which we can congratulate Burr and Burton Academy. Likewise, Bensonwood has provided a different kind of classroom building, for which they, too, deserve much praise.

Learn more about Bensonwood at 877.203.3562 or www.bensonwood.com.

IDLE-FREE SCHOOLS

Idling awareness will be raised in the school community to reduce greenhouse gas emissions, conserve energy, and protect student health.

Vermont Idle-Free Schools will work with various educators, as well as other stakeholders in the school community, to conduct 60 idling awareness and green driving classroom sessions for approximately 800 students from 5th grade through high school.

Project resources and materials include the Vermont Idle-Free Schools webpages, toolkit, information handouts, and no idling signs.

The school project's goal is to make a difference in the Vermont school community by reducing greenhouse gas emissions, conserving energy, protecting student health, saving money annually, complying with Vermont no-idling laws, and raising student (and adult) awareness.

The High Meadows Fund awarded Idle-Free VT a $17,500 grant to implement Vermont Idle-Free Schools for the 2014-15 school-yr. Wayne Michaud, Idle-Free VT's director, is coordinating the project. Idle-Free VT is raising awareness of unnecessary vehicle idling in the school community to educate students in being fuel efficient, environmentally responsible drivers, and seeking to increase the number of Vermont schools with official no-idling guidelines to help promote healthy school environments.

Just one driver reducing idling for five minutes a day for the next 15 years could cut CO2 emissions by more than two tons and avoid burning 225 gallons of fuel. Parents and other drivers avoiding idling at schools will protect students, in particular, from respiratory diseases like asthma. Children breathe at a significantly faster rate than adults, plus their lower height makes them more vulnerable to toxic exhaust chemicals from ground level tailpipe emissions. Vermont's prohibited idling of motor vehicles law limits the idling of all vehicles to five minutes in any 60-minute period. Students will learn to be idle-free from the start\ and, potentially, pass it on to their parents, too.

Learn more at idlefreevt.org/vermont-idle-free-schools.

VERMONT IDLE-FREE SCHOOLS

GREENEST SCHOOL LIST
PLYMOUTH STATE UNIVERSITY

Sierra Club Names Plymouth State One of America's Greenest Schools

PSU students are involved in numerous environmental awareness and advocacy activities, including reducing the use of plastic water bottles on campus. Studies show 86% of water bottles sold in the US are not recycled, and are either incinerated or end up in landfills.

Plymouth, N.H. – Plymouth State University's environmental sustainability efforts are catching the attention of the country's largest environmental advocacy group. The Sierra Club has named PSU to its list of America's Greenest Schools. According to the Sierra Club, the rankings are based on "an extensive questionnaire that asks about everything from where a campus gets its energy to whether its landscapers use native plants and its cafeterias offer recycled napkins." Brian Eisenhauer, PSU's Director of Environmental Sustainability, said he's proud of the institution's efforts in being "green."

"In my experience the greatest asset we have at PSU is the depth of commitment to sustainability that exists in our students, staff, and faculty, and perhaps just as importantly, in our community," Eisenhauer said. "PSU's efforts to be more sustainable involve students and community partners directly in what we do; we have ideas from students and classes directly affect our operations, and I think our willingness to listen and learn from each other as a community has everything to do with our successes."

Eisenhauer noted the Sierra Club's list of environmentally sustainable schools considered a large amount of data.

"One reason the Sierra Green Schools list is so meaningful is the comprehensive nature of their analyses, which involves a great deal of information about campus operations, curricular efforts, and co-curricular activities," he said. "At Plymouth State University we like to say that 'green is more than our school color,' and to that end we have made efforts to integrate sustainability not just in academic classes, but across our operations and thinking. It is this depth of commitment and the many, many ways it takes shape at PSU that have led to this recognition as one of the institutions of higher education playing a leadership role in addressing sustainability issues."

Eisenhauer added that PSU places a high priority on creating an awareness of sustainability issues for each student.

"An important part of our sustainability goals at PSU is to ensure that all of our students become aware of sustainability through their education and co-curricular experiences, and see the importance and value of including sustainability as a factor in the personal and professional decision-making. As result of these efforts we have a very environmentally-aware student body at PSU, and we continue to be pushed by them to pursue excellence in our sustainability efforts."

Founded by legendary conservationist John Muir in 1892, the Sierra Club is now the nation's largest and most influential grassroots environmental organization, with more than two million members and supporters.

For more information: Bruce Lyndes, PSU News Services Mgr., (603) 535-2775 blyndes@plymouth.edu

NASHUA, NH STUDENT HONORED
SOLVING GLOBAL WATER CRISES
NH STUDENT WINS AWARD

White House Council on Environmental Quality Acting Chair Michael Boots, former President's Environmental Youth Award (PEYA) winner and current EPA intern Apoorva Rangan, Administrator Gina McCarthy, new PEYA winner May Wang, new PEYA award winner Deepika Kurup, and White House Office of Science and Technology Policy Director John Holdren before the PEYA awards ceremony. Photo: Flickr.

BOSTON – A 15-year old student from Nashua N.H. was a recently awarded a "President's Environmental Youth Award" (PEYA), given jointly by the White House Council on Environmental Quality and EPA.

The Nashua student, Deepika Kurup, developed a green and sustainable method to purify water. Her project also increased the awareness of children and the general public in her community of how clean and safe water is an indispensable natural resource.

The winning project was a light-weight photocatalytic composite that harnesses solar energy for water purification. Ms. Kurup developed a simple, fast and cost effective methodology where a composite degrades organics in water, and rapidly inactivates bacteria in sunlight, visible light or in the dark. Her project also developed several different prototypes for real world applications. She has filed a patent and plans to deploy her invention in places around the world that are affected by water pollution.

"I am inspired to see such creative and promising work coming from one of New England's younger citizens. The solutions to our environmental concerns need to come from all directions. Ms. Kurup's innovative work, and that of the other PEYA winners, bodes well for a cleaner and healthier environment in the future," said Curt Spalding, regional administrator of EPA's New England office.

"I have been passionate about solving the global water crisis since I was in elementary school, as I was exposed to the water problem at a very early age," commented Deepika Kurup. "I believe that environmental education is very important, and I am very honored to be the EPA Region 1 recipient of the 2014 President's Environmental Youth Award. The recognition ceremony held at the White House was an amazing experience, and I was delighted to introduce EPA Administrator Gina McCarthy!"

The President's Environmental Youth Award program recognizes outstanding student leaders in environmental stewardship. In a ceremony at the White House, 60 students from nine states across the nation were honored for their contributions to environmental stewardship. At the same ceremony, 17 teachers were also recognized for outstanding efforts to implement environmental education in their schools and communities.

More information on the 2014 PEYA winners: http://www2.epa.gov/education/presidents-environmental-youth-award-peya-winners

The President's Environmental Youth Award Winners include a student from NH

Deepika Kurup is a 2013-2014 National Winner selected by the Environmental Protection Agency from region 1, in New Hampshire.

Deepika developed a green and sustainable method to purify water. She increased public and youth awareness of what an indispensable natural resource clean and safe water is to all.

After much research, Deepika created a novel lightweight photocatalytic composite that harnesses solar energy for water purification. Deepika has filed a patent application for her invention and plans to deploy her invention in places around the world that are affected by water pollution.

Deepika has won several regional, state, and national competitions for her invention. She also has been recognized by national and international media.

** STEM is an acronym referring to the academic disciplines of science, technology, engineering, and mathematics.*

Source: http://www2.epa.gov/education/presidents-environmental-youth-award-peya-winners

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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Call in your ad info or e-mail ad copy to: INFOGREENENERGYTIMES.ORG. Deadline for Dec. 15th Issue: Nov. 30th. Up to 50 words: $25. Each additn'l word 65¢. Call for more info: 802.439.6675.

AD SALES POSITIONS FOR G.E.T.

for VT, NH & MA. Experience preferred. Must be self-disciplined and familiar with Green Energy TImes - passionate about solution for the planet is better. Must have great communication skills and be self-motivated. Work from home - for the sake of the planet. Send cover letter and resume to info@greenenergytimes.org.

BUTTON UP WORKSHOP RYE, NH

Wednesday, November 19, 2014. 6:00-7:30pm. Location: Rye Public Library, 581 Washington Rd., Rye, NH. Host: Rye Energy Committee. Sponsors: North Hampton Energy Committee, New Castle Energy Committee, and Rye Public Library. Contact: Zak Brohinsky at PAREI: 603-536-5030. Registration: www.buttonuprye.eventbrite.com

LAKES REGION ENERGY FAIR SAT., OCT. 18

Set aside the morning of Oct. 18 for the Lakes Region Energy Fair. This free event features 15 presentations, vendor tables, and door prizes. At Inter-Lakes High School in Meredith, 9:30 - 2:00. See you there! Click Here for more information.

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Schletter Ground Mount PV System: 4 Galvanised Steel Poles 13 ft. long, 4 Aluminum Girders with Struts - no rails. 4 Head Mast with ss steel bolts & nuts. Fits 24 255W PV Panels, 2 rows x 12 (40 ft long, can split for 2 20 ft rack). Info:802 727 4879. ntenergy&gmail.com

PREOWNED R.E. EQUIPMENT FOR SALE

Fronius IG 237.5VDC in, 240VAC out, grid inverter: $1200. Pellet Stove: $1000. SCI TX-12 transfer switch: $20. Two Shell 165W PV modules: $250 each or both for $400. Sunnyside Solar Store, Rt.9, W. Brattleboro, VT. 802-376-3838

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GUIDE TO ADVERTISERS:

Ingredient of the Month

By Larry Plesant

MOLECULAR ZEN: SECRETS REVEALED!

I've been thinking a lot about Molecular Zen this month, which is, of course, the underlying theme of this column and the basis of my personal world view. And thus, in the tradition of pop science writers everywhere, I must reveal at least one great truth about the universe per article using a paucity of verbiage. So before your rectangle beeps you yet again with an instant message, here it tis:

The crux of the Molecular Zen biscuit is to practice NOT viewing the world-at-large as a bundle of separate objects we find ourselves wandering around in (practicing Wholeness Perception).

Notice that I said "practice." Buddha knew that all of us are practicing at being ourselves every day. Optimistically we are practicing being the best selves we can be right now. Like everything else in life the more you practice something you more you get out of it and presumably the better you become at it. Practicing not being self-obsessed is ALWAYS a good idea.

Practicing NOT viewing the world-at-large as a bundle of separate objects means (logically) keeping to the forefront of one's thinking the "ones-ness" of it all.

Keeping to the forefront the ones-ness of it all means understanding that the Universe has an operating system that is increasingly discernable over time (by practicing Wholeness Perception). Seeing the system of life and interlocking existence as an ocean - rather than a mishmash of waves and currents helps us to understand the basic principles of how life and stuff are put together and behave here at home base.

You see, Nature does not reinvent itself every time it creates something new. Rather it borrows heavily from everything that came before, building off of the previous models. The point is this:

The basic laws and working systems that operate on every level, from atomic system to ecosystem to solar system -- all apply equally to human existence and behavior. The distribution of warm water into cooler water is no different from the dissemination of new ideas into a society. The colonizing behavior of penicillin mold on bread is incredibly similar to the colonization of "virgin" land by humans.

Humans are passionate; and so are molecules. They hook up, long or short term and form new families with new properties when they "mate" with other molecules. Every law of Newtonian physics and biology can and is applied to human construction and human behavior.

We arose out of the Universe, are made of its stuff, and follow the same principles in our short existence as does the rest of the mess.

Simple! Molecular Zen rules. Now back to practicing…practice, practice……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.

Concerns About Essential Oils

by Roddy Scheer and Doug Moss

Essential oils are more popular than ever for medicinal and therapeutic purposes as well as in fragrances and flavorings for food and drinks. Typically produced by harvesting and distilling large amounts of various types of plant matter, essential oils are in many cases all-natural and can take the place of synthetic chemicals in many consumer applications. But some wonder whether our fascination with essential oils is so good for the planet, now that their popularity has turned them into big business.

"It often takes hundreds of pounds of plant material to make one pound of essential oil," reported aromatherapist and author Mindy Green of GreenScentsations.com. She adds that it takes 50 to 60 pounds of eucalyptus to produce one pound of eucalyptus oil, 200 to 250 pounds of lavender for one pound of lavender oil, 2,000 pounds of cypress for a pound of cypress oil and as many as 10,000 pounds of rose blossoms for one pound of rose oil. Production of these source crops takes place all over the world and is often organized by large multinational corporations with little regard for local economies or ecosystems.

"Growing the substantial quantities of plant material needed to produce essential oils results in a monoculture style of farming, with large swaths of land dedicated to a single species," said Green. "These systems are most efficiently managed by intense mechanization, and irrigation is frequently used for optimal oil production of the plants."

"As global citizens we have not learned how to equitably distribute vital resources like food, and water resources are trending toward a crisis of the future," added Green, "so there are deep ethical concerns about devoting croplands to essential oils destined for use in candles, bath oils, perfumes, or lavish massage and spa purposes." Green also warned that many essential oils are not produced from sustainable sources. "Some species are at risk, particularly those occupying marginal habitats such as dwindling tropical forests," she reported, adding that the poverty-stricken in developing countries will harvest and sell whatever they can, in order to put food on their own tables.

Cropwatch, a non-profit that keeps tabs on the natural aromatics industry, maintains a list of wild species threatened by the fast-growing essential oil trade. Of particular concern are essential oils derived from rosewood, sandalwood, amyris, thyme, cedarwood, jatamansi, gentian, wormwood and cinnamon, among others, as they may well be derived from threatened and illegally harvested wild plant stocks.

Some wonder whether our fascination with essential oils is so good for the planet, given that it can take hundreds if not thousands of pounds of plant material to make just one pound of an oil. Pictured: A lavender field at the Norfolk Lavender farm and nursery and distillery in Heacham, Norfolk, England. Photo: Mary Hillary

Also, some essential oils must be treated as hazardous if spilled and should be kept out of sewers and local waterways. Mountain Rose Herbs, a leading retailer of essential oils, reports that if its tea tree oil spills, it should be absorbed with inert material and sealed in a container before disposal at a hazardous waste collection site. Such information is included on the company's material safety data sheet for every essential oil and includes information about flammability and chemical composition. Consumers would be well served to check the MSDS for any essential oils they might like—Mountain Rose will supply them to customers by request—to make sure they are using (and disposing of) them correctly.

Contacts: Green Scentsations, www.greenscentsations.com, Cropwatch, www.cropwatch.org, Mountain Rose Herbs, www.mountainroseherbs.com.

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The LOW-HANGING FRUIT

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skip the energy audit. You can add insulation to your house but not fix the leaks and actually end up causing problems. You can seal all the leaks and also end up causing problems with how the house is ventilated. Consult with a qualified professional before you decide to take on do-it-yourself work. It is easy work and it is also easy to get off track. Some measures if not done properly can lead to mold and rot issues that wouldn't have been present prior to the work. Start with an audit and understand how the various pieces work together in the ecosystem that is your home.

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.

left: Air-sealing in the attic.
right: Foam Insulation above and Cellulose insulation below.

The Great Snowgun ROUNDUP

By Roger Lohr

This summer Vermont ski resorts are investing nearly $15 million to upgrade their snowmaking equipment, thanks in part to an innovative rebate offer from Efficiency Vermont. Efficiency Vermont's Great Snow Gun Roundup supports the purchase of approximately 2,300 new low-energy snow guns for the upcoming season, and in return the resorts will donate 1,800 older model snow guns to scrap. The snow gun exchange program is expected to help the state's ski industry reduce carbon emissions and save $2 million a year in energy costs.

Jim Merriam, executive director of Efficiency Vermont, said he hopes to replace 3,000 older snow guns with ones that are 85 to 90 percent more efficient. Funding for the program comes from the surcharge utility customers in the state pay to support Efficiency Vermont. While some may balk at having to subsidize snowmaking upgrades for private ski resorts, Merriam said the energy savings will benefit everyone, since we all share the same power grid.

Efficiency Vermont said they counted 3,000 to 3,300 older-technology guns at the beginning of the summer, and about 1,800 to 2,000 of those have been scrapped. The estimated annual energy savings from this swap is equivalent to saving enough electricity to supply approximately 1,500 homes for one full year, and to save enough diesel to heat 340 homes annually.

Rikert Nordic Center in Ripton, VT. Photo: Rikert Nordic Center

These new guns are not only saving lots of energy for resorts, which will allow them to rely on less power and result in lower emissions, but they will also create better quality snow surfaces and enable resorts to blow snow at higher temperatures, extending the ski season for winter revelers everywhere.

"An industry-wide upgrade in snowmaking efficiency of this magnitude has never been seen before," said Parker Riehle, Vermont Ski Areas Association President. "We are very proud of our partnership with Efficiency Vermont and that our resorts are leading the way in switching to low energy technology." To help ski areas determine the efficient snow guns that would best meet their needs, Efficiency Vermont engineers conducted side-by-side testing of fifteen different models, tracking data on their air, water, energy consumption, and overall performance. Modern, energy-efficient snow guns require up to 85% less energy to operate than older snow gun models, and the new snow guns being installed this year represent the most advanced available.

Efficiency Vermont has also pledged to donate proceeds from the scrapped metal of old snow guns to Ski Vermont's Learn to Turn program, which encourages people to embrace winter and try skiing through Learn to Ski month, the Fifth Grade Passport, and Bring a Friend challenge.

Top: Snow guns at Bolton Valley Resort, Vermont. Photo courtesy of Bolton Valley Resort. Bottom: Sugarbush Resort, Vermont. Photo courtesy of Jeb Wallace-Brodeur for Sugarbush Resort.

Follow the progress of Vermont's Great Snow Gun Roundup via #VTSnowUpgrade. Ski Vermont (Vermont Ski Areas Association) serves its 20 alpine and 31 nordic member resorts in three major areas: Governmental Affairs, Marketing and Public Affairs.

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

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

DINING ... IN THE GREEN
THE COMMON MAN

By George Harvey

When he was a young man, Alex Ray had an unusual set of interests. They included his chosen profession, the hospitality business. They also included a love of old buildings of many kinds. In addition, he was interested in the environment, efficiency, and sustainability. Finally, we might also mention that he really loved New Hampshire.

That was about 1971. Now, all these years later, he has not given up any of those interests. In fact he has blended them. He has spent those years opening restaurants in many New Hampshire communities, each in a very special old building.

His interests are nothing if not democratic. The buildings he is works with are not the typical sort of quaint farmhouse that can be made into a high-priced bed and breakfast. Instead, he has focused on salvaging such things as abandoned mills. In some cases, when the building was right but the location was not, he went to the trouble of having old buildings moved.

Alex Ray now has sixteen restaurants and three inns. They are all in New Hampshire, and he has no interest in opening one anywhere else. Somewhat unsurprisingly given his interests, seven of his restaurants and two of his inns are called "The Common Man."

We might focus on one enterprise in particular. It is The Common Man Inn in Plymouth, New Hampshire. Originally, the building was an abandoned wood mill. It had, in its heyday, manufactured tongue depressors, popsicle sticks, and paint stirrers. Photos of it show stacks of logs that would be reduced to small slivers of wood to be sold, used, and disposed of. The building itself had fallen into disrepair, but Ray and his team saw its potential.

Note the 750 s.f. of solarhot water units on the roof

The 60,000 square-foot mill was transformed into an inn with 37 overnight rooms, two event halls, a spa, and a salon. The mill's old boiler room became a three-storey-tall restaurant and lounge named in honor of its original function, "Foster's Boiler Room."

The renewable energy features of the inn are impressive. As much as practically possible, natural resources are used for energy. On the roof, there is a 750-square-foot solar thermal system, which supplies much of the hot water for the spa, the restaurant, and the guest rooms.

Heat for the facility comes from a pellet boiler, with the pellets coming from New England resources to keep energy used in transportation down. The inn's swimming pool in particular uses a lot of heat. Additional heat is required to heat some

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QUEEN CITY POPS

QUEEN CITY POPS

Green Energy Times staff

Sarah Carson claims she was raised on a diet of chocolate and ice pops. Whether we take this as hyperbole or not, one thing is certain – she has made herself expert on the things she loves.

Seeking more knowledge and experience, she studied with an accomplished chocolatier in Michigan, and then she started experimenting at home to perfect the flavors she wanted. Her ingredients were organic and natural, and her standards were high. She persisted in the experimentation for three years.

In 2014, she brought her work to the public with a new business, Queen City Pops. Sarah brought to market products proudly calls decadent. To get an idea of what they are like, you might best imagine a frozen chocolate truffle on a stick. If you really want to know what they are like, you will have to try one for yourself. They are available at some local stores and catered events.

Queen City Pops has more to interest us than their products, however. The pops are sold from two solar-powered freezer carts at the Burlington Farmers Market, a Friday night food truck gathering, and a waterfront location overlooking Lake Champlain. Sarah's husband is an engineer, and devised the apparatus used to charge the carts. The whole operation has people talking.

Local people are not the only ones who have noticed. In September, Queen City Pops was able to announce that it had been named a finalist in Martha Stewart Living's "American Made" awards competition, which honors makers, craftspeople, small-business owners and innovators across the United States. The "American Made" program celebrates 10 rising stars from four areas including food, design, crafts and style. Winners will be announced on October 17 and will be honored guests at a celebratory event in New York City on November 7-8.

We should mention that Queen City Pops is not the only Vermont company to be a finalist in the "American Made" awards competition. Fortuna's Sausage is also in the running. We wish them both the best.

THE COMMON MAN

Cont'd from p. 36

parts of the facility, particularly the maintenance ship. It comes from an oil burner, but the oil is bio-diesel, rather than fossil fuel. The biodiesel itself is recycled frying oil from the kitchen, and it is also used to power the inn's delivery truck.

Both water and lighting systems are designed for efficiency. Water fixtures are low-flow to conserve. Lighting fixtures are fluorescent, but are being replaced with LEDs in many places.

Apart from energy use, sustainability is still an important feature of the inn's operation. Paper products used at the inn for napkins, menus, and pizza boxes are from recycled fiber. Both staff and guests are encouraged to recycle whatever they can, including aluminum, plastic, and glass. Guests are given the option of reusing linens and towels so the laundering can be kept to a minimum.

The food served at the inn is sourced to local farmers wherever possible. This keeps transportation energy to a minimum, but it also helps to ensure freshness, which guests can appreciate.

Perhaps the newest sustainable feature of the inn is a plug-in station for electric vehicles where guests can recharge their EVs. This was installed last winter. It has a J1772 connector type and is available on a 24-hour basis.

The phone number of the Plymouth Common Man Inn is 603-536-2200. The website of The Common Man Inn, covering facilities in both Plymouth and Claremont, is at www.thecmaninn.com. A general website for the family of all Common Man inns, restaurants, and diners is at www.thecman.com.

Lacto-fermentation

By Jessica Barber Goldblatt

In this issue's "Green Shots" and its organic homemaking tips I want to bring it into the kitchen and talk about the art of lacto-fermentation: The work goes faster than water-bath or pressure canning. The process (and storage) can be done with zero energy usage.

Lacto-fermentation has been used for centuries as a means to preserve food. Lacto-fermented foods are fermented by lactobacillus bacteria, which is a category of beneficial bacteria that feeds on sugar and that produces lactic acid as a byproduct. Just about any vegetables and even fruits can be lacto-fermented and many wonderful spice combinations can be used.

General guidelines for lacto-fermentation

At its basis, most lacto-fermented foods are whole, chopped, sliced or grated vegetables placed in a brine of salt and water for a period of time at room temperature and let to the beneficial bacteria develop. The important thing is that the vegetables should stay submerged to prevent mold from forming. The lactobacillus bacterium is a facultative anaerobic type, and doesn't need oxygen for energy production. If you decide to chop, slice or grate your vegetables, you should add salt as you place the cut vegetables in your chosen fermentation vessel and pound everything heavily with your fists or a potato masher to break up the vegetables, release their juices and to eliminate any pocket of air that may form. When using whole vegetables, as with sour pickles, you'll simply place them in your vessel and submerge them with a brine.

For the fermentation vessel. You'll want to choose a large ceramic crock or glass jar where you can fit a cap or plate on top, keeping weight on the vegetables and keep them under the brine at all times. The salt will keep on extracting water from the vegetables several hours after you put them in the fermentation vessel, but you should verify that the liquid covers your vegetables the following day and add water if that's not the case. Sometimes mold can form on the surface after some time in the form of a white film, but it's usually not a problem, and you should remove it as best you can.

The fermentation time will vary on a lot of factors: temperature, starter used, quantity of salt, nature of the vegetable or fruit. The best way to go about it when trying original combinations is to taste it along the process and to go with the taste as the best indicator. When it tastes acidic enough for your liking, it's ready to be enjoyed. Taste it after three days, then taste it three days later and so on. The finished product will keep for months when stored in the refrigerator.

When trying this at home: please take more time to research the process and recipes on the internet and via some wonderful books on the subject like.

Wild Fermentation: The Flavor, Nutrition, and Craft of Live-Culture Foods by Sandor Ellix Katz

Nourishing Traditions: The Cookbook that Challenges Politically Correct Nutrition and the Diet Dictocrats by Sally Fallon

Jessica Goldblatt Barber is the owner of Interiors Green -- the Home and Living Store at 2021 Main Street in Bethlehem, NH.

Simple Sauerkraut

Sauerkraut originates in Germany and consists of lacto-fermented cabbage. A few trivial facts: Explorer James Cook was well known to bring vitamin C-rich sauerkraut in his travels to prevent the men from suffering from scurvy. During World War I American companies renamed sauerkraut "liberty cabbage," a bit like today's "freedom fries."

Ingredients

- Four or five heads of read or green cabbage, shredded;
- 1/4 cup sea salt;

Preparation

- Place the shredded cabbage little by little in your fermentation jar, pounding them vigorously and sprinkling some of the sea salt as you go.
- Make sure the mixture fills the jar up to one inch below the top (because of the expansion), adding more if needed, and that the extracted water covers the vegetables entirely. If not, create a brine of two tablespoons sea salt to four cups water and add it to the cabbage.
- Press the vegetables and keep them under the brine by placing a plate or a lid on top weighted down by a rock or a jug of water. Cover with a clean towel if needed to keep out fruit flies.
- Place the fermentation jar in a warm spot in your kitchen and allow the sauerkraut to ferment for seven to 10 days.
- Check on it from time to time to be sure that the brine covers the vegetables and to remove any mold that may form on the surface.

A good way to know when it's ready is to taste it during the fermentation process and move it to the refrigerator when you're satisfied with the taste.

Green Tips

HARVESTING GRATEFULNESS

By Deborah DeMoulpied

Just when some voices were asserting that climate change had lost its relevance, over 400,000 people marched in the largest climate-change event in history. New York City hosted the People's Climate March which brought the discussion of global warming back to the front burner it should never have left.

Nicely timed to precede the United Nations Climate Summit, the march was the perfect opening act for the UN. It appears to have worked as media are actually covering the largest gathering of heads of state for climate change, at least more than usual and though a little late. Polls show that more Americans than ever accept that climate change is real, that it is significantly human-caused, and that it should be a priority for us all.

It seems the countries have finally stopped the finger-pointing and may actually be holding hands to confront the coming consequences of our follies. This is a global problem for which each person is part of the cause. We need global solutions to which every one of us can contribute. Fortunately, leaders are beginning to act serious.

The trends we can see in recent human history have brought about some terrible surprises, and we must live with the effects. Now that we know better, our future actions must be thoughtful of the outcome, not focused on the present. (Human evolution of foresight is a bit lacking.) While it could be easy to dwell on what could have been, should have been, and was not done, this is the time of year to appreciate the harvest with gratitude for what of good was planted. So here my list of thoughts for thanksgiving:

1 – Be grateful for all the enthusiastic people who joined The People's Climate March and made an impact the world (and media) could not ignore.

2 – Be grateful for the leaders who are reaching out with both hands and are willing to come to the table, and take serious action.

3 – Be grateful to the scientists' endless work and devotion.

4 – Be grateful for all the activists who have been working for decades to better the environment.

5 – Be grateful for the headway that has been made – energy efficiency, green building, renewable energy, land conservation, the "local" movement, and consumer consciousness.

6 – Be grateful for all involved - from the business that cares to the child who carefully recycles – for their dedication to the earth and all its inhabitants.

We can add up, we do add up and we will add up to make change.

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.

SILVER LAKE

Courtesy of Peter Huntoon, from 'A Day in Vermont' collection -- celebrating the beauty of Vermont through art. More of his art is in Peter's free weekly email newsletter at www.ADayinVermont.com.

Silver Lake is a 45-minute hike above Lake Dunmore in the Moosalamoo National Recreation Area in Vermont.

For outdoor enthusiasts of all levels and for all seasons, it's a treasure in the heart of the Green Mountain National Forest. Hiiking, biking, wildlife and bird watching, cross/back-country skiing opportunities, snowshoeing, and more. Spectacular scenery with expansive mountain vistas, waterfalls, and secluded lakes and streams. Retrace the footsteps of Robert Frost, whose last summer home on the northern edge of the area.

For more info send message to: contact.moosalamoo@gmail.com.

Swimming in E-waste

By Roddy Scheer and Doug Moss

With electronic equipment and gadgets the fastest growing waste stream in many countries, how to deal with so-called "e-waste" may in fact be one of the most pressing environmental problems of the 21st century. According to BCC Research, consumers around the world purchased 238.5 million TVs, 444.4 million computers and tablets and a whopping 1.75 billion mobile phones in 2012 alone. Most of us discard such items within three years of purchase, and this is driving the global growth in e-waste by some eight percent a year. Meanwhile, a recent study conducted by researchers from the Massachusetts Institute of Technology on behalf of the United Nations found that the growth in demand for and manufacturing of new electronics will result in a 33% increase in e-waste globally between 2012 and 2017.

But why is e-waste any more of a problem than old fashioned garbage? "Some of the materials in personal electronics, such as lead, mercury and cadmium, are hazardous and can release dangerous toxins into our air and water when burned or deposited in landfills improperly," reports the non-profit Natural Resources Defense Council. "And throwing away metal components, like the copper, gold, silver and palladium in cell phones and other electronics, leads to needless mining for new metals."

Today some 80% of unwanted electronics are disposed of improperly. "E-waste is either discarded or exported to emerging nations, where open-air burning and acid baths are used to reclaim precious metals and other elements," reports Maureen O'Donnell in EHS Journal. The lack of proper controls in such countries, she says, has led to elevated lead levels in children and heavy metals pollution of soil and water. As a result, she adds, "we now stand at the forefront of a growing environmental catastrophe."

The good news is that many nations have enacted new laws to hold manufacturers responsible for the future e-waste created by their products. The European Union has led the way with its Waste Electrical and Electronic Equipment (WEEE) Directive, which calls on electronics makers to take back their products for recycling when consumers upgrade to something new, and restricts European countries from exporting or importing e-waste. Japan and China are among other countries that have passed similar laws.

The U.S. government has yet to follow suit, but the Electronics Takeback Coalition (ETC) reports that 21 U.S. states have implemented their own 'take back' laws, and several other states are considering similar legislation. Meanwhile, environmentalists continue to pressure Congress to consider similar legislation at the national level, given especially that Americans are the world leaders in generating e-waste.

Additionally, many manufacturers are adopting voluntary e-waste recycling certification standards. One is the e-Stewards program, which helps those looking to dispose of obsolete electronics identify recycling options that adhere to high standards of environmental responsibility and worker protection. Another program, R2 Certification, run by the nonprofit SERI, is supported by several large manufacturers, including DirecTV and Microsoft. Consumers can do their parts by choosing manufacturers that embrace so-called "producer-pays" electronics recycling through participation in one of these programs.

According to BCC Research, in 2012 alone consumers around the world purchased 238.5 million televisions, 444.4 million computers and tablets and a whopping 1.75 billion mobile phones. Most of us discard such items within three years of purchase. Photo: Matthijs Rouw, courtesy Flickr

Contacts: ETC, www.electronicstakeback.com; e-Stewards, www.e-stewards.org; SERI, www.sustainableelectronics.org; WEEE, http://ec.europa.eu/environment/waste/weee/legis_en.htm;

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