ISSUE 34 OCTOBER - DECEMBER 2015

FREE!

6 YEARS!

SUSTAINABLE SOLUTIONS FOR VT, NH, MA, NY and Beyond

green energy times

Energy Independence, Energy Efficiency, Sustainable Living and MORE!

www.greenenergytimes.org | 802.439.6675

Coming Soon To a College Near You

The R.W. Hitchcock Center Is Doing It Right!

By George Harvey

In our last issue, Green Energy Times had an article on the Hampshire College's R. W. Kern Center, which is being built in Amherst, Massachusetts, by Wright Builders with a view to meeting the standards of the Living Building Challenge (LBC). Here, we discuss the Hitchcock Center for the Environment, which is being built to the same high standards, also by Wright Builders, and also in Amherst.

LBC standards are so high that they were thought impossible to achieve by some people when they were first published. According to the International Living Future Institute (ILFI), which administers the LBC, there have been only twenty-five structures certified under the standard, worldwide, since the LBC program began, ten years ago. Considering that, Wright Builders' work on two structures in Amherst, both attempting to meet those standards, can be seen as remarkable.

The Hitchcock Center, however, is very remarkable for reasons of its own. In fact Eric Corey Freed, Vice President of ILFI, made it clear that it stands out as one of his favorite projects. He explained, "I love the Hitchcock Center because it stands as a testimony to what an educational center can be."

The Hitchcock Center for the Environment was founded in 1962 by Ethel Dubois, a retired guidance counselor. She was inspired by the works of Rachel Carson to foster environmental awareness among children. The center teaches five principles: understanding principles of ecology, valuing place, promoting resilience, demonstrating resilience in the built environment, and educating for active citizenship.

When the Hitchcock Center found it needed to expand to a new building, it was clear from the start that it should have net

cont'd on p.27

The approach to the new Hitchcock Center. Credit: designLAB Architects.

SOLAR CAPITAL OF THE NORTHEAST!

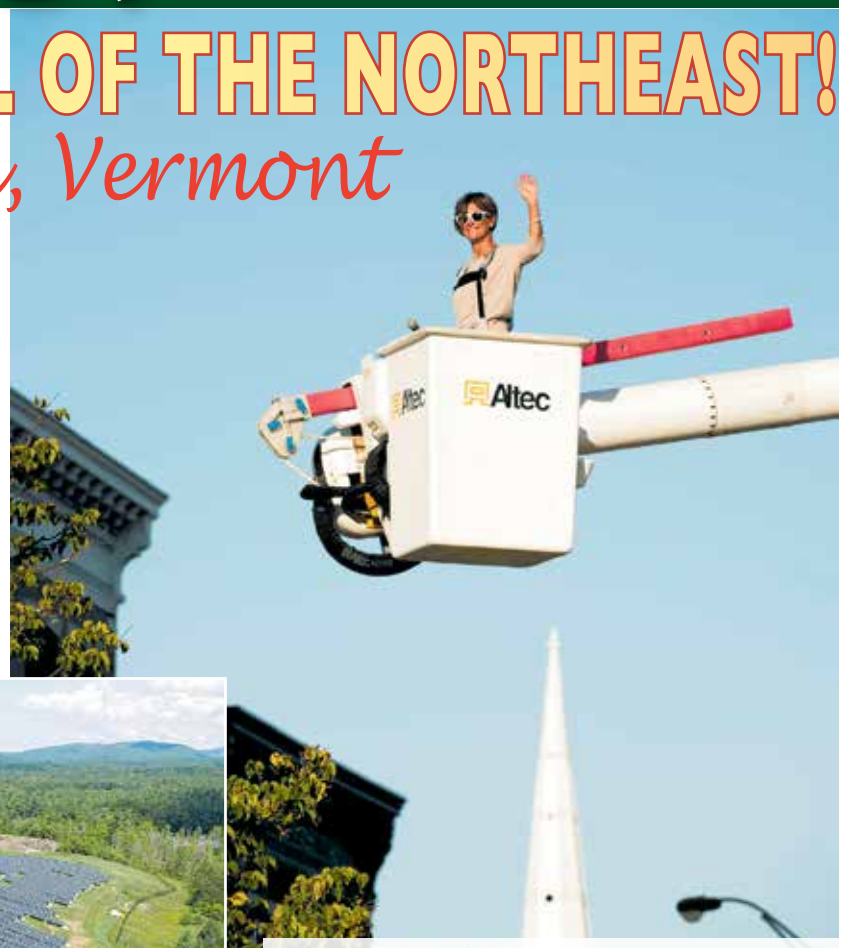
Rutland, Vermont

By George Harvey

On September 15, Green Mountain Power CEO Mary Powell, Vermont Congressman Peter Welch, Governor Peter Shumlin, Rutland Mayor Chris Louras, and others gathered to announce that Rutland, Vermont, is the Solar Capital of New England. What they mean by this is that there is significantly more solar power generated in Rutland, per capita, that in any other city in the northeast.

The effort to achieve the goal has been underway since it was announced, in 2013. The target was to reach 7,000 kilowatts (kW) of solar photovoltaics (PVs) installed. That goal was surpassed, however. The total capacity of PVs installed to date was 7,870 kW. Perhaps more important in its implications is the fact that the original goal, for the installation to be

cont'd on p. 9



Above: Mary Powell dancing in a GMP utility bucket to "Walking on Sunshine," the theme song for the solar capital. Photo credit GMP. Left: Aerial view of Rutland's largest solar project, Stafford Hill Solar Farm. Photo credit Eric Hudiburg (www.erichudiburg.com)

Renewable Energy in NH at Crossroads

By Kate Epsen, NH Sustainable Energy Association

New Hampshire is at a crossroads and our growing renewable energy economy hangs in the balance. A critical tool to enable renewable energy and solar energy in particular, known as net metering, is at risk of hitting its statewide cap and thereby halting our ability to generate onsite renewable energy for our homes, businesses and towns.

Net energy metering is a critical tool to enable people, towns, and businesses across our state to generate their own electricity and get fairly compensated for the extra electricity they export into the grid. This is why nearly every state in the US offers net metering and the US Energy Policy Act of 2005 required utilities to offer net metering to customers on request.

But in New Hampshire, only 50 megawatts — all of one to two percent — of total generation are allowed to net meter, as set by state statute. That limit was set well before many other states demonstrated that high levels of solar and other distributed renewable energy can be accommodated on the grid.

New Hampshire's 50 megawatts are shared among the electric distribution utilities, with Eversource receiving the greatest share, but still only 36 MW for its entire service territory that covers most of the state. Unitil only allows about 6 MW and Liberty about 4 MW (the NH Electric Coop has its own net metering regime and no longer has a cap).

The net metering cap has been reached in towns throughout New Hampshire – residents, businesses, and municipalities who want to net meter are being turned away. Liberty Utilities hit their share of the 50 MW cap in July, and no longer is allowing customers to net meter. Eversource, our state's largest utility, could hit their cap any day.

NH needs to raise its cap immediately in order to prevent massive job loss and renewable energy market disruption, and loss of control over energy

cont'd on p. 3

This is Phat!

See page 36!

IN THIS ISSUE:

GREEN ENERGY TIMES (G.E.T.)

1749 Wright's Mountain Road • Bradford, VT 05033
t/f: 802.439.6675 • info@greenenergytimes.org

G.E.T.'s COMMUNICATIONS TEAM:

Publisher/Editor/Production ..... Nancy Rae Mallery
General Factotum ..... George Harvey
Copy Editor ..... Ray Brewster
Coordinating Director ..... Michelle Harrison
Web Editors ..... George Harvey, Michelle Harrison
Design/Layout ..... Nancy Rae Mallery, P.J. Fischer
Printing Valley News Lebanon, NH Using 100% Recycled Newsprint & Smudge-Free Environmentally Safe Inks*

Advertising: .. Nancy Rae Mallery, Bradford, VT **802.439.6675**
nancy@greenenergytimes.org
..... **Michelle Harrison,** Londonderry, NH **603.437.0167**
michelle@greenenergytimes.org
..... **Danielle Turo,** Danville, VT **802.424.1482**
dany@greenenergytimes.org
..... **Hope O'Shaughnessy, Stratham, NH 413.222-2820**
hope@greenenergytimes.org
..... **Donna Stein**, New York, NY **212.307.6189**
donna@greenenergytimes.org
..... **Aubrey Cabot-Case,** Peacham, VT **802.778.0906**
aubrey@greenenergytimes.org

Distribution: Dany Turo, Mona Sweat, George Plumb, Bill Pearson, Carol Levin, Jon Ford, Kika McArthur, Marty Philbrick, Larry Plesant, Jessica Goldblatt, Ed Solar, Alan Phenix, Larry Chase, Jon Ford, Irving Webster, Hippo Distribution, Manchester, NH; NY Team: Joanne Coons, Wyldon Fishman, Tammy Reiss, Adam Flint... *Hopefully we have not forgotten to mention anyone. It is your help that spreads the way to a sustainable, resilient planet!*

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!

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

If you would like to have G.E.T. available somewhere you have not seen it, let us know!

G.E.T. is also online at www.greenenergytimes.org.

We encourage you to patronize our advertisers. We strive to selectively include trust-worthy services & products. G.E.T. cannot be held responsible for advertising claims.

Please support our advertisers. Keep it Local!

To advertise in G.E.T. contact Account Executives listed above.

By advertising in Green Energy Times or sponsoring us, you not only help to create energy awareness, understanding and independence for a sustainable future, but also help to support our efforts to make it all happen! Please call one our Advertising Representatives today!

Editorial Policy: Green Energy Times works with a variety of writers and also publishes community submissions on various topics. We aim to publish content that is independently researched, unbiased and relevant to our audience. Submissions are subject to our guidelines. Publication is subject to our editorial judgment & schedule.

Subscriptions: $30/yr. Online or with the form on this page.

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!

The Secret is Out: Homeowners Want Zero Ready Homes

If homebuyers acted in their own self-interest, Zero Energy Ready Homes would be everywhere in the market. But they are not. The superior homeownership experience with Zero Energy Ready Homes that live, work, last, and feel better has been a secret. No longer. The U.S. Department of Energy has just launched the Tour of Zero, an exciting new virtual tour of Zero Energy Ready Homes across the country. Visitors are able to view extensive photographs, homeowner testimonials, lists of innovations, floor plans, and key statistics including data on incredibly low or no annual energy consumption.

However, a key challenge is mobilizing consumers across the country to experience this difference so they can make more informed home purchase decisions. This national campaign is where you come in. DOE needs Innovation Partners vested in high-performance homes (e.g., manufacturers, associations, non-governmental organizations, utilities, and government programs) to engage American consumers to take the Tour of Zero and see the homes of the future that are available today. Collectively, we can increase homebuyer awareness and interest in zero energy homes that are better for homebuyers, communities, and the nation.

To visit the Tour of Zero Homes, go to energy.gov/eere/buildings/doe-tour-zero.

You can also join Sam Rashkin (U.S. DOE) in a DOE Zero Energy Ready Home Webinar to learn more about this important opportunity to change the housing landscape. You can also help others find better homes by becoming a DOE Innovation Partner.

To register for the DOE Zero Energy Ready Home Webinar on October 28th at 2:30-3:30 pm, go to bit.ly/DOE-net-zero-webinar.

"Climb the mountains and get their good tidings. Nature's peace will flow into you as sunshine flows into trees. The winds will blow their own freshness into you, and the storms their energy, while cares will drop away from you like the leaves of Autumn." - John Muir

'Peak Season'. Killington's summit view of Pico Peak ... Courtesy of Peter Huntoon, www.adayinvermont.com

TABLE OF CONTENTS

SUBSCRIPTION FORM

☼1 YR…$30 ☼2 YRS…$50 ☼3 YRS…$65

name _____

address _____

city.state.zip _____

phone _____

email _____

website _____

Offer good in U.S. only. Canada: $US 34.00. Foreign: $US 40.00
Gift subscriptions available! One year = 6 Issues!
please send check to 1749 Wright's Mountain Road
Bradford, Vermont 05033
802.439.6675
info@greenenergytimes.org
www.greenenergytimes.org
Energy Awareness, Understanding & Independence!

What Do You Want? - COST

The threat of doing nothing …

By George Harvey

Not a pretty view. These hemlocks have been killed by woolly adelgids. Photo by Steve Norman, USDA Forest Service

The bad news is that the environment is changing in ways we cannot stop. We may try to guide the changes, but we cannot stop them.

The immediate problem is that Nature is not in balance. Tens of billions of tons of carbon dioxide are dumped into the atmosphere each year. It will take a very long time for Nature to get it out of the atmosphere again. Nearly all climate scientists (upwards of 99.9%, according to MSNBC) say our emissions are driving global temperatures up. And the rising temperatures may speed up change even more.

Many people are not impressed with a rise of one or two degrees Fahrenheit. After all, it barely makes a difference in fuel bills. They do not understand the implications.

The temperature change is not uniform and it has effects on other weather conditions that vary regionally. In the Northeast, minimum winter temperatures have already increased over five degrees F., and this has been accompanied by changes in winter precipitation. The result is that an unusual event that used to happen every few years, a period of a few days when temperatures were very cold and there was little or no snow cover, has become ever rarer. It is this combination that kept ticks at bay, and since ticks carry Lyme disease, its absence has brought the disease ever farther north.

Anyone who has contracted Lyme disease in a place where it did not exist in years past is very likely a victim of climate change caused by carbon emissions.

Lyme disease strikes animals also, including moose, though they are actually being killed by the blood loss of tick bites. Other diseases are also causing problems among animal populations, and other diseases are moving into the area. Eastern equine encephalitis and West Nile virus are among them.

Plants are being threatened, as well. Perhaps the greatest tragedy is what is happening to our forests. Our fir and hemlock trees are being attacked by different species of woolly adelgid. Both woolly adelgids given the conditions they require, are quite capable of killing off entire forests of trees, leaving behind what is called a "ghost forest." Both are propelled by climate change. And there are other invasive insects, such as the emerald ash borer and the Asian longhorned beetle. Nature is turning messy, largely because of carbon emissions.

The forest path, the picnic area, and the view from our back porch are all under threat. Perhaps the greatest threats are our unwillingness to take responsibility for our destructive actions, mostly burning fossil fuels, and our unwillingness to take responsibility to undertake the things that need to be done to address the problem.

The good news is that by addressing climate change we may be at a point when we can have better health, enjoy greater comfort, and achieve greater prosperity than we have ever had in the past. But we have to ditch the denialism to get there.

What Do You Want? - TOOLS

The tools for change …

By George Harvey

Kingdom Community Wind in Lowell, Vermont. Photo courtesy of Green Mountain Power.

The good news is that we have all the tools we need to stop climate change. Not only that, converting to use those tools will almost certainly save us money, improve the environment, save species of animals and plants, and improve our health. In most parts of the country, perhaps all parts, it will also improve employment opportunities.

The bad news is that there are many forces trying hard to prevent us from using those tools. Some of these are being financed, and almost all are being given misinformation, by people and organizations associated with the fossil fuel industry.

We have seen attempts to discredit every form of renewable power. Wind power, the most threatening to the fossil fuel companies, gets the most attention in these attacks. Solar electric power, regardless of whether it is generated on a rooftop, in a field, or elsewhere, has an increasing share. But every renewable energy technology has people and organizations attacking it. And every attack brings comfort to the fossil fuel industry.

Science and mathematics disprove many of the myths of those who attack renewables. Nevertheless, there are two myths that go largely unattended. We should address them here.

It is a fact that solar and wind energy generation are intermittent. The myth is that this matters in the modern world. The truth is that demand for electricity is highly variable, and conventional base-load power plants are too inflexible to accommodate changes in demand. They cannot be turned back at night without sacrificing some ability to meet demand the next day. The remedy for base-load plants happens to be precisely the same as the remedy for intermittent solar and wind power. What additional storage we need for solar and wind may or may not be more than what is needed for base-load power, but backup for local distributed power is often less expensive than the transmission lines we would need without it. Experience with power grids with high percentages of intermittent solar and wind has shown they are both more reliable and less expensive that the old technologies we have had in place.

The second myth is that there is some magic bullet up the sleeves of scientists or government that would stop climate change. Technology takes time to develop, and does not always work in the real world. Scientists have been trying to develop commercially viable nuclear fusion reactors for about sixty years, and have only recently tested one that made more power than it used. They believe a commercial plant is coming; perhaps it will be ready for trials in less than a decade. Perhaps a decade after that, it will be ready to go into production. Perhaps it will take only a decade or two to get into widespread use. We cannot afford to wait that long.

We have the tools we need, and we have the need to use them. The work is underway. But for the sakes of our health and the environment, we need desperately to expedite it.

Renewable Energy in NH at Crossroads

cont'd from p. 1

costs. There are many reasons why New Hampshire should continue to offer a robust and fair net metering program:

Net metering is pro-consumer, especially at this time of high electricity rates, because it allows us to control and stabilize our own electricity costs through homegrown energy resources.

Net metering is a critical tool that supports the ongoing growth of NH's clean energy and clean tech sector, an industry which already provides 15-20 thousand well-paying jobs here in our local economy, and which is seeing dramatic growth.

Net metering helps deploy new, clean supply, often at times of peak demand (when power is most costly), that does not require the use of transmission lines, which lowers costs in the system that we all pay for on our bills

Thankfully, there is a solution to this problem but it will require quick action from the New Hampshire legislature and Governor Hassan in order to avoid taking a step backwards in the development of clean energy in the Granite State. While the Governor can call a special session with the agreement of Executive Council and Legislative leadership, only the Legislature – through legislation – can increase the limit on net metering. What is needed now is for the Legislature to come together as soon as possible to pass the legislation and avoid an enormous disruption to clean energy development. New Hampshire simply cannot afford to continue to lose jobs, diverse and renewable energy supply, and significant economic and environmental benefits.

The Roberts family is happy about their choice to go solar with net metering benefits. The future of net metered solar in NH is jeopardy. Photo courtesy of ReVision Energy.

Kate Epsen is the executive director of the NH Sustainable Energy Association (NHSEA).

GMP Offers Grants for Four Solar-Powered Electric Vehicle Charging Stations

First Comprehensive EV Charging Network in Vermont Will Help Drivers Reduce Fossil Fuel and Save Money

As part of building a comprehensive electric vehicle charging network across the state, Green Mountain Power is offering nearly $50,000 in four separate grants to build four solar-paired electric vehicle charging stations. Applications will be accepted until October 23.

"We are so excited to be placing more charging stations where lots of Vermonters will use them, and having the sun power it all," said Dorothy Schnure, GMP spokesperson. "As Vermont's Energy Company of the Future, our goal is to help Vermonters save money and reduce fossil fuel use through innovative products and services like these chargers paired with solar, all while continuing to provide highly reliable, clean and cost-effective power."

People and businesses can apply for the four grants. Grant recipients will be chosen based on how suitable their proposal is for charging stations, including locating in areas with high visibility and the availability of activities, such as shopping, to engage people nearby while they charge and help boost business in downtowns.

"Installing solar panels along with the EV chargers is a great way to increase renewable generation while customers fill up with clean electricity to run their cars," Schnure said. "This is part of an exciting energy transformation we are partnering with customers on – where energy is generated and used closer to home."

Green Mountain Power has committed to build a comprehensive fast-charging network across the state, and has already installed 38 charging stations across Vermont, increasing Vermont's energy independence and contributing to cleaner air and lower carbon emissions. Vermont is the first New England state to be added to NRG EVgo's national public fast-charging network, and GMP is the first utility in the country to partner to expand the EVgo network. GMP is also working to help its customers lower their energy bills, be more comfortable and reduce their dependence on fossil fuels with its comprehensive energy makeovers through the eHome and eBiz programs.

Applications should be submitted via email to Jenn.Cortez@greenmountainpower.com and should include a description of the project, the location, and other sources of funding to leverage the best projects. GMP will work with the Clean Energy Development Fund to coordinate these projects.

New Charging Stations in W. Lebanon, NH Draws Tesla's from Near & Far

By GET Staff

Tesla has been adding new charging stations across the country, and it seems they are coming along as fast as they can. One of the newest in the Northeast, is a group of eight stations in the Valley Square Shopping Center in West Lebanon, New Hampshire.

Tesla distinguishes between Superchargers, where any Tesla owner can recharge in minutes at no cost, and Destination Chargers, which includes those installed at hotels, restaurants, and other destinations. Tesla cars can charge at stations for other vehicles, but the charge rate is slower.

The Superchargers are located in high traffic areas to support long-distance travel. The one in West Lebanon is near access locations for both Interstate 91 and Intestate 89. There are two other Superchargers in New Hampshire, four in Massachusetts, five in Connecticut, one in Rhode Island, one in Vermont, and eight in New York, all in areas with long-distance traffic.

Destination chargers outnumber Superchargers by a wide margin, but may have costs associated with their use. The Hilton Worldwide hotel chain is installing them, alongside charging stations for other vehicles, at fifty hotels in the United States this year, with another fifty for next year. This is just one example of many, as restaurants, stores, and other establishments add chargers to support electric vehicle use.

As I chatted with a man charging his Tesla in West Lebanon, he told me of his other environmental efforts. Among other things, he owns a hydro-electric facility in south-western New Hampshire. But he really likes to talk about his Tesla. He even offered to let me drive it. I did. My take on the car: Wow!
-- Nancy Rae Mallery

Three Teslas are charging at a shopping center in the small town of W. Lebanon, NH. With five more stations that could be used, this site can handle a lot of traffic. And more are coming. Photo by GET's editor, Nancy Rae Mallery.

Signed, Sealed & Delivered

A Solar-powered Boat on the Erie Canal

By George Harvey

"I have a mule, and her name is Sal." It is the first line of an old song, "Low Bridge," that looks nostalgically back at a time when the Erie Canal was a bustling transportation pathway. The early boats each carried thirty tons of cargo and were pulled by solitary mules walking on a pathway that ran alongside the canal. It was a slow journey, but when the canal opened, in 1825, it was the fastest way to cross New York State, and it cut the cost of moving goods along its path by 95%. And that, in turn, made it profitable to live and work in the Midwest, opening up the old Northwest Territory, establishing the potential of cities like Detroit, Chicago, and Minneapolis.

Sal might have opened the center of our country, but her importance did not last long. Though the canal's mules and horses continued working into the twentieth century, engines, first powered by wood and then by coal, reduced their relevance and ultimately replaced them. Railroads were the first challengers, then powered boats on the New York Barge Canal, opened in 1918, but these lost their importance in turn to tractor trailers and pipelines. The bustle of the modern world made old Sal the mule just a memory. But her memory has given rise to a new vision.

On September 29, Sal's namesake, Solar Sal, pushed off from a terminal on the Erie Canal in Lockport, New York, only a few miles from Lake Erie, on a mission of commerce. She is carrying a full load of cargo to Mechanicville, New York, at the other end of the canal. It will be the first cargo hauled by a 100% renewably powered boat on the Erie Canal since the last draft animals were put out of work.

Solar Sal, as the name implies, has the sun for her mule. She is powered by sixteen solar panels, with a capacity of five kilowatts. That implies a maximum power of about six and a half horsepower, a good deal more than a single mule. Nevertheless, the solar power does not provide for a particularly fast trip, and she will probably never break the Erie Canal's lowest speed limit, which is five miles per hour on the slowest stretch.

Solar Sal was featured in our June issue, which had an article about how her creator, David Borton, took his dream of a solar-powered boat to reality, with help from many people, most especially the Schodack Schools, in whose garage Solar Sal was built. Since that time, the boat has been on tour in various parts of New York State. This is not Solar Sal's first trip, but it is the first time she has carried cargo.

The boat is not small. She is forty feet long and has a cargo capacity of twelve tons. Her cargo is a load of baled cardboard, destined for a paper mill.

At this writing, Solar Sal has reached Schenectady, where she has been an object of local attention for several days. The trip would undoubtedly have been quicker to this point, except for such interest along the way. Joanne Coons, who contributes to Green Energy Times, visited a celebration in her honor at the Schenectady Yacht Club on October 13. Peter Bardunias, CEO of the Southern Saratoga County Chamber of Commerce commented that it was a "historic and unprecedented Erie Canal cargo delivery trip aboard Solar Sal."

We expect that by the time this issue of Green Energy Times is distributed, Solar Sal will have delivered her cargo, and her trip to Mechanicville will be completed. Perhaps her trip is just the beginning of a new page in history, in which water transportation does not need more fuel than the sun provides.

Left: Solar Sal, loaded with cargo, on it's historic return trip from Lockport to Mechanicville, NY. This picture was taken on Oct. 9th, 2015, during a stop at the Schenectady , NY Yacht Club.
Right: Solar Sal being loaded with cardboard in Lockport, NY. Photos courtesy of Joanne Coons.

Vermont Electric Vehicle Charging Station Grants due October 31st

Electric Vehicle Charging Station Grants The Department of Housing and Community Development in partnership with the Agency of Natural resources is pleased to announce a third round of approximately $44,000 in Electric Vehicle Charging Station Grants for Designated Downtowns and Village Centers. They are pleased to extend this funding opportunity to include designated village centers previously only available to designated downtowns. This is a great bonus incentive for village centers looking to install electric vehicle charging stations.

Grant applications are due October 31, 2015. See the Electric Vehicle Charging Station Grant Application for eligibility, funding and application requirements. Any municipality with a Designated Downtown or Designated Village Center may apply for funding and must be submitted by the municipality. The maximum grant amount is $25,000 with a 25% match requirement that can be cash or in-kind.

Priority consideration will be given to high priority areas that do not currently have an existing or planned EVCS in the designated downtown or village center and/or geographic location is close to major highways/roads. You can find locations for the existing electric vehicle charging stations in Vermont by following this link.

http://www.driveelectricvt.com/charging-stations/publicchargingmap

The electric vehicle charging station grant is a great funding opportunity to expand the network of charging stations statewide. Please contact Gary Holloway, the Downtown Program Coordinator at 802.828.3220 if you have questions or need assistance with the grant application.

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 & Travel Training 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**

NH RIDESHARE – Your Source for Transportation Alternatives. **nh.gov/dot/programs/rideshare/**

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 - Commuter buses from Randolph and Fairlee to Dartmouth, Local village buses. 800-427-3553 **stagecoach-rides.org**

VW Cheated

... AND THE COST OF DECEPTION WAS HIGH.

By George Harvey

VW Golf TDI "clean diesel" at the 2010 Washington Auto Show. Photo by Mariordo. CC BY-SA 3.0.

Volkswagen (VW) stock lost a third of its value on Monday and Tuesday, September 21 and 22. The total value of all VW stock lost was well over $20 billion. Stockholders were hit hard.

The cause of the problem was deception. VW had cheated on emissions. The deception, however, was on a scale that is almost unimaginable. It was not a matter of fudging data on a form. Every VW diesel car built over a period of seven years had software built into it that would sense whether the car's emissions were being tested and alter performance of the engine accordingly. And the alteration was not minor. The emissions of some of the cars were forty times the maximum allowed.

> Motor vehicles are one of the greatest contributors to American air pollution.

Faced with growing scandal that could include losing the right to import cars into the United States, VW finally admitted what it had done. It was then that the stock price fell precipitously.

The story of how this happened is worth telling. Two green activists, Peter Mock, in Germany, and John German, in the US, had set out to try to show that the VW diesel system actually was as clean as they claimed. They felt confident it was, because it passed US air pollution tests, and they wanted to prove other vehicle makers could similarly reduce pollution levels. They asked the University of West Virginia, which had some specialized testing equipment, for help. The equipment could measure the actual performance of the car on the road, instead of in a laboratory.

According to reports, a 1,300 hundred mile trip from San Diego to Seattle showed that the nitrogen oxide (NOx) emissions of a VW Jetta exceeded the maximum allowed by factors of fifteen to thirty-five times. NOx is an important atmospheric pollutant with potentially serious effects on health. Bypassing the emissions standards gives the cars more acceleration power and better mileage than they otherwise would have.

VW has had to recall nearly 500,000 cars sold in the US which have the cheating software. The total number of cars that were equipped with it worldwide is 11 million, according to a statement from VW.

VW has announced that it is putting aside $6.5 billion to pay fines resulting from its cheating. According to an article in the Los Angeles times, however, the EPA could fine VW as much as $18 billion, or $37,500 per car sold in the US. Furthermore, the fallout could be very broadly felt throughout the world. Australia, India, Italy, and South Korea are all starting investigations to see what cheating might have been done in their countries, according to news reports.

The damage to VW is not limited to fines. Diesels sold in the US that are being recalled have to pass standards. They will have to undergo alterations that will reduce performance, and this will doubtless displease more than a few customers. Additionally, however, VW members of management that who were involved with the deception could face very long prison terms. The CEO of VW has already resigned.

For those who might wonder whether VW could have been the only auto manufacturer that cheats on emissions, CleanTechnica put together a report. It says EPA inspectors consider searching for cheating devices and software as normal parts of their jobs, with Chrysler, Ford, and GM all having been caught trying to cheat. They did not do anything close to the damage VW did, however, and so they did not suffer the fines VW will undoubtedly have to pay.

Nor are automotive manufacturers the only culprits. For instance, industry insiders claim that Exxon has knowingly concealed information about climate change for decades. Cheating and fraud are pervasive problems, and companies that do them for short-term gain are putting the long-term survival of our society in question.

Regional Energy Planning through TRORC

Helping VT Reach Renewable Energy Goal Set for 2050

By Dee Gish, Two Rivers-Ottauquechee Regional Commission

In 2011 the Vermont Comprehensive Energy Plan (CEP) established the ambitious goals of obtaining 90% of Vermont's total energy from renewable sources by 2050 and 25% of all energy produced in-state by 2025. The CEP recognizes that achieving these goals will require communities to virtually eliminate Vermont's reliance on fossil fuels through enhanced efficiency, conservation, and greater use of renewable energy sources for electricity, heating, and transportation. These goals will require a substantial change in how we approach energy use, transportation and land use. It will impact us on a state, regional and municipal level. As with any plan, the ultimate question is implementation. The CEP states what needs to be done and why, but does not provide specifics on how it will be implemented.

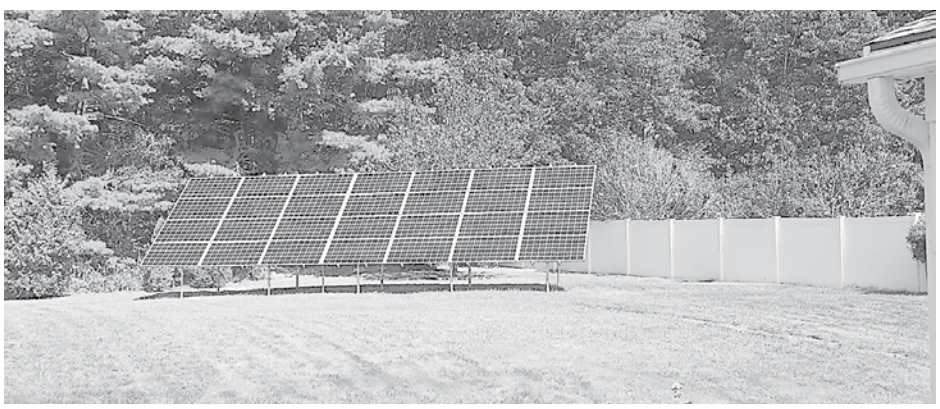
The Vermont Department of Public Service (PSD) has contracted with three regional planning commissions (Bennington Regional Planning Commission, Northwest Regional Planning Commission and Two Rivers-Ottauquechee Regional Commission) in an effort to develop a framework for implementation. The PSD recognizes that the way each region will contribute to the implementation strategy will be different because regions have different geographic, socioeconomic and political constraints. The contract states that the Regional Energy Plans will "advance the State's energy and climate goals while being consistent with local and regional needs and concerns, and will provide specificity to enable progress of each region toward those goals."

To begin the Regional Energy Plans, the regional planning commissions and partner organizations (including the Energy Action Network and Vermont Energy Investment Corp.) have established baseline energy use across all sectors, have established regional goals for changes in energy use across all sectors, and have mapped potential renewable energy generation resources and constraints. The regional planning commissions will continue to meet with statewide partners and hold public meetings with municipalities and members of the public to select strategies and implementation programs that will focus on thermal efficiency and alternative heating systems; transportation system changes and land-use strategies; and conserve electricity and improve efficiency of delivery and end use. To complete the project, the participating RPCs will take all data, strategies and implementation recommendations, as well as renewable energy generation siting recommendations and use it to develop their Regional Energy Plans. The ultimate goal is to create a framework by which all Regional Plans will be updated to implement the CEP. Final versions of the Regional Energy Plans are due to the PSD in February 2017. Meeting announcements for the Regional Energy Plan public meetings in the TRORC region can be found at www.trorc.org.

For more information, please contact Dee Gish at dgish@trorc.org or Chris Sargent at csargent@trorc.org or 802-457-3188.

TRORC
Two Rivers-Ottauquechee
REGIONAL COMMISSION

Solarize Hudson, NH



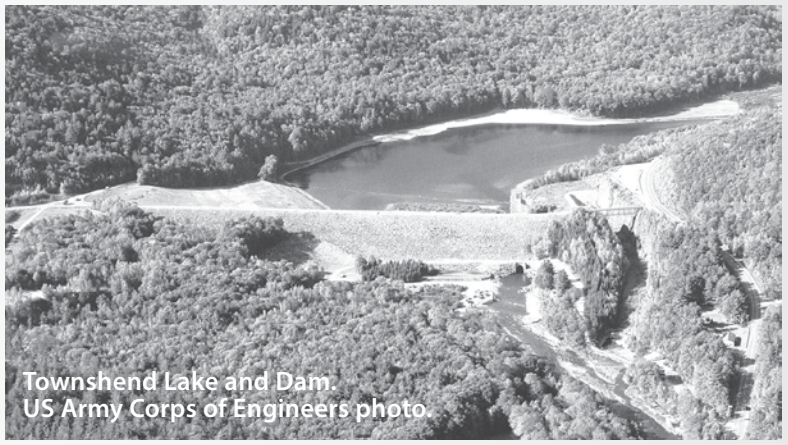
Deb Putnam's Solar installation in Hudson, New Hampshire

A group of volunteers in Hudson, NH have decided they want to solarize, inspired by the programs done in the Upper Valley, and the current Solar Up NH program that has been running in neighboring towns. They are in the process of gathering together a small group of volunteers to promote solar to the residents. Deb Putnam, the leader of the group, recently had a solar array installed by Milhouse Enterprises and is excited about the benefits of going green. She believes that the key to the success of solar is educating everyone about the benefits, options and cost of owning a solar system, so they can make a decision without the pressures of a sales presentation. Education is what the solarize program is all about. This is done through information sessions that are held in town to learn about everything from how solar works, to the cost and benefits, what the installation process looks like, and the paperwork involved in the rebates. The program is still in the planning stages, with a start somewhere in October.

You can contact Deb Putnam at 603-882-8485 or Chris Millner of Milhouse Enterprises at 603-300-2943.

WINDHAM COUNTY HYDROELECTRIC STATIONS

By George Harvey



Townshend Lake and Dam.
US Army Corps of Engineers photo.

Many Green Energy Times readers will recognize the name of Lori Barg, who did an extensive study on Vermont dams that lacked hydroelectric facilities. She concluded that a large number of them could be developed for hydroelectric power without appreciable negative effects on the environment. In 2008, she undertook to incorporate Blue Heron Hydro, LLC, to develop some of these dams. Under her guidance, the company acquired rights to develop hydroelectric facilities on two dams in Windham County, Vermont, from the Army Corps of Engineers (ACE).

One of the installations is the 924-kilowatt (kW) Townshend Project, in Townshend, Vermont. The other, only a few miles away, is the 2,196-kW Ball Mountain project in Jamaica, Vermont. Both dams were built for flood control, and they are operated by ACE. They also provide for water recreation and have small beaches.

Having obtained the rights to develop, Blue Heron Hydro set about getting the necessary permits to proceed with installation. Permitting for hydroelectric projects is a notoriously slow, complicated, and expensive process. Multiple agencies at just about all levels of government are involved.

Blue Heron Hydro reached a number of important milestones during its first four years. The Vermont Public Service Board (VPSB) certified the projects. The company entered into power-purchase agreements with Vermont's Sustainably Priced Energy Enterprise Development (SPEED) program. The Federal Energy Regulatory Commission (FERC) issued 50-year licenses.

A persistent impediment was that ACE still had to issue the actual permits for construction, an entirely separate process from simply granting development rights. In fact, the projects had to get extensions from VPSB more than once as ACE was delayed. The most important problem was that ACE had a backlog in permitting, which slowed development of other hydroelectric facilities all over the country.

In 2012, shortly after it got the licenses from FERC, Blue Heron Hydro was sold to Eagle Creek Renewable Energy, based in Morristown, New Jersey. Eagle Creek owns and operates more than three dozen small hydroelectric plants in the Northeast and the Midwest. It has continued to pursue the development process at the Windham County sites through Blue Heron Hydro.

After the long wait, the final permits from ACE were issued early this year. Construction groundbreaking took place on June 12, and both projects should be supplying electricity to the grid by year's end. Construction is being done by D.A. Collins, of Wilton, New York. The turbine-generator units are built by Obermeyer Hydro, Inc. in Colorado.

The work started with building access roads and control buildings. Old concrete had to be removed and new foundations poured. After installation of the turbines, final work has to be done, and it is expected that power will be flowing to the grid by the end of the year. During the construction period, care has been taken to be sure that activities at the site continued normally. People who enjoy access to the ponds should be able to continue to do so.

The electric energy produced will be sold through the SPEED program to Vermont Utilities. It is estimated that the dams will provide 10 million kilowatt-hours of electricity to the grid each year, enough to supply power for about 1,300 average New England homes.

Solar with Storage in Affordable Housing

Three years after Sandy, New Report Shows Solar Plus Storage Can Protect Residents, Reduce Costs, and Increase Power Resiliency in Affordable Housing

Economic analysis makes a case for increased investment and incentives for solar plus storage in affordable housing to serve critical power needs.

Solar combined with energy storage systems (solar+storage) can help protect vulnerable populations during power outages in multifamily affordable housing and provide an economic return to building owners, according to a new report by Clean Energy Group, a national nonprofit organization working to increase the deployment of clean energy technologies.

The first-of-its-kind analysis of how solar+storage could benefit low-income communities, Resilience for Free: How Solar+Storage Could Protect Multifamily Affordable Housing from Power Outages at Little or No Net Cost stresses the need to make vulnerable populations – including seniors, disabled people, and low-income families – more power-resilient in the face of natural disasters.

Three years ago, Superstorm Sandy knocked out power to over eight million people, stranding residents and threatening

New York City in the dark during Superstorm Sandy. Credits: @CCHO/Creative Commons (Flickr)

lives because of the lack of electricity to power critical services such as elevators, heating and cooling systems, communications, and other life-supporting technologies.

"Three years after Sandy, we now know that solar+storage in affordable housing can mean the difference between safety and tragedy," said co-author Lewis Milford, Clean Energy Group President and Nonresident Senior Fellow at the Brookings Institution. "But this analysis shows us something we didn't expect – these new resilient power technologies can make economic sense for building owners to install now, not years from now."

Resilience for Free uses project data for buildings in New York, Chicago, and Washington, D.C. to examine the financial case for installing solar+storage systems to support critical common area loads in multifamily affordable housing. The report concludes that with the right market structures and incentives, solar+storage systems can provide a positive economic return on par with energy efficiency or stand-alone

cont'd on p.15

- SOLAR SHARING -

FIRST OF ITS KIND WITH A UTILITY

Innovative Sharing Economy Initiative Makes Rooftop Solar Available through Collaboration between Residents of Barre and Rutland, VT.

On Sept. 21, 2015, Green Mountain Power and Yeloha, a peer-to-peer Solar Sharing Network, announced a groundbreaking partnership with a mission to unlock the benefits of solar energy for everyone - by sharing it.

The partnership marks the first utility-adopted Sharing Economy platform to offer its customers the opportunity to generate their own energy and share it with other residents online. The initiative represents a beacon of change for energy nationwide.

Yeloha and GMP will make it possible for individuals who don't have a roof suited for solar to subscribe online to power produced by other homeowners and businesses, essentially going solar on someone else's roof. Those who do own suitable roofs will be offered to host the panels free of charge in exchange for sharing some of their solar power.

"This is a unique opportunity to empower more people to be able to harness the power of the sun," said GMP President and CEO Mary Powell. "We see a tremendous opportunity in leveraging more rooftops around Vermont for the benefit of all those who may currently be renters, or own homes that are not well suited for solar. As Vermont's energy company of the future, we are transforming the old grid system into one where power is generated and consumed closer to the home or community where it is needed. This partnership with Yeloha will help accelerate this revolution in distributed power," added Powell.

The Sharing Economy, which has impacted all areas of our lives from transportation to accommodation, is about to revolutionize solar energy by providing simple accessibility through collaboration between individuals, made possible by Yeloha's technology platform.

"We are pleased to join forces with Green Mountain Power, a forward-thinking energy provider, as our first utility partner," said Amit Rosner, Co-Founder and CEO, Yeloha. "Working together, we have the unique opportunity to democratize access to clean energy — literally bringing power to the people, by the people," added Rosner.

Yeloha is an online platform with a mission to make solar accessible to everyone, including those who don't own a roof suitable for solar, such as renters and apartment dwellers, or those who can't afford the panels by going solar on someone else's roof.

It is often referred to as the "Airbnb of Solar" because it lets people put their unused roofs to work, benefiting themselves and others. Joining is simple, and the online subscription takes a few minutes.

The partnership will start as a pilot in Rutland and Barre Vermont, where it will both open up exciting options for homeowners to save money while living sustainably, and also create opportunities for local solar developers and installers who will deploy the installations.

"We are thrilled to have this new option for our residents who rent or live where solar isn't possible," said Barre Mayor Thom Lauzon "Bringing the value and benefits of solar to more Vermonters is a great step forward and will help economically here and across the state," he added.

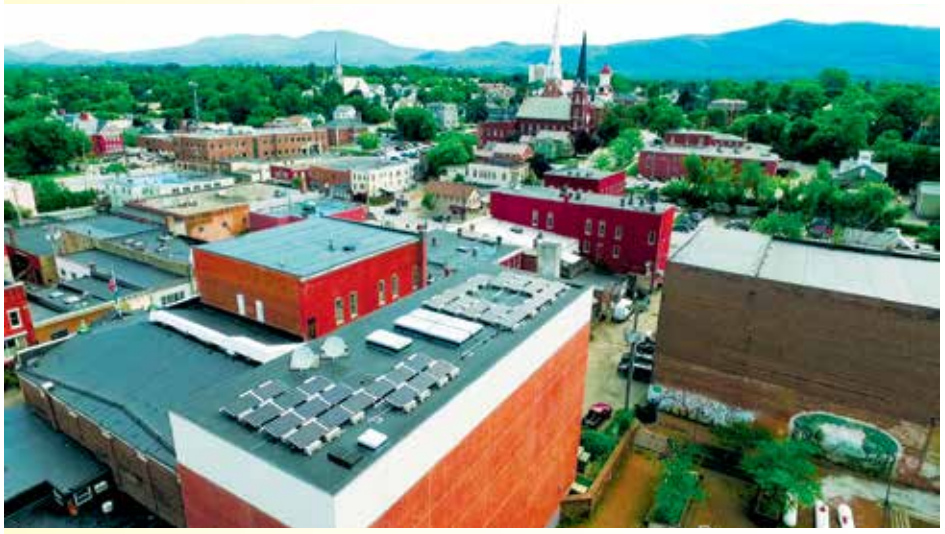
"Solar energy is boosting the economy and programs like this will provide more local jobs," said Nik Ponzio, Co-Founder of Building Energy, a Vermont solar installation company.

Many thanks to our Sponsor:

yeloha! Solar Sharing

SOLAR CAPITAL OF THE NORTHEAST!
Rutland, Vermont

cont'd from p.1



11.2kW solar PV installation on the Stage House roof of the historic Paramount Theatre. Photo provided by Same Sun of Vermont, Inc.

completed by 2017, was achieved over a year early.

There were fifty-one PV installations put up as part of the project. The smallest were quite small, as two were only one kW each. Three were of 2,000 kW or larger. Seven were made possible by grants from GMP.

The projects in Rutland date to considerations arising during the merger of GMP with Central Vermont Public Service (CVPS). Rutland was the home of CVPS, which had its main offices there, and employed a lot of people locally. A merger would make many workers' jobs redundant, meaning there was a possibility that some employees would lose their jobs. There was concern that Rutland, which was hardly excessively prosperous, could be hit hard economically. The issue was recognized in advance, and a way to address it became part of the merger negotiations.

One GMP proposal was to open a research center in Rutland. While the Energy Innovation Center provides local employment, it has also turned out to produce some very interesting work. Among other things, it has studied new ways to understand how a utility can benefit customers while still making a decent living for itself. GMP has been working to develop not just a new utility business plan, but a new paradigm for its place in society.

Of special interest for the present, however, GMP has been giving value to the Rutland economy by moving it toward solar power. That was the reason for the push to make it the solar capital. It provided employment, and contributed significantly to the local economy.

Solar power also can contribute to the energy security of the city. GMP built a microgrid, with a 4,000 kW battery for power backup, that can provide emergency power to essential services including the emergency shelter at the high school, the hospital, and other facilities.

When solar power is installed it has an interesting effect on power costs. It helps stabilize wholesale prices during the time of day when demand is highest. Ultimately, this can produce important savings for customers.

The efficiencies resulting from the merger had impressive value for ratepayers throughout Vermont. GMP promised this to be $144 million over 10 years. Some of this would be in reduced electricity costs. There would be other forms of return, however, and ways to benefit everyone, especially those who needed it most, have been examined.

GMP has not limited its efforts to Rutland. It has been helping customers throughout its service area reduce their energy costs significantly. For that purpose, it is introduced and expanded programs to help with installation of solar panels, heat pumps, insulation, improved windows, air sealing, and more. GMP is also interested in extending distributed generation in other parts of the state, though no specific plans have been announced as yet.

One final point is that while GMP was doing these things, it somehow remembered to visit the Public Service Board with requests for permission to reduce our electric rates each year since the merger. Elsewhere, power rates have gone up, but in GMP's territory, they have declined.

The GMP website is greenmountainpower.com/innovative/solar_capital.

Installations	Capacity in kW
33 homes and businesses	382
Rutland Regional Ambulance	15
Good Shepherd Lutheran Church	11
VT Farmers Food Center	13
Rutland Region TV-Peg TV	9
The Paramount Theatre	10
Depot Park	1
Rutland County Parent Child Center	69
College of St. Joseph	93
Creek Path	150
Electrical Maintenance Building	59
Energy Innovation Center	20
GMP Grove Street	1
GMP Solar Center @ Rutland Regional	140
Stafford Hill	2,510
Street Lights	10
NextSun Route 7 array	2,000
Next Sun Park Street array	2,290
NRG Residential Solar Solution	145
Grand Total, 51 projects	**7,870**

Many thanks to our Sponsor:

RMI Solar ... *a green company gets greener*

By GET staff

Resource Management, Inc. (RMI), of Holderness, New Hampshire, has been in the business of recycling for over twenty years. They provide recycling services for organic by-products from municipalities and businesses throughout the Northeast. Materials conservation goes hand-in-hand with energy conservation, so it is natural that they would give thought to reducing their electricity consumption. They did this by putting a south-facing roof to work, gathering the power of sunlight with photovoltaic (PV) panels.

It happens that another business, New England Commercial Solar Services (NECSS), is also in Holderness. They worked with RMI to realize RMI's solar power vision. Ted Vansant of NECSS put together a team of local enterprises for the project. TG Design Carpentry and Solar, also of Holderness, was recruited for the project. Mauchly Electric, of Plymouth, New Hampshire, did design and solar installation work.

The ninety-two 260-watt PV panels on RMI's roof were made by Solar World in the United States. Together, they are expected to produce 27,000 kWh of electricity each year. The electricity generated by the system will produce about 100% of RMI's annual electric use and this is enabled through the NH Electric Co-op (NHEC) net-metering program.

The Plymouth Area Renewable Energy Initiative (PAREI) supplied technical assistance and energy auditing services for the project. PAREI's Sandra Jones provided an explanation of the net-metering and renewable energy credits (RECs). "In addition to RMI receiving the monthly benefits of net-metering, this array will also generate at least 27 [RECs] annually," she said. "NHEC must own a certain number of [RECs] to meet New Hampshire's Renewable Portfolio Standard and net-metered Co-Op members, like RMI, can help them meet their REC requirement by selling these credits to NHEC."

Solar power has a tiny carbon footprint. The panels nearly always far outlast twenty five-year warranties that are typical of the industry. But not only do they reduce emissions of carbon dioxide that would otherwise happen, they also reduce sulfur dioxide and nitrogen oxide emissions. If RMI's panels perform as expected, their 27,000 kWh per year represents reductions of over 189 tons of carbon dioxide, 216 pounds of sulfur dioxide, and 135 pounds of nitrogen oxides. And that is every year for as long as they last.

The ninety-two 260-watt PV panels on RMI's roof are expected to produce 27,000 kWh of electricity each year -- about 100% of their annual electric use. Photo courtesy of Resource Management, Inc.

Shelagh Connelly, president of RMI, put the system into the context of her business. "This solar project feels like the ultimate example of re-using and recycling. The sun beats down on our roof most days, it makes good sense environmentally and economically to 're-use' that solar power to produce all the electricity needed to run our main office, and then some!"

ENERGY TIDBITS *by George Harvey*

Local Renewable Energy. Growth in Vermont's clean energy jobs is projected to double in the next six to twelve months, according to a new state report. This is even after a year of outperforming other job sectors. The growth has other benefits of more jobs and dropping costs, according to Governor Peter Shumlin. (9.15.15)

Renewable Energy. The US will add eleven gigawatts of utility-scale solar power plants in 2015 and 2016, doubling the capacity in that segment, the US Energy Information Administration projects. California, North Carolina and Nevada will get 70% of the expected new solar capacity. About 4.4 GW will be deployed in California alone. (10-10-15)

Read up to date *Energy News,* daily, on our website: www.greenenergytimes.org.

The Story behind High Peaks

-- the newest SOLAR STORE in the southern Adirondacks --

High Peaks Solar's showroom is an interesting educational experience. Photos courtesy of High Peaks Solar.

Kevin Bailey started working in the renewables industry in 2005, when a chance encounter got him a job as an intern with David Blittersdorf installing solar equipment. After three years learning about solar installations, grid-tied systems, off-grid systems, and more.

In 2008, Bailey began his own business. Originally called Sycaway Solar and Wind, the company was incorporated in 2011 as High Peaks Solar. Over its history, High Peaks has had spectacular growth.

Needing a good sized building for his business, Bailey started with a building that had previously housed a carpet business. The downstairs became the home of his business, and the upstairs was fitted out to be an apartment for his family. This was gutted for an energy-efficient retrofit. It was super-insulated with spray foam. Twelve inches of insulation went into the roof decking. The walls got seven inches of foam in the open cells in the walls in the upstairs, and five inches of closed cells in the downstairs block building.

The old gas boiler in the building was removed. The first floor got two Mitsubishi mini splits, and the second floor got two ducted heat pumps from the same manufacturer. When extra or backup heat is needed, it is supplied by a Harmon pellet furnace from Best Hearth and Fire, a local business. Last winter, the 6,000 square foot building needed only three tons of pellets.

The hot water supply is provided by another heat pump from Stiebel Eltron. This unit reduces the need for electricity for water heating by 75% from what it would be with a conventional electric resistance unit.

In addition to these efficiencies, lighting is supplied by LEDs from Phillips.

The building has two grid-tied solar systems. One is six kilowatts, for the commercial side of the building. The other is four kilowatts for the apartment.

Efficiency and energy work did not stop with the heat and electric power. Bailey was also interested in making sure the carbon footprint is reduced for the vehicles used for his business. The trucks for the business are powered by biodiesel, using the highest percentage of waste cooking oil available – usually, that means 99%.

Power tools used in the field by High Peaks are solar powered, wherever possible. The three trailers used for on-site work are their own microgrids, powered by photovoltaics with backup power from four batteries of six volts each, delivering about four kilowatt-hours.

For Bailey's next step, he is looking forward to using electric vehicles. He wants to put an electric charging station on the side of the building and make it available for other people to use.

Bailey says, "We are committed to renewable energy plain and simple, love doing it, and hope to do it for a long time." The commitment that he has clearly kept in his own business and home is also obvious anywhere he has done work for others. He has done many installations of solar, ranging from small, off-grid cabins to large tracking arrays for farms and businesses.

High Peaks' showroom in Wynantskill, New York, is set up to provide an educational

cont'd on p. 13

Left: Tracking mounts for solar panels at a farm in Brunswick, New York. Right: Rooftop solar photovoltaics at the Murphy home in Wynantskill, New York.

NYSERDA Opens 2nd Round of Solarize Campaigns

Solar is to be more accessible to residents and businesses

The New York State Energy Research and Development Authority (NYSERDA) has announced the second round of support for Solarize campaigns is now open. Under Andrew M. Cuomo's NY-Sun Community Solar NY program, Solarize campaigns make solar easier and more affordable through community-driven initiatives and are an essential component of Reforming the Energy Vision (REV).

Community Solar NY provides support for community education and marketing of group solar purchasing projects. In this round, NYSERDA is encouraging projects that make solar more accessible for low- and moderate-income participants, and provides opportunities for renters, homeowners, low-income residents, schools and businesses to join together to set up shared renewable energy projects resulting in healthier and stronger communities.

Local governments, school districts and other community partners are eligible to participate in Community Solar NY. Applications for this round will be accepted through November 16, 2015.

"Community Solar NY is building awareness of the benefits of clean, renewable solar power, simplifying the process of choosing a solar installer and driving down costs," said John B. Rhodes, President and CEO, NYSERDA. "It aligns with Governor Cuomo's REV strategy by helping to increase renewable energy in the state and reducing energy costs."

Solarize campaigns bring together groups of potential solar customers through widespread outreach and education, and help customers choose solar companies that offer competitive, transparent pricing. The campaigns generally run for between six and nine months, including planning and outreach. By educating the local community, streamlining marketing efforts and aggregating customers, Solarize campaigns help make solar a more accessible and affordable energy option.

In 2015, communities across New York State launched more than 30 Solarize campaigns with support from NYSERDA. These local campaigns have drawn thousands of New Yorkers to attend solar workshops and community events, resulting in hundreds of households and businesses "going solar."

For information on how to enroll in the second round, visit bit.ly/NY-solarize-your-community. A Community Solar NY Solarize Round 2 webinar took place on September 22. The webinar can be seen by visiting bit.ly/NY-solarize-round-2-webinar.

NY-Sun is Governor Andrew M. Cuomo's $1 billion initiative to advance the scale-up of solar and move New York State closer to having a sustainable, self-sufficient solar industry. The growth of solar in the State has increased more than 300% from 2011 to 2014, twice the rate of U.S. solar growth overall.

Reforming the Energy Vision is New York Governor Andrew M. Cuomo's strategy to build a clean, resilient and affordable energy system for all New Yorkers. REV is transforming New York's energy policy with new state-wide initiatives and regulatory reforms. REV will grow the state's clean energy economy, support innovation, ensure grid resilience, mobilize private capital, create new jobs, and increase choice and affordability for energy consumers. REV places clean, locally produced power at the very core of New York's energy system. This protects the environment and supports the State's goal to reduce greenhouse gas emissions by 40% while generating 50% of its electricity from renewable energy sources by 2030. Successful initiatives already launched as part of REV include NY-Sun, NY Green Bank, NY Prize, K-Solar, and a commitment to improve energy affordability for low-income communities. To learn more about REV, visit www.ny.gov/REV4NY.

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and support to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce their reliance on fossil fuels, protect our environment and create clean-energy jobs. To learn more about NYSERDA's programs and funding opportunities, visit nyserda.ny.gov.

High Peaks *cont'd from p. 12*

experience for visitors. There are numerous examples of working equipment in the showroom, along with a large number of catalogs. This was done so visitors can understand which solar equipment will help them best.

One more note we should make is that Kevin Bailey's work is not all about profits. In 2006, he started a non-profit organization, The Sky is Not Limited. This organization has worked to install nine wells in Tanzania since 2011, and has two more under construction. Bailey asks us to remember that there are a billion people in this world who have no access to clean water.

High Peaks Solar is at 180 Main Avenue Wynantskill, New York. The web site is highpeakssolar.com.

High Peaks Solar's high performance building with rooftop solar and many efficiency features that make it possible to procuce the energy they need for both the store, as well as the owner's home, which is above the store.

COMMUNITY SOLAR NEW YORK

Community Solar NY Solarize Workshops

Community Solar New York is offering their Creating and Implementing Your Solarize Campaign training program to those interested in the Solarize NY initiatives that are available. The training workshops prepare communities to implement a group purchasing campaign through the Community Solar NY initiative.

A pre-requisite for communities that wish to participate in the second round of Community Solar NY, these workshops are very valuable. Solarize experts will discuss how to create a successful Solarize campaign. This includes how to develop a strong campaign team and outreach strategy, tips for implementing a campaign over several months, and lessons learned from previous Solarize campaigns in New York State and nationwide.

All applicants must attend one of the following Solarize Workshops in order to be eligible for a Community Solar NY award https://training.ny-sun.ny.gov/.

- **October 15, 2015 NYC - Manhattan**
- **November 4, 2015 Finger Lakes - Geneva**
- **November 5, 2015 Western New York - Buffalo**

All program information can be found by visiting the NY-Sun webpage, ny-sun.ny.gov/Community-Solar.

Additional info can be found at nyserda.ny.gov.Or you can email them at communitysolar@nyserda.ny.gov with questions about the program.

Deadline Approaching for Local NH Solar Power Discount Program

Alert: Chester and Derry, New Hampshire

SOLAR UP NEW HAMPSHIRE
Solar Makes Sense.
www.SolarUpNH.com

Exeter, NH. -- The deadline is fast-approaching to participate in a discounted solar power program in the towns of Chester and Derry. Solar Up New Hampshire is a community-supported initiative that offers a discount on the installation of solar photovoltaic arrays in a designated area. After a competitive bidding process, New England-based ReVision Energy was selected as the preferred vendor for both towns.

The tiered pricing structure depends on the number of participants and is available for contracts signed by a November 30th deadline. Each higher tier represents a greater per watt system discount. The program is nearing tier three of a five-tiered pricing structure, though it is expected to eventually reach tier five. At its highest tier, the discount will translate to an approximate 6% savings on an installed system. The incentive is in addition to a 30% federal tax credit and a state rebate up to $2,500.

ReVision has received more than 200 inquiries for Solar Up site evaluations. The company's first installation in the Chester-Derry program was completed this month on the home of Dave Ciarla. Thirty grid-tied solar panels were installed on the Derry home. The nine kilowatt solar array will produce approximately 11,250 kilowatt hours per year and will translate into an annual savings of approximately $1,800.

Derry, NH was chosen as a community for a new solar program, in July, 2015. Chester was chosen to be a Pilot Town for Solar Energy in mid July 2015, as well. To learn more about these solar initiatives, visit the Solar Up New Hampshire website.

Ciarla says his family's decision to adopt solar power was driven by financial and environmental considerations. "Every sunny day is like watching a faucet running," said Ciarla. "You're seeing the energy going to waste. Environmentally speaking, it feels good to know that I'm going to be relying on the sun and not someone's fossil fuels."

To learn more about Solar Up New Hampshire, go to www.SolarUpNh.com. ReVision Energyhas four locations throughout New Hampshire and Maine. Their website is: revisionenergy.com.

ReVision Energy

Dave Ciarla's solar-powered home in Derry, New Hampshire. Photo courtesy of Revision Energy.

Lithium Battery Technology
Energizes the Renewable Storage Market

By Luke Simmons

Advancements in battery technology have revolutionized consumer electronics over the past decade, making them smaller, lighter, and able to last longer on a single charge. Recently, lithium battery technology has made its way into renewable energy storage applications, offering a safer, smarter and more reliable option to those living off the grid or with backup for important loads in a grid outage.

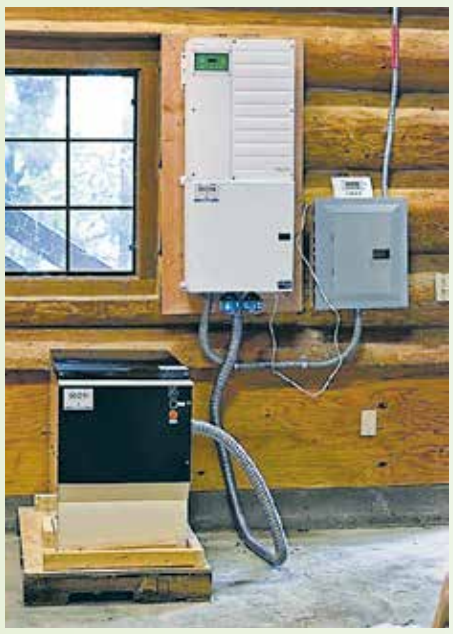
The lithium ion battery was first used commercially in the 1990's, employing a lithium cobalt or lithium manganese chemistry. These first-generation lithium ion batteries have higher energy density than other battery types like nickel-cadmium, which has led to a revolution in mobile technology. The lithium ion battery was originally commercialized by Sony for use in their hand-held consumer camcorders and was later utilized by Motorola in the first StarTac flip phone. This was a major advancement over the large form factor of the nickel-cadmium battery used in the first generation of cell phones. The challenge with lithium cobalt and lithium manganese batteries is they are volatile and prone to thermal runaway which can lead to fire or explosion. A modified lithium chemistry - lithium iron phosphate - has been recently developed, which is both safer and better suited for the home energy market.

In a lithium iron phosphate (LiFePO4) battery, oxygen molecules travel to and from the battery electrodes during the charge and discharge process. In a lithium cobalt or lithium manganese battery, the oxygen molecule travels alone between the electrodes. In the lithium iron phosphate battery, the oxygen molecules are bonded with an element in the electrolyte, so they never travel alone. Fewer loose oxygen molecules of the lithium iron phosphate battery leads to an inherently safer chemistry. The lithium iron phosphate battery is much less likely to ignite if they are mishandled, and a lithium iron phosphate battery will only "steam" under misuse rather than explode. This factor is critical for home safety.

Additionally, an integrated safety system is a requirement for every lithium iron phosphate battery. The "battery management system," or BMS, keeps constant tabs on cell temperature, voltage and current by using a sensor attached to each cell. If a level is detected that is outside normal operating conditions, a built-in contactor will disconnect the battery from the source circuit. Further, the BMS can log data on an external memory card, helping technicians diagnose any technical issues that may arise. This data can also be used by the end user to track battery performance over time. Next-generation battery management systems will connect to the Internet to allow for remote monitoring of battery performance and state of charge.

> In the second quarter of 2015, the U.S. energy storage market had its best quarter in two and a half years, with 40.7 MW of energy storage being deployed ...

With the advent of saver batteries, the market for battery storage for grid applications is booming in the United States. In the second quarter of 2015, the U.S. energy storage market had its best quarter in two and a half years, with 40.7 megawatts of energy storage being deployed, according to a report by Green Tech Media Research and the Energy Storage Association. The debut of the Tesla Powerwall in 2016 is only expected to promote this growth.



AC Coupled 48V Lithium Battery. Iron Edison Photo courtesy of Iron Edison

Iron Edison Battery Company has also witnessed this growth, seeing record demand for its lithium iron phosphate battery in 2015. The demand has led Iron Edison to start assembling their own lithium iron battery in Colorado, with a roll-out in the last quarter of 2015.

As the market for battery storage continues to emerge in the United States, the lithium iron phosphate battery will be at the forefront. Lighter, smarter, safer and more reliable, Lithium batteries are poised to be the chemistry of choice for renewable energy applications in the 21st century.

Luke Simmons is a system designer and sales manager at Iron Edison Battery Company. He is NABCEP-certified in PV technical sales and specializes in both grid-tied and off-grid renewable energy systems. He can be reached at (720) 432-6433 or luke@ironedison.com.

Solar with Storage in Affordable Housing

cont'd from p.8

> *"Economic analysis makes a case for increased investment and incentives for solar plus storage in affordable housing to serve critical power needs."*

solar. In some cases, the addition of batteries improves affordable housing project economics by generating significant electric bill savings through reducing utility demand charges and creating revenue by providing grid services.

"The consequences of losing power are stark, especially for low-income residents, the elderly, and disabled," said report co-author Robert Sanders, Senior Finance Director at Clean Energy Group. "In markets where these favorable economics exist, there is no excuse to leave low-income and vulnerable people at risk from power outages in the future."

The report's findings should encourage housing developers to seriously consider installing solar+storage technologies to protect residents from future power outages and to reduce their buildings' overall operating expenses. Resilience for Free recommends that states like New York, where the economics of solar+storage are the least favorable of the three cities studied, should consider new energy storage incentives to better protect their most vulnerable residents.

"Policymakers should implement more targeted incentive programs to encourage solar+storage deployment in low-income communities now, so we don't wait another decade for the benefits of these technologies to trickle down to the those in need, as happened with stand-alone solar," said Seth Mullendore, a project manager at Clean Energy Group and co-author of the report. "With storms of Sandy's strength expected to make landfall more frequently in the future, there's no time to lose."

The full report is available online at bit.ly/CEG-resilience-report.

Clean Energy Group will be hosting a webinar on this report on October 29th. Details on this free webinar are available at bit.ly/CEG-resilience-webinar.

Clean Energy Group is a leading national, nonprofit advocacy organization working on innovative technology, finance, and policy programs in the areas of clean energy and climate change. For more information, visit www.cleanegroup.org.

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

USDA Rural Development offers opportunities to producers to develop biofuels 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 Small Scale RE Incentive Program, administered by Renewable Energy Resource Center (RERC), provides funds to help defray the costs of new solar thermal and advanced wood pellet heating systems. For more information: www.RERC-vt.org or call (877)888-7372

SOLAR THERMAL INCENTIVES – BASED ON RATED CAPACITY OF SYSTEM

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

Pellet Heating

- Advanced wood pellet heating systems -- $2500 per boiler (+$500 if an audit is completed and +$500 if the system includes at least 20 days' worth of pellet storage).
- **Details at 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.

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 $2,500 in incentives - using participating* contractors

Appliances (must be ENERGY STAR)

- Dehumidifiers - $25 mail-in rebate
- Clothes Washers - $40 rebate for CEE Tier 3 qualifying models, $75 rebate for ENERGY STAR Most Efficient
- Refrigerators - $40 rebate for CEE Tier 2 Refrigerators, $75 for CEE Tier 3 & ENERGY STAR Most Efficient
- Working second refrigerators or freezers are potentially eligible to be picked up. $50 incentive to retire old units.
- Clothes Dryers - $50 to $400 rebate on select ENERGY STAR models

Heating/Cooling

- heating systems - se EV*
- solar hot water - $950 rebate post installation
- heat pump water heater - $400 rebate or point of purchase discount
- energy efficient central AC and furnace fan motor - up to $100 mail-in rebate
- central wood pellet boilers (excluding outside wood systems) - $2,000

Residential New Construction

- enroll in Residential New Construction Service – up to $2,000 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 – up to $400 rebate on qualifying ENERGY STAR models
- 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.

Category 1:

- Less than or equal to 100 kW AC.
- New Solar PV = $0.50/Watt AC or 25% of total project cost, whichever is less.
- Expanded Solar PV = $0.50/watt AC capped at $2,500 or 30% of system cost. whichever is less.
- New Thermal (total size of less than or equal to 15 collectors) = $0.12/rated or modeled thousand Btu/year or 25% of total cost, whichever is less.
- New Thermal (total size of greater than 15 collectors) = $0.07/rated or modeled thousand Btu/year or 25% of total cost, whichever is less.
- Expanded Thermal = $0.04/rated or modeled thousand-Btu per year or 25% of total cost, whichever is less.
- Maximum incentive in combination with other incentives received: Rebate in combination with other rebates or grants received from the utility or other programs, including other state, local or federal programs, shall not exceed 40% of the total cost of the system (Does not include federal tas credits).

Category 2:

- Maximum 500 kW AC and greater than 100 kW AC.
- New Solar PV = $0.65/Watt AC or 25% of total project cost, whichever is less.
- Expanded Solar PV = $0.30/Watt AC or 25% of total project cost, whichever is less.
- Maximum incentive in combination with other incentives received: Rebate in combination with other rebates or grants received from the utility or other programs, including other state, local or federal programs, shall not exceed 40% of the total cost of the system (Does not include federal tas credits).

Contact Elizabeth.Nixon@puc.nh.gov

PLEASE NOTE: Changes are anticipated for the solar PV residential program and the solar C&I program. For Info contact executivedirector@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

- Rebates for solar electric/thermal projects 100kW (or thermal equivalent) or less
- New Solar PV = $0.75/Watt AC or 25% of total project cost, whichever is less.
- Expanded Solar PV = $0.50/Watt AC or 25% of total project cost, whichever is less.
- Solar thermal = $0.12/kBtu for systems of 15 collectors or fewer ($0.12/kBtu for systems of greater than 15 collectors) or 25% of total project cost, whichever is less.
- Expanded Solar Thermal = $0.040/kBtu/yr or 25% of total project cost, whichever is less.
- Maximum incentive in combination with other incentives received: Rebate in combination with other rebates or grants received from the utility or other programs, including other state, local or federal programs, shall not exceed 40% of the total cost of the system (Does not include federal tas credits).

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

PLEASE Check for UPDATEs With NHEC.

Commercial Solar Thermal (Hot Water)

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

Commercial Solar PV

1. $0.50 per watt up to the lesser of 15% of installed cost or $20,000

Commercial Fossil Fuel Program

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.

2. 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

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), Eversource or a participating Municipal Light Plant community. .

Residential Rebate: $75/per collector X the SRCC thermal performance rating of the collectors (pls refer to kBTU/ panel/day for Category C, Mildly Cloudy climates)

Metrics for typical SHW system for 2-4 people, 2-panel roof-mounted plus 80 gal solar tank: materials/installation costs = $10,000, MA CEC residential rebate = $3860 including • Adder for moderate home value or for moderate income. MA State Tax Credit (use only once) = $1000, Federal Tax Credit (30% system cost) = $3000, Net Cost = $2100 **Visit http://www.masscec.com/programs/commonwealth-solar-hot-water**

MASSSAVE HEAT LOAN SHW

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

ENERGY 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 W. 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.**

MASSACHUSETTS SOLAR LOAN PROGRAM

Mass Solar Loan focuses on connecting homeowners who install solar electric systems with low-interest loans to help finance the projects.

The $30 million program, a partnership between the Massachusetts Department of Energy Resources (DOER) and MassCEC, will work with local banks and credit unions to provide financing to homeowners interested in solar electricity. DOER's program design will work with banks and credit unions to expand borrowing options through lower interest rate loans and encourage loans for homeowners with lower income or lower credit scores.

Since 2008, the solar electric industry in Massachusetts has grown into a robust economic sector with over 1,400 businesses and 12,000 workers, with enough solar electricity installed in the Commonwealth to power more than 100,000 homes.

Mass Solar Loan will continue to grow this sector, while allowing more homeowners the ability to achieve the cost savings and environmental benefits of this clean, renewable energy source. **www.masscec.com/programs/mass-solar-loan**

DEPT 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 MA SREC POLICY

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

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.

More information can be found at: http://bit.ly/Mass_SREC_II

NEW YORK

RENEWABLE ENERGY INCENTIVES OFFERED THROUGH nyserda

New York State Energy Research and Development Authority.

- Business & Industry
- Communities & Governments
- Partners & Investors
- Cleantech & Innovation
- Residents& Homeowners

DISCOVER YOUR HOME'S ENERGY WASTE

Getting a home energy assessment can help you take control of your energy costs. It can identify where your house is using the most energy and which improvements would have the biggest impact on your bottom line. Heating and cooling costs frequently account for 50% of residential energy bills. Identifying your energy waste can lead to big savings.

Visit: nyserda.energysavvy.com to get an energy assessment

RENEWABLE ENERGY INCENTIVES OFFERED THROUGH NY-SUN

http://ny-sun.ny.gov/

NY-Sun is structured around customized Megawatt (MW) Blocks targeted to specific regions of the state. To learn more, see the Megawatt Block Incentive Structure.

Residential and Small Business

http://ny-sun.ny.gov/Get-Solar/Residents-And-Small-Business

Commercial and Industrial

- http://ny-sun.ny.gov/Get-Solar/Commercial-and-Industrial

Community Solar

- http://ny-sun.ny.gov/Get-Solar/Community-Solar

Find a Commercial/Industrial Solar Installer

- http://ny-sun.ny.gov/For-Local-Government/Local-Government

Find a Residential/Small Commercial Solar Installer

- http://ny-sun.ny.gov/Get-Solar/Find-A-Solar-Electric-Installer

Financing Options

- http://ny-sun.ny.gov/Get-Solar/NY-Sun-Financing

Clean Power Estimator

- http://ny-sun.ny.gov/Get-Solar/Clean-Power-Estimator

NY-Sun is structured around customized Megawatt (MW) Blocks targeted to specific regions of the state. To learn more, see the Megawatt Block Incentive Structure.

The Megawatt (MW) Block Dashboard provides real time information on the status of block and current incentive levels by sector and region. Block status is updated as applications are submitted, so click the refresh button to see the current status.

https://www.powerclerk.com/nysuniinitiative/dashboard.aspx

Heat Saver Loan

Vermont Department of Public Service Announces the Heat Saver Loan Website Launched to Encourage Home Energy Improvements

The Vermont Public Service Department announces the launch of a new website to help Vermont home owners learn about and access the Department's Heat Saver Loan. More than $1 million of energy saving projects have been financed using Heat Saver Loans since the program officially launched in October 2014.

The Public Service Department, Efficiency Vermont, Opportunities Credit Union and Vermont State Employees Credit Union (VSECU) are working together to help Vermonters prepare for the upcoming heating season. As Vermonters prepare to button up their homes and replace or improve their heating systems, the recently launched HeatSaverLoan.com website has all the program details to help homeowners learn how to finance qualified home energy projects.

The Heat Saver Loan currently offers interest rates that range from 0% to 4.99% based on an applicant's household income and loan terms for loans up to a maximum of $35,000 and 15 years. Available statewide through Opportunities Credit Union and VSECU, Heat Saver Loans can typically be approved within two days for qualifying heat saving projects installed by Efficiency Excellence Network qualified contractors or an eligible solar hot water or wood pellet system installer.

Commissioner Chris Recchia noted, "Vermonters pay an average of about $2,500 annually to heat their homes, and many face uncertainty with the widely variable prices of propane and heating fuel. The Heat Saver Loan provides an excellent tool to enable Vermonters to reduce and make their heating bills more consistent while also improving the comfort of their living spaces. These improvements are also critical as Vermont strives to reduce greenhouse gas emissions."

Heat Saver Loans can be used to finance home energy improvements that include any of the following:

High efficiency oil or propane furnaces and boilers (and in certain cases, natural gas furnaces and boilers)

- Cold-climate heat pumps
- Central wood pellet-heating systems
- Solar domestic hot water systems
- Weatherization improvements
- Health and safety measures, and repairs needed for the specific type of approved thermal system and energy efficiency measures

For program details, see www.HeatSaverLoan.com.

The Heat Saver Loan is the result of a partnership between the Vermont Public Service Department (including the Clean Energy Development Fund) and the Vermont Low Income Trust for Electricity (VLITE) along with the Efficiency Excellence Network and EfficiencyVermont under the Thermal Energy Finance Pilot Program announced in 2014

HEAT PUMPS: HOW THEY WORK AND WHY THEY ARE SO EFFICIENT

By Jake Marin, Efficiency Vermont HVAC Program Manager

When most people think of electric heat; efficient and inexpensive are not the first words that come to mind. However, with current heat pump technology, this is exactly what you get. In Vermont, air- source heat pumps (also known as mini-splits or ductless heat pumps) have garnered a lot of interest as Vermonters continue to struggle with controlling the cost of heating their homes.

Unlike most heating systems, mini-splits do not burn anything or use electric resistance to generate heat. As the name suggests, a heat pump transfers or "pumps" heat from one place to another. How does it work? I often explain heat pumps as an air conditioner working in reverse. Air conditioners do not make cold air. Instead, they extract heat from inside a building and "pump" it outside, leaving the air cooler. A heat pump is doing the same thing; just in the opposite direction.

The illustration below shows how heat is taken from the air outside, compressed, and brought into the house at a high temperature. There is a significant amount of heat to be extracted from cold outdoor air, even during a Vermont winter. Because they move heat rather than generate heat, cold climate heat pump systems consume much less energy than traditional electric, propane, or oil heating systems. By efficiently capturing the heat energy in the cold outside air, heat pump technology has become a realistic heating option for cold regions, like Vermont.

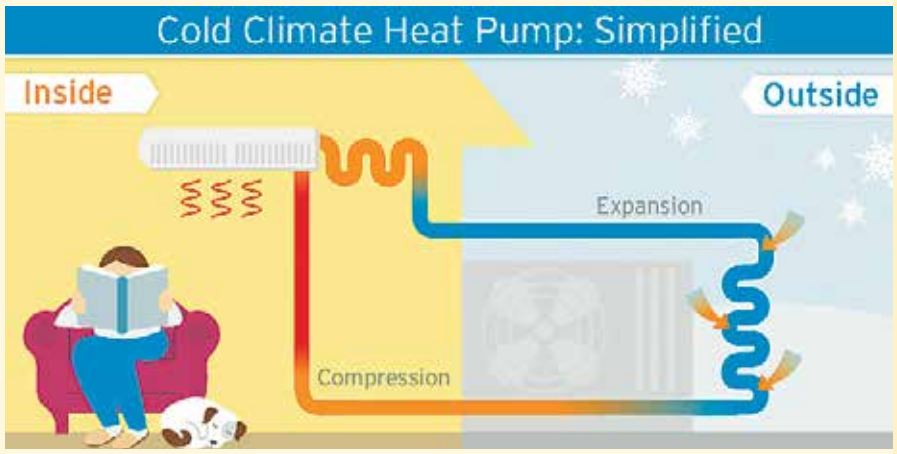


Image courtesy of Efficiency Vermont

HEAT PUMPS: NOT JUST FOR HOME HEATING

Heat pump technology is found in a variety of new innovative products. For instance, until recently, electric water heaters and clothes dryers have been big energy users in a home, but heat pump technology makes these appliances much more efficient.

At Efficiency Vermont we've excitedly watched this technology develop. The potential energy cost savings that heat pump products can provide to Vermonters is huge, and we've jumped at the opportunity to make these savings attainable. We're currently offering rebates or discounts on ENERGY STAR® 2014 Emerging Technology Award-winning heat pump clothes dryers, heat pump water heaters, cold climate heat pumps, and anticipating additional offerings as more products become available in Vermont.

System Type	Discount/Rebate Amount
Heat Pump heating & cooling system	$300 to $400 OR GMP Customers can lease a system with up to 7 months free from Efficiency Vermont
Boiler or Furnace	$500
Central Wood Pellet Boilers	$2,000 plus an additional $2,500 from the Clean Energy Development Fund: http://publicservice.vermont.gov/topics/renewable_energy/cedf
Heat Pump Water Heater	$400 point of purchase discount at a Participating Distributor, OR $400 Rebate for a retail purchase
Solar Water Heater	$950 Post-Installation rebate
Home Air Sealing and Insulation	Up to $2,100 in incentives per household

CHOOSING HEAT PUMPS FOR YOUR HOME: WHAT TO EXPECT

If you heat with electricity, the U.S. Department of Energy estimates that a heat pump can trim the amount of electricity used for heating by as much as 50%. If the heat pump is displacing (offsetting) the use of a fuel oil or propane heating system, actual energy savings will depend on the costs of the combustion fuel relative to the cost of electricity. Like any heating system, heat pumps work most effectively in buildings with high levels of thermal efficiency. Basic improvements in your home, such as proper air-sealing and insulation are therefore recommended before installing any heat pump technology.

If you are choosing a new clothes dryer with heat pump technology, these units are about 20% to 60% more efficient than their standard issue counterparts. Heat pump water heaters cost about 50% to 65% less to operate than traditional electric resistance water heaters. These water heaters are estimated to save as much as $3,250 over the lifetime of the equipment.

More information about heat pump technologies and available incentives: efficiencyvermont.com.

DIGEST THIS™

By Alexander Kuno

Magic Hat® brings PurposeEnergy™ to digest waste and create energy

Above: PurposeEnergy's Tribrid-Bioreactor™ at The Magic Hat Brewery. Rt: Brewery waste before and after it is processed by PurposeEnergy's Tribrid-Bioreactor™. Photos Courtesy of Alex Kuno of PurposeEnergy, Inc.

In Vermont, the craft brewing scene is exploding! Beer drinkers from far and wide are flocking to Vermont to experience for themselves some of the most creative and flavorful craft beers in the country. While consumers get to enjoy the fruits of that labor, what they don't see behind the scenes is just as important to keeping the industry thriving. Brewing beer is water-intensive and produces high volumes of waste water that require treatment. Magic Hat Brewing Company is the first brewer in the country to partner with PurposeEnergy to design and implement a wastewater solution that turns brewing waste into renewable energy, and ultimately reduces their environmental impact.

Magic Hat Brewery in South Burlington, VT, produces nearly 180,000 barrels of beer a year. Every barrel of beer produced results between 90 and 150 gallons of byproduct wastewater, all of which runs through the custom designed and built PurposeEnergy Tribrid Bioreactor™ The MIT grads behind the PurposeEnergy technology have engineered a cutting edge system to reduce organic waste, convert byproducts to renewable energy and remove pollutants from the wastewater. For environmentally-minded brew masters such as Chris Rockwood, having a single on-site system that accomplishes all these tasks lets the brewers focus on what they do best – make great beer. "It makes my job easy," said Rockwood. "I don't have to worry about occasional batches of spoiled beer and the impact of everything that goes down our drains…the guys at PurposeEnergy do that for me."

"The waste water we take from the brewery (wash water, floor drains, yeast and trub) hits our digester at a measure of about 20,000 mg/L [biochemical oxygen demand – a measure of pollutants in water], on average, which is organically 100x stronger than household waste," said PurposeEnergy's Vice President of Sales Todd Hasselbeck. "By the time it leaves our digester, we have cleaned the water to less than 100 mg/L. Along with large reductions in phosphorus, this helps keep Lake Champlain clean and reduces algae blooms that feed on the organic material."

Cleaning wastewater is not the only way that the best-of-class PurposeEnergy system sustains the environment. This innovative wastewater system also produces bio-gas-derived electricity and high-nutrient fertilizer. A pump circulates the yeast, grist and hops that flow from the brewing process into the Tribrid-Bioreactor™ where they are efficiently converted to carbon-neutral biogas. The biogas is then shuttled to a 300 kilowatt power plant that provides electricity to the brewery and heat to the anaerobic process. PurposeEnergy Digester operations co-manager Alex Kuno explains that methane produced in the Magic Hat digester can satisfy between 30% and 40% of the brewery's electricity requirements when burned in their on-site biogas generator. "And as for the solids, since there is so much high-strength waste going into our patented digester, about once every eight weeks or so, we 'decant' the solids that have been broken down and settled to the bottom of our digester. A local farmer will use that organic material as fertilizer to grow corn and beans."

Together, these benefits allow the brewery to operate more efficiently, with less environmental impact, and at a significant cost savings. Which lets the brew masters at Magic Hat and PurposeEnergy achieve their true passion, which is to "save the world, one beer at a time."

Alex Kuno works for PurposeEnergy and is the co-manager for the biodigester operation at Magic Hat Brewery.

Many thanks to our Sponsor

Sustainability in the Vineyards: Fresh Tracks Farm

By Michelle Harrison

Solar pv & geothermal power, heat & cool the winery.

Autumn is upon us and the harvest season is here. A great way to enjoy the scenery is relaxing in a comfortable chair and taking in the foliage along with some local wine. Growing and caring for grapes can be challenging, but Fresh Tracks Farm in Berlin, Vermont, has found the answer while incorporating sustainable practices on the winery and farm.

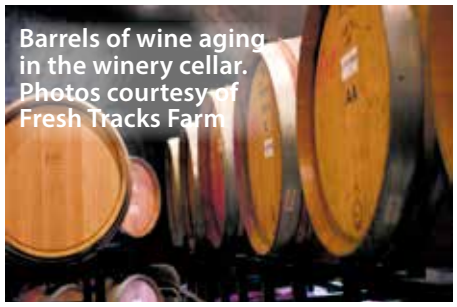
Christina Castegren, proprietor of Fresh Tracks Farm, tells us the key to growing grapes in the New England climate is choosing the right variety. Fresh Tracks started with 17 types and has narrowed it down to 6 cold-hardy varieties.

Fresh Tracks has also taken on the challenge responsible and sustainable farming. After the harvest, the grape pomace is recycled through composting throughout the farm. The 8.1 kW solar system installed in 2009, is adjusted seasonally to maximize production and support the winery's electrical needs. A geothermal system maintains cellar temperatures of 55ºF in the winery and heats and cools the tasting room.

While wine is the primary business of Fresh Tracks, they also sustainably harvest firewood for use at home and the Sugarhouse Round, which has 1000 trees tapped to make maple syrup and maple wine. They also raise chickens for eggs and have a very large vegetable garden used by all of the staff.

When your travels bring you through the Dog River Valley of Vermont, be sure to stop by Fresh Tracks Farm and Winery. Visit the state-of-the-art tasting room and enjoy other events hosted at the farm. You will be glad you did.

Fresh Tracks Farm is located at 4373 VT-12, Montpelier, Vermont. The farm's web site is freshtracksfarm.com.



Barrels of wine aging in the winery cellar. Photos courtesy of Fresh Tracks Farm

The harvest ready to crush at Fresh Tracks Farm.

Cheesemaking in NE

Cheese making. Cheddaring: breaking the curd. Photo: Flickr

A great way to welcome the autumn harvest sustainably is to share a nice glass of wine or mug of beer from our local wineries and breweries.

cont'd on p. 35

WOODSTOCK INN & BREWERYS'
Sustainable Brewing

By Green Energy Times Staff

Left: The Woodstock Inn Station & Brewery at 135 Main St., No. Woodstock, NH.
Below: The restaurant area with heat pump units on the ceiling.
Photos courtesy of Scott Rice, owner of the Inn.

Almost two years have passed since we had an article on the Woodstock Inn, Station and Brewery in North Woodstock, New Hampshire. We wanted to revisit the inn with special focus on the brewery.

The inn has two solar systems, one photovoltaic (PV) and one thermal. The PV system provides for the electric needs of the inn and brewery, as 90% of the heat comes from five air-to-air heat pumps. The solar thermal system provides hot water. Altogether, solar power provides for about 70% of the energy.

The buildings are energy-efficient. The building envelopes were built, sealed, and insulated to high modern standards. As usual, this implied a need for heat-recovery ventilation. There are, however, complications for energy use, and in this sense a brewery is rather like an industrial plant.

Brewing beer starts with malt, grain that has been allowed to begin sprouting, and then has been dried. As the grain starts to sprout, it produces enzymes that will convert the starch in the grain to sugars, which yeast can ferment. The malt has to be "mashed," which means that it is steeped in hot water, for the starch conversion to happen. The resulting liquid, with sugar in it, is called "wort." It is boiled for an hour or more to produce the right flavor. Then it is quickly cooled to the correct temperature for fermentation.

All of these processes use energy. Boiling a thousand gallons of wort for an hour is not a trivial matter. The power for this part of the operation is provided by propane. Cooling things off requires energy also. Clearly efficiencies are called for.

One efficiency results from the facts that water for mashing has to be heated and that the wort has to be cooled quickly after it is boiled. The wort and the incoming water are put through a heat exchanger, so the heat from the wort pre-heats the water for mashing. Because the wort has to be cooled quickly, a plate heat exchanger is used with metal plates whose large surface allow for rapid transfer of heat.

The wort is then further cooled to the correct temperature. The water that got much of its heat is stored in an insulated tank until it is needed.

Of course, there are other matters of ecological interest besides cooling and heating liquids. Breweries create spent grain by the ton. The grain still has enough nutrition in it to be useful. For that reason it is often used for feeding farm animals. The Woodstock Inn's grain is used at Meadowstone Farm, in Bethlehem, New Hampshire, where it is used to feed chickens. Any excess grain beyond what the chickens will eat is composted.

Woodstock Inn, Station and Brewery's beer is distributed throughout New England.

DEHYDRATING TAKEN UP A NOTCH
With a Solar Oven

Recipe courtesy of Anne Patterson

Preserving summer's bounty in dried form has great appeal. It is less work than canning and takes less space for storage or carrying along on those autumn hikes. Sweetness and color blend for great kid appeal.

The solar oven is the answer. It is the only truly off-the-grid, no-fossil-fuel cooking appliance. The solar oven's low cooking temperatures are a perfect fit for the 170ºF-200ºF range which is ideal for dehydrating fruits and vegetables, slow-cooking, and baking. We recommend cooking on a screen or mesh instead of a tray or a pot (unless you're making leathers as in the recipe below) and prop the lid open ¼" to allow moisture to escape.

Anne Patterson, CEO of Solavore, maker of the Sport solar oven, cites beet jerky as one of her favorites. But her latest find takes solar dehydrating up a notch, out of the snack bag and on to the hors d'oeuvre table with tomato basil leather caprese bites. See the recipe below from Solavore contributing blogger Elizabeth Van Huffel at localsavour.com. It is a deceptively simple fruit leather to make.

Tomato Basil Leather Caprese Bites {Made with Sunshine}

Servings: 8-10 1" strips Prep Time: 10 minutes Cook Time: 5-6 hours

Ingredients

- 1 pound fresh tomatoes
- 2 tablespoons fresh basil
- 1 teaspoon granulated sugar
- 1 teaspoon olive oil
- ½ teaspoon kosher salt
- 18-20 small balls of fresh mozzarella cheese

Instructions

Chop tomatoes if needed and place all of the ingredients (except the cheese) into a blender and pulse until well combined –– about 45 seconds.

Cover a half sheet pan with tin foil and pour tomato mixture out onto the pan. Spread out evenly onto the tinfoil. Place into your solar oven and let cook for 5-6 hours or until firm and cooked through.

Remove from the oven and let cool in the pan. Take foil out of the pan then using a flat spatula push the edges of the leather off of the foil. Gently peel back the leather until it is completely removed from foil. Lay out flat onto a piece of parchment paper and slice into 1" strips.

Using a skewer or pick, layer the leather between the cheese balls and push through to hold together. Continue the process until all of them are made and serve.

Kudos to the Hopkinton Fire Station

Above: Hopkinton Fire Station, NH; far rt: Froling pellet boiler at Hopkinton Fire Station; Rt: Pellet fill. Photos courtesy of Chief Doug Mumford, Hopkinton Fire Dept.

By Green Energy Times Staff

The Town of Hopkinton, New Hampshire, recently did a number of energy upgrades at the fire station on Pine Street. Among the upgrades were replacing lights with advanced LEDs, super-insulating the station itself, and installing a new biomass heating system fueled by locally-sourced wood pellets. The biomass system was installed by Froling Energy, a member of NHCTC. Froling Energy is a leading full service biomass company located in Peterborough, New Hampshire.

The installations have earned Hopkinton kudos from far and wide. Whenever a town invests carefully in energy efficiency and renewable energy, it is very likely to save local taxpayers money and boosts the local economy. Hopkinton's investment not only is good for local home owners and businesses, but also provides for continuing employment in the area. In addition, by cutting carbon emissions and other pollution, it is good for the environment and the world.

Among those who came personally to the fire station was George Pataki, a former governor of New York and currently a candidate running for nomination by the Republican Party to be President of the United States. Jim O'Brien, Chairman of the Hopkinton Select Board, commented, "We are pleased to welcome the Governor to Hopkinton and show him our newly renovated and energy efficient fire station. We are very proud of these improvements which will save energy and our taxpayers money."

Kate Epsen, Executive Director of the New Hampshire Clean Tech Council (NHCTC) said, "The NHCTC is a bi-partisan advocacy organization led by business leaders from throughout the state. We are thrilled to welcome Governor Pataki to visit a great example of a town taking control of its energy future and installing technology provided by one of our member companies and to discuss these important issues with us. We recognize our unique opportunity to engage with potential Presidential candidates from both parties and hope Governor Pataki's visit continues our series of these important conversations about energy and this thriving economic sector."

The recent New Hampshire Cleantech Market Report, an economic review conducted for the NHCTC, illustrates the clean technology and energy sectors' importance in providing employment. Cleantech is one of the fastest growing sectors in the state economy, and its wages are high. Approximately 15,000 New Hampshire residents are currently working in it, a number that will almost certainly increase.

The New Hampshire Cleantech Market Report can be found at http://bit.ly/1FZg1yu.

CONSIDER THIS:

According to data in the *New Hampshire Cleantech Market Report, if NH could achieve the kind of relatively more efficient relationship between total energy expenditures and economic activity as Massachusetts (which is a leader in New England and the nation in cleantech), then NH citizens and businesses would have spent $2 billion less on energy in 2012 for the same level of economic output.

And where would that $2 billion have gone? Mostly back into the state's economy in other areas, boosting producers of other goods and services and incentivizing job creation.

**Excerpted from the New Hampshire Cleantech Market Report. Read more at the NH Sustainable Energy Association (NHSEA) website: nhsea.org or download the full report pdf at http://bit.ly/1FZg1yu, page 15.*

ENERGY TIDBITS *by George Harvey*

Climate Change. A new Citigroup report says the fossil fuel reserves that need to be left in the ground if the world is to meet its targets of trying to limit global warming to 2° C could be valued at $100 trillion. But 2° C is not as safe as we had thought just 10 years ago. (8.17.15)

Renewable Energy Storage. The Imperial Irrigation District is getting ready to build one of the largest battery storage systems in the western United States. It will help the utility deal with power fluctuations, but the battery could help keep the grid operating during a big blackout. The 30-MW battery complex will use lithium-ion battery technology. (8.17.15)

Transportation. Five solar projects along the Massachusetts Turnpike and Route 3 are not the biggest in the state, but they are among the most visible. They are striking examples of a solar industry that has grown more rapidly than most policy makers ever imagined. They will produce a combined 2,500 kW, enough for about 500 homes. (9.8.15)

Wind. The opening event for the K2 Wind project in Ontario took place on September 3. K2 Wind is expected to provide enough power each year for about 100,000 Ontario homes. With the commissioning of K2 Wind, Canada is one of only seven countries in the world that have 10 GW or more of installed wind energy capacity. (9.15.15)

Energy Storage. Toyota now collects more than 90% of the nickel-metal hydride batteries used in its hybrid cars, and is trying to bring that to 100% collected. After the batteries are collected, some are recycled, but from an environmental perspective, it's even better if they are reused. Right now, some have a second life in Yellowstone Park. (9.18.15)

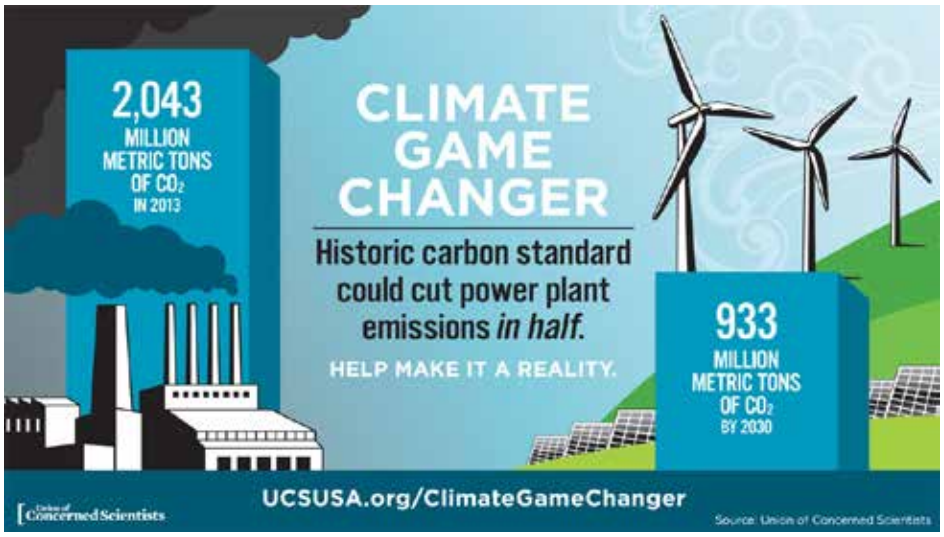
Renewable Energy. Aspen, Colorado has weaned its electric power from fossil fuels and is running 100% on renewables, the third city to do so after Greensburg, Kansas, and Burlington, Vermont. Aspen's "Canary Action Plan" commits to reducing the community's remaining greenhouse emissions 30% by 2020 and 80% by 2050. (10.12.15)

Climate Change. A report examines two sources and asks whether they should be sold at all without subsidies. It concludes that the subsidies supporting coal mining in Australia and in the Powder River Basin in the US are "distorting the market, driving up emissions, and acting as a barrier to entry for cleaner energy sources." (9-17-15)

Climate Change. Two extensive studies showed major US business organizations have knowingly undermined health, safety, and even lives of real human beings in regards to climate. One study looks at ExxonMobil's actions; the other says nearly half the world's 100 largest companies obstructed climate change legislation. (9-18-15)

Read up to date Energy News, daily, on our website: www.greenenergytimes.org.

Energy Efficiency and The Clean Power Plan



The Clean Power Plan is a historic and important step in reducing carbon pollution from power plants that puts energy efficiency front and center as an important strategy for meeting state goals. For years, energy efficiency strategies have been widely used by states because they can substantially and cost-effectively lower energy demand and carbon dioxide emissions from the power sector. The Clean Power Plan will not only expand these practices – it offers flexible compliance options, providing states a wide array of ways to use energy efficiency to meet their state goals, regardless of the state plan approach chosen.

Energy efficiency programs make perfect sense for states; they have low costs and large potential. Our analysis projects that, in every state, demand-side energy efficiency programs will be a significant component of state compliance plans under the Clean Power Plan. Because energy efficiency is not assumed as part of each state's goal, it can serve as kind of a "bonus" strategy for compliance – as many comments suggested.

And the energy savings achieved by these programs will not only help cut emissions, they will save consumers money on their electric bills. We project that the Clean Power Plan will spur a 7 percent reduction in electricity demand, reducing electricity bills by, on average, $7 per month for American families and businesses in 2030. The way we'll get there is through energy efficiency.

Here are ten ways that the Clean Power Plan encourages energy efficiency:

1. The Clean Power Plan encourages states to select energy efficiency as a compliance path to meet their goals, leading to cost savings for consumers.
2. With the final Clean Power Plan, EPA also proposed model rule text describing how states could credit energy efficiency.
3. Draft Evaluation, Measurement and Verification (EM&V) Guidance is available to help states effectively credit demand-side energy efficiency.
4. The final Clean Power Plan simplifies interstate accounting for energy efficiency compared to the proposal.
5. The Clean Power Plan's Trading-Ready concept facilitates interstate trading of Emissions Reductions Credits (ERCs) – including those issued for energy efficiency – without requiring formal agreements between states.
6. Under a mass-based approach, energy efficiency automatically "counts" toward compliance and states can use an unlimited amount to help achieve their state goals.
7. Under a rate-based approach, the final Clean Power Plan enables states to get credit for all eligible energy efficiency projects installed after 2012, a longer time frame than what was proposed.
8. Under a state measures approach, the Clean Power Plan allows state energy efficiency policies and programs to be used to meet the emissions guidelines, without requiring the state measures to be federally enforceable.
9. The Clean Energy Incentive Program (CEIP) provides additional incentives for early investment in demand-side energy efficiency in low-income communities.
10. The Clean Power Plan Toolbox offers resources to help states implement proven, cost-effective energy efficiency strategies.

A more detailed explanation of each item on this list can be found on our Energy Efficiency Fact Sheet at http://1.usa.gov/1PntSAH

Source: https://blog.epa.gov/blog/2015/08/energy-efficiency-and-the-clean-power-plan/

THE CARTOON INTRODUCTION TO CLIMATE CHANGE

By Grady Klein and Yorum Bauman, Ph.D.

THE WORLD'S FIRST AND ONLY **STAND-UP ECONOMIST**

Island Press, Paperback, 206 pages, $16

Book Review by N.R. Mallery

This is a great book with a different approach to explain climate change — the whys and what it's all about, as well as solutions. The authors present the material in a way that creates a serious sort of humor to this serious issue that we face today.

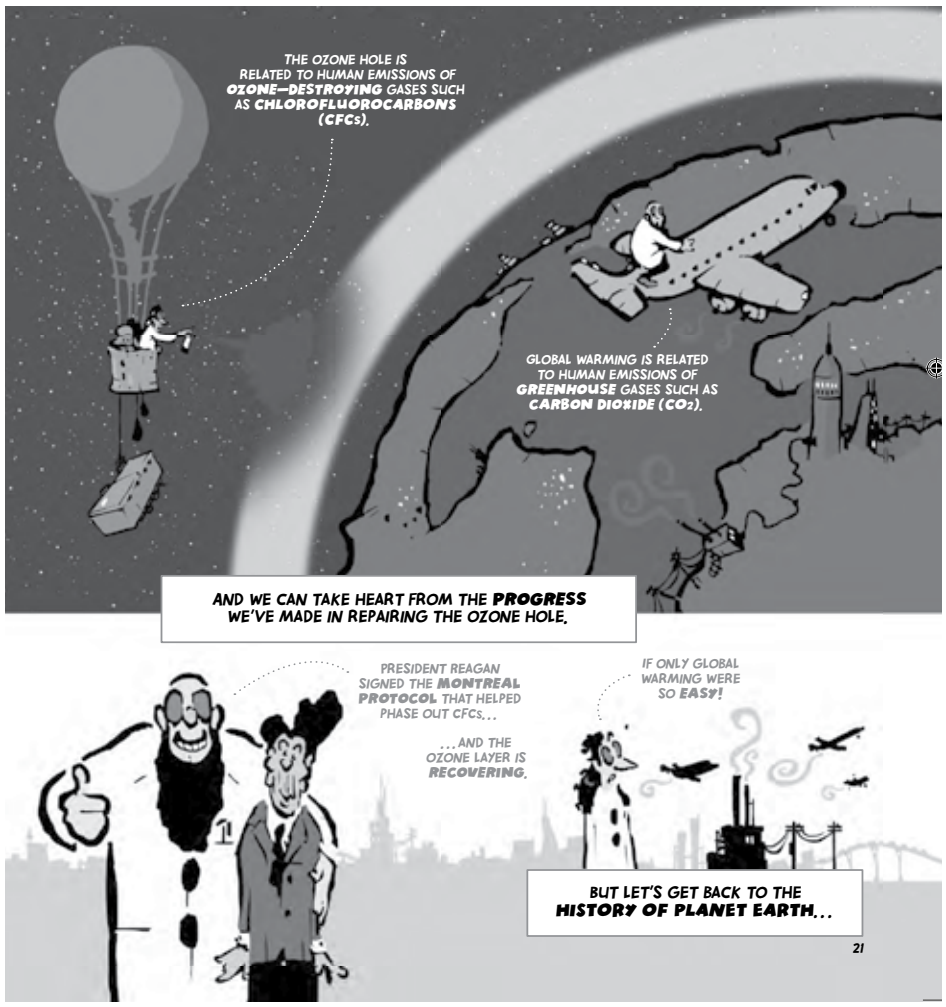
Yorum Bauman is a well-respected stand-up economist. He has appeared at energy related events in our region recently, such as at a Jordan Institute celebration in Concord, NH and also at the Renewable Energy Vermont (REV) Annual Conference in Burlington, VT, as the keynote speaker.

Grady Klein is a cartoonist, animator and graphic designer. He has co-authored numerous books and novels.

The authors have created an educational tool for both children and adults, and have done so with a Monty Python appeal that baby boomers might love.

The book covers the history and science behind climate change starting with the Milankovitch cycles and 90-year predicitons that may sound daunting, but by breaking down complex science with accessible comparisons - and good jokes — Bauman and Klein offer practical understanding of climate change and show us that we all need to be better citizens of the world. The content is based on the most recent Intergovernmental Panel on Climate Change (IPCC) report for the scientific data, consequences and insights.

For instance, under the subject, Policies, the authors simply head this section (starting on p. 160) as "…Market-Based Approaches like Carbon Taxes and Cap and Trade Systems." It is followed by cartoon illustrations that help the reader understand the topic with 'between the lines' comments. They go on to explain "The way these policies reduce pollution… is by making polluting expensive." Drawbacks are also comically illustrated with appropriate comments, again, with examples from British Columbia's success story. The authors conclude this topic with "…But what they all have in common is that the revenue can be put to good use." Then the illustration comments, "Those good uses are one of the side benefits of carbon taxes and …in addition to the main benefit of potentially saving the planet." They then go on to cover Cap and Trade as a separate topic.



The conclusion really nails many practical solutions by "looking at your own life… — at home, around town, on the road and by helping your own community and country by making smart decisions."

This book is a great read and way to show what the authors state, "It is time to change the world!"

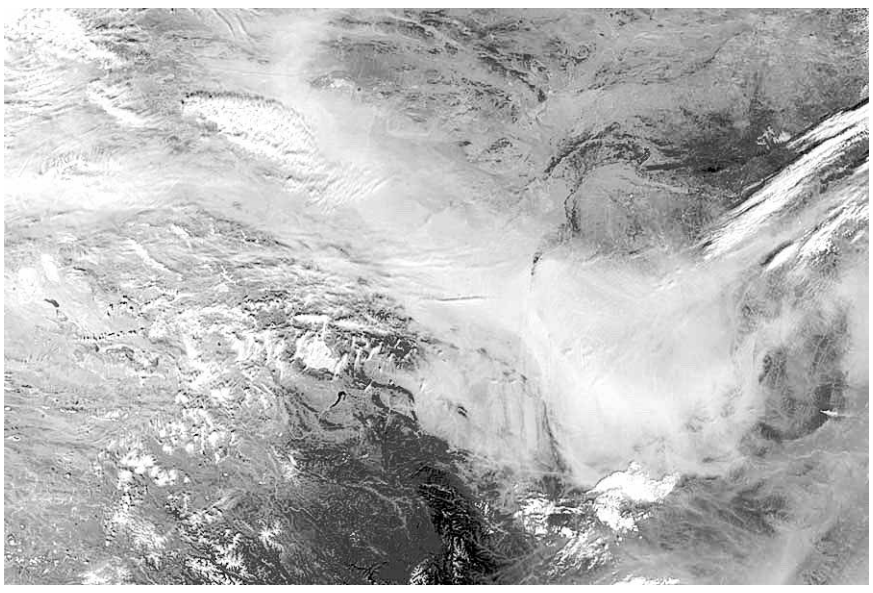
The Great *'Green'* Wall Of China

By Doug Moss & Roddy Scheer

Unlike the Great Wall of China, a 5,000-mile fortification dating back to the 7th century BC that separates northern China from the Mongolian steppe, the Great Green Wall of China—otherwise known as the Three-North Shelter Forest Program—is the biggest tree planting project on the planet. Its goal is to create a 2,800-mile long green belt to hold back the quickly expanding Gobi Desert and sequester millions of tons of carbon dioxide in the process. If all goes according to plan, the completion of the Green Wall by 2050 will increase forest cover across China from five to 15% overall.

The Chinese government first conceived of the Green Wall project in the late 1970s to combat desertification along the country's vast northwest rim. Soon thereafter, China's top legislative body passed a resolution requiring every citizen over the age of 11 to plant at least three poplar, eucalyptus, larch and other saplings every year to reinforce official reforestation efforts.

But despite progress—according to the United Nations' most recent Global Forest Resources Assessment, China increased its overall forest cover by 11,500 square miles (an area the size of Massachusetts) between 2000 and 2010, with citizens alone planting upwards of 60 billion trees—the situation is only getting worse. Analysts think China loses just as many square miles of grasslands and farms to desertification every year, so reforestation has proven to be an uphill battle. The encroaching Gobi has swallowed up entire villages and small cities and continues to cause air pollution problems in Beijing and elsewhere while racking up some $50 billion a year in economic losses. And tens of millions of environmental refugees are looking for new homes in other parts of China and beyond in what makes America's Dust Bowl of the 1930s look trivial in comparison.



Dust storms in the Gobi Desert (as seen from space) highlight the need for China's Great Green Wall. Credit: NASA

"The desertification of north and western China is arguably the most under-reported environmental crisis facing China today and is little understood outside the circles of NGOs [non-governmental organizations] and groups of scientists who are desperately fighting against it," reports Sean Gallagher, an activist with Greenpeace. While climate change is certainly a big factor, Gallagher adds that overgrazing, water mismanagement, outdated agricultural methods and the swelling of human populations are also contributing to this wholesale conversion of the region's once arable and habitable landscapes into sand dunes. "In China, approximately 20% of land is now classified as desert or arid, and desertification is adversely affecting the lives of over 400 million people in China alone."

More recently, the Green Wall project has taken on additional importance for its potential as a "carbon sink" to store greenhouse gases that would otherwise find their way into the atmosphere and exacerbate global warming. But critics point out that it's hard to quantify just how much carbon the Green Wall can store, and that plantations of fast-growing non-native trees going in as part of the project don't store as much carbon as more diverse, naturally occurring native forests.

Regardless, the Chinese government is already talking up the Great Green Wall as key weapon in its arsenal to fight global warming and as proof to the rest of the world that China is taking strong steps to mitigate carbon emissions. With completion of the Great Green Wall still 35 years out, only time will tell how effective it will be as a solution for some of China's (and the world's) most vexing environmental problems.

Contact: UN Global Forest Resources Assessment, www.fao.org/docrep/013/i1757e/i1757e.pdf.

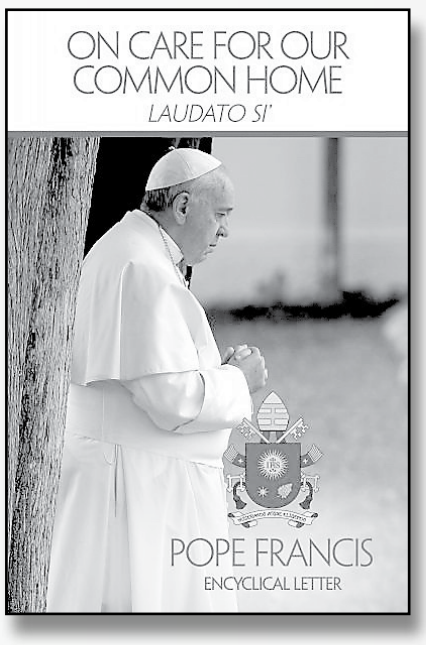
POPE FRANCIS SPEAKS OUT ON CLIMATE CHANGE

ON CARE FOR OUR COMMON HOME (LAUDATO SI) POPE FRANCIS ENCYCLICAL LETTER

By Pope Francis, Melville House Publishing, 2015, 165 pages, paperback, $14.95

Book review by Tammy Reiss, with quotes from the text.

Stock markets and economists are closely watching how consumers will respond to the landmark encyclical letter from Pope Francis, "Encyclical on Climate Change and Equality: On Care for Our Common Home." In it, the Pope shows us the toll a "global economy" is having on Earth.



His insightful and informative words are grounded by scientific data. The letter is an appeal to the ethical and moral side of humanity and is meant to unite and incite action from all of us, regardless of station, and of all faiths or no faith. We're asked to use science and religion to start a fruitful and intense dialogue. "As often occurs in periods of deep crisis which require bold decisions, we are tempted to think that what is happening is not entirely clear."

The 246 numbered paragraphs read as a call to preserve human dignity and quality of life and a guide on how to do it. It speaks to all generations, from this generation's "disconnected youth" to "Baby Boomers."

We are repeatedly asked to face reality and take an honest look at ourselves. We are shown how consumerism bereft of social and ecological awareness will be our undoing if we don't act immediately. "Our freedom fades when it is handed over to the blind forces of the unconscious, of immediate needs, of self-interest, and of violence."

The reader is given suggestions on how to become a happy, sustainable consumer. We see how we can show a conviction to protect Earth and the environment.

Many references are made to developing renewable energy globally and a need for adequate storage technologies for energy. Emphasis was placed on informing the reader. Coal, oil and natural gas are clearly highly polluting forms of energy and need to be replaced immediately. Though it is mentioned that gas is less polluting than other fossil fuels, the Pope does not let the industry off the hook. Many paragraphs speak directly to industry and our wastefulness.

The letter also thanks all who work to save us by protecting the environment from human exploitation, like the work being done to slow the oil and gas industry's ever expanding infrastructure, which we can see clearly in horizontal hydro-fracking. "When a project may lead to a greater use of natural resources, higher levels of emissions or discharge, an increase of refuse, or significant changes to the landscape, the habitats of protected species or public.....[t]he culture of consumerism, which prioritizes short-term gain and private interest, can make it easy to rubber-stamp authorization or conceal information."

Will Pope Francis' words of love for our common home and its inhabitants fall on deaf ears or will his words move us to do our part to make a difference? "Obstructionist attitudes, even on the part of believers, can range from denial of the problem to indifference, nonchalant resignation or blind confidence in technical solutions. We require a new and universal solidarity."

Tammy Reiss is a conservationist and focuses her attention on the local region of central New York, where she lives. She teaches and promotes energy efficiency and independence through renewables in the Marcellus Shale regions of New York State.

A CONSUMER'S GUIDE TO SOLAR

Empowering people to make informed choices

By Matthew Myshkin, 33 pages, available online, $4.99

Book Review by George Harvey

This is a small book. The Kindle edition is only 49 pages. The pdf edition has only 33. It has many illustrations. I read slowly, but I could finish it during a coffee break.

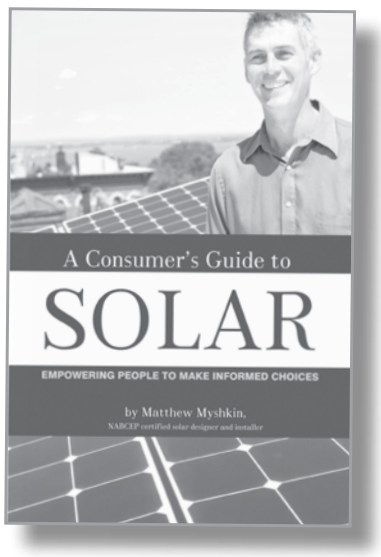
This book's few words are easy to understand. A person with no special background can take it in with little effort. But each sentence may have important value.

The cost of a solar system is not trivial, as anyone thinking about installing one should know. Even though the amount the system can save may be much greater than its cost, it is very likely worthwhile to think things over for a few extra minutes before making the investment.

The cost of this book ($4.99) is trivial compared to the value it could have for anyone considering installing a solar system. The time it takes to go through it is similarly trivial.

It is not merely a consumer's guide. It is a guide for a complete novice. Nevertheless, it is probably a good book for nearly everyone, regardless of familiarity with the subject, because it can be used almost as a checklist of things to keep in mind. And I would really like to know if anyone can spot anything missing. Certainly, I cannot (though honestly, I am not known for such things).

With all I have read about solar installations, I do not feel like a complete novice. Nevertheless, the book had things in it I probably would have forgotten or overlooked if I were having a system installed. An example is remembering to check that the installer has insurance, just to avoid liability issues if there is an injury during the course of the work. I feel almost certain that I would have missed that point.



I would recommend this book to anyone involved in a solar installation, even the solar installers. They might benefit from knowing it is available, so they can guide potential customers to it. An informed customer is less likely to feel disappointed in good work done by an expert.

The one issue I have with the book relates to its design. You might call me old fashioned, but I like books printed on paper. The format for the book is such that it should be printed on sheets with four pages each. The number of pages is not divisible by four, and implies allowing three blank pages in the print copy. And I am sorry if anyone is disappointed by that objection. It is the best I can offer.

A Consumer's Guide to Solar is available at Amazon through www.aconsumers-guidetosolar.com.

ENERGY TIDBITS

by George Harvey

Climate Change. The summer of 2015 is Earth's hottest on record, according to NOAA. The meteorological summer of June, July, and August saw its highest globally averaged temperature since records began in 1880, with record highs on both land and sea. Scientists had predicted a record-breaking summer based on computer modeling. (9-19-15)

Climate Change. It seems a lot of people have talked about a "global warming hiatus," but no one really knows where the idea came from. Now, papers have been published by two different groups of researchers showing there never was a pause in global warming. NASA says 2015 will most likely break the record for the warmest year on record, the second record-breaking year in a row. (9-20-15)

Renewable Energy. One day, Hillary Clinton announced that she opposes building the Keystone Pipeline. The next day, she released her energy infrastructure plan. The first item in the plan was repairing and upgrading existing pipelines. The words, "solar" and "wind" do not appear in the plan at all. (9-24-15)

Renewable Energy. Scotland has already surpassed its target of generating 500 MW of locally and community owned renewable energy by 2020. Scotland's Energy Minister announced that the country had achieved its goal five years ahead of schedule by installing 508 MW of community and locally owned renewable energy capacity. (10-8-15)

Energy Efficiency. For every dollar spent on energy efficiency last year, Michigan ratepayers realized benefits of $4.38, according to a report from the Michigan Public Service Commission. Between 2010 and 2014, the state's Energy Optimization program cost a total of about $1.1 billion; because of the investment, the lifetime savings to all ratepayers will be $4.2 billion. (10-12-15)

Read up to date Energy News, daily, on our website: www.greenenergytimes.org.

DEEP ENERGY RETROFIT

Bulk Water Management in Basements and Crawlspaces

By Michael Goetinck

Over the course of this summer I did a lot of rot-related repair work. This fall I've done several energy audits in houses with "bulk water" problems. The sources ranged from basement flooding (three to four inches of standing water) to roof-related leaks, to continual soaking of siding and steps. The necessary repairs and corrective measures range from excavation to correcting flashing details to mitigating splash. All of these problems could have been avoided through proper attention at the time of original design or construction. I this article, I'm going to review some common basement problems and what to do about them. In the next few articles I'll discuss roofs, siding, and steps.

Basement flooding is a common enough occurrence that many homeowners assume that it's inevitable or unavoidable. This may have been true when rubble stone or dry stone foundations were the norm, but dry basements and crawlspaces are possible with materials and techniques available today. The water can be managed externally, internally, or both.

External water management can be accomplished by installing gutters that capture water as it runs off the roof and direct it away from the building. The down spouts can be tied to a perimeter drain if it exists. The most appropriate gutters for our region are metal gutters with a top or cover that allows leaves, twigs, snow, and ice to run over the top of the gutter while still allowing the water to enter and be carried through to the exit drain. These gutters have sturdy attachments which prevent them from being torn off by snow or ice.

If the basement is getting flooded because of ground or surface water, the most effective means of keeping the basement dry is to install an exterior perimeter drain at the footing or base of the foundation. The ditch should be lined with landscape fabric to prevent sediment from clogging the pipes. Leave enough extra fabric to be able to fold the cloth back over the trench after it's been filled. The pipes should be as close to the base of the foundation as possible and pitched ¼ inch per foot all the way to daylight or a catch basin. The trench is backfilled with crushed stone and the landscape cloth is then folded back over the filled trench. It can be top-dressed with finer stone or soil and grass (although this is less effective than leaving the stone exposed).

Internal basement water management assumes that some water is going to get past the external drainage or that external drainage is not practical or possible. The most effective method I've come up with is to use drainage mat on the walls and floors of the basement to collect and direct water to a sump which drains to daylight. If that isn't possible then a pump can be installed to move the water out of the sump. The drainage mat is then covered by a vapor barrier, which in turn is covered by rigid insulation (typically polystyrene) on the floor and dense pack cellulose in a framed wall around the perimeter. The walking surface can be either wood or concrete installed on top of the rigid insulation. In the case of a house with a small year-round spring running in the basement, I supplemented the drainage mat with four-inch perforated drain pipe.

As a courtesy to your neighbors, please make sure you're not directing any of your bulk water toward their house or driveway. If surface run-off or a daylight drain is going to cause them to inherit your water install a catch basin well below grade.

Wet basements and crawlspaces affect the entire house. They can lead to structural problems; mold and mildew; and poor indoor air quality in conventional and high performance construction, in some cases to the point where the house can become uninhabitable..

Michael Goetinck is the owner of Snowdog Construction, Ltd, in Norwich, VT. This series will continue in Green Energy Times, *where the author will cover other topics that can help achieve the deep energy measures which help buildings' energy performance, and so can benefit us all.*

Above top: Sump.
Above bottom: Catch Basin.
Above right: Back-filling exterior drainage.
All photos courtesy of Michael Goetinck, Snowdog Construction, Ltd.

Components of an interior drainage system: drainage mat on the walls and floor; rigid insulation and vapor barrier on the floor prior to pouring the concrete slab; a sump hole.

Coming Soon To a College Near You

The R.W. Hitchcock Center Is Doing It Right!

cont'd from p.1

The Ecotone will connect the Visitor's Center to the classroom wing of the building with an artistic rendering of the Connecticut RIver Watershed stained into the concrete floor, reinforcing "connection to place". The tubes serve as first flush tanks for the building's rainwater harvesting water system. Credit: desingLAB Architects.

zero energy use. But the center's leadership believed net zero energy had to be surpassed, given the center's mission. As they worked with Wright Builders and Design Lab Architects, they became increasingly drawn toward the LBC standard for educational reasons.

Julie Johnson, the Hitchcock Center's executive director, commented on how the center used the LBC standards to make them useful for teaching children. "It became crystal clear that given our commitment to environmental education, this was an opportunity to take a great leap to amplify our mission and use our building as a teaching tool," she said. "Each performance standard had an incredibly cool story behind it."

Sam Batchelor, of Design Lab Architects, also spoke of the standards that required him to design every piece of the building to make people aware of its impacts on the environment. "Our challenge throughout was to make sure that the building be about environmental literacy," he said.

An example of how a standard is used for teaching resulted from the LBC requirement for net-zero water use. The architecture makes the building its own watershed. Children who are present when rain begins to fall can see how the first flush of rainwater from the roof goes into acrylic tubes, where the dust, pollen, and tiny debris coming off the roof are trapped. By the time those tubes fill, the water is cleaner, and it then goes to storage tanks. It is filtered and purified naturally, before it is used in the building. After water is used, the gray water is passed into wetland areas of the environment around the building, instead of going to a waste treatment plant. The center uses composting toilets to complement the system.

There is a graphic display of the Connecticut River watershed rendered on the floor of the main room, so children can see how the building mimics nature. The operation of the building's net zero water system can be easily compared to the natural watershed of the river.

One unusual story of the new Hitchcock Center has to do with its history. In days gone by, the land was an orchard. As such, it was subjected to decades of insecticide use. In fact, it was still possible to detect the traces of lead arsenate in the soil. While the amount was below the legally allowed limit for human exposure, the center's leadership wanted to go past what was simply required and make the grounds absolutely safe for the children who would use them.

Since lead arsinate cannot be removed from the soil by any practical means, the soil was removed and used to fill below the parking lot. New soil, which was tested and found free of contaminants, was spread across the site.

Mark Ledwell is the project manager for Wright Builders. With his knowledge of building and LBC, he was able to provide a long list of details about the building's insulation, windows, heat, lighting, lack of thermal bridges, photovoltaics, and more. But he also reiterated an insight about the building's design. "The intention," he said, "is to showcase the environment." In this case, the environment includes the entire Connecticut River watershed and beyond.

Way-finding signage and engaging exhibits and displays will introduce experiential learning opportunities throughout the building, while reinforcing ecological principles. Credit: designLAB architects.

Tom Moore creates a Family Affair

By George Harvey

A module for the second high efficiency home being delivered. The first high efficiency modular home is in the background. Photo courtesy of Kika McArthur.

Tom Moore Builders has a new development in Vermont that stands out in more ways than one. The development's three homes are all being built for members of a single family. The largest is being built for the parents, and the other two are for two married daughters, with a site reserved for a third daughter. These are high performance homes, and examples of energy efficient construction.

The family is close and its members are very excited about the fact they will be living so near each other. The land for their homes was purchased by the parents. The engineering for the property was done by Champlain Consulting Engineers and the site work is by Island Excavating.

All three homes are oriented toward views to the north, and this makes the high performance of the homes challenging. The large areas of glass face north when you would optimally design them to face south. All three have views of a Vermont valley, the town of Hinesburg, and Lake Champlain.

The two daughters' homes are modular. People who are unfamiliar with modular construction might be tempted to think that means they are identical, but such is not the case. Though the underlying modular components are similar, the homes are custom-made, and not of the same design. Each has three bedrooms, but they are not the same size. One of these has a music studio, and the other has a third story finished attic. One is 2100, the other is 2560, square feet.

The modules were constructed by Preferred Building Systems (PBS), of Claremont, New Hampshire. Their modular construction provides a number of advantages. One limitation is that they need to be transportable. They need to be built and no wider than 13 foot 10 inch widths. They have the distinct advantage of being built in a plant, where the conditions are controlled. This means that they can be built to a higher standard than most construction done entirely in the field, and are unexposed to weather during manufacturing.

With site preparation completed, installation of the modular components of the buildings went very fast. It took about a day and a half for each set. Preferred Building has their own installation crew and crane, which assembled the modular sections, finished the roofs, and made the units water tight. At that point, Tom Moore Builders took over once more.

The homes were built to similar standards, and they are extremely energy efficient. The walls have six inches of dense pack cellulose. Three inches of EPS Silverboard has been put on the exterior. The foundation has three inches of

cont'd on p.29

Top right: A 15.25 kW solar PV array was installed by Sherwin Solar of Esssex Junction, Vermont.
Below on right: A high efficiency module being hoisted into place.
Photos courtesy of Kika McArthur.

cont'd from p.28

Dow insulating board. The flat ceilings have 24 to 30 inches of loose cellulose, and the sloping ceilings have seven inches of closed cell spray foal. Windows are triple-pane models from Paradigm.

The larger of the two modular homes has a Bosch Greenstar 151 Combi gas boiler, with an efficiency rating of 95%, and hot water radiators. The smaller home has a York two-stage high efficiency gas furnace, with an efficiency rating of 96%, and a three-zone system. Each home has a 50-gallon double insulated electric hot water system, and each has a separate drilled well. Electrical work was done by CAE, headed by Corey Estus, a company that has done many projects with Tom Moore Builders.

With the daughters' homes largely completed in September, and one family already moved in, construction started on the parents' home. Foundation digging started in September. This home is to be panelized and erected at the site, with performance standards even higher than those of the modular structures. Because it is being built entirely at the site, the process will take longer.

This home was not a candidate for modular because the sections are wider than 13 feet 10 inches. The foundation will be a VTICF-supplied Amvic ICF foundation with an R-value of 30. The walls will be framed with double two-by-fours constructed 12 inches on center with 12 inch dense-pack cellulose insulation having R-43 value. The windows will be European tilt and turn and triple pane, with very high insulation values.

Electric power for the homes is provided by a solar array on the site. With three homes drawing power from the array, each having its own electric meter, the project's power is group-net-metered. Dave Bonta, who founded the USA Solar Stores, worked on the project personally, with the Sherwin Solar Store in Essex Junction, Vermont.

The array has sixty Astronergy modules of 255 watts each, for a total capacity of 15.25 kilowatts. The system has three Kaco Blue Planet transformerless inverters. The solar array is mounted on DP&W racking, which can be adjusted seasonally. The seasonal adjustment provides up to 20% more energy than a fixed mount of the same capacity, but is nowhere near as expensive or complicated as solar trackers. Electrical work and installation of modules and inverters were done by Sherwin Solar Store.

A Home Bio-digester Produces Bio-gas for Cooking from Food Scraps

FROM FOOD WASTE TO NUTRITIOUS COMPOST FOR GROWING FRESH VEGGIES, THE SYSTEM COMPLETES THE CIRCLE

By Kathy and Edward Puffer

Bio-gas produced from a home bio-digester is used fro cooking by a family in Tillson, NY

What's in your basement? Furnace, shelves, boxes of stuff you forgot you had?

We are the Puffers in Tillson, New York, and we have all of that too. But we have one more thing. In one corner of the basement, where we never got around to putting in a kitchen and bathroom setup, we have something even more interesting.

It looks like an insulated box with pipes and tubes stuck into it, and it bubbles and belches as if it came from the mind of a mad scientist. In one end, we put our food scraps. Out of the other end, we get excellent, organic liquid compost. And out the top, we get enough methane gas to cook just about all of our meals.

Say hello to the world's first indoor residential twin bio-digesters, in the Hudson Valley of NY.

Anyone who gardens knows it is important to keep a compost pile for vegetables and garden waste. The form of composting usually done in a compost bin is aerobic, meaning "with air." It is actually less effective than an anaerobic system that is essentially a big plastic stomach with the air sealed out. In an anaerobic digester, the microbes are able to produce even-more-nutritious compost. And it also gets you cooking with gas.

The first seeds of our basement project were sewn in 2013, when we met Professor Thomas Culhane of Mercy College. He is a champion of biogas as an alternative to the wasteful and polluting fossil fuels that the world has come to depend on, and he saw our basement as the ideal place to bring his concept to life (yeah, he's the mad scientist in this story, but he's mostly harmless). His first installation is at his home in Germany, where it works very well, but it is outdoors and therefore freezes solid during the winter.

In the spring of 2014, Professor Culhane brought a team of students to Tillson to set up our system. Two IBC tanks sit in the basement, full of horse manure. An Insinkerator food grinder sits beneath the kitchen sink to break up all food waste we put into it. The plumbing is re-routed so that, whenever we want, everything that goes down the kitchen sink will flow into one or both bio-digesters. A Raspberry Pi [a type of single-board computer the size of a credit card] is installed to record the temperatures inside the tanks (top and bottom) and outside.

With constant in-tank temperatures around 90ºF, and a good feeding every day or so, the active microbes from the horse manure eat the food waste and burp out about 500 liters of methane gas every day. The gas flows through tubes and outdoors to a heavy-duty plastic bag made by EDPM. For cooking, there is more tubing that brings the gas to a Shenzen Puxin Technology GB/T3606-2001 two-burner gas stove in the kitchen.

That's just the gassy benefit. The solid matter that goes in and is eaten then becomes a highly-nutritious liquid compost. This is known as bio-slurry, although some of us with a nose for fine wine like to call it Compeaujolais. It is the newest, freshest, most potent form of compost available anywhere.

The bio-slurry is fed to several "aeroponic" vertical gardens that produce basil, lettuce, tomato, parsley, beans, spinach, Swiss chard, and bok choy. Vertical aeroponic farming [sometimes called a type of hydroponic farming], like these made by AERO, Rethinking Growth, need only 5% of the water used in conventional farming.

Kathy runs comparison tests by growing vegetables using standard hydroponic nutrients, and she is seeking spectrographic analysis on why her bio-slurry results are spectacularly better. She sells aeroponic vegetables at a farmers market that is part of local Creative Commons (which uses a local currency called the "Current"). She is working with local officials to include household anaerobic digestion in building codes.

We also have an outdoor bio-digester that produces about 500 liters of gas per week. Gas from this unit is used on a grill for barbecues. Feedstock includes plant waste and chicken manure.

Kathy is a founding board member of Solar C3ities, Professor Thomas Culhane's organization. Solar C3ities has a demo in Westchester County at Yosemite Park that was facilitated by Paul Feiner. Children will use the anaerobic digester for disposing of food scraps. Gas will be used to grill on a gas barbecue.

Collecting the bio-slurry which is fed to several aeroponic vertical aeroponic garden systems produce fresh vegetables. All photos by Anne Coleman

Emerging Frontiers in Bioenergy: Vermont Bioenergy

Initiative proves biofuel potential for Vermont, concludes ten-year project

By Ellen Kahler

Vermont can produce more of its own biofuel energy, and the environmental and potential economic benefits of local bioenergy have been proven by the Vermont Bioenergy Initiative,a program of the Vermont Sustainable Jobs Fund. Since 2005, the Vermont Bioenergy Initiative has invested more than $2.5 million in innovative bioenergy research, projects, and people, so Vermont can locally produce more of the state's energy needs, from a variety of agricultural and algal feedstocks.

US Senator Patrick Leahy made the investment at this scale possible through awards from the US Department of Energy (US DOE). The funding concludes in early 2016, at which point a complete impact report will be released by the Vermont Sustainable Jobs Fund, which has served as the intermediary between the US DOE and 52 individual Vermont bioenergy projects over the past ten years.

Research, development, and early stage demonstration projects have included:

- Investing in two on-farm methane digesters;
- Building farm-scale infrastructure to turn oilseed crops such as sunflowers into biodiesel to run farm tractors;
- Growing switchgrass and densifying it into "pucks" that are burned in a high efficiency commercial boiler instead of using propane;
- Identifying the most lipid producing strains of native Vermont algae which can feed off the excess nutrients from methane digesters and can eventually be harvested to make biodiesel or jet fuel;
- Developing two "Biomass to Biofuels" college-level courses which run repeatedly at the University of Vermont and Vermont Technical College to inspire and train the next generation of bioenergy experts and technicians;
- Exploring bulk wood pellet delivery systems to Vermonters' homes;
- Organizing a number of learning opportunities and conferences for oilseed, grass and algae researchers, farmers and entrepreneurs to attend;
- Providing agronomic and engineering support to oilseed and grass farmers;
- Educating the general public about why the local production of energy crops for local use from Vermont farms and forests makes good economic and ecological sense.

The Vermont Bioenergy Initiative is a unique effort and one that is gaining resonance in other parts of rural America. The initiative's resource website, www.VermontBioenergy.com is utilized by biofuel producers, educators, and technical service providers from across the country.

The work conducted over the past ten years by the Vermont Bioenergy Initiative to conduct research, provide technical assistance, and develop infrastructure in emerging areas of bioenergy will continue with the initiative's partners at UVM Extension and the Vermont Agency of Agriculture, Food & Markets. As Vermont moves forward – with innovation and increasingly focus on generating renewable energy from the fields and forests – the research and infrastructure the Vermont Bioenergy Initiative has invested in over the past ten years will endure and spawn the next wave of bioenergy development in the state.

Learn more at www.VermontBioenergy.com.

Ellen Kahler is executive director of the Vermont Sustainable Jobs Fund, a non-profit organization created by the State of Vermont to help develop Vermont's sustainable agriculture, renewable energy, and forest product businesses.

VT Bioenergy Team at Green Mountain Power's Energy Innovation Center in Rutland, Vermont – left to right: Chris Callahan of UVM Extension, Kirk Shields of Green Mountain Power, Christy Sterner of US DOE, Larry Scott of Ekolott Farm, Ellen Kahler of VSJF, John Williamson of Stateline Biofuels

VT Bioenergy Team at Borderview Farm in Alburgh, Vermont – left to right: Roger Rainville of Borderview Farm, Christy Sterner of US DOE, Heather Darby of UVM Extension, Natasha Rainville of Borderview Farm

Permaculture Tips

Image: Wikimedia Commons

Planting Edible Landscapes

FOR A SUSTAINABLE FOOD SYSTEM

By David Fried, Elmore Roots Nursery

As you walk the hills and valleys of Vermont you will see apples, hazelnuts, butternuts, rhubarb, raspberries, juneberries and the occasional plum or pear tree. Almost every home, every farm, every road has some of these fruits and nuts growing. Long before "edible landscaping" became a popular idea, Vermonters knew and understood that fruits and nuts that come back every year without doing anything are good to have around.

Every spring we have to start our seeds, till or turn over our garden or field, and plant vegetables or grains. Plant a fruit tree or a nut tree once and it can provide bountiful crops for over a hundred years!

The squirrels, the blue jay, and the deer know it. They spread the seeds of the fruits or bury the nuts here and there, and voila! A fruit grove appears! Now they will have food to stock up on before winter. We can learn from these locals.

As I picked up a heavy nut yesterday, that had fallen from a black walnut tree, I told my visitor: "wow, I planted this tree 30 years ago and I have been harvesting walnuts for 20 years now and I don't have to do anything to feed or take care of it. The main thing is for us humans not to hurt the tree with mowers or vehicles or string trimmers and to protect them from animals when they are young."

Painting by Gabriel Tempesta, courtesy of David Fried

You don't have to be a squirrel to plant nut trees. Simply gather a nut or two (or a few handfuls), make a hole in the earth with a stick, and drop them in. "Double the height of the nut deep" is a good guide. You can plant them in forest clearings, in parks, or on the edge of fields. Imagine if everywhere we went, there were nut trees growing!

If you have a home and some land, you can plant them in October or November in garden beds or in a row, a few inches apart. Cover the nuts with a piece of hardware cloth (strong metal mesh) to keep squirrels and voles off the nut seeds. Mark the individuals or the rows with a stake, so you can remember where they are planted. When they come up in the spring, flag each one. You can move them to their permanent spot later, whenever the leaves are off the trees.

Although deer and other animals inadvertently plant apple and pear trees as they move about eating them, you will probably be happier planting a great proven cultivar from your local nursery; nurseries grafti the tastiest ones that have been proven already in your area. Fall is an excellent time to plant, as the ground is moist until summer. You have to water a lot less and your new trees will not be stressed by the heat of an oncoming summer.

Last week I designed a "forest edge snack walk" for a customer. As they leave their home for a walk, hazelnuts will on their left, and purple raspberries to the right. Going up their hill they will have the choice of pine nuts, haskaps and aroniaberries. In the wetter areas there will be elderberry and wild raisin to taste on their walk. Reaching the top of the hill, there will be a bench with a view between two apple trees.

This is the kind of homegrown sustainable food system that will not require any care other than keep a mowed or well-worn foot path, leading to the great outdoors and a trail with many interesting and tasty destinations along the way. Thirty years from now, these fruit and nut and berry plants will probably still be producing food. The deer, blue jays and squirrels may have exported some of their favorites over to your neighborhood by then, too.

David Fried has been planting and growing fruit trees and nut trees and berry plants and natives in Elmore, Vermont at Elmore Roots Nursery for 35 years. Learn more at www.elmoreroots.com or (802) 888-3305

A RULING FOR THE BEES

By George Harvey

The 9th Circuit Court of Appeals has ruled against the EPA's approval of the DOW pesticide, sulfoxaflor. Sulfoxaflor is one of a class of chemical poisons known as neonicotinoids, all similar in important ways to nicotine. They are used to control insect pests, and their use is widespread. Neonicitinoids are used on as much as 95% of our corn and soybean crops, and sulfoxaflor is just one of them.

A particular problem with neonicotinoids is that they are highly toxic to bees and may even be an important cause of honey bee colony collapse disorder. Loss of honey bees is an especially great problem because they pollinate a large percentage of our agricultural crops. A number of crops are largely or even entirely dependent on honey bees for pollination. Almonds are 100% reliant on them. Bees add an estimated $15 billion per year to agricultural production. Loss of honey bees is a serious economic problem.

The implications of use of neonicotinoids are really rather complicated. For example, according to New Agriculturalist online (bit.ly/insecticides-and-killer-bees) , the so-called "killer bees" from Africa are less susceptible to insecticides than European honey bees. One implication of this is that insecticides could help the spread of African bees that might replace weakened colonies of honey bees in the United States.

We should point out that sulfoxaflor is only one of the neonicotinoids, and the court ruling applies only to it. The others are more important commercially and agriculturally than it is, and they will continue to be used without any effects from the court case.

Clearly, we can get to a point where by eliminating the insects we find to be pests, we can eliminate insects that are absolutely necessary. Perhaps this has come because politics values corn and soybeans above almonds and bees. We need a better way to deal with our environment.

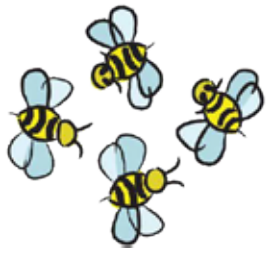


Image: mydailymaine field.com

GAMBLING with Natural GAS

Will Vermont Play Its Cards Right?

Union of Concerned Scientists – reprinted by permission

The decisions Vermont Governor Peter Shumlin makes in the near term could impact Vermont's energy future for decades to come—and Vermonters' pocketbooks as well. While natural gas has a potential role to play in the state's energy transition, too much natural gas—a fossil fuel—can be a problem. New UCS analysis shows that consumers in two-thirds of U.S. states may be at financial risk because of an over-reliance on natural gas. While Vermont doesn't have any natural gas plants within its borders, it is part of a regional electricity grid that is very dependent on natural gas. Vermonters: Write Governor Shumlin today and urge him to protect you and your fellow consumers by prioritizing renewable energy over natural gas in working to reduce global warming emissions in the region.

You can personalize, sign, and send a UCS letter to Governor Shumlin at bit.ly/letter-to-Shumlin-on-NG. General contact information for Governor Shumlin can be found at governor.vermont.gov/contact-us.

Make sure your state doesn't lock in a fossil fuel future

Union of Concerned Scientists – reprinted by permission

It's hard to escape the ads, you know the one: all blue skies with happy people talking about how clean natural gas is. And sure, it might be cleaner than coal, but that's not saying much. Natural gas is still a fossil fuel—producing and burning it creates global warming emissions. The prevalence of these ads is a sign of how critical this moment is for our energy choices. If we become too reliant on natural gas, we put ourselves at risk for increasing climate change and seeing natural gas price spikes. We have a great opportunity to make the switch to clean energy now—and avoid excessive investments in another fossil fuel that won't pay off in the future.

Fracked Gas – Not In Anyone's Back Yard

Green Energy Times

Vermont and New York have both banned fracking. For Vermont, the first state to ban fracking, the ban was largely symbolic because there are no known gas deposits that might tempt exploitation. For New York, however, the ban on fracking was more substantive, because it came as a law for a state with large reserves.

Notably, neither state banned importation of gas from fracked wells. There are some among us who regard that as hypocritical, especially as the percentage of fracked gas in the gas supply increases and there are moves to extend pipelines.

A study from Johns Hopkins University, published in the journal Epidemiology is sobering. (You can find the abstract at bit.ly/PA-fracking-study.) It shows that the increase in the number of fracking wells in Pennsylvania has been associated with significant increases with high-risk pregnancies and premature births.

We should consider the consequences of using fossil fuels, not only relative to climate change, but also to health impacts on people and the environment in the places where they are extracted, processed and transported.

LYME, NH ELEMENTARY

ON-GOING SUSTAINABILITY

By George Harvey

The Lyme Elementary School. Below: Froling wood pellet boilers at the Lyme Elementary School. Photos courtesy of Tarm USA.

Lyme, New Hampshire is a town with strong local interest in renewable power. The August issue of Green Energy Times had an article on Crossroads Academy's 40-kilowatt (kW) solar photovoltaic (PV) array. The same issue had a short article about the three communities in New Hampshire that had the greatest number of solar rebate permits, and Lyme was among them, despite its small population of only about 1700 residents. Lyme may arguably be the most solar-oriented town in the state.

Now it is time to turn to another school in Lyme, to showcase its accomplishments. The Lyme Elementary School has done a lot of work, not only on renewable electric energy, but also on both renewable heating and efficiency.

The start of any energy conservation program is identifying the most effective choices to make. Such planning should start with an energy audit, because it points out the specific steps that can be taken to produce savings. Efficiency is almost always the most important and least costly single step, but careful efficiency steps can be practically wasted, unless the whole is examined and the areas of greatest waste identified and addressed. Insulation does not help much if there is an open window.

The timing of the move toward efficiency and renewable fuel was important at the Lyme Elementary School because it was being done just as the size of its school building was increasing by about a third. After studying the alternatives, the school had a new heating system installed by Tarm USA. The old system, which would have been inadequate to the job of heating the school with its additional space, burned a lot of oil.

The new system consisted of two pellet boilers from Froling Energy, each rated at 350,000 BTUs. A level of efficiency is achieved by the fact that there are two biomass boilers. This means that one of them can be idle, when the temperatures outside are not very cold. The 9,000 gallons of oil previously used was replaced by eighty tons of locally produced wood pellets. A pellet silo was added to the building, and it can hold thirty tons of fuel. There is also a propane heater that can come on when the temperature is below ten degrees Fahrenheit.

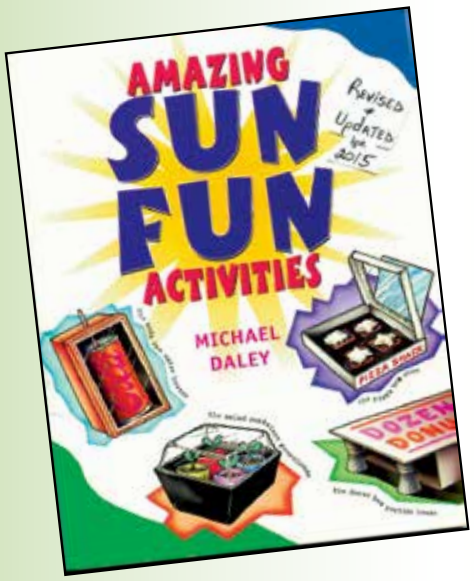
The combination of efficiencies and changes in the type of fuel used saved the school about $10,000 each year, according to the principal, Jeff Valence. Additionally, the school has received some support because the switch from oil to wood made it eligible for renewable energy credits, and because it could take advantage of the New Hampshire commercial boiler rebate, which was available when the boilers were installed. The boilers also have recording meters that keep a record of how much heat they have produced. The school is eligible for thermal renewable energy credits based on the figures reported by the monitors.

Lyme Elementary school also has its own solar array to provide it with electric power. The array has a capacity of 15 kW, which reduces the dependence on the grid for electricity greatly.

One of the advantages of having a PV system is that it can be used as a basis for additions to the school's curriculum, examining renewable power. Valence says that the school is currently examining how to integrate that. We might note that one of the great advantages of distributed power is that a class can take a field trip to the school's own solar array, without a drop of fuel being used.

Renewable Energy e-books for the Young at Heart

By Michelle Harrison



The topics of renewable energy and climate change are mature in nature. Trying to explain these concepts to young ones can be a challenge. Michael J. Daley can help you overcome this challenge with two great e-books, Amazing Sun Fun Activities and Racing the Blue Monarch. Both these books are fun, appealing to young readers, and educational.

Amazing Sun Fun Activities contains 117 pages of sun facts and activities aimed at students in grades 5 through 8. The many illustrations throughout the book are engaging to young readers. This book has a good mix of science, history, social studies, and math. There are several checks on learning sprinkled throughout the book. Mr. Daley shows readers how to turn many fast-food containers into solar projects.

The first chapters provide a fun and easy way to understand sun energy and the relationship of the sun to the earth. A history of solar architecture is given along with how the Greeks were the first to implement this science. You will learn how to make your own sun dial and experiment with greenhouse designs.

The middle chapters educate young readers on how to capture the sun. It relates this science to the history of how people got hot water long ago. Readers are shown how to make their own solar water heater. You learn how to graph results which is a nice blend of math skills along with the science and history provided.

One of the most fun activities is learning how to make a solar oven. This activity is a great way to illustrate how the sun can be captured. Different designs are examined to help increase the temperature of your oven. The use of insulation to achieve this goal is introduced.

The final chapters address heating your house with the sun using flat plate collectors and getting electricity from the sun.

Racing the Blue Monarch is 134 pages of thrilling fun geared for ages 12 and up. Scooter Cochran misses his brother, Eddie, who went off to Daytona. Eddie was a championship race car driver, and Scooter helped out in the pit. A scientist named Karl Henson visits Scooter's school sharing his concern about the world's use of fossil fuels. Henson shows a model of a solar race car called the Blue Monarch which peaks Scooter's curiosity. Henson needs a driver for the solar car race in Daytona. He recruits Scooter to this task. Scooter sees this as a way to be reunited with Eddie.

Henson is a wealth of knowledge regarding solar energy. Scooter (and the reader) learns how to address concerns about shading, storing energy, and capturing the sun. As Henson is working hard to improve solar technology, the big oil industry, headed by Kruger, is trying to bring him down. They want to buy Henson out and destroy the Blue Monarch, but Henson will not let him. Big Oil does not like to lose and comes up with another plan.

The reader quickly gets engaged in the subplots. What was the real reason Eddie left home? Will Big Oil win and destroy the Blue Monarch? Will the solar race be a success and who may win?

During the solar race Scooter notes the camaraderie among the different participants. They help each other for the bigger cause of showing solar technology can win. If solar wins, everyone wins by helping conquer climate change.

For more information about these e-books and others by Michael Daley, http://www.michaeljdaley.com.

SUN FACT

In 1880, the first solar-powered printing press went on exhibit in Paris. Crowds watched as 500 copies of the **Solar Journal** were printed, using sunshine for power. The sun's heat boiled water to make steam to run a steam engine that turned the press.

Integrating Sustainability into Teachers' Curricula

By Doug Moss and Roddy Scheer

Planting and tending a schoolyard garden is a hands-on way for students to learn about sustainability, the environment and healthy food choices. Credit: Gottfried not Bouillon, FlickrCC

Teaching our kids about sustainability and green living is one of the most important things we can do to safeguard the future of humanity and the planet we inhabit. The North American Association for Environmental Education (NAAEE) reports that environmental education teaches children how to learn about and investigate their environment and to make intelligent, informed decisions about sustainability. Furthermore, learning about the environment is multi-disciplinary, so it allows teachers rare opportunities to integrate different parts of curricula while challenging students to think about the big picture. Fortunately, teachers today have a plethora of resources for incorporating sustainability in their lessons and activities.

One great resource is Green Teacher, a quarterly magazine dedicated to helping educators promote environmental awareness among young people aged six through 19. The magazine offers perspectives on the role of education in creating a sustainable future and provides lots of ready-to-use activities. Green Teacher has also released a series of books, including Teaching Green: The Elementary Years, Teaching Green: The Middle School Years and Teaching Green: The High School Years, each of which contains over 50 of the best teaching strategies and activities published in the magazine over the past decade. These books contain kid-tested ideas contributed by educators from across North America and cover a wide spectrum of environmental topics, from biodiversity to resource consumption to green technology. Another one of Green Teacher's books, Teaching in the Outdoors, is a practical guide for getting students outside and includes helpful suggestions for maximizing their learning experience when they get there.

Another great resource is the U.S. Energy Information Administration's "Energy Kids" website, which provides teachers with energy related stories, hands-on activities and research articles for their classrooms. Free, easy-to-access lesson plans allow students from K-12 to have fun learning about different forms of energy and why some are better for the environment than others. The website also offers biographies of scientists that discovered the energy sources we use today, energy timelines that show how different energy sources and technologies have evolved, and stats on topics like what renewable fuel the U.S. uses most.

A more "hands-on" approach to getting students involved and concerned about their environment is to start a school garden—planted and tended by the kids themselves. According to KidsGardening.org, school gardens build an understanding of and respect for nature and our environment while motivating kids to eat and love fruits and vegetables. Gardening also teaches children to nurture and care for other living things while developing patience. KidsGardening.org provides a full step-by-step guide to help any teacher get a school garden off to a great start.

Meanwhile, more than 5,000 K-12 schools worldwide have teamed up to network about and integrate environmental

cont'd on p. 34

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 Vermont: 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 Power Rocks: Impressive data and info ,including per state. www.solarpowerrocks.com/
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…

BUSINESS LISTINGS

PIKA ENERGY

Contact: Chip Means at (207) 887-9105.
35 Bradley Drive #1, Portland, Maine.
Pika Energy's products capture and manage clean power, from home wind turbines to microgrid electronics.
Email: sales@pika-energy.com
http://www.pika-energy.com

CLASSIFIEDS

ADVERTISE IN GREEN ENERGY TIMES

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.

Sales Positions for VT, NH & MA. Experience preferred. Must be serious, self-disciplined and familiar with Green Energy Times - passionate about solutions for the planet is a bonus. Must have good communication skills. Work from home - for the sake of the planet. ***Serious inquires only.*** Send cover letter and resume to **info@greenenergytimes.org.**

SECONDHAND SOLAR

Sunnyside Solar Store's Secondhand Solar "There are Always deals!" Consignment and preowned renewable system equipment - Outback power board with two 3524 inverters with disconnects and breakers, some 2V and 6V batteries, Battery cables, Schlettler Ground Mount Racking system for up to 24 panels, Morningstar TriStar MPPT Solar Charge Controller (45A), one Evergreen 102W 12V PV solar panels - available only until sold. Sunnyside Solar Store, 499 Marlboro Road, West Brattleboro. (802) 376-3838 <carol@sunnysidesolar.com>

PERMACULTURE

Upcoming Educational Events with Sowing Solutions in Western MA: Nov 7th Full Day STRAWBALE CONSTRUCTION WORKSHOP; Next Summer PERMACULTURE DESIGN CERTIFICATION COURSE June 18th - 28th. www.PermacultureSeries.org

WIND TURBINE FOR SALE

One brand new still in crate Skystream 3.7 wind turbine package $9,000. 802-635-9435

INTEGRATING SUSTAINABILITY INTO TEACHERS' CURRICULA

cont'd from p. 33

best practices into their curricula, administration and facilities through the non-profit Green Schools Alliance (GSA). Membership in GSA is free, but requires a commitment to take action on any or all of three tracks: (1) reducing the member school's climate and ecological impact; (2) educating and engaging the local community; and (3) connecting to nature and place. No doubt, GSA is right when it asserts that schools are "hubs of their communities that build resilience, transform markets and policy, shift behavior, and prepare the next generation of innovators to become environmental stewards."

Contacts: Green Teacher, www.greenteacher.com; EIA Energy Kids, www.eia.gov/kids; NAAEE, www.naaee.net; KidsGardening.org, www.kidsgardening.org; Green Schools Alliance, www.greenschoolsalliance.org.

EarthTalk® is produced by Doug Moss and Roddy Scheer and is a registered trademark of Earth Action Network Inc. View past columns at: www.earthtalk.org. Or e-mail us your question: earthtalk@emagazine.com.

GUIDE TO ADVERTISERS:

Ingredient of the Month

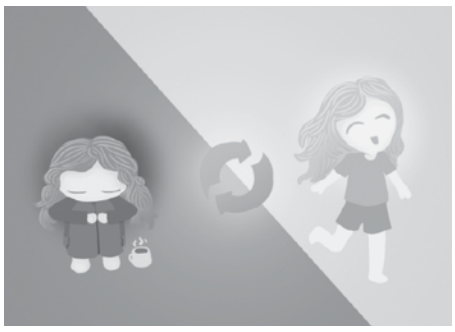
By Larry Plesant

FALLING BACK ON TIME

It's autumn again. Mind-boggling color schemes, frost on the zucchini and daylight actually getting shorter by three minutes a day. That's an hour of light loss every twenty days if my math neuron is still working. Not so easy to adjust one's body clock to the change. At least it happens just slowly enough for most of us to muddle well enough along into mid-November without seeing too much of the Seasonal Depression.

Nationally, Seasonal Affected Disorder or SAD affects 10 to 20% of the population. Those folks don't live in Vermont. And certainly not in Vermont valleys where terrain further limits the amount of sunlight. I can only report anecdotally that I believe the New England rates to be even higher than in the sunny flatlands.

So why the %$##@$@@**!! (etc.) does Vermont still use the now obsolete Daylight Savings Time system? Most people don't know it, but this is a state's decision to make and not a federal one. One good lobbying push and we can end the cruel and inhumane, sanity-bending, heart attack-raising and depression-inducing practice of mucking around with our liberty-loving clocks.



Seasonal depression. Photo Courtesy of But I Smile Anyway… at http://bit.ly/1Ndr6vp.

And I only hold mild opinions on the issue.

It's hard to bring about world peace or even to get the neighbor's dog to stop barking. But it is not all that hard in a small and close-knit state like Vermont to pass a law ending Daylight Savings Time in Vermont once and for all.

Or keep us on it. I don't care. Just stop tormenting us by mucking around with the clocks. Pick one. And stick with it. Clock changing is the psychological equivalent of waterboarding for a huge number of people. By this I refer not only to the 60,000-plus Vermonters who suffer from SAD, but to the sainted husbands, wives, friends and coworkers who have to put up with it.

The monetary loss of productivity, accident and error rates in the workplace from SAD is potentially staggering; and not only from the huge insurance and medical costs. At least, those that spend our taxes can reduce the onset, duration and depth of symptoms of SAD without spending one additional penny of our collective dough. Simply by leaving the clocks alone, the Vermont State Legislature can quickly reduce medication use, both licit and illicit, reduce highway deaths by crazed and drunken citizens in the grip of SAD and increase our already legendary worker productivity to new national heights.

Boycott Cartoon. Photo Courtesy of fallingfith.com

And just as important, it will raise our Happiness Index. And isn't that a big part of what it is all about — enjoying our lives here without stressing our neighbors or our blessed planet too much, living together in a way that makes sense for here and now? Come on legislature. Do the right thing and leave our clocks alone!

This is the *Soapman,w*ishing you ALL the Best during this beautiful season.

Contact Your State Representative here: http://legislature.vermont.gov/people/

A Virtual Power Plant

Renewable power for 24/7 energy production

By George Harvey and Tori Wiechers

On a hot summer weekday afternoon, when factories and air conditioners are running full speed, demand for electric power can be very high. On a temperate night in the spring, demand can be very low. Demand goes through daily and seasonal variation.

The dirty little secret of conventional base-load power plants, such as conventional fossil fuel and nuclear facilities, is that they cannot make sudden or short-term changes in the output of their generators to match such changes in demand. Their boilers take so long to bring up to temperature that if they were turned down at night they would not be ready to meet peak demand loads in the following afternoon. Longer-term changes can be adjusted for by turning units off or on. If they produce more power than the grid requires during low demand times, they need some way to offload it. Otherwise something will overload, and possibly burn up.

Base-load power operates with a complicated and expensive set of back-up generation sources, in a highly variable wholesale market. If the demand exceeds what base-load plants can provide, peaking power plants are turned on, providing for the shortfall, though at a high price. If there is need to offload power, various mechanisms kick in to use it up. The wholesale market provides incentives to use electricity at low demand times by adjusting prices continuously. The lowest power prices are actually negative, and this is not uncommon. The highest are about $10,000 per megawatt-hour (MWh), which translates to about $10 per kWh, and is over a hundred times normal prices. (For an example, see bit.ly/Australian-market)

Renewable power systems add a new and exciting dimension to this mix. There are many types of them, each type with its own set of characteristics. Some are intermittent, but some of these are highly predictable. Some are variable in output, and some are as continuous as traditional base-load power plants. They include at least four different kinds of solar power, several of wind power, over six kinds of hydro power that do not require dams, different kinds of biomass and bio-digesters, and more. We have lots of options.

Adding to the complexity, we have ways of using power that can help equalize supply and demand. At low demand times a pumped storage plant can buy inexpensive electricity to pump water to the top of a mountain, and at high demand times, the plant generates electricity from the water as it is released back down the mountain. Such plants have been around for decades. But now, smart battery systems and electric vehicles can be charged when demand and prices are low. Low-priced power can also be used to produce synthetic fuels such as hydrogen that are used when power prices are high. Some buildings have ice makers that operate at low demand times, and the ice is later used for air conditioning. And there are many other ways we can shift power use to low-demand times.

All these systems can be controlled with computers operating in essence as virtual power plants. Combining information about weather conditions, resource characteristics, supply availability from a variety of sources, and load demands, computers can be used to balance the grid to eliminate wasted power generation. Changes in supply and demand can be managed in seconds or less, whereas previously, a power source that could be turned on in a quarter hour was considered fast. This greatly reduces supply and price problems.

Thousands of virtual power plants are already in use, most commonly in Germany, with the largest having "outputs" similar to a coal-burning generator. They manage supply of renewable power, making it more reliable and less expensive at the wholesale level than power from coal or nuclear plants, because it matches demand.

Cheesemaking in NE

cont'd from p.20

The perfect accompaniment to these beverages is cheese made locally. A great resource to find local cheesemakers is the website of the state's Cheesemakers Guild or Cheese Councils.

For easy reference, below is a list within some of the Green Energy Times distribution area.

New Hampshire

- Agape Homestead Farm, LLC,
- Boggy Meadow Farm
- Brookford Farm,
- Country Critters Farm, LLC,
- Heart Song Farm
- Hickory Nut Farm
- Knight Farm
- Landaff Creamery
- Robie Farm,
- The Sandwich Creamery
- Taylor Brothers Creamery

Vermont

- Big Picture Farm
- Blue Ledge Farm
- Blythedale Farm
- Bonnieview Farm
- Boston Post Dairy
- Boucher Family Farm
- Bridport Creamery
- Cabot Creamery
- Cedar Hollow Farm
- Champlain Valley Creamery
- Cobb Hill Cheese
- Consider Bardwell Farm
- Crooked Mile Cheese
- Crowley Cheese Company
- Fairy Tale Farm
- Franklin Foods Inc.
- Grafton Village Cheese Company
- Hildene Farm Signature Cheese
- Hi-Land Farm
- Jasper Hill Farm
- Jericho Hill Farm
- Karim Farm & Creamery
- Lazy Lady Farm
- Maplebrook Farm
- Midnight Goat Farm
- Mountain Home Farm
- Mt Mansfield Creamery
- Neighborly Farms
- Orb Weaver Cheese Co
- Parish Hill Creamery
- Plymouth Artisan Cheese
- Sage Farm Goat Dairy
- Scholten Family Farm
- Shadagee Farmstead
- Shelburne Farms
- Spoonwood Cabin Creamery
- Springbrook Farm
- Sweet Rowen Farmstead
- Taylor Farm Cheese
- Thistle Hill Farm
- Three Shepherds Farm
- Twig Farm
- Vermont Creamery
- Vermont Farmstead Cheese Co.
- Vermont Shepherd
- von Trapp Farmstead
- West River Creamery
- Willow Hill Farm
- Willow Moon Farm
- Woodcock Farm

Fat Bikes

Freedom, Fun and No Fossil-Fuels

By Danielle Sussmann Turo

Do you know what a fat bike is? Fat bikes are your guarantee of a fun bike ride in all-terrain, in all types of weather, all year round.

"Fat bikes are mountain bikes with big goofy-looking tires", says Carrie Tomczyk, co-owner of Village Sport Shop, a bike shop in Lyndonville, Vermont. Those "big goofy-looking tires" range from 3 inches to 5 inches wide, while regular mountain bike tires are 2 inches to 2.5 inches wide.

The differences between a regular mountain bike and a fat bike don't stop there. A special fork and frame are required to allow for the big tires, and the big tires require low air pressure, as low as five pounds per square inch (psi), to allow better traction while conforming to the terrain. The range of eight to ten psi is right for most riders.

Chris Hibshman, co-owner of Village Sport Shop, and Tomczyk's brother, explains that today's carbon fiber technology used in manufacturing Fat bikes is incredibly agile and light. There is no doubt that Fat bikes are all about the tires, pressure, tread, and width. "A wider tire will have a very stable feel," explains Hibshman.

Fat bikes were invented in the 1980s for winter biking, and racing in Alaska on the Iditarod Trail, and for traveling the deserts of New Mexico. These bikes have no limits. You can ride on pavement, trails, rocks, snow, mud, and sand – everywhere. The big fat tires make for a stable and smooth ride.

In the winter you can find trails specially groomed for fat bikes, like the Kingdom Trails, in East Burke, VT. Winter trail riding will offer you great exercise, beautiful views, fresh air, and a new perspective about biking. Just be sure to wear "proper attire, and you have just extended the fun from fall into spring," adds Tomczyk.

Anyone can ride a fat bike, and they even come in kid's sizes. "In fact, for people who struggle with balance, fat bikes might be a little easier because of the wide, stable tires", Tomczyk explains.

There are companies manufacturing fat bikes for commuters, which is good news for people looking into fat bikes for transportation. Hibshman says that fat bikes offer great potential to commuters because of their stable platform. They also provide a level of safety in adverse conditions.

Fat bike prices start around $600.00 and go up from there, though models at the Village Sport Shop start at prices a bit higher. Hibshman tells us that new manufacturing companies, and a diversity of full suspension models are making these bikes more financially accessible to the public. Tomczyk remarks, "spending more on a bike usually makes it easier and more comfortable to ride, … higher priced bikes (from the same manufacturer) typically are lighter, have better components (like gears, brakes, shocks, tires) and often have a more elaborate frame geometry to make the ride quality better."

So if you love to ride a bike, and have always dreamed about being able to ride year- round in all conditions, a fat bike might just be a bike for you, especially, if your budget only allows the purchase of one bike.

These bikes are cool looking, tough, good for all-terrain, all weather, with endless purpose from recreation, to transportation. They are here to capture the hearts of aspiring bikers, and to amaze all types of seasoned bikers. They are big fat bikes that will leave nothing else behind on the trail except for great memories, and big fat tire prints.

Top left: A fat bike parked in front of the Village Sport Shop Trailside, on the Darling Hill Road, in Lyndonville, Vermont. Photo by Danielle Sussmann Turo. Above: A group of fat bike riders enjoying a winter bike ride on the Kingdom Trails, in East Burke, VT. Photo courtesy of Kingdom Trails, and taken by Herb Swanson.

Jiminy Peak mtn resort

ONE OF THE GREENEST RESORTS

By Roger Lohr

Jiminy Peak is striving to become 100% powered by renewable energy sources. Courtesy photos.

Jiminy Peak Mountain Resort located in the heart of the Berkshires of Western Massachusetts just announced the construction start of a 2.3 megawatt community solar facility located on 12 acres of the ski area and resort's property, owned and operated by Nexamp. Renewable energy is not new to the resort – back in 2007 it was the first ski area in North America to generate power from its own GE 1.5 MW wind turbine.

The solar project, which is expected to come online this fall, significantly expands Jiminy Peak's renewable energy program, while extending the environmental and cost-saving benefits of solar to up to 200 neighboring homes and small businesses. By adding the new solar power facility to Jiminy Peak's existing wind turbine, 75 kWh cogeneration unit, and extensive conservation efforts, the resort estimates it will be able to offset 90% of its total energy needs from local renewable resources, making Jiminy Peak Mountain Resort one of the greenest energy resorts of its kind in the nation.

All power generated by the new 7,500-module solar facility will be exported to the grid. Resort president Tyler Fairbank said, "We then receive credits in return. Half the net metering credits will be utilized by Jiminy Peak about 1.15 MW, the balance by individual homeowners in the local area, thus reducing their cost by an estimated 15 percent. The resort uses all the power generated by the wind turbine and have been doing so since its installation in 2007. We receive net metering credits from the utility for every electron we pump onto the grid…and we're saving more than $500,000 through all our renewable and conservation efforts each year."

The resort has upgraded to more efficient lighting and programmable thermostats in the lodges and is in the process of more than doubling the energy efficiency of the lights used on the slopes for night skiing. Using the heat from 2 snowmaking compressors to heat 34,000 square feet of space in three Village Center buildings avoids the need of an equivalent of 63,800 kWh.

Jiminy averages 425 acre-feet of snow per winter using machine-made snow. Nine years ago the snowmaking system's old technology would have required 4,566,100 kWh versus 2,661,400 today. The annual savings is 41.7% in energy or 1,903,300 kWh.

Waste oil is taken from snowmaking compressors, grooming machines, and all vehicles, and used to heat the Mountain Operations building. This process avoids storage and disposal of approximately 200 gallons of waste oil per year.

Jiminy Peak installed a cogeneration unit in the Country Inn. The unit uses propane that powers a turbine that in turn produces hot water for use throughout

cont'd on p.37

Jiminy Peak mtn resort

cont'd from p.36

the Inn. This hot water also provides the heating source for the central core of the building that includes the year-round outdoor pool, hot tubs, and John Harvard's Restaurant & Brewery, too.

A by-product of the cogeneration turbines operation is the production of electricity producing 400,000 kWh per year all of which is consumed on the property.

The ski area slope grooming fleet was replaced with the Pisten Bully that uses approximately 30% of fuel consumed by the old fleet due to increased fuel efficiency. The towel and sheet program in the lodge rooms save about 25,000 gallons of water a year by only washing the sheets and towels when requested by guests staying for more than one night. They've eliminated the use of toxic cleaning agents and only use green, biodegradable solvents and cleaners. Conversion to waterless urinals in bathrooms of several buildings and at JJ's Lodge saves 40,000 gallons of water per urinal.

Jiminy Peak won the Golden Eagle Award from the National Ski Areas Association for Overall Environmental Excellence in 2008 for construction of the wind turbine and a

Silver Eagle Award from SKI/Skiing Magazine for Fish and Wildlife Habitat Protection in 1994. But awards are not why Jiminy Peak Resorts conserves and invests in renewable energy. Fairbank reflected, "Conservation is practiced every day at Jiminy Peak. It's part of our corporate DNA. We have an in-house energy management team that conducts an on-going and aggressive program to help us to identify and curtail energy waste and research ways to source 100% of our energy from renewable resources. They are constantly evaluating opportunities for savings. Our renewable efforts have come from facilities we've built and we're striving for 100%, local, onsite-generated renewable resources."

Roger Lohr is the founder and editor of XCSkiResorts.com and prolific national writer on cross country skiing. He lives in Lyme, NH.

Sweet Potato & Apple Animal Crackers

As the kids head back to school, finding new snacks to keep lunchboxes exciting can be a challenge. Our homemade version of a childhood favorite features sweet potato, applesauce and honey for a sweet treat that doesn't pack the same amount of sodium and sugar processed versions do. Give them a try!

COMPONENTS:

- 1 medium-sized sweet potato
- 3 tablespoons applesauce, unsweetened
- 1 ½ cups whole wheat flour
- 3 tablespoons unsalted butter
- 2 teaspoons baking powder
- ½ teaspoon cinnamon
- 1 tablespoon honey
- ½ teaspoon salt

CREATION:

- Cook sweet potato until soft (bake, microwave or boil). Let cool, remove the skin and add sweet potato & applesauce to a blender or food processor. Mix until well combined and smooth – set 1 cup aside for recipe.
- Cut butter into cubes and place in the bowl of your stand mixer, fitted with the flat beater attachment. In a separate bowl, sift flour, baking powder, salt and cinnamon together. Combine with butter and mix together on a slow setting until the flour starts to create small clumps.
- Change mixer attachment to a dough hook. Add sweet potato puree & honey to flour mixture. Mix on slow until dough ball forms. Wrap and let dough sit for 30 minutes to 1 hour.
- Preheat your oven to 350 degrees.
- Roll dough out as thin as you can. Cut using cookie cutters, place on parchment-lined sheet tray and cook for 5-8 minutes on each side. Check after a few minutes – ovens may vary with cooking time!

Courtesy of SEVENTH GENERATION
www.seventhgeneration.com

How to Green Up

Your Jack-o'-Lantern

By Clare Innes

Even the ghouliest Jack-o'-Lantern deserves a proper burial when Halloween is over. Just keep a few things in mind when you're decorating it so you can compost it in the yard debris pile at any CSWD Drop-Off Center or Green Mountain Compost, rather than tossing it into the trash where it will be lost forever in a landfill:

1. Please don't paint your pumpkin! Paint contaminates compost. If you use paint, the pumpkin can't be composted and has to be thrown in the trash when the holiday is over.

2. Please pull out the candles, leftover wax, decorations, and anything that didn't come from Mother Nature's own, spooky self. Most candles are made from petroleum products, which are considered contamination. Use beeswax candles and your pumpkin is fine, because beeswax candles DO break down into natural elements.

Note: If you have 10 or more compostable pumpkins, please bring them to Green Mountain Compost in Williston and stop in at the office to find out where to unload them.

What happens to all those pumpkins you bring to CSWD Drop-Off Centers and Green Mountain Compost? We turn them into the rich, dark soil that next year's pumpkin crop will sink its roots into and grow big and plump in time for next Halloween!

Source: Chittenden Solid Waste District (CSWD) Newsflash, October, 2015. 802.872.8111 • CSWD.NET • cinnes@cswd.net

Green Mountain Compost's website is greenmountaincompost.com.

The CSWD Drop-Off Center's website can be visited at bit.ly/CSWD-drop-off-center.

Living Near Noise . . .

By George Harvey

One of the responses to the article, "Windpower – don't be Fooled," in Green Energy Times' August issue, challenged me to try living within 750 feet of the noise of a commercial wind turbine. The idea put me in mind of my youth, when I was a college freshman.

I lived in a dormitory at Pratt Institute, in Brooklyn, and the Myrtle Avenue El ran on tracks about 250 feet from my window. The El was like a subway train, except that it was elevated three stories above the street. It ran by my window every fifteen minutes, all night long, breaking up what quiet the city night afforded with its screeching iron wheels. It was like camping out in a subway station.

I did not sleep well the first four nights I was in the dormitory. After that, however, I slept quite happily. Nothing could arouse me from my dreams, partly because, though I was a bit too stupid to realize it at the time, I was falling in love.

Many years later, I lived on a mountain top in New Hampshire. I often slept with the window open, but was waked by the sound of a distant diesel locomotive. I could see it from my window, and found it on a map. When the train came into view, about ten minutes after I first heard it, it was seven miles to the south. It rumbled around my home, spending an hour switching tracks and then departed to the north-east. I could often hear it for over two hours. Though it bothered me at first, I eventually made it my friend.

Some people like to say wind turbines are different, as they make infrasound, with a pitch so low no one can hear it. But infrasound is everywhere. I was first introduced to it about forty years ago. The head of a lab I visited showed me a highly sensitive seismometer. He said the needle on its recording chart kept going constantly from about 5:00 am to 9:00 pm, every day except Sunday, when it was usually motionless. Puzzled, he did a little research. It turned out that it was recording the infrasound of traffic on a highway about four miles away.

One place I lived had heavy-duty infrasound every time the weather kicked up. I was about two miles from ocean beaches, and crashing waves create lots of infrasound. Living near the shore is a rather magical experience, and I wonder whether infrasound has any part of that.

Kiowa County Memorial Hospital has its own wind turbine. Photo courtesy of the City of Greensburg, Kansas.

Of course, none of this proves that people can live near wind turbines comfortably. Some people who live near them in Vermont complain bitterly. I decided to ask people from other parts of the country who live inside wind farms to see how they feel. I called the municipal buildings of a couple of communities in the Midwest, where the people lived in very close proximity to wind turbines.

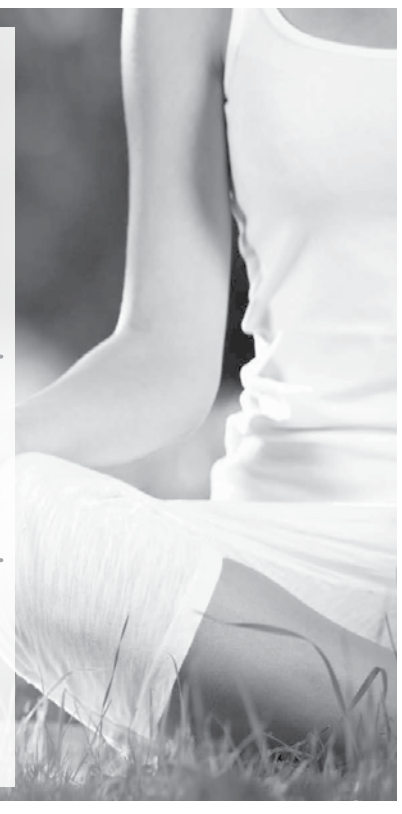
Roscoe, Texas is in the middle of the Roscoe Wind Farm's 634 commercial turbines. A very nice lady who answered the phone told me everyone she knew really liked the wind farm. Her mother has one on her property.

A call to the municipal building at Greensburg, Kansas produced similar results. Greensburg has a wind farm about three miles away, but the city never passed an ordinance against turbines. The John Deere dealership has two of them. The school has one. The arts center has three. And there are three more at the Best Western, which presumably are there in to sing customers to sleep at night. The prettiest, perhaps, is at the Kiowa County Memorial Hospital. I would guess it is about hundred feet from an entrance.

So this brings us to a question of how some people find wind farms terrible to be around, like the Myrtle Avenue El was when I got to Pratt, while others find them pleasant, like the Myrtle Avenue El is in my fond memories.

The Australian Medical Association says the human health effects of wind power are produced by stress from anti-wind activists. One German researcher told me the trick to keeping people happy is to be careful not to allow them to feel disenfranchised. My advice to all is, "Be kind, and do as little harm as possible."

The World Health Organization says 10,000 people die every day because of air pollution from fossil fuels. The Audubon Society says we could lose half our bird species if we do not deal with pollution from fossil fuels.



Ask the Soapman

Dear Soapman,
I recently purchased the Arnica Salve for my achy parts. Works quite well – thank you. I started to get a headache yesterday and instead of taking a pill I rubbed the arnica on the back of my neck. Worked great! Better than I ever expected. So my question is; "How come your Old Fashioned Arnica Salve is not categorized as a drug by the FDA? " - Quizzical

Dear Quizzi,
A drug is defined by its intent of use. Non-prescription items can claim to soothe, moisturize, ease, calm, relieve tension; but not much more. Pain for example, is a medical condition. If you are in pain see a medical professional. Aches and tensions are a normal part of life and are not considered to be illnesses or medical conditions. Thank goodness, since there many safe and natural ways to soothe life's little owies!

OTC remedies cannot claim to diagnose, treat or cure any ailment without falling under FDA drug labeling rules. Do some companies make outrageous drug like claims for their OTC products? Yes, of course. But only until they get caught. Best to stick with Mother Nature!

Thanks for Keeping it Natural,
Soapman

Cork Flooring

Interiors green Shots!
THE HOME AND LIVING STORE

By Jessica Barber Goldblatt

If you're looking for warm, cushiony flooring, think cork. Soft like suede, it has the insulating qualities and resiliency of carpet; the easy-to-clean surface of wood or tile; plus luxurious appeal from its earthy colors and rich visual texture. Made from tree bark, it's also a natural and renewable resource. Cork has a multitude of green characteristics. The material is acquired by stripping most of the outer bark from the cork oak tree. This regular harvesting does the tree no harm, and the bark grows back, to be stripped again every nine years. The trees live for 200 years or so, and the forests, called Montados, are highly prized and passed down through generations of families in the cork-producing business.

Cork Flooring. Photo Courtesy of Flickr

The cork sheets or pieces are cured, boiled and pressed. Scraps are collected for reuse, so almost nothing is wasted. It comes from Europe. Forests of Quercus suber, the one oak species that produces cork, grow in the Mediterranean, primarily in Portugal. However, fuel consumption from shipping cork adds to the embodied energy in every cork flooring product. The dilemma of long-distance shipping, however, is counter-balanced by the truly urgent need to preserve cork oak forests. "A cork forest loss is coming from the decline of the global cork market," The decreased demand for cork has devalued the forests, leading to sales — even abandonment — of the once-valuable land. Harvesting and making of cork products such as flooring, on the other hand, will keep Montados intact.

Cork Flooring Choices

In addition to its environmental benefits, there are many practical reasons to choose cork for flooring. The material is waterproof (think of the cork in a bottle), and the natural waxy substance contained in cork, called suberin, makes it mold- and mildew-resistant, too. If someone in your family suffers from allergies, a cork floor could provide a soft and warm alternative to other flooring types. Cork is even naturally flame-resistant. And it's acoustically insulating properties — shhh, it's quiet — will take the clatter and thud out of noisy foot traffic.

Cork flooring can be used in living areas, bedrooms, workout rooms and even wet spots such as bathrooms or saunas. You can purchase cork floors as roll-out sheets, floating panels, stick-in-place squares or tap-in-place tongue-and-groove tiles, and our store even sells small, round, penny mosaic cork tiles, which are installed much like ceramic or glass mosaics, with mastic and grout. And some types of cork flooring are suitable for use over radiant heat.

Pricing varies considerably, from an affordable $2 per square foot to over $20 per square foot for specialty shapes, styles or colors. Most cork flooring installations can be managed by do-it-yourselfers. Because of its elasticity, cork is especially forgiving on uneven surfaces, and may even be installed directly on top of existing wood, linoleum or similar flooring — or as underlayment for ceramic, wood or stone. Foot traffic and even heavy furnishings are well-tolerated because cork springs back.

Not all cork flooring is made equal, however; some products have not-so-eco-friendly binders, finishes or substrates added. Cork is sometimes combined with Polyvinyl Chloride (PVC) to make resilient flooring much like linoleum. Vinyl is best avoided, however, as the manufacturing of it may produce hazardous byproducts and the disposal may leach toxins into the environment. Other significant factors to consider are the dyes, binders, adhesives or finishes used in the manufacturing or installation processes for cork flooring. To preserve the air quality within your home, look for cork flooring that is formaldehyde-free, has low- or zero-volatile organic compounds (VOCs), and that is made without harmful solvents. [Also ask for no- or low-VOC adhesives, now commonly available. - ed.]

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