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Disturbing News of 1.5 Degrees

By George Harvey

According to NASA, it is official: 2015 was the hottest year in the 136 years records have been kept. In achieving that goal, it blew away the record set in 2014, which beat a record set in 2010, which topped a record set in 2005, which beat the record set way back in 1998. Clearly, climate change has not deferred to those politicians who would wish us to believe it has been put on hold for the last seventeen years.

NASA also informed us that of the sixteen hottest years on record, fifteen have happened since 2001. And by the way, in case you are interested, the last year that set a record for cold temperatures was 1911.

The results of warming are showing. The winter barely happened in much of Alaska, at least by Alaskan standards. Things there were so bad that the Iditarod dog sled race had to be started on snow imported in seven rail cars from hundreds of miles away. Race officials had the snow covered with tarps so it would not be ruined by rains, and when the time came it was spread on the main street of Anchorage.

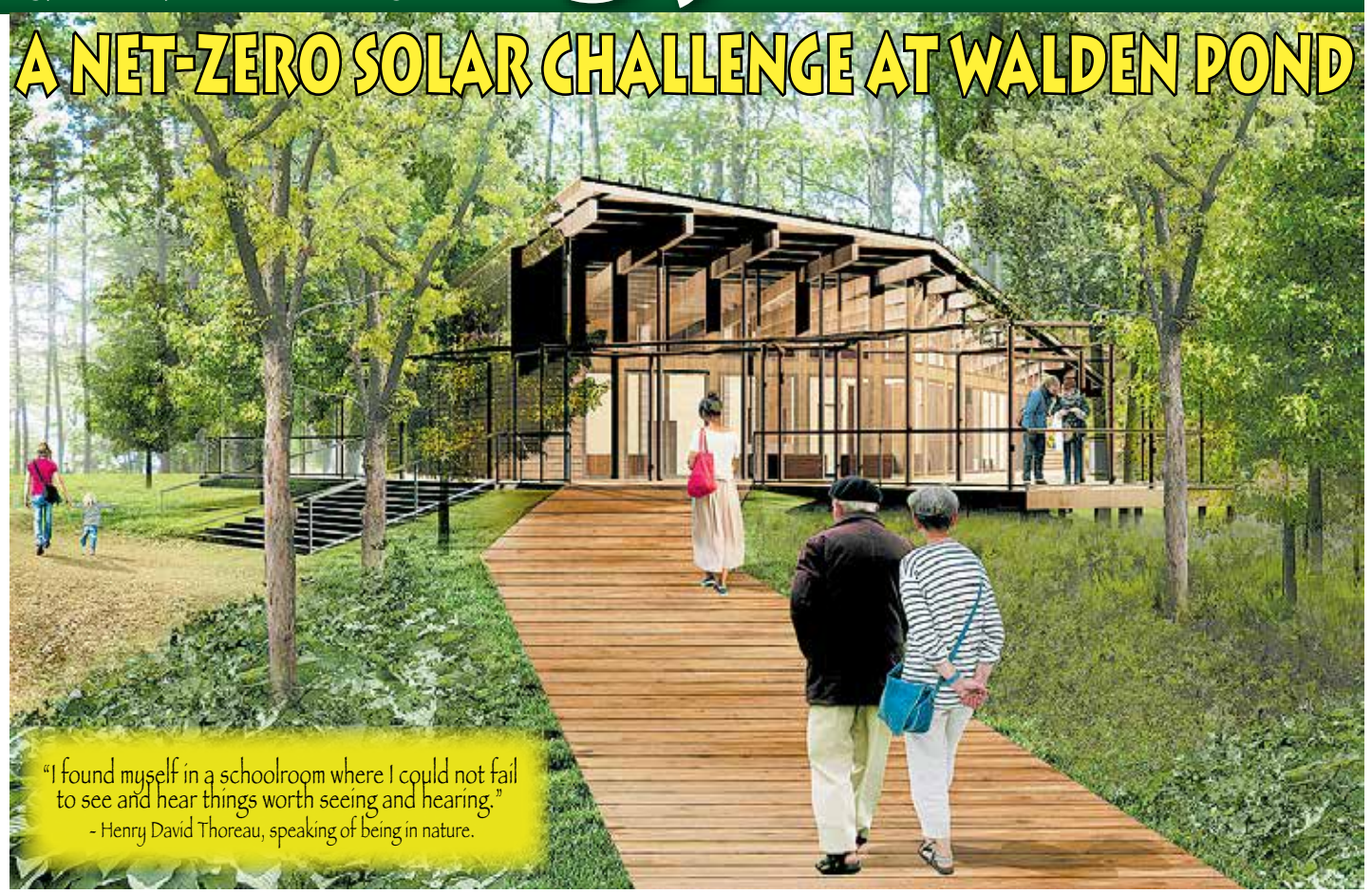
Alaska was only one of many areas in the far north that reported a warm winter. The National Snow and Ice Data Center reported that the extent of Arctic ice extent was the lowest it had been since 2012, which set an all-time record for least extent at the end of the summer. We seem to be headed for another record.

The warm winter coincided with a dramatic rise in carbon emissions. In Hawaii, NOAA's Mauna Loa Observatory reported a spike of 3.05 ppm in CO2 levels from the previous year, with the level at 402.59 ppm. This was the largest year-to-year increase of atmospheric CO2 ever observed in the 56 years of recording. It was the fourth consecutive year that CO2

Cont'd on p.35

Image source: depositphotos.com

A NET-ZERO SOLAR CHALLENGE AT WALDEN POND



Rendering of the Walden Pond Visitors' Center. Photo courtesy of Maryann Thompson Architects

By Emma Rumple

There was a time when people in this country were taught that air pollution was the "smell of progress," and buying disposable products was beneficial because it meant more things would be made, creating more jobs. The message was still spread when I was a child, though some were already seeing through it.

A whole generation of us came alive when we discovered Henry David Thoreau's Walden. It showed us that there was a path out of that morass, and we felt refreshed by its vision. It was our environmental guide, showing us a clear way to a better life and a better world, in which human beings once more integrated themselves with nature, to their own greater joy.

The Commonwealth of Massachusetts Department of Conservation and Recreation (DCR) administers Walden Pond State Reservation in memory of Thoreau and his simple, happy life in the woods. Walden is appreciated by hundreds of thousands of visitors each year. Now, the state is providing a new facility where they can learn about Thoreau's intentional self-reliance.

We might be tempted to reflect on the incongruity in a picture of people arriving in cars to learn, under electric lights, in comfortably heated space, about Thoreau's rustic life, lighted

Cont'd on p.36

We Will Win the Climate War!

By George Harvey

While the bad climate news looks bad, the good news is stunningly good.

It is clear that economics now favor renewable power strongly. Many people expected the sharp reduction in fossil fuel prices to undermine renewable power, but that did not happen. Most investors want to have a sense of security, and they have increasingly considered fossil fuels risky. Many of our largest coal companies have already gone bankrupt, and the oil industry is in trouble. Some analysts say that we could see as many as a third of those in the United States go under this year.

At the same time, the costs of wind and solar power have declined sharply worldwide, as have costs of utility-scale batteries. Prices for long-term solar power purchase agreements are down, below 4.4¢/kWh in one unsubsidized instance in Spain. At this price, the cost of solar with battery backup is very competitive with natural gas. GTM Research says solar power is at grid parity in twenty states already.

Given these facts, it is hardly surprising that the International Renewable Energy Agency says the world could save $4.2 trillion annually by doubling our renewable capacity by 2030. And that figure, they say, is fifteen times as much as the investment to do it would cost.

Part of our trend away from fossil fuels depends on simple changes in our understandings and applications of science. For example, a NOAA study says installing high-tech transmission lines could enable changes that would reduce

Cont'd on p.24

IN THIS ISSUE:

How to preserve your ability to "go solar"

-- Page Three --

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
Contributing Writers ..... Dr. Alan Betts, D. Roberts, J. Highland
Design/Layout ..... Nancy Rae Mallery, P.J. Fischer
Printing ..... Valley News Lebanon, NH Using 100% Recycled Newsprint & Smudge-Free Environmentally Safe Inks*

Advertising Team:

..... **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,** Portsmouth, NH **413.222-2820**
hope@greenenergytimes.org

..... **Aubrey Cabot-Case,** Peacham, VT **802.778.0906**
aubrey@greenenergytimes.org

Distribution: Roslyn Moore, Mona Sweat, George Plumb, Carol Levin, Jeff & Wenda Skelsie, Julia Lloyd Wright, Johnny Hinrichs, Wally & Melody Reed, Barb & Greg Whitchurch, Marty Philbrick, Larry Plesant, Jessica Goldblatt, Larry Chase, Hippo Distribution, Manchester, NH; and our New York Team. *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, and for all you all do! Let us know what YOU are doing for our planet!*

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

Solar Power works! … anywhere! under the sun!

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

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Have Something To Say? Green Energy Times is Listening.

G.E.T. YOUR VOICE HEARD IN G.E.T.

YOUR STUDENT VOICE Matters

Green Energy Times welcomes letters and guest articles from students.

Submissions should be aligned with G.E.T's mission to educate readers on measures they can take to reduce their carbon footprint and be responsible for our sustainability and energy independence. Articles must be backed by facts and present a specific point of view. The article length should be 500-600 words along with 1 – 2 pictures (please include captions and photo credits). This is a fantastic opportunity to get your work and ideas published!

Please send your letter or executive summary of your article to the editor of Green Energy Times: Nancy Rae Mallery, nancy@greenenergytimes.org.

Check out www.greenenergytimes.org to find out more about our publication.

Earth Day is April 22
Check out the Earth Day web site all month long for ideas, class projects, and links to events.
www.epa.gov/earthday

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Welcome This Early Spring

Change is coming whether we like it or not – the Earth is so much more powerful than our civilization.

By Alan Betts, http://alanbetts.com/writings

When the Earth becomes vibrant again with life in spring, we welcome the change, and many feel a surge of joy and gratitude. I know that spring is very early this year – the daffodils bloomed in Pittsford, VT in March, the earliest date ever. This is no surprise as winters are 10° warmer when there is little snow. This past winter set record new temperatures globally, and we can expect a much warmer world in coming decades.

Globally, December was very warm, January broke that record, and then February broke the record again by a huge margin that surprised even climate scientists. The figure shows the average winter temperature anomaly in degrees Celsius (above the mean climate for 1951-1980). Notice the red patch of warm water in the eastern Pacific, related to the strong El Nino. But notice the red and brown colors across the northern continents and in the Arctic, where it was warmer than it has ever been in winter. It was so warm that even in the Arctic night, the sea-ice extent stopped growing a month early at a new record low in February.

For a gardener, but not for skiers, the warm winter was satisfying. The ground in my garden in Pittsford was unfrozen for parts of January, February (for the first time) and almost all of March, so I was able to dig my cover crop of rye grass. Unprotected spinach survived the winter, again for the first time. Under glass, lettuce and spinach thrived, and started growing by the end of February. The daffodils bloomed in late March. Putting all the pieces together I realized that spring comes nearly four weeks early, when there is a warm winter with no snow cover.

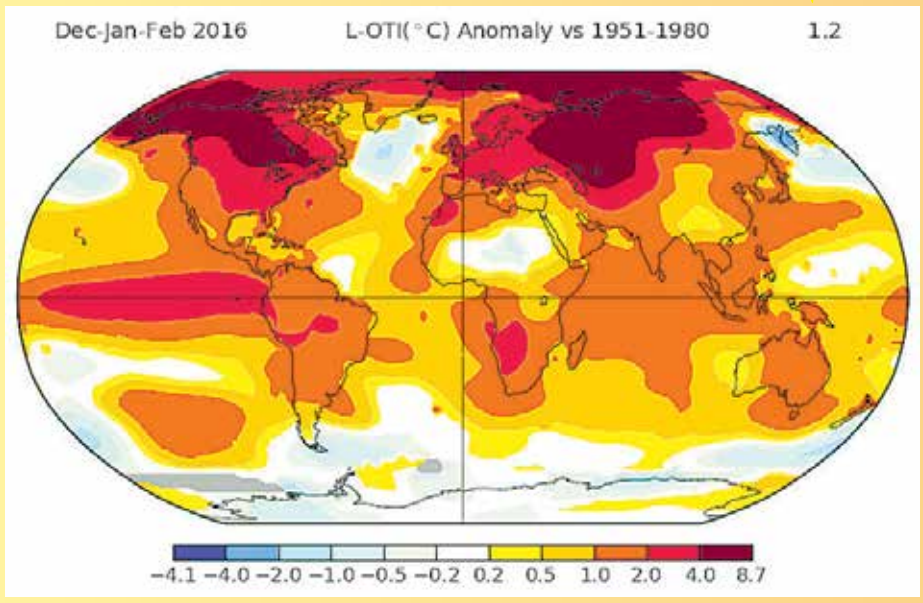
Can we embrace a changing climate, a changing Earth, with the same joy and gratitude as we welcome spring? This is not so easy. Because we fear change, many turn to denial. But because we are an integral part of the interconnected life on Earth, we must try, or we could slip into denial, fear or even despair at the changes ahead. And that is too bleak.

The political season is in full swing with a presidential election ahead, and the electorate is very angry with the failure of the federal government to address what they see as the real issues. But perceptions of reality differ widely, and accusations and blame are flying in many different directions. Yes, the political system works to further the interests of the rich and powerful at the expense of the poor and the Earth itself, and this must be challenged. But few look at the whole picture, where we all share responsibility for the future of the world we have created from our dreams and sense of entitlement.

But change is coming whether we like it or not – the Earth is so much more powerful than our civilization. Our dream of unlimited human power that came with the discovery of fossil fuels and nuclear fission is a mirage. We have to make the giant shift to both the acceptance of our responsibility for the future; and the realization that we must create a sustainable path for our civilization that recognizes our integral, inseparable relation to the Earth itself. And for this to work we must accept new paths with gratitude and joy in the heart, rather than grudgingly regret that the dream has faded.

So it is spring and easy to start working with the earth. Go out and plant seeds, and watch them grow into a joyful harvest. Start to dream where we might go this year as communities cooperating with the soil, the sun, rain and wind. Can we and our families come closer to the Earth and its renewable resources so we can embrace change? And share what you grow and what you learn with your neighbors.

Dr. Alan Betts of Atmospheric Research in Pittsford, VT is a leading climate scientist. Browse alanbetts.com.



Difference map of mean 2015-2016 winter temperatures from the global climatology for 1951-1980 from NASA-GISS (downloaded from http://data.giss.nasa.gov/gistemp/maps/)

VT Net Metering Revisions - *How to preserve your ability to "go solar"*

VERMONT READERS TAKE NOTE: *Submitted by the Vermont Law School Energy Clinic*

For those of us who live in VT, our ability to install net-metered solar may be in jeopardy,due to proposed changes in net metering.

1. If the net-metering changes are finalized in their current form, we will likely find it no longer makes financial sense to go solar in Vermont.

2. The information in the fact sheet with this article provides the knowledge necessary to understand precisely what the impact of the changes will be, and how we can act to preserve our ability to go solar. This knowledge is not widespread at this time.

3. This is a very time-sensitive issue. Once the comment deadline closes on May 12th, the rule may be finalized as written. This printing of the Green Energy Times is likely to be the only opportunity to educate ourselves on the proposed changes.

VERMONT PSB RULE 5.100 REVISIONS -- NET-METERING

What to know about the PSB's proposed net metering changes and how you can act to preserve your ability to go solar.

The Public Service Board is currently revising the net-metering program (Rule 5.100). As directed by the Vermont legislature in Act 99, the PSB must design a revised program with input from impacted parties and the public.

The proposed rule makes a number of changes to the current net metering program that harm Vermonters who want to go solar:

- Eliminates the solar adder, an additional credit for each kWh a solar system produces that is applied directly to a customer's bill. The solar adder is currently between 4-6¢ per kWh, depending on the size of the system.
- Replaces the adder with positive and negative "adjusters" for siting and renewable energy credits (RECs). Solar generation would be credited at the applicable residential retail rate, plus or minus the relevant adjusters.
- The proposed REC adjuster will penalize solar customers who consume solar power from their own solar systems (the only way to "go solar") rather than turning over their RECs to the utility. It will cost customers in total a 6¢ per kWh penalty to retain and retire their RECs in order to go "solar," "renewable," "clean," or "green." No other state penalizes a solar customer in this manner.
- + 3¢ per kWh: Customers who transfer RECs to the utility will receive a 3-cent bonus, but will not consume solar energy from their panels and are legally prevented from making any renewable energy claims.
- – 3¢ per kWh: Customers who retain and retire their RECs will have an additional 3-cents per kWh subtracted from the base net metering rate. These customers who reduce Vermont's greenhouse gas emissions will be treated the same as a customer who sells their RECs out of state for additional profit.

Other changes to the rule include a new siting adjuster:

- The proposed siting adjuster will increase or decrease the credit depending on a) size and b) a list of eight preferred siting criteria: a rooftop, parking canopy, brownfield, landfill, quarry/gravel pit, previously developed site, on the premise of the consumer of the majority of the electricity, or on a site approved by the town.
  - + 1¢ per kWh: Smaller than 15kW or smaller than 150 kW and on preferred siting listed above.
  - 0¢ per kWh: 150-500kW and on preferred siting.
  - – 2¢ per kWh: 15-150 kW, not on preferred siting.
  - 3¢ per kWh: 150-500kW, not on preferred siting.

Institute for Energy and the Environment, Vermont Law School

Cont'd on p.24

TRANSPORTATION EFFICIENCY AND ELECTRIC CAR UPDATES

By David Roberts

2017 Chevrolet Bolt. Photo © General Motors

Transportation is one of the largest generators of global greenhouse gas emissions. As an example, the most recent greenhouse gas inventory for Vermont calculated 45% of the state's 2012 greenhouse gases came from transportation. The shifts in individuals' habits required to transform this sector are often difficult, particularly for residents of rural areas with longer travel distances and low availability of public transportation. The good news is more people are meeting the challenge to reconsider car habits and benefit from more healthful transportation options like walking and bicycling, or shifting to other more efficient modes like carpooling, vanpooling, transit, telecommuting, or using car-sharing and new ride-hailing services like Uber and Lyft to meet occasional transportation needs. Living in "location-efficient" places like downtowns and villages with easier use of, greater access to, many of these options makes it much easier to reduce one's greenhouse-gas "footprint" as well as costs of getting around.

In the bigger picture, new technologies are also improving transportation services, such as Smartphone apps providing real- time information on transit bus locations. The advent of autonomous vehicle systems could lead to major shifts in how we get around sooner than we think.

In the meantime, there are actions you can take to drastically increase your transportation efficiency even if you are stuck driving a vehicle on your own. Electric cars are much more efficient and less polluting than most gasoline or diesel-powered vehicles, even taking into consideration the source of the electricity. Grid electricity from local utilities is getting cleaner all the time, and using your own renewably generated electricity is even better.

There are now about 20 electric car models widely available in the Northeast, with two basic varieties: all electric vehicles (AEVs) powered solely by a battery and plug-in hybrid vehicles (PHEVs) powered by a combination of battery and gasoline. These electric vehicles are fun to drive and can charge at home using standard 120 volt outlets. Faster charging is available by upgrading to a 240V charger (running on higher-voltage electricity, like an electric clothes dryer or range). In addition, many workplaces are installing charging stations for employee and visitor use and there is a growing network of public charging stations making it easier to travel longer distances in AEVs, particularly through DC fast charging locations which can charge vehicles in 30 minutes or less.

Leasing is a very popular option for electric car ownership as lessees can take advantage of the latest technology improvements after a two or three-year lease period, bringing protection from depreciation and any maintenance issues related to long term life of vehicle components (although most electric cars have proven highly reliable). An added benefit is that vehicles coming off leases generally enter the used market at affordable prices.

Coming Attractions

The spring season means automakers are taking the wraps off a new generation of electric cars due to arrive in the next year. Below is a sampling of new and updated models.

Chevrolet Bolt

– an all-electric vehicle with 200-plus-mile range and flexible hatchback body type. Starting price will be around $30,000 after incentives. Due at dealerships in late 2016.

Mitsubishi Outlander Plug-in Hybrid

- This is an all-wheel drive plug-in hybrid SUV due later this year. Prior versions have been sold in Japan and Europe for several years, so this should be a proven second generation product.

Updated Toyota Prius Plug-in

– Toyota has taken the wraps off the Prius Prime, a new version of their Prius Plug-in which remains popular despite low availability due to production changes that have occurred over the past year. The new model doubles the electric range to about 20 miles, with over 600 miles of estimated range on a charged battery and full tank of gas. Hits dealers in late 2016.

Tesla Model 3

– As of March 31, Tesla will have begun accepting reservations for their latest techno-marvel model, which is expected to be about half the cost of their Model S sedan or Model X SUV. Deliveries are anticipated to start in 2017.

These upcoming models look great, but there is no reason to wait for them if you are shopping for a new or used car today. The Drive Electric Vermont website has detailed information on

Cont'd on p.6

Drive Electric Vermont

VBike Helping to Make Bike Transportation in Vermont Viable

...and is a Total Blast!

By Dave Cohen

For many of us who are concerned with energy issues and climate change and are thinking about or have adopted the "tailpipeless dream" of the electric car, it might be good to know about another transportation movement that's afoot.

Emerging just in time for us is a bicycle design and technology revolution that is profoundly extending the range, comfort, hill climbing ease, carrying capacity and overall utility of bike transport. This is vastly important to consider because, while the electric automobile might help in some regards, it may deeply exacerbate other problems like car-centric planning, sprawl, obesity, unsafe communities, massive resource consumption and our general disconnect from the real world outside the car. The word "automobile" has been telling to us for decades that it is about a form of "automatic mobility" that disengages our bodies (and what we think we can do with them) while largely subverting our sensory and emotional connections to the more-than-car world. The electric car is an "automobile" and in many respects may represent the everything-stays-the-same approach to transport.

The two-seat Elf. Photos courtesy of Dave Cohen

So, it is great news that in cities and towns across the US there is a flourishing bicycle mobility renaissance taking place. In fact, biking has become the indicator species for healthy communities and a lot of what is driving this is the millennial generation (Generation Y). They are incidentally driving 24% less and biking, walking, and using public transit proportionately more. This has had an effect; in the past 10 years alone there have been 38 major, multi-million dollar bike-share programs launched in the United States. These projects are being built because these regions are all vying for the same thing – the millennials. Many communities understand that the key to remaining economically and socially viable is to attract a younger population and that by remaining with a latter-twentieth-century vision of transportation, you and your community are going to suffer.

I'd like to introduce you to VBike, a non-profit organization working to update and rejuvenate Vermont's bike transportation culture by introducing new bike innovations and technologies like cargo bikes and electric-assist options. Formed in January of 2015, VBike has accrued a solid list of accomplishments. The organization earned a groundbreaking contract with Vermont's alternative transportation state agency, Go Vermont, to provide free bike consultations, helping Vermonters choose a cargo bike, electric-assist option, or really anything related to bike transportation. Along with this, VBike helped the VSECU develop Vermont's first low-interest loans for bikes. For all this and many other accomplishments the group just received the Project of the Year award this April at the 2nd Vermont Walk/Bike Summit.

VBike now has its sights on getting many more families and households on bikes. To do this, VBike has established a fleet of e-cargobikes and e-bikes to showcase around Vermont. These bikes will also be used for the launching of VBike's Take it Home pilot project this spring in Brattleboro, allowing households to take a bike home to try out on their daily errands. VBike plans to expand this program to e-bikes for businesses, e-trikes for seniors and great innovations like the ELF, a solar-electric-human-powered vehicle, including a partial enclosure, room for passengers, built in solar panels and a full lighting system, including directional signals!

Look, electric cars are quickly transforming into self-driving cars or "carbots" and will likely bring about a dystopian, robotic landscape (we are almost there right now). That's a great reason to bring a human face and our human bodies, senses and emotional connections back to the "real world" as soon as and as much as we can.

Dave Cohen has over 30 years of experience promoting human-power for everyday transportation. He also works as an integrative psychotherapist in Brattleboro, VT.

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**

AN ENERGY-EFFICIENT MAKEOVER
DOWNTOWN BENNINGTON, VT

Downtown Bennington, Vermont is getting an energy-efficient makeover. Photo courtesy of BBC.

Downtown Bennington, Vermont, is getting an energy-efficient makeover through Residential Network member Efficiency Vermont's residential and community programs and support. As part of Vermont's Downtown Energy Efficiency pilot program, Efficiency Vermont and the state Department of Housing and Community Development (DHCD) will work to make energy efficiency programs and services more visible and accessible to the community, through office hours, partnerships, community events, workshops, information sessions, and home energy walk-throughs.

Efficiency Vermont and DHCD will integrate sustainable energy solutions with downtown revitalization efforts for three other Vermont state-designated downtowns in 2016.

On February 18, 2016, the Downtown Bennington community leaders gathered at the Catamount Tap House to learn more about plans to rally around energy efficiency.

Better Bennington Corp. (BBC) is leading the effort, in close collaboration with the Bennington Area Chamber of Commerce and the Town of Bennington, to encourage downtown businesses, property owners, and residents to take advantage of programs and support offered through Efficiency Vermont and DHCD. The two organizations announced the Downtown Energy Efficiency pilot program recently, which will include similar efforts in Randolph, Barre, and Hartford-White River Junction this year.

"I commend BBC for its leadership in organizing community leaders to be a part of this pilot program," said Stuart Hurd, Bennington Town Manager. "This concerted effort to save energy will bring long-term economic value by making downtown commercial, residential, and public spaces more comfortable and affordable for years to come."

"The future of Bennington is with collaborations and partnerships. The Chamber is very excited to be working with these other organizations to bring efficiency standards downtown and to the community," said Matt Harrington, Bennington Area Chamber of Commerce Executive Director. "I think as we roll out this pilot program Bennington can become a leader in green and efficient energy in the region."

Similar efforts will follow in Randolph, Barre, and Hartford/ White River Junction in 2016.

For the next several months Efficiency Vermont and the DHCD will work closely with BBC to make energy efficiency programs and services more visible and accessible to the community. Activities will include:

- Efficiency Vermont office hours at least two days a month at the BBC offices
- Numerous community events, workshops and information sessions
- Business and home energy walk-throughs
- Additional activities to be developed as the pilot program evolves.

"Downtowns are the heart of Vermont communities, where we gather to work, live, and play," said Efficiency Vermont Director Liz Gamache, who is also the Mayor of Saint Albans and a longtime downtown revitalization champion. "By working closely with BBC we can better understand the community's goals and priorities, and figure out ways that energy efficiency can support revitalization efforts. Along the way we expect to make lots of new friends and form working relationships that can keep driving energy efficiency improvement for many years."

In late 2015 Efficiency Vermont and the DHCD issued a statewide request for interest to participate in the pilot program. BBC was one of several downtown organizations to respond. The goal is to learn more about how to best support downtown revitalization efforts, and then expand the program to more downtowns in future years.

The Better Bennington Corporation (BBC) is the lead organization which coordinates public and private efforts to maintain Downtown Bennington, Vermont as the commercial and cultural heart of the community. Contact BBC at 802-442-5758 or betterbennington.com. Contact Efficiency Vermont at 888-921-5990 or efficiencyvermont.com

TRANSPORTATION EFFICIENCY AND ELECTRIC CAR UPDATES

Cont'd from p.4

the various options currently available at dealers - use the website contact form to submit your questions on making the switch to an electric car and we'll do our best to steer you in the right direction.

GoVermont – www.ConnectingCommuters.org

Drive Electric Vermont – www.DriveElectricVT.com

David Roberts is the Drive Electric Vermont coordinator. He has driven an all-electric Nissan LEAF for the past three years and says if you have to drive, drive electric.

E-BIKES

There are many super-efficient electric bicycles available, including cargo e-bikes, which are great for meeting a variety of transportation needs. Visit the VBike coalition or the Electric Bike Report for more info: www.vbikesolutions.org and www.electricbikereport.com.

End-of-Session Legislative Update on Energy
Vermont Lawmakers Tackle Siting, Weatherization, Carbon Pricing, Divestment

By Johanna Miller, VNRC

VT State House in Montpelier. Photo courtesy of VT Natural Resources Council

The latest scientific polling continues to show Vermonters' strong support for meeting our energy needs through more clean, local, renewable energy resources. Each year, the Legislature has taken steps to respond to this interest – and planetary imperative – by crafting policies that balance cost, community and climate-related goals. With the 2015-2016 legislative biennium soon drawing to a close, here's a quick update on the bigger energy-related issues under consideration:

Energy Siting

Vermont's commitment to greater energy independence has resulted in a fairly swift deployment of renewable resources across the state, and far more solar installations in particular. Many homeowners, businesses, schools and municipalities are now enjoying more stable, affordable and clean energy as a result. The transition has not been met without controversy, however, as more solar projects dot rooflines, roadways, fields and forest perimeters.

In response to communities seeking more of a voice in how energy projects are deployed, and in an effort to set the stage for more strategic development of a distributed, 21st-century grid, the Senate recently passed S.230 – "An act relating to improving the siting of energy projects."

Some of the core provisions of the Senate-passed bill include:

- The creation of a process for enhanced regional and municipal energy planning. Regions and municipalities would receive "substantial deference" in regulatory decisions around proposed energy projects, once they demonstrate through a state certification process how their plan will help meet the state's statutory greenhouse gas emissions and Comprehensive Energy Plan goals.
- Incentives for renewable energy development in preferred locations, such as parking lots and landfills, as well as places designated by the community in its duly adopted municipal plan.
- A new Public Assistance Officer at the state Public Service Board to help citizens better access information and navigate the regulatory process.

There is strong support for the intention of these provisions, and some others, including making it easier and more affordable to harness existing (but currently defunct) hydro plants. To many clean energy advocates, however, the Senate's version contains some serious flaws, such as a provision that gives communities immediate deference to their local plans without first ensuring they align with state statutory and energy goals. The bill is now under consideration in the House, where it will likely change significantly – and its future is uncertain.

Low-Income Weatherization

In late March, the Vermont House reauthorized and passed a modest increase – ¼ percent – to the Fuel Gross Receipts Tax, which funds low-income weatherization programs. A greater commitment to these programs has been long needed, since funding has declined significantly in recent years, resulting in longer waiting lists for low-income Vermonters who want to save energy and money. The Senate will soon take action and, if they support the increase (which applies to all covered fuels except electricity) it will be the first increase in the GRT since it was initially instituted in 1990.

Pricing Carbon Pollution

In recent weeks, the House Natural Resources and Energy Committee has heard from businesses, low-income advocates, state officials, faith leaders, a fuel dealer, and others about the urgent need to respond to climate change and about a carbon pollution tax in particular. This climate policy is embraced by many leading economists, ExxonMobil, President Obama, and many others. It's also an approach many nations and provinces have already harnessed to successfully and affordably help people reduce their consumption of fossil fuels.

Both the recent Vermont Council on Rural Development's "Climate Change Economy Council" and the 2016 Vermont Comprehensive Energy Plan highlighted carbon pricing as a key climate solution Vermont should examine. A diverse coalition called Energy Independent Vermont has been pressing for an equitable, phased-in state-based carbon pollution tax paired with investments in programs to help Vermonters transition off fossil fuels and cuts to other taxes Vermonters are currently paying.

An economy-wide policy like a price on carbon is needed, because, despite Vermont's efforts to date to help people and businesses transition to cleaner, more affordable energy, we are falling far short of our long-term state energy goals. For example, when fully implemented, the ambitious Renewable Energy Standard passed last year, would result in reducing only one quarter of the state's greenhouse gas emissions. It's clear we need to do more.

While no vote on carbon pricing will take place this year, there is growing interest in examining how this policy could work in Vermont in a way that would reduce other taxes, grow jobs and the state's economy, protect low-income Vermonters and serve as the single most powerful and cost-effective policy to reduce Vermont's polluting carbon emissions.

Divestment

There is a robust conversation happening at the local level all the way up to Governor Shumlin calling for the state to divest its investments in fossil fuels. The Vermont House of Representatives passed a resolution and over half of the Vermont Senate signed a letter, both calling for Vermont Treasurer Beth Pearce and the Vermont Pension Investment Committee to explore fossil fuel divestment. While action has shifted from the legislature to the board that overseas the pension funds (the Vermont Pension Investment Committee), lawmakers and divestment advocates, including many state pension holders themselves, are engaging in a process underway to explore this opportunity fully and fairly.

The legislative landscape on energy issues changes almost daily, so stay tuned via www.vnrc.org for the latest updates. Strong, consistent public support is needed to ensure Vermont continues to move policies that support a 21st-century clean energy economy. Your legislators, as well candidates for the legislature and governor, must hear early and often about the need for greater commitment to efficiency, renewable energy and bold climate action.

Johanna Miller is the Energy Program Director for Vermont Natural Resources Council and VECAN Coordinator.

New Hampshire Legislative Update:
Increased Net-metering cap is a go, and other highlights from Concord

By Kate Epsen, NHSEA

NH State House in Concord. Photo courtesy of the Jordan Institute.

On Thursday, April 7, 2016, the NH Legislature passed HB1116. This bill raises the state's net metering cap from 50MW to 100MW, especially vital because the original 50MW limit was nearly used up. The bill also directs the Public Utilities Commission (PUC) to determine a fair compensation rate for both net metering customers and other customers. Once initiated, the PUC will have ten months to complete the process and announce a new rate. The hope is that the increased MW will allow enough time for a new rate to be determined, but it remains unclear if this new cap will be reached before the allocated 10 months are up. This bill is the culmination of months of discussions and efforts from legislators, industry, and other interested parties including NHSEA, who took an active support stance to raise the cap from the get-go. Governor Maggie Hassan is expected to sign the bill into law soon.

In other legislative news, the NH Senate passed SB 492, which would allow greater funds (deriving from NH's participation in the Regional Greenhouse Gas Initiative, RGGI) to go into utility-run energy efficiency programming, specifically programs for low income residents, municipalities, and residential weatherization. The House Energy committee passed this bill on a split vote of 12-5. The bill will now go to the full House of Representatives for a vote, where successful passage is uncertain. NH continues to lag in the region in its investment into cost-effective energy efficiency: SB 492 would help us to use greater amounts of RGGI funding to help residents and towns save energy and thereby save money on their bills. More on efficiency soon.

While there have been several bills proposed to prevent or increase prudency around the construction and/or financing of natural gas pipelines or high-powered transmission lines, many of those bills have been voted as "inexpedient to legislate" by NH Representatives and Senators. There are active bills however, including HB 1148, which requires the NH Public Utilities Commission to make a public interest finding when ruling on proposed natural gas capacity contracts. HB 1660 allows an owner of land to require a pipeline company to take an entire tract of land under eminent domain, allows for pipeline company eminent domain takings to include public lands with consent

Cont'd on p.30

Solar Mounting Matters

By George Harvey

Utility-scale solar system in White River Junction, VT. These systems do not usually come with hot air balloons. Photo courtesy of RBI Solar.

To have a functional solar system, it is necessary to have the panels mounted on hardware specifically made for the purpose. There are many choices available for the mounting hardware. Under some circumstances, the choices are rather simple, but certainly not always. There are many types of solar mounts and different reasons for each.

Rooftop solar is perfect in many places. Fixed ground-mounted systems are similar, except that the choices of direction and angle of mounting can be optimized with an appropriate rack, instead of being dictated by the pitch and orientation of a roof. By contrast, the more complicated and expensive tracking systems move the panels and keep them aimed at the sun through the day, delivering more energy, as much as 40% in optimally sited systems.

Kirsta Tortorice, whose father, Bob Tortorice, is known to many of our readers as a builder of high-performance homes, recently wrote a thesis dealing with solar mounts in some depth, "Utilization of Contaminated Land for Renewable Energy Projects: Constructing Solar Farms on Capped Landfills in Massachusetts." Though the paper deals with special situations, Ms Tortorice's general comparisons are useful. She had this to say, "Fixed tilt is when the panels are installed at a permanent angle that has been designed to receive the most solar radiation throughout the year, based on variables such as slope, latitude, and direction. Sun-tracking technologies, or azimuth, tracking is the technology that allows the PV panels to follow the optimal amount of sun exposure over the course of the day."

There is a distinction to be made between fixed systems that are mounted at a permanent angle, and those that allow the tilt of the panels (angle up and down) to be adjusted seasonally. Adjustable mounts can produce efficiency gains but are also valuable because, in the winter, they are at a steeper angle and snow tends to slide off easily.

A similar distinction is made for tracking systems. Of these, Ms Tortorice wrote, "Single axis trackers are mounted on an axis horizontal to the ground, which lets the panels rotate based on the sun's location during the day. Double axis trackers are slightly different because they allow the panels to follow the sun's position in the sky, as well as the east and west movement. This allows the panels to adjust no matter what time of day or season during the year. Both of these technologies are effective at maximizing electricity output but tend to be more expensive than the fixed tilt technologies."

To some extent, the nature of the mounting system is dictated by the site. Chris Milner,

Matt Reiss cleaning snow from the finished solar system. Photo courtesy of Matt Reiss.

Cont'd on p13

Getting to know our Solar Installers

GRASSROOTS SOLAR, INC.

dorset, vermont

By George Harvey

Bill and Lisa Laberge with their electric car in front of their barn with a 9.5kW solar array. Courtesy photo.

Bill Laberge, the founder of Grassroots Solar in Dorset, Vermont, has long been interested in sustainable living. He spent many years producing his own hand-made furniture, raising a family with his wife Lisa, dreaming of living a sustainable home, and even volunteering to work for SolarFest. Things began to change as the children became more grown up and spent less time at home.

We might say some things change and some do not. There were two big decisions to be made. Perhaps the more momentous was about where to live, and the couple decided that the place they loved most was where they were. But the other decision was about sustainability, and it entailed having Solar Pro, of Arlington, Vermont, install a 9.5-kilowatt solar system.

As the new solar system came alive, Laberge decided he wanted to share the experience with friends and neighbors, so he had a party. The party was such a success that the next day he had a new job at Solar Pro.

He worked at Solar Pro for two years, pushing the company to expand to new areas. His employers' business plan was not the same as his, but they felt there was a lot of room in the market and suggested he might like to have a business of his own. They had trained him, but they did not need to hold him back. And so, in the beginning of 2015, he started Grassroots Solar.

Since that time, he has completed 19 installations. Most of these were solar installations, though there are many types of those, including off-grid and grid-tied, both with and without battery backup. They have installed roof-mounts, ground-mounts and trackers.

One thing that Laberge takes real interest in, however, is storage. He has taken a keen interest in batteries, and has looked deeply into the different technologies that are available. He regards Elon Musk's announcement of the Tesla Powerwall line as a watershed event, because it made people serious about storage. The interest the Tesla batteries created did not blind him to other manufacturers, however, and he is happy to talk about the pros and cons of such batteries as the Encell, Juicebox, and Aquion.

Laberge's expertise in off-grid systems has led to his being chosen for some very interesting work. One job that is particularly exciting is the solar and battery system for Emerald Lake State Park, in Dorset, Vermont. This project was announced by Green Mountain Power (GMP) late last summer. The situation was that park's electric service was provided by a line that went through over half a mile of bad terrain, including marsh and swamp. It required $7,000 to $8,000 of repairs each year, usually because of trees that fell on it, and access slowed work greatly. When the state needed extensive work at the end of the winter, the engineers at GMP did the cost calculations and found that there would be a 20% saving if the park went entirely off-grid, using a solar system with batteries. The Vermont Parks Division loved the idea. And so did Laberge.

Laberge also takes great interest in smart metering and demand response. These, he says, offer both consumers and utilities opportunities to see some real cost savings. Utilities have long had the problem that the wholesale cost of power they had to buy at high demand times was often higher than the retail price they were allowed to charge. Smart metering and demand response allow customers the opportunity to defer use of power when demand is high, putting off consumption until demand and costs are low, saving money for both themselves and the utility. "Businesses that are feeling the burden of Peak Demand charges would help themselves by looking into peak shaving through battery systems," Laberge has said.

Laberge expects this year or next to bring us to the point the economics of battery backup systems fall to the level that ordinary users can make economical use of them, regardless of whether they have renewable power generating systems. If that is the case, then we are on the cusp of yet another energy revolution.

Learn more about Grassroots Solar at GrassrootsSolar.com or call 802-681-3579.

7.6 kW rooftop array installed on a standing seam metal roof in Dorset, VT. Courtesy photo

Solaring the Monadnock Food Co-op

By George Harvey

106 Ten K Solar 410-watt panels providing a capacity of 43.46 kW power the Monadnock Food Co-op community in Keene, NH. Photo courtesy of Craig Bell, Solar Source.

A new solar system is being installed on the roof of the Monadnock Food Co-op in Keene, New Hampshire, by Solar Source (a division of the Melanson Company, Inc.). Craig Bell, the company's general manager, provided us with specifications. The system was designed to make the best use of the co-op's roof, fully occupying it. It consists of 106 Ten K Solar 410-watt panels, providing a capacity of 43.46 kilowatts (kW) DC. There are four Ten K 7.2-kW AC inverter buses, and a single Ten K 3.6-kW inverter bus. The estimated annual production is about 50,000 kilowatt hours. Eight of the panels are on the lower roof over the main entrance and can be seen from the parking lot, with the remainder of the panels on the upper roof hidden by the parapet.

Many people will find the history of this system most interesting. It was first envisioned in 2013, when the Monadnock Sustainability Network (MSN) and a group of Antioch University New England (AUNE) students conducted a study on community solar. Renewable power production and reducing carbon emissions were important goals, but the organizations also prioritized ownership by area people because local ownership promotes local sustainability.

The study led to a community presentation from which a steering committee was formed. It pointed the project in the direction of community supported solar (CSS). This is a type of community solar that is partly based on the model of community supported agriculture. The Monadnock Food Co-op was a natural fit for them, and its members were excited about having a solar system.

Community solar projects have been built in other places, so we might expect a clear path to follow. It becomes a problem, however, when state laws addressing the particular needs of CSS do not exist, and such was the case in New Hampshire. The federal rules are not supportive of broad participation, so MSN and the steering committee had to find their way through what turned out to be largely uncharted legal territory.

Fortunately, the legal work was largely done pro bono, but this did not make the job easy. The list of things that were not allowed under the laws seemed to be a lot longer than the list of available options. The work of finding the right combination was frustrating, and the process dragged on for the better part of two years.

In the end, of course, the array is getting built and soon to be connected. The owners of this community solar project, all local individuals, will make a profit, though by no means a huge one. The Monadnock Food Co-op will get electricity from the sun at low cost, and in the not too distant future will be able to own the array.

In the process, MSN has gained a fully documented body of experience. They want

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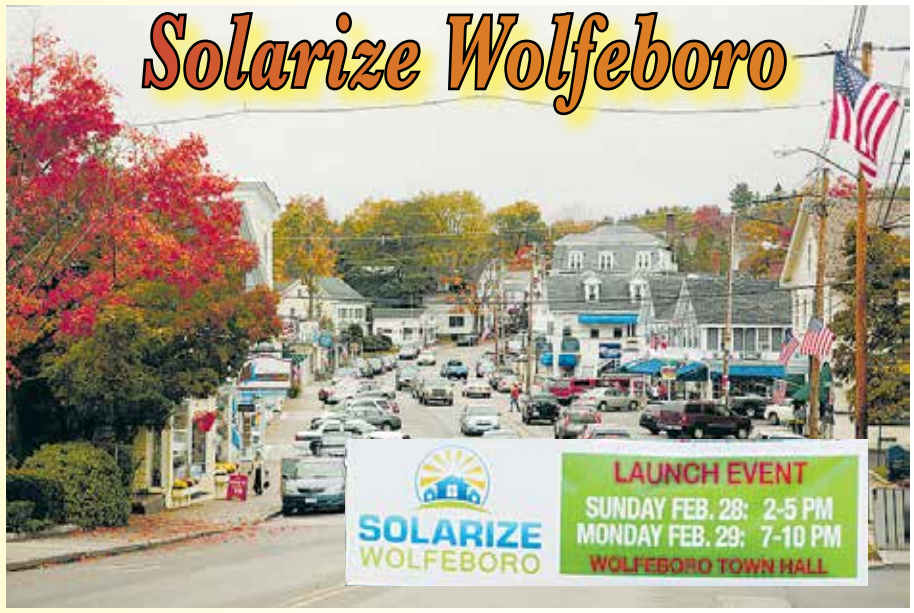


Main Street in Wolfeboro, NH. Wikimedia. Banner photo: Solarize Wolfeboro Committee.

NH Region Campaign Starts with Incredible Interest to Go Solar

The Solarize Wolfeboro Committee, an offshoot of the Wolfeboro Energy Committee, conducted a launch event for their solarize campaign in late February.

To date, Frase Electric, LLC, the partner installer, has conducted site visits and given free bids to over 70 residents in Wolfeboro and surrounding towns.

On April 23rd, the committee will be hosting its next two big events. In the morning there will be a two hour workshop called "Solar 101," offered to residents throughout the state. This workshop will be conducted by Andy Duncan of the Lakes Region Community College and is targeted at people looking to put solar photovoltaic systems on their homes or land.

A second workshop, offered in the afternoon, is targeted at citizens who are wishing to conduct a solar campaign in their town or community. This workshop, titled "Solar Team Training," will be led by Sarah Simmonds of Vital Communities (www.vitalcommunities.org). Sarah has developed a model and "toolbox" that greatly helps communities to expand their solar footprint.

To learn more about either of these workshops, please visit www.solarizewolfeboro.org.

Solarize Wolfeboro is supported by a seed grant from the New England Grassroots Environmental Fund and with advertising support from Frase Electric, LLC.

Solaring the Monadnock Food Co-op

Cont'd from p.10

to share this so others can do similar work in other parts of New Hampshire without the problems they had to endure. John Kondos, president of the organization, said, "We want to make it as easy as possible given the painful process we had to go through." And so their documented guide can be had by others at very little cost.

The New Hampshire Community Supported Solar (NHCSS) Guide is available to all MSN members. Membership is available for $25 for those who are in the Monadnock region, and for $50 for others. MSN is providing a menu of support and legal documents explained in the guide, as well as consulting services. Since the need is clear, MSN has undertaken the work of changing the securities regulations at both the state and federal level to enable broad participation by local citizens in harvesting solar energy in their communities.

MSN's website is greenmonadnock.org.

Front of Monadnock Food Co-op with one row of panels installed. Photo courtesy of Monadnock Food Co-op.

Solar Mounting Cont'd from p.8

of Milhouse Technologies, gave some pointers. Where there is good exposure to the sun only during the middle of the day, the low initial cost of fixed systems is important. Where there is a lot of exposure to the rising and setting sun, trackers can gather sunlight during all hours, showing its advantage.

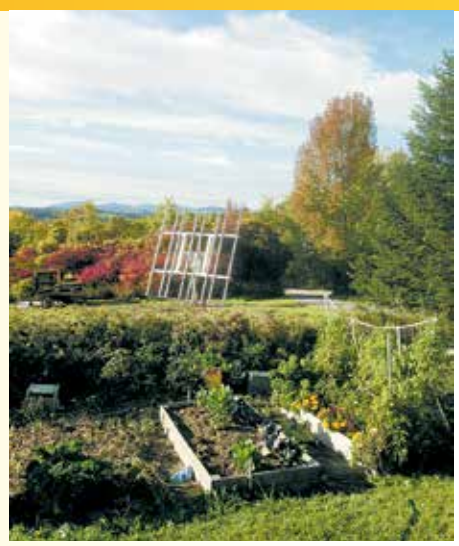
We might look at some examples of mounting systems. Matt Reiss, of Butternutts, New York, has a system that illustrates the sort of fixed system that is put on rooftops and in yards and fields. There is no roof, but there are rafters with purlins screwed across the top. The panels are bolted to the purlins from underneath. The system functions as a car port, though there is no actual roofing. It is made of wood anchored in concrete. With the exception of those pieces of hardware specific to solar electric systems, the hardware came from ordinary hardware stores. The panels are fixed at a 33º angle toward the south. It is a home-built system, but very functional.

When mounting solar panels directly on a roof, it is wise to use professionally designed and manufactured equipment. Anyone who wishes to consider installation might do well to take a look at the hardware made by Unirac Solar Mounting Solutions, for one example of the mounting systems. The fixed-mounted "racking" is used at sites ranging from small residential rooftop installations to utility-scale ground mounts.

Our editor, Nancy Rae Mallery, has a pole-mounted system that does not track but can be adjusted seasonally. Such systems can be over 5% more efficient than nonadjustable fixed systems.

There is a nice example of a tracking system that powers a residence in Bradford, Vermont. It was installed by O'Meara Solar of East Orange, VT using a tracker from AllEarth Renewables, of Williston. The tracker keeps the panels pointed directly at the sun, allowing them to get the greatest exposure and operate at the greatest efficiency. This system is 6.84 kilowatts and based on performance since October should produce about 10,000 kilowatt hours per year, reducing his electric bill to about $32 per month.

Watch for more examples -- and other mounting systems that are not mentioned here that are available and made in the Northeast -- in future issues of Green Energy Times.



An AllEarth solar tracking system under construction outside of Bradford, Vermont.

The AllEarth solar tracker with PVs installed, Darren O'Meara inspecting. Photos courtesy of O'Meara Solar.

2016: The Year that Welcomed Offshore Wind to the United States

By Tyler Morin

February 28th marked the start of a revolutionary conference with industrial-sized, clean energy implications. The U.S. Offshore Wind Leadership Conference was held in Boston, Massachusetts. With the bright lights of the city on one side of the hosting hotel and a view of the Atlantic on the other, the juxtaposition of energy and the ocean couldn't have been clearer. This event brought together entrepreneurs, industry magnates, and future energy leaders for one singular purpose: to develop the offshore wind industry in the United States of America.

Void of bureaucrats, the event was meant to bring these industrially-important people together. Through a plethora of panel presentations, discussions, and networking sessions, the seeds have been planted to get this industry moving.

Truthfully, the planting of seeds began many years ago when a project titled Cape Wind began off Cape Cod. After years of political and legal battles, the project is, and may forever remain, a thought. Another attempt at developing offshore wind in the United States occurred when a Norwegian energy company showed interest in a project off the coast of Maine. Due to a variety of factors including uncertain energy policy, the company took its investment to Scotland. The project, called Hywind, is going to cost almost a quarter of a billion dollars – money that Scotland is happy to see spent in that country.

So what makes this year so special for offshore wind in America? Enter the Block Island Wind Farm in Rhode Island. Deepwater Wind, the project developer, is halfway through construction of our country's first offshore wind facility. Offshore wind is now a present industry in New England. Marion Gold, a commissioner in Rhode Island's Office of Energy Resources, claimed that this success was largely due to policy agreement between stakeholders and the project developer. Another indicator for success is the arrival of the largest offshore wind developer in the world. DONG Energy, titling their local efforts as "Bay State Wind," has decided the American market is worth investing in. They purchased a lease agreement and plan on constructing within the next few years. One might ask, "Why here?"

Massachusetts has a very inviting coastal environment for offshore wind technology. The state is also going to be decommissioning a number of power plants in the near future, including coal and nuclear facilities. Therefore, a demand has been created for new sources of energy. With Europe's quick development of the offshore wind industry, the cost of electricity from offshore wind has continued to decrease, making it a viable option with a promising future.

While there is a need for energy producers like offshore wind, this industry is still in its infancy. If we want to bring in its job-creating, clean energy solutions, we must show demand. So how do we, as a country, make this happen? The answer is industrial policy. Current federal policies for wind and solar are going to expire by 2019 and 2021, while oil and gas policies are permanent. I'll repeat that word for emphasis: permanent. We need to show public demand for clean energy. We need to show public demand for energy independence. We need to show public demand for the elimination of financial exportation to OPEC so that we invest in resources and job creation here in America. Our policies are enabled by our politicians, and our politicians are enabled by our people.

Part of an offshore wind farm developed by DONG Energy in the North Sea capable of powering 200,000 homes. Photo: dongenergy.com

As the conference drew to an end, we were reminded of the potential for the growth of the industry and the positive effects of embracing a local resource. When a panelist was asked what the single most important step will be in getting this industry off the ground, he quickly indicated that it was the passing of Massachusetts' senator Ed Markey's credit extension bill. This bill will instill confidence in industrially capable entities that Americans want clean energy. So contact your senators and congressmen and tell them that you want this bill passed. Also, when you vote for new representatives for your town, your state, and your country, be confident that they will represent your opinions on clean energy.

For more information about offshore wind, visit offshorewind.work.

Tyler Morin is an engineer with interests global wind efforts. Morin's passion for renewable energy is exceeded only by his love of the outdoors. A recent Appalachian Trail "thru hiker," Morin aims to complement New England's iconic beauty with a leading clean energy industry.

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

- $0.40 per kWh/year for residential and commercial customers
- $0.80 per kWh/year for Special Category customers

***special customer category limited to municipalities, non-profit housing authorities, public schools., and non-profit hospitals and health care centers. 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®)

Due to exceptional program participation in 2015, Efficiency Vermont has made several changes to LED lamp rebates effective October 1, 2015, with the following program impacts:

- SMARTLIGHT discounted replacement lamp program:
- LED R/BR/PAR $11 to $17 rebate
- Globe, A, Candle/Decorative $6 rebate
- Reduced support of CFL promotions
- LED fixtures $15 rebate
- LED task/under cabinet fixtures $8 rebate
- There is a retail price floor on lighting of $3.99 after incentives are applied

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 1 qualifying models, $75 rebate for CEE Tier 2, 3 or ENERGY STAR Most Efficient
- Refrigerators - $40 rebate for CEE Tier 1, $75 for CEE Tier 2, 3 & ENERGY STAR Most Efficient
- Clothes Dryers - $50 to $400 rebate on select ENERGY STAR electric models

Heating/Cooling

- LP/Oil boilers & furnaces - $500 rebate*
- solar hot water - $950 rebate post installation
- heat pump water heater - $400 rebate or point of purchase discount
- central wood pellet boilers (excluding outside wood systems) - $2,000
- circulator pumps - $50-$600 point of purchase discount
- cold climate heat pump - $300-$400 point of purchase discount

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 – 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

*1. *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 = $0.75/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 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 tax credits).

Category 2 is closed.

Contact Elizabeth.Nixon@puc.nh.gov

PLEASE NOTE: The program is under review to determine if any changes should be made. For Info contact executivedirector@puc.nh.gov.

For C&I solar program details, go to: http://bit.ly/NHPUC-re-Rebates

Residential Solar PV Rebate Program

- Rebates for solar electric/thermal projects 10kW (or thermal equivalent) or less
- New Solar PV = $0.50/Watt DC or 30% of total project cost, whichever is less. Max $2500.
- Expanded Solar PV = $0.50/Watt DC or 30% of total project cost, whichever is less. Max $2500.

Contact jon.osgood@puc.nh.gov

Residential Solar Water Heating Rebate Program

- $1500 - $1900 per system based on annual system output
- 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 tax credits).

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

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

2. $0.50 per watt up to the lesser of 15% of installed cost or $20,000

Commercial Fossil Fuel Program

3. 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.

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.

• 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

MA State incentives link is: http://www.masscec.com/get-clean-energy

Welcome to the 2016 New York solar incentive and rebate information page!
https://solarpowerrocks.com/new-york/

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/nysuninitiative/dashboard.aspx

Keep Your Cool This Summer with Heat Pumps and Solar

By George Harvey

A multi-zone, Mitsubishi Electric 36,000 BTU heat pump system serves to cool and heat the Meriden, New Hampshire Library. Left: The installed outdoor unit rests on a bracket to keep it above the level where snow can build up. Line-hide enclosure covers the refrigerant, condensate and control lines running up the side of the building. Bottom right photo shows one of two wall-hung units in the library.

It might come as a surprise to some of us, but nearly everyone has and uses heat pumps. They drive our refrigerators, air conditioners, and even dehumidifiers. In the past few years, new technology has made them economical for heating homes in the northeast. But one thing even more of us do not focus on is that the same technology that heats homes during the winter, can keep us cool the summer, and do it more efficiently than dedicated air conditioners.

We connected with Kim Sager of ARC Mechanical Contractors, from Bradford, Vermont, for information on details. She told us that heat pumps beat out other forms of both heating and cooling in almost all ways. Specifically, she said, "Heat pumps compare very favorably to other types of heating and cooling systems in terms of installed cost."

She also addressed the carbon impacts of heat pumps, saying, "As far as environmental impact, it all depends. Heat pumps use electricity to operate, so it all depends upon how efficiently the electricity was produced." If we have solar systems or other renewable energy driving them, operating them can be carbon-neutral.

Heat pumps can be air-sourced (ASHP), also called mini-splits, water-source, or geothermal, so we asked Sager about the different kinds of heat pumps and whether they can all be used for cooling. Her reply was, "All heat pumps heat and cool regardless of the source, air or water."

She directed us to a quote from a US Department of Energy website for a comparison of different kinds for efficiency: "...geothermal heat pumps are substantially more energy-efficient than even air source heat pumps because they take advantage of the relatively consistent ground temperatures, which are far more uniform than air temperatures. Geothermal systems can reduce energy consumption by approximately 25% to 50% compared to air source heat pump systems. Geothermal heat pumps reach high efficiencies (300%-600%) on the coldest of winter nights." [bit.ly/DOE-geothermal-HP-guide]

There are different kinds of ASHPs, and we asked about permanently installed ones, as opposed to those that can be mounted in a window, like an air conditioner. To this, she said, "SEER and EER ratings will tell you how efficiently a unit performs, the higher the rating the less expensive it will be to run the unit. A quick online Home Depot search found three window heat pumps: a 9,000 BTU unit for $615; an 11,600 BTU unit for $700; and a 17,300 BTU unit for $867. All units advertised up to a 9.8 EER rating. Compared to a 9,000 BTU ductless-split cold-climate heat pump system installed for $3,850 with an EER of 16.1, a window unit is certainly less expensive albeit much less efficient."

Specifically, she said of her own experience with makes and models, "For residential and small commercial applications, we install more Mitsubishi Electric heat pump systems than any other. We also install quite a few Fujitsu systems. Both manufacturers produce reliable, robust cold-climate heat pump systems."

One interesting thing about heat pumps is that they can be used for some other pretty specific jobs. For example, there are special units that are designed to take heat from a basement environment and deliver it to a water heater. As a side benefit, their cooling can be used to condense water vapor and deliver it to a drain or sump. This means a heat pump can do double duty, dehumidifying the cellar while it heats water. Sager observed, "A dedicated de-humidifier operates off a humidistat that is sensing the humidity level of the space. The heat pump water heater reacts to the temperature of the water in the tank and will only dehumidify when there is a demand for hot water, and the compressor is running, regardless of the space humidity." Nevertheless, the heat pump is not only a highly efficient way to heat water, but the energy that is lost in the process can be used for the purpose of dehumidifying, a clear gain.

The bottom line for summer heat, however, is that while mini-split or geothermal heat pumps are among the most efficient and environmentally-friendly ways to heat buildings, they are also quite possibly the most efficient and environmentally-friendly way to cool them.

Cont'd on p.19

Cooling with Heat Pumps - Cont'd from p. 18

Meriden, NH Library, Heat Pump Installation

ARC installed a Mitsubishi Electric ductless heat pump system at the Meriden Library, in Meriden, New Hampshire. Not only do the library patrons stay cool when summer heats up, but the new system also provides heat when winter returns, reducing their reliance on their oil-fired furnace.

The Meriden Library, like many small town libraries, had limited funds, and although air conditioning was needed, it seemed like a luxury.

The Meriden Library Director, Mary King, is excited to now be able to offer patrons a comfortable refuge in the heat of the summer as well as realize savings from the efficiency of the heat pump.

The multi-zone Mitsubishi Electric 36,000 BTU heat pump system includes an outdoor condenser with two indoor evaporators. Even when the outdoor temperature falls to 17º the system will provide heat at 75% of its capacity, reducing the library's heating oil expense.

Right: Refrigerant and electrical lines are connected to the outdoor heat pump unit. Far right: A hole is cored through the brick exterior to run condensate drain lines. Photos courtesy of ARC Mechanical Contractors.

Gardening Freedom. Take Your Summer Back!

By N. R. Mallery

I love to garden, and grow about 80% of what I eat. But I am also a very busy person, and I find it very difficult to keep my garden weeded. I have tried many ways to make weeding easier. The garden claw tool is an awesome tool for getting to the roots, but weeds still come back. I tried covering the rows between and around the plants with the grass clippings I catch with my electric (charged with solar) lawnmower, but the grass seeds make more weeds when they sprout. What to do? Covering my organic soil with plastic that breaks down into it is not ok. I have even replaced my hoses with PVC-free and lead-free hoses, for goodness sake.

Last spring I heard about a local company called GardenMats. A friend had been using them for years and marveled about his lack of weeding chores. He is very particular about growing organically, too, so he had my attention.

GardenMats claim to provide natural weed control while letting in air and water to help retain moisture, prevent erosion, increase yields by 10%-20% as an environmentally friendly, low-impact weed control solution that can last up to 10 years. In addition, they are made in Worcester, Vermont – local to my home base.

I called the founder and owner, Peter Comart, who explained their sales policy, saying, "[We] manufacture and sell direct, giving us total quality control and no middle men. This enables us to sell a premium product and keep our prices affordable. Some people think we are in the business of making mats, but we are not. We are really in the business of helping people meet their food supply needs. The number one problem preventing or inhibiting people from doing that is maintaining a garden. GardenMats take out 95% of the labor. So now you can go on vacation and not return to a jungle of weeds."

Peter promised they would cut my weeding time down immensely – to just a few hours all season. I knew Green Energy Times readers would like to know about such things, and so I agreed to test the product for review. The mats would be used in only half of my own garden, for comparison.

I had three concerns about them:

1. I plant intensively, so the pre-cut holes might not fit in with the way I generally plant.
2. Voles. In the past, row-cover over my sweet potato bed created a vole haven, so this was a concern for me. Peter said he has heard about this issue, but has not experienced it himself.
3. I was concerned about keeping my soil moist. I live on top of a mountain with a sandy loam soil that drains too fast, despite all amendments to hold in moisture. It is a struggle to keep it watered. A 275 gallon rain catchment barely helps.

The GardenMats website video explains how to use the eight pre-cut patterns. It requires some planning for sure.

GardenMats work perfectly for sweet potato slips helping the soil to warm ahead of planting. This is ideal to meet the need for a longer growing season than northern Vermont usually has. They worked well for bean rows, corn, and beets, as well as broccoli, tomatoes, cabbages, cantaloupes, and more. I did not use the mats on my asparagus, parsnips and garlic because of the holes.

The founder of GardenMats, Peter Comart, proudly stands in his own weed-free garden that has produced a bountiful garden paradise. Courtesy photo.

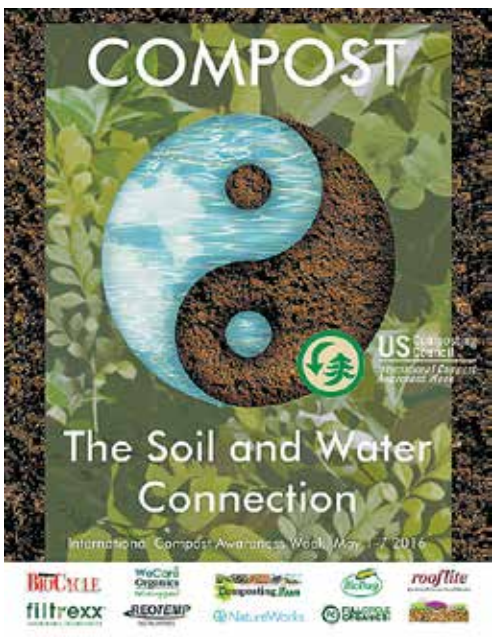
At the end of the season, I had my answer. They actually do help the soil hold moisture, without the sun baking the soil dry. Weeds were non-existent except for the few that came up in the pre-cut holes. The reduced time for weeding the garden was tremendous. The crops grew well because I mulch well in the fall and worked it into the top layer before laying down the GardenMats.

At the end of the season, the mats were removed after the harvest was done. Manure and leaves for mulch were then applied for the next growing season, as the mats were hosed off, air-dried, and stored for reuse in spring. Nine more years of freedom from weeding chores to go!

I did have one problem: the voles and the sweet potatoes! The vines and potatoes grew extremely well. But the voles loved living under them and only left me one, the biggest I ever grew! Help, I need to get rid of the voles.

Cont'd on p.33

International Compost Awareness Week
Kicks off on May 1st!



Winning poster design by Yessi Budisari of West Indonesia. Photo courtesy of the U.S. Composting Council.

Across the USA, events featuring food scrap diversion, organics recycling, and the use of compost as a solution to soil and water challenges worldwide will be the focus of celebration for International Compost Awareness Week, May 1-7, 2016.

As part of this event, compost facilities are inviting the community in to see their operations; non-profit organizations, recyclers and government agencies are holding homeowner composting demonstrations and movie screenings; Earth Day and other events are celebrating the natural microbial process of breaking down organic materials to become healthy soil amendments.

What will you do to celebrate compost awareness week? Purchase compost for a garden? Commit to composting at home? Find a local composter to either pickup or deliver food scraps from your home or place of work? There are many ways to get involved! In fact, there are a number of compost facilities and organics recyclers in New England – a web search will reveal a plethora of resources for those looking to get active in this local and sustainable green living trend.

Each year the US Composting Council membership votes on a celebratory poster to highlight the value of composting during this special week. This year's commemorative design was designed by Yessi Budisari of West Indonesia. In her country, she heard growing concern for soil revitalization in the wake of a brush fire and smoke damage to the natural environment and designed the winning 2016 International Compost Awareness Week poster in response.

The poster, which is being distributed nationally for the celebration, focuses on a water conservation theme of Compost: The Soil and Water Connection. This year there were nearly 125 entries from all ages and across the world.

"Encouraging compost enthusiasts of all ages to think about compost as a soil and water resource is an effective way to educate people about the vital role it plays in the world's food supply and health," said Jeff Ziegenbein, chair of this year's International Compost Awareness Week Committee and project manager for Inland Empire Regional Composting Authority in California.

Budisari, who is an artist, received a $500 prize for her poster's selection.

International Compost Awareness Week is an annual multi-media publicity and education campaign that showcases composting and compost products, from backyards to large-scale composting facilities.

The U.S. Composting Council is a national organization dedicated to the development, expansion and promotion of the composting industry. Established in 1990, the USCC achieves this mission by supporting and performing compost-related research, promoting best management practices, establishing standards, educating professionals and the public about the benefits of composting and using finished compost. USCC members include compost producers, marketers, equipment manufacturers, product suppliers, academic institutions, public agencies, nonprofit groups and consulting/engineering firms.

The USCC is a non-profit 501(c) (6) organization that also directs the Composting Council Research and Education Foundation (CCREF), a 501(c) (3) charitable foundation, which administers public and private research and education activities.

Sponsored by Casella Organics, a manufacturer and wholesale distributor of earthlife compost, mulches and soils throughout the Northeast, and a proud U.S. Compost Council member.

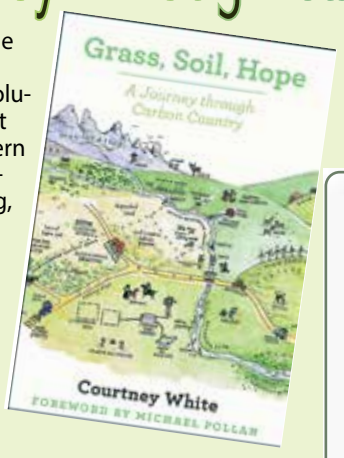
GRASS, SOIL, HOPE: A Journey Through Carbon Country

by Courtney White (Chelsea Green Publishing, May 2014, 272 pages, Paperback $19.95)

Book Review by Jennifer Highland

When was the last time you saw a book about climate change that featured the word "hope"? That alone is good reason to read this book and share it with everyone you know. Author Courtney White is so brimful of optimism on this usually fraught subject that you may occasionally want to tell him to calm down. Still, the core message in Grass, Soil, Hope is both exciting and empowering: the potential to stop climate change is already in our hands and under our feet.

The soil is the world's largest available carbon sink—a place to redirect problematic carbon dioxide from the atmosphere, and it has a large unused capacity, White explains. Plants pull CO2 out of the atmosphere via photosynthesis, and farmers can use relatively low-tech methods to encourage plants in turn to pump it into the soil. Given that much of the world's croplands, rangelands, and deserts are carbon-poor after centuries of mismanagement, this represents a huge opportunity.



This climate solution requires that we rethink modern agriculture. Practices like plowing, overgrazing, monocropping, and application of chemical fertilizers and pesticides have gravely depleted many soils of carbon, valuable nutrients, and microbial life. Reversing this trend requires using different techniques—some old, some new, but all well-proven to rebuild soil health while growing more healthful food for all of us. This win-win approach has been dubbed "regenerative agriculture." And it gets even better.

Over the course of the book, White takes us on a virtual journey to farms, ranches, backyards, and meadows where real people have been pioneering real solutions. While many of the case studies are not so relevant to New England, he does profile a New Hampshire organic farmer, two backyard permaculturists from Holyoke, MA, and rooftop gardeners in New York. While Northeast pastureland is quite different from rangeland in the arid West or Australian Outback, some of the grazing practices developed in those settings may still enhance outcomes for

Cont'd on p.25

What's the MPG on Your House?

By Jeffrey Gephart

If you're under 54, every new car you've ever bought has had a miles-per-gallon (MPG) rating on it. Maybe the vehicle purchased didn't get great mileage, but at least you knew what you were getting into.

If you are building, buying, or even refinancing, what about your "MPG" for the house? For most, energy costs are the second highest cost of home ownership, second only to the mortgage. Having an estimate of a home's energy costs is crucial for informed decision making when purchasing a home. High energy costs are also indicators of comfort, indoor air quality, and building durability problems. If a home were tested, rated, scored, or certified by accredited third parties, you would know, just as in the case of your car, what you were getting into.

For new home construction, "MPG" ratings do exist and they are provided by NHSaves and Efficiency Vermont. Home energy raters review building plans to identify cost-effective improvements, and provide a Home Energy Rating Score showing the home's performance. Other certifications like ENERGY STAR® Homes, Efficiency Vermont Certified, Efficiency Vermont Certified High Performance Home (a net- zero-ready home), LEED for Homes, National Green Building Standard, and Passive House, describe building performance and sustainable construction features.

These third-party ratings and certifications provide valuable documentation the real estate market needs for sales, search, and appraisal purposes. The New England Real Estate Network (NEREN), our regional multiple listing service (MLS), was an early adopter – adding "green" information fields to listings in 2010. NEREN is revising their green fields to meet new industry standards. NEREN's efforts are moving us toward a future where accurate energy efficiency and renewable energy information will be available through the MLS. Just as tax data is uploaded electronically into the MLS, third party verified ratings, scores, and certifications could be as well.

So what about existing houses? What's its MPG? Efficiency Vermont will soon pilot the Vermont Home Energy Profile (the "Profile"), an asset rating for existing homes. With the Profile, like the MPG, actual mileage may vary depending on how you drive.

The Profile estimates annual energy use for all fuels, estimated energy cost per year, and the U.S. Department of Energy (DOE) Home Energy Score are included. The Profile's pilot starts this summer with some of Vermont's Home Performance with ENERGY STAR certified contractors and by property inspectors trained and certified as "Assessors". It tests whether the Profile fits into the contractors' and inspectors' business models and proves valuable to their customers. A similar pilot will be rolled out shortly in New Hampshire using the DOE's Home Energy Score platform.

An energy audit can provide the estimated energy costs for an existing home, the investment needed to reduce those costs, and the likely energy savings from that investment. Using data from Efficiency Vermont Home Performance with ENERGY STAR participants, the chart below demonstrates how the total cost of ownership over time can be less for a more expensive but more energy efficient home. Home Performance with ENERGY STAR participants were broken into three savings ranges, and those ranges were averaged for both cost of improvements and energy savings achieved. The chart shows how audit-driven improvements to the home are cost-effective when financed over a sufficient term, as with a new mortgage, refinance, or financing upgrades. The better, more comfortable and affordable home is less expensive to own the day you move in.

Total Cost of Ownership	Unimproved Home	Improved Homes		
Average Efficiency Improvement	0%	23%	34%	44%
Cost of Unimproved Home	$250,000	$250,000	$250,000	$250,000
Average Cost of Improvement	$0	$8,404	$11,837	$12,573
Total Price	$250,000	$258,404	$261,837	$262,573
Monthly Ownership Cost & Savings				
Mortgage Payment*	$1,117	$1,155	$1,170	$1,173
Average Energy Costs	$424	$351	$276	$202
Combined Mortgage & Energy Costs	$1,541	$1,506	$1,446	$1,375
Average Savings	$0	$35	$95	$166

* 3.5% down payment, 30 Year Fixed Rate FHA loan, & an interest rate of 3.75%

So if you are building a new home, buying or refinancing an existing home, or simply know that you need a break from cold drafts and high bills, improving your home and comfort can pay for itself. By using the services of Efficiency Vermont, NHSaves and NH's DOE Home Energy Score, you can get help in making efficiency improvements and in documenting your home's "MPG" (using consistent, standardized, industry-recognized methods). The economics above don't even take into account the financial incentives available through these efficiency services.

For current or future sellers of improved homes, documenting energy performance enables you to accurately disclose advantages that your energy efficient home has over other homes. There is no contributory value for energy efficiency if no one knows about it. Documentation is valuable. With enough data ("MPG") in the market, more informed decisions, such as getting a better home for lower total cost of ownership, become easier.

Jeffrey Gephart works with Efficiency Vermont and supports the VGHA.

Jeffrey Gephart, works with Efficiency Vermont and supports the VGHA.

Homeowners' Associations - Ruling Out Solar

Just for the Look of It?

By Joan Rech

New York Assemblywoman Sandy Galef. Flickr

As solar power systems have become more affordable, more homeowners are installing such systems to meet some or all of their homes' electrical needs. But others face a major obstacle – their homeowners associations (HOA's). Many HOA's were incorporated before solar was a realistic possibility, and their rules or by-laws either prohibit roof-top solar arrays or fail to address the issue completely. This leaves decisions to the current board, whose members may or may not be sympathetic to renewable energy. In some cases, it has led to litigation, the results of which have been inconsistent.

Because of this, New York Assemblywoman Sandy Galef has introduced a bill (A06878) to prohibit HOAs from banning roof-top arrays. In support, the bill states that in order to meet state renewable energy goals, "… solar power opportunities must be expanded to those, who for a variety of reasons, have been prevented from installing solar power systems, particularly solar arrays, on their houses." The intent of the bill is clear. It applies only to situations where the roof is owned by the homeowner and is not common property of the HOA. The bill also lists restrictions HOA's may and may not place on solar energy systems. HOAs may adopt rules regarding the qualifications of installers or contractors and the location, size and color of the arrays. However, they may not adopt any rule or regulation which "inhibits the solar power system from functioning at its intended maximum efficiency." Four states, Massachusetts, California, Arizona and Florida, already have similar laws.

I have a strong interest in this bill. I own a small (1200 square feet), inexpensive townhouse. Each homeowner is responsible for his or her exterior maintenance (including the roof) and landscaping. The houses are grouped in units of two and four, essentially equivalent to row houses.

I had proposed a small system – 13 panels on less than 25% of my roof, which would have provided me with all of my electricity on an annual basis. My HOA rejected the proposal. The reason given: it would "… significantly change the architectural appearance of the entire community as it was designed." Significantly? Entire?

Times change. At one time, HOA's could ban satellite dishes. The rules of my HOA still include such a ban although it cannot be enforced, (due to federal legislation dating to 2005). Assemblywoman Galef's bill would similarly address the issue of solar arrays. It would bring clarity to the issue and allow more homeowners to obtain some or all of their electricity from a renewable source – the sun.

If you are interested in supporting this bill or have faced similar problems with a HOA, please contact me at 518 307-1294 or runner1930@hotmail.com.

Joan Rech is a retired computer programmer. She lived in Vermont and now resides in upstate New York. Joan wrote two books about short hikes and interesting walks in southern Vermont.

Top 10 Reasons Why Solar PV Has Reached Escape Velocity

AND WHY SOLARCITY AND NET-METERING SUBSIDIES ARE DISTRACTING OUTLIERS

By Laurie Guevara-Stone

A solar photovoltaic installation. Photo: Flickr.

With Nevada rolling back net-metering and solar company stock prices falling, one might think the solar industry is in big trouble. In fact, a New York Times article on February 10, 2016 stated that SolarCity and other residential solar companies face a cloudy future. The article implies that the solar business model is based largely on subsidies (federal, state, and local), and therefore highly exposed to regulatory changes. Yet we believe the opposite is true: the solar industry will continue to have sustained and significant growth despite SolarCity stock woes and net- metering policy changes. And here are ten reasons why.

1. PV COMPANIES ARE DIVERSIFYING

The PV industry is increasingly diversifying, making it more resilient to incidents of bad policy. "While the New York Times article focused on residential solar, that segment is less than 25% of the market," according to RMI Associate Kevin Brehm. In fact, SolarCity, a company commonly associated with rooftop solar, is now building and owning utility-scale solar projects. As companies diversify they are less exposed to policy risk that may affect one segment, such as the Nevada policy change.

2. THE PV INDUSTRY IS GLOBAL

On a global scale, new markets will enable the U.S. PV industry to grow despite short-term recessions in local markets. In October of 2015, global information and analysis company IHS predicted 2015 global PV demand would reach 59 GW, 33 percent higher than 2014, and 2016 would reach 65 GW. This growth is largely due to increased demand in China, India, and other emerging economies. "It's a growing global market and U.S. developers are really well positioned to capture that market," said Brehm. For example, SunPower has been diversifying into markets including the Middle East, Latin America, and Africa, and 50 percent of SunEdison's project pipeline is outside the U.S. First Solar is also going global with over 60 percent of its 2015 Q2 potential booking opportunities (16.7 GW) coming from international markets. "This global diversification mitigates local, state, and federal electricity policy changes to a great extent and helps to insulate the solar PV industry from microeconomic vagaries," according to Anthony Coker, VP of Market Development for Hannah Solar.

3. SOLAR PV IS A PROVEN ROBUST TECHNOLOGY

Standard solar PV module warranties currently range from 25 to 30 years and product lifetimes are far exceeding manufacturers' warranties. Many early off-grid adopters are still harvesting solar energy from modules installed in the 70s. Even inverters are getting out of the reliability hot seat with over-20-year warranty extensions based on the belief that if products fail at 15 years they will delight customers with higher-efficiency, longer-lifetime replacements.

4. SOLAR PV COST IS BEATING FOSSIL FUELS

According to Lazard's latest Levelized Cost of Energy Analysis (LCOE 9.0), the "levelized" cost of electricity for utility-scale solar PV without subsidies is beating conventional alternatives in many parts of the U.S.—even with current low fossil fuel prices. First Solar recently agreed to sell power from its 100 MW solar plant in Nevada for 3.87 cents per kilowatt-hour (rising at 3% per year), thought to be the lowest electricity price ever. And last June, Austin Energy received bids for over 1.2 MW of PV projects at under 5¢/kWh.

5. COST OF SOLAR PV WILL CONTINUE TO FALL

PV costs in all segments are expected to continue down. According to LCOE 9.0, "The levelized cost of rooftop solar PV is expected to decline in coming years, primarily as a result of more efficient installation techniques, lower costs of capital, and improved supply chains." Canadian Solar estimates that the cost of the modules will fall 25% in the next three years, and GTM Research predicts that through a balance of systems cost reductions, PV system prices will fall an average of 40% by 2020. Economies of scale along with improved business processes in a newly emerging industry will continue to drive down costs.

6. THE INDUSTRY IS ATTRACTING TOP TALENT

Forbes "Top 30 under 30" list of the brightest entrepreneurs and change agents under the age of 30 has a disproportionate share of PV talent compared to market cap. The new generation of leaders is bringing a pragmatic outlook honed in the 2007–2009 financial crisis. Yet, where previous generations largely fled green agendas this pragmatic generation has analyzed the long-term trends that will play out in our lifetime and see renewable energy and energy efficiency as sure bets for both job security and satisfaction.

7. DECOMMISSIONED COAL PLANTS WILL DRIVE SURGE IN PV DEMAND

Even with the unknown outcome of the challenge to the Clean Power Plan, a total of 46,000 MW of coal generation is on track to close in the span of 2012–2022. Just last July the 200th coal plant shut down in the U.S. As coal assets are decommissioned, solar PV is likely to step in and cover a large share of the capacity need. Solar PV is affordable, and with falling storage prices, it can be a great alternative to coal. According to Brehm, "The war on coal is over. Now it's just a question of rebuilding and solar will be a large portion of that generation capacity." Duke Energy, which installed over 200 MW of solar in 2015, has stated that despite what happens with the Clean Power Plan, any new generation it installs will be in natural gas and renewables. Coker adds, "No one is arguing for a single silver bullet—one generation source for the global economy's electricity. Rather, we are seeing a displacement of coal by lower-priced gas, solar, and wind in many regions. Economics are dictating the change."

8. COMPLETELY UNTAPPED MARKETS STILL EXIST

New solar business models will create access for more customers. There is currently a huge market for low-to-moderate income households in the U.S. Fewer than 0.04 percent of these families have solar PV systems, which we estimate at a $250 billion dollar market in the U.S. alone. And worldwide, over a billion people have no access to electricity at all. As PV costs continue to decline and more developing countries enact policies supporting renewable energy expansion and continue to push for electrification to drive economic development, the solar PV market is poised to grow at an incredible rate in those countries. Solar PV can reach these populations providing them with clean, reliable, and affordable electricity.

9. NEW SOLAR MARKETS SEGMENTS ARE EMERGING IN MATURE MARKETS SUCH AS THE U.S.

Even if some currently active solar market segments stagnate, there are significant new markets opening up. Community solar is a large currently untapped market. There are currently 65 MW of community solar installed in the U.S. with an estimated 250 GW market potential. "Community-scale solar is an exciting segment of the market. Increasing demand from rural electric coops, community-based organizations, and local municipalities is driving developers and service providers to innovate new technology and business solutions," according to RMI Associate Kieran Coleman. "Clearly this is a very early stage nascent sector that has huge potential to meet broader need."

10. BUSINESS MODELS ARE BEING CONTINUOUSLY INNOVATED

While the New York Times article makes it sound as though SolarCity and other companies' business models have inherent flaws and risks, we believe that business models are continuously changing. Whether it is a non-profit organization like Clean Energy for Us, a for-profit solar company such as PosiGen, or a utility such as Kit Carson Electric Cooperative, there is continuous innovation to make solar more affordable, accessible, and profitable. Even large, conservative investor-owned utilities are adding more solar (e.g., Southern Company with its three military bases of over 90 MW under construction and several large utility scale solar farms publicly announced by Mississippi Power) forging new solar business models in highly regulated markets. "And regulators like the New York Public Utilities Commission play an equally important role in opening the field in business model innovation in current and emerging sectors," added Coleman.

A BRIGHT FUTURE

So while states like Hawaii and Nevada end net-metering, and solar companies' stock values fall with the market like oil and gas or banking stocks, we feel the solar industry does not face a cloudy future – far from it. Policies, regulations, and the stock market can't stop the continued growth of this clean, affordable, reliable technology; the future of solar PV is bright.

This story first appeared on: Rocky Mountain Institute at http://blog.rmi.org.

VT Net Metering Revisions Cont'd from p.3

What stays the same:

- Unused net-metering credits will be forfeited to the utility without compensation after 12 months.

What the proposed rule means for existing solar installations:

- Existing installations will receive their utility's net-metering rate on file with the PSB on December 31, 2016 for 20 years from the date system is installed.
- Existing installations will receive solar adder for 10 years from date installed.
- Existing installations will not be subject to the proposed adjusters.

What does this mean for Vermonters who want to go solar?

The Homeowner:

Tom and Jan want to go solar and reduce their carbon footprint by installing a 5kW array on their home's roof in GMP territory. Under the current rule they would receive $0.20/kWh. Under the new rule they would receive less than $0.13/kWh. For a typical family's electric use, this would change the solar array's payback period from 13 to 20 years.

The Town or Small Business:

Residents of Barnard have voted to go solar and fund a bond to put a 30kW array on the roof of the town's Emergency Services Building. Under the current rule, they would receive $0.19/kWh. Under the new rule, they would receive less than $0.13/kWh. For Barnard's project this rule would change the payback period from 14 years to 22 years.

The Community Solar Group:

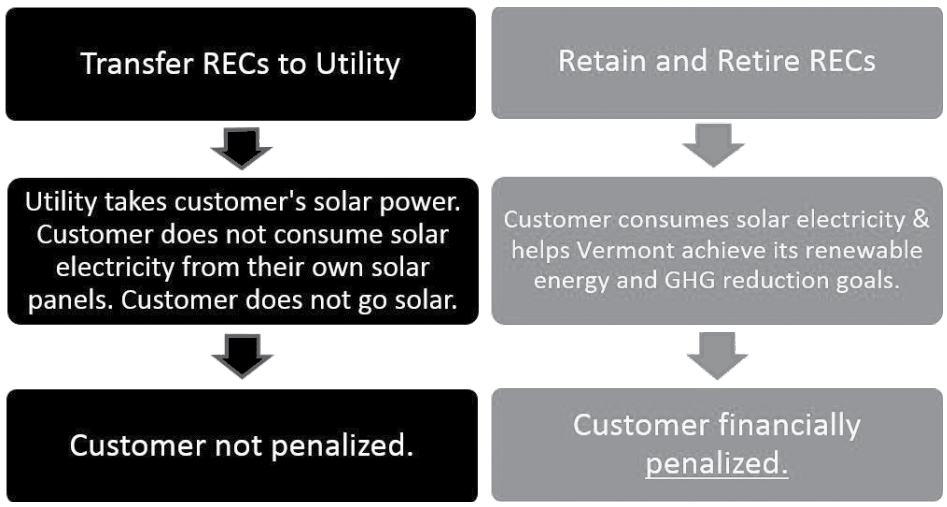
A 150 kW community solar array planned for Richmond would receive less than $0.13/kWh if sited in a preferred location. Currently, that same size array receives $0.19/kWh. The proposed rule would change the payback period for Richmond's ground-mounted community solar array from 9 years to 15 years—or longer if negative siting adjusters apply.

So what does this mean for Vermonters who want to go solar?

Vermonters who seek to go solar in 2017 and beyond will find that the economics are substantially worse than they are today. If the rule is finalized in its current form, many Vermonters will find that it makes significantly less financial sense to go solar.

Furthermore, honest solar installers would no longer be able to market their installation services as providing "solar" or "renewable energy" for customers who choose the most economical option. Vermonters interested in buying solar panels would be faced with a stark choice: either turn over your right to your solar power to the utility, or receive a substantial reduction in credit that undermines the fundamental economics of your solar array.

There is no sound policy reason for creating this dilemma, which will prevent Vermonters from going solar, harm honest solar companies and slow the adoption of solar energy in Vermont. No other state has provisions that economically force the solar customer to turn their RECs over to the utility:



To comment on the proposed net metering rule:

- Email written comments to: psb.clerk@vermont.gov by May 12, 2016.
- Attend a public hearing on Wednesday, May 4 @ 7:00 PM Montpelier HS Cafeteria, 5 High School Drive or Thursday, May 5 @ 10:00 AM PSB Hearing Room 112 State Street 3rd floor.
- In addition you should copy your letter to your legislators. *(See sample letter below.)*

The full-text of the proposed net-metering rule (5.100) is available at: http://psb.vermont.gov/statutesrulesandguidelines/proposedrules/rule5100

Sample Letter:

VIA Email: psb.clerk@vermont.gov, Vermont Public Service Board; RE: Proposed Rule 5.100

Dear Vermont Public Service Board:

As Vermonters who install solar for our homes and businesses, we believe that it is important to legally "go solar." We want to be able to claim we consume the solar energy that is generated from our solar panels. It will be financially prohibitive for Vermonters to retain and retire their RECs under the new rule. Citizens, businesses, and community organizations who go solar contribute additional renewable energy toward Vermont's 90% renewable energy goal and greenhouse gas reduction goals.

There is no sound policy reason to penalize us by reducing our net-metering credit compared to customers who turn their RECs over to the utility. Our decision to go solar has the same benefit to the climate and contributes equally toward Vermont's renewable energy and greenhouse gas reduction goals. It is bad public policy to compensate a Vermonter who helps the state achieve its renewable and climate goals with the same credit as a customer who sells the RECs out of state for profit and does not contribute renewable energy for Vermont.

Furthermore, the proposed rule would harm Vermont's local solar installers by putting them in an impossible position where they have to decide between having a viable, competitive business, or a business that actually sells solar to their customers. Currently there are too many deceptive solar marketing claims and this rule change will only worsen the situation.

We respectfully request that you amend Rule 5.100 to credit Vermonters who go solar by retaining and retiring their RECs for Vermont greenhouse gas reductions in a similar manner to those who turn their RECs over to the utility. *(This article and letter are available online at bit.ly/vt-net-metering.)*

The Best 3 States for Solar in USA

By Roddy Scheer and Doug Moss

In the United States, whether or not it is easy and economical to "go solar" depends more on state politics than prevailing weather trends. In those states with ample sunshine and the legislative initiative to get solar panels on roofs on residences, there has never been a better—or cheaper—time to put photovoltaic panels to use.

According to Solar Power Rocks, a website that helps homeowners understand the rules, incentives and investment returns on local solar panel installations, the top three states where switching over to solar power makes the most economic sense are in the Northeast (New York, Massachusetts and Connecticut). Maryland, New Jersey, Oregon, Minnesota, New Mexico, Vermont and Colorado round out the top ten.

What makes these states particularly suitable for rooftop solar PV is their willingness to allow homeowners to lease photovoltaic equipment from third-party owners (like Sun Edison, Solar City, SunRun, etc.) and legislature-backed incentives to help keep costs down overall. Going solar in one of these states might end up being cheaper than remaining on the grid.

Surprisingly, a few states in the South (Florida, North Carolina, Oklahoma and Kentucky), where solar panels would seem like a no-brainer, continue to resist this change, in large part due to entrenched utility lobbies intent on maintaining their fossil-fuel-based lock on the status quo. According to a recent Rolling Stone article by Tim Dickinson, the recent ascent of solar power in the U.S. poses a grave threat to the business interests of big fossil fuel industry investors. Dickinson details how these entrenched interests are "mounting a fierce, rear-guard resistance at the state level—pushing rate hikes and punishing fees for homeowners who turn to solar power." He adds that their efforts have "darkened green-energy prospects in could-be solar superpowers" like Arizona and Nevada. "But nowhere has the solar industry been more eclipsed than in Florida, where the utilities' powers of obstruction are unrivaled.

"The solar industry in Florida has been boxed out by investor-owned utilities (IOUs) that reap massive profits from natural gas and coal," reports Dickinson. "These IOUs wield outside political power in the state capital of Tallahassee, and flex it to protect their absolute monopoly on electricity sales."

While Florida might be a laggard on rooftop solar for now, that could all change if some residents are successful in their drive for an amendment to the state constitution to allow for third-party solar ownership (which would enable solar leasing). Of course, the state's utilities have challenged the amendment by creating their own, designed to confuse voters into keeping solar panels off their rooftops.

For more information on where your state stands in terms on rooftop PV solar, check out Solar Power Rocks 2016 U.S. Solar Power Rankings. Also, visit the website of the Database of State Incentives for Renewables & Efficiency (DSIRE) for a full run-down of state, federal and other incentives for installing solar panels and other forms of renewable energy equipment.

Contacts: Solar Power Rocks, www.solarpowerrocks.com; Database of State Incentives for Renewables & Efficiency, www.dsireusa.org.

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We Will Win Cont'd from p.1

emissions from United States' electric generation by 80% in fifteen years.

With the increasing renewable buildout it is becoming clear that wind and solar power can do anything baseload power plants can do – and do it better. Baseload power plants match grid demand very badly because they are inflexible. By comparison, solar plants produce their power during high demand times, and widely distributed wind turbines can usually have their output adjusted as needed, so they can match demand well.

Chemistry is also helping us, as more synthetic and biologically based fuels are brought to market. One example of this is a system developed by German and Portuguese companies that can make a drop-in gasoline replacement from carbon dioxide and water at prices that are competitive with oil when it is $30 per barrel.

Unsurprisingly, renewables are being built out very quickly, as these changes take effect. For example, two-thirds of new electric capacity in the United States was renewable last year. Additions of natural gas capacity have declined steeply, and additions of coal capacity have nearly ceased. Renewable power output is growing markedly, and output by fossil fuels is shrinking.

With increased efficiency, energy demand is in decline, and this has made the shift away from fossil fuels worse for those companies that depend on them. American electric consumption fell 1.1% last year, according to U.S. Energy Information Administration figures. Heating and transportation are also seeing reduced demand.

These trends are true not only in the United States, but also in most of the rest of the world, and for the same reasons. Large companies and governments of all sizes are shifting to renewable resources (with some notable exceptions among fossil fuel companies and governments that support them). The great majority of new capacity is renewable, worldwide.

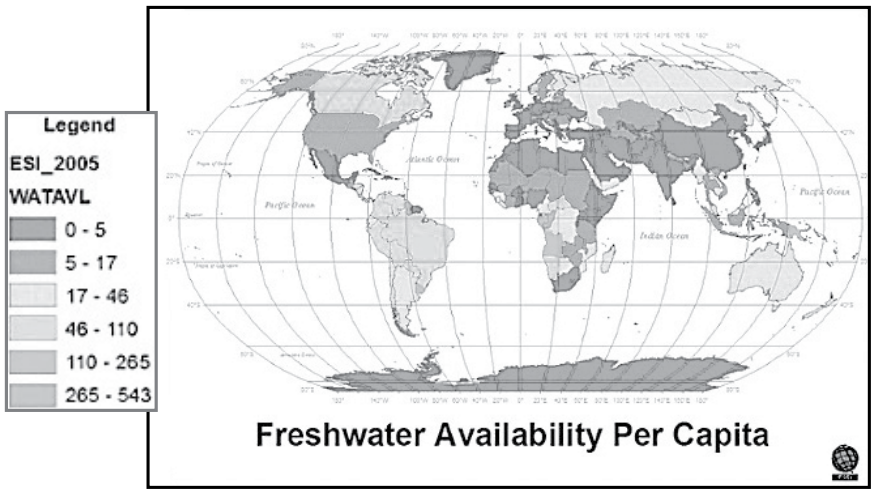
The problems presented by climate change are also being addressed in other ways. For example, there is a European effort to plant 600,000 hectares (1.5 million acres) of forest over the next five years, according to a senior adviser to the European Commission. The growing trees will absorb millions of tons of carbon dioxide as they grow.

Governments leading the way include San Francisco's, which has enacted a requirement that all new buildings have solar power, Oregon, which is ending use of electricity produced with coal, and the Island of Hawaii, which gets 41% of its electricity from renewables. Uruguay increased its wind power from about 2.5% of its demand to about 19% in just one year, Costa Rica gets 99% of its power from renewables, and this year China will close about 1,000 coal-fired power plants. Cont'd on p.25

The True Scope of Earth's Fresh Water Crisis
Ten Shocking Facts

By Robert Kravitz

The California drought and Flint's lead problem are just part of the bad news about world water supplies.



The map plots fresh water availability per capita in terms of thousands of cubic meters per person. The per capita volume of water resources available is a good indicator of a countries ability to support the needs of the population. The model used to gather this information is based on over 30 years of global hydrological data.

Even though only a handful of U.S. states are experiencing severe to exceptional drought conditions, down from more than 35 states a couple of years back, water concerns just won't go away.

"All over the globe, there are areas and entire continents experiencing water shortages," says Klaus Reichardt, CEO and founder of Waterless Co., a company that makes no-water urinals and other restroom products. "And according to a variety of studies and water experts, these conditions are expected to only get worse."

Indeed, the facts about water are startling.

1. Worldwide demand for water tripled in the 20th century but is expected to double every 21 years in the 21st century.
2. According to the U.S. Agency for International Development, one-third of all humans will face severe or chronic water shortages by 2025.
3. An estimated 80% of India's surface water is contaminated by animal or human waste.
4. In northern China, the water table is dropping about three feet per year due to over-pumping.
5. For the first time in 30 years, Saudi Arabia will no longer grow wheat; they don't have enough water for wheat irrigation purposes.
6. Closer to home, Arizona and New Mexico use about 300 million gallons more water per day than they get in renewable supplies.
7. Lake Mead, which provides water for large areas of the western U.S., has 50% less water compared to 1998.
8. Every eight seconds, a child dies from drinking soiled drinking water.
9. It is predicted that 1.7 billion people will be living in "dire water poverty" by 2050.
10. Eight states in the U.S. are now so concerned about their dwindling water supplies that they have banned the export of water to other states. Canada also is attempting to ban export of water to the U.S.

"As you can see, we have some serious water issues before us," says Reichardt. "Our biggest hope is that new technologies and more investment in water infrastructure around the world will help us address these growing concerns."

Source: http://bit.ly/Water-Crisis_Facts. Robert Kravitz: 312-880-8176; rkravitz@rcn.com.

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We Will Win *Cont'd from p.24*

There are, of course, dangerous developments that could impede our progress. Among the worst of these are political hate-mongering, the scare tactics that are being used to derail renewable energy development, and the ignorance that feeds off of hatred and fear.

Ultimately, we will win the race with climate change. Addressing an audience of 2,800 energy professionals, EPA Administrator Gina McCarthy put it simply: "The clean energy train has left the station, folks."

Please Note: Numerous references were used for this article. The online form of the article has links to them embedded. To see them, please visit http://bit.ly/wining-the-climate-war.

Sunrays in the forest. Photo by Peeliden. CC BY-SA 3.0

Antioch Climate Change Preparedness Conference Update

By George Harvey

Courtesy Photo

The beginning of April saw a Climate Change Preparedness Conference in Baltimore. It was put on by the Environmental Protection Agency (EPA) and the Center for Climate Preparedness and Community Resilience (CCPCR) at Antioch University New England (AUNE). It served EPA regions 1 through 4, which include the eastern United States. It was held in Baltimore, partly because that city is central to the regions and because of the city's focused leadership on climate adaptation and community resilience initiatives.

This was not a trade show, full of talk new technology and innovation. It was largely about the human side of things. It focused on the need for reaching out to local people and planning for local resilience. It concerned itself not only with care for the environment, but for local values and history. It dealt with issues ranging from motivating ordinary people to planning how to deal with the traumas widespread destruction associated with climate change will produce. This conference was about being ready where it matters, at the local level.

When Abi Abrash Walton, one of the conference organizers for CCPCR, spoke about its purpose, she said, "The goal was to deliver a strong human resource capacity, building programming for local leadership and decision makers, at the level of watersheds, regions, counties, and municipalities." The words "capacity-building programming" were not used in relation to infrastructure, but as it applies to the abilities of local leadership to deal with the issues relating to climate change and resilience.

One keynote speaker was Dr. Mark Jacobson, of Stanford University. In recent years, he has developed a number of modeling tools that give guidance on how we can achieve, at levels ranging from local to international, complete independence from fossil fuels. Part of the good news Dr. Jacobson delivers rather consistently, is that we can reach this goal. Another part of the good news is that we will see benefits far beyond the costs.

There were a number of interesting sessions and workshops given. One was "Implementing a climate resilience program: A practical approach." It was facilitated by David Herring of the National Oceanic and Atmospheric Administration's Climate Program Office and Latham Stack, of Syntectic International. In its first part, participants went through a five-step Climate Resilience Toolkit in some detail. The toolkit is available online at toolkit.climate.gov.

The second part of the same workship was "Sources and Use of Downscaled Climate Data to Support Infrastructure Adaptation." It addressed a real need for local leaders and decision makers to understand the effects of the overall trends of climate change as they play out in the local environment.

Some titles are really self explanatory, such as "Business Continuity: In the Face of Extreme Weather." In other cases, we can see the importance and guess the contents of the "Education Summit," merely by observing the name of the keynote speaker, Bill McKibben.

The CCPCR has a conference on climate change and resilience every two years. For those who "just can't wait," we have some really good news. There are webinars through most of the year about every six to eight weeks, though there will be a delay until September, as the CCPCR staff busies itself with some intense summer chores. The webinars can be found online at bit.ly/ccpcr-webinars.

Abi Abrash Walton stressed some points for local leadership and why it has special need for training, People need to feel that they are heard and that they can trust the process. "Change is never easy," she said, "The leadership dimension is essential."

GRASS, SOIL, HOPE *Cont'd from p.21*

Yankee farmers. And that is the beauty of practices that build soil carbon—they improve outcomes on many levels. Just as one poor choice can beget many bad effects, White reminds us over and over that one positive move brings with it a host of co-benefits. Regenerative agriculture provides a long list of positives, including increased soil productivity, improved food quality and nutrition, higher profits for farmers, increased soil water storage leading to increased system resilience, greater biodiversity, high quality wildlife habitat—and, oh yeah, saving the planet from climate catastrophe.

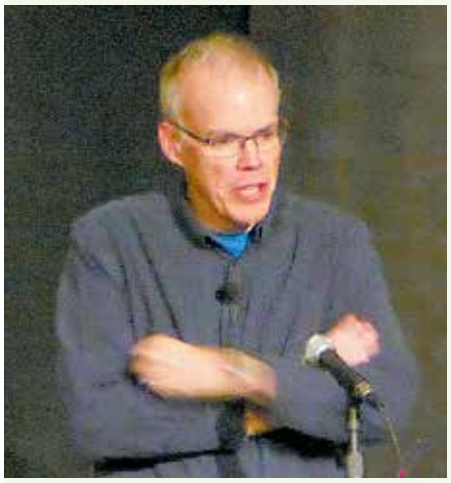
In short, Grass, Soil, Hope may change your thinking about atmospheric CO2, from serious problem to golden opportunity. White's mission with this book appears to be to jump-start a carbon revolution that is already underway, taking it from the margins toward the mainstream. It is by no means a how-to manual, although he outlines many basic principles. Those who really want to dig in and start "carbon-farming" in their own fields, yards, and communities will want to follow up on some of the references and organizations sprinkled throughout this book and seek out more detailed resources. This book will give you a good sense of the territory and the possibilities, and will fire you up with the excitement of becoming part of the solution. The solution will need all of us, not just farmers. It will require new businesses, venture capital, political activism, canny food-shoppers, innovative policies, nonprofits, and more. There is a place for each of us at this table, once we start to see the world through the lens of carbon. In the end, that is the greatest source of hope.

Jennifer Highland is on the board of the PAREI. She practices osteopathy out of New Hampshire's first solar-powered medical office.

DEEP ENERGY RETROFIT

What in the World am I Doing?

By Michael Goetinck



Bill McKibben presented the keynote address at Efficiency Vermont's Better Buildings by Design's (BBD) Conference that was held on February 3-4, 2016, in Burlington, VT. Photo courtesy of Greg Whitchurch.

I went to the Better Building by Design Conference in Burlington, VT this February. Attendees who heard Bill McKibben give the keynote address had opportunity to ask themselves this question even before the standing ovation. Bill gave us a brief history of 350.org and how it became a global movement that has transcended socio-economic and cultural boundaries. Most of the slides were of people all over the world expressing their concern about climate change and its impact. Among the many moving and powerful images, one stands out for me: someone was holding a sign that said "What you do, affects me."That was their way of holding others accountable for their actions. The correlation is, "What I do, affects you." This is taking personal responsibility for my own actions. Thinking about it is an interesting intellectual exercise. Putting it into practice I'm finding is something else altogether. I'll share some of the things I've been considering, but at this point I don't have confidence that I'm being as much of a low impact builder as I would like to be.

Deep energy retro-fits and high performance building are specialties within the construction industry. They have the potential to dramatically reduce the carbon footprint of our housing stock. I use the word "potential" deliberately because the very nature of the work itself has implications for the planet in terms of resource use before, during, and after the job is done. Here's a sobering thought: everything we make or use comes from the planet we inhabit. The more we make and use now the less we have for later. Here's another sobering thought: much of what we make or use for our buildings has undesirable consequences.

I once had to file a worker's comp. claim when I got hurt on a job. As part of the intake process, I filled out a form asking me to identify which harmful substances I was exposed to in the normal course of my job. The list was three columns wide and a page long. Single spaced. Small font. I checked almost every single one. The products and materials I was using as part of my job were harmful to me. The homeowners were also being exposed to these products and materials when they lived in their newly completed project.

What about when buildings burn? Firefighters have one of the highest cancer rates of any profession in the United States. Paints, solvents, plastic foam, petroleum based products, adhesives, the plastic coating on Romex wiring, etc., all give off toxic fumes when they burn. The self-contained breathing apparatus and protective clothing that firefighters wear are only so effective at keeping these harmful fumes out of their bodies. What affect does a burning building have on the neighbors? How far do the airborne toxins travel? What do they do when they land?

So much of what we do is mandated by the various codes and regulations that govern our work. I recognize that they are necessary to ensure a basic level of safety and performance and I am not categorically opposed to them. I do wish that there was more flexibility in how the intent of the code could be achieved. I'm sure that there are many ways to create safe and durable buildings without requiring the use of toxic and unsustainably produced materials. Unfortunately there is no one in Vermont who has the authority to make those kinds of decisions so everything "has to be done by the book." Some cities and towns in New Hampshire have code officials and I have found them to be very willing to consider non-prescriptive approaches.

One of my friends in the construction business tries to use products and materials that he would feel comfortable composting in his garden. He admits that he doesn't come close to meeting the goal, but that mindset guides him as he's making his decisions. Another builder I know is focused on natural materials in new construction, but when we get into conversations about retro-fits and renovations we both see more challenges than solutions at this point.

Kristina sectional from ELKA HOME, Environmental Building News' and Built Green's Top 10 Building Product of 2015. Photo courtesy of ELKA HOME.

I've been urging customers to think about impact for quite a while and recently one of them asked me to take it further. She has a small house. She wants a small house with a small footprint. The goal is to do a deep-energy retro-fit and make some modifications to the living spaces while keeping our impact on each other and the planet as low as we can. If you have any suggestions please send me an email. Thanks.

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.*

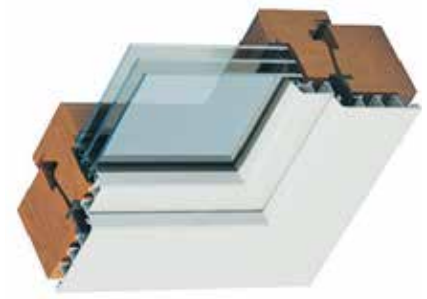
High Performance Windows

By George Harvey

Choosing new windows for a retrofit or new building can be a daunting experience for an ordinary person. There are numbers of choices that seem to go on endlessly. We can choose among installers, manufacturers, and designs. We can pick different materials, components, and construction.

On top of everything else, there are different standards used, which are not directly comparable. Most of us know simple conversions, such as changing a distance from kilometers to miles. Others are a bit more difficult, but pretty straightforward because a simple formula does the trick. But comparing window standards between those used in Europe and what we have in North America is somewhat daunting. Fortunately, there are professionals who are well-educated in these matters, and who are available locally.

What we need is not to understand window construction and the meanings of all of the standards. What we need is to be able to connect with professionals who understand the issues and can advise on them with reliable advice. These are experts in installation and manufacture.



Menck Window's clad wood window with triple glazing. Photo courtesy Menck Windows.

Loewen Window Center of Vermont & New Hampshire

Steve Cary, of Loewen Window Center of Vermont & New Hampshire, is an expert on the subject. He told us, "It's apples versus oranges on the testing." Explaining this further, he pointed out that the European standard was developed with Passive House (PH) standards in mind. German engineering, in particular, is careful and thorough. Nevertheless, he also says many of the North American products are very good, and added, "While many European products are indeed very good – it's not as [greatly] spread as commonly thought."

He explained, "Many of our lines have been used in PH projects, but only one (Tanner) has a certified PH window. The performance claims are only as good as the certification and in the North American market that's the NFRC label." He is referring to the National Fenestration Rating Council. Though the ratings are different, they are nonetheless useful for comparing windows rated under the same standards.

Cary says the Tanner products, which are certified for PH, are the most expensive. They are of "tilt/turn" design, with minimal framing showing to the exterior and are engineered to European standards. He says Loewen's own products are less expensive, but the company has been manufacturing triple-glazed windows since 1973, making it the most experienced major maker of such windows in the United States. Even less expensive are the Comfort Line Fiberframe, the oldest US fiberglass window manufacturer; they are followed, among the products Cary represents, by Kohltech windows, which include triple-glazed models in a number of product types, including tilt/turns windows, casements windows, and a new single-hung series.

The web site for Loewen Window Center of Vermont & New Hampshire is www.loewen-vtnh.com.

Tanner Lauda Tilt/Turn windows. Photo courtesy Loewet Window Center of VT & NH.

Menck

Menck Windows, based in Chicopee, Massachusetts, manufactures high performance, German engineered tilt-turn windows, win-doors, swinging doors, and lift and slide doors. With their designs, product quality and performance is guaranteed through European testing and trade federations. Their tilt-turn type windows provide superior performance with wind and water infiltration and are tested to withstand high loads.

Alan B. Wall, Director of Sales and Marketing, spoke to the importance of triple-glazing, saying, "Not only does triple glazing increase thermal performance, it increases interior comfort (the interior pane of glass ends up being much warmer, so you do not feel the 'convected cold' that's present with double glazing on cold days) and a much quieter interior."

Menck's website is menckwindows.com.

Intus

Intus is a window manufacturer based in Fairfax, Virginia. Marketing Executive Ema Klimaite pointed out the importance of proper window and door installation as a very important part of the process. "You may purchase the most expensive products, but if they are poorly installed it will result in a potential loss in energy savings." She also commented on the importance of efficient design. "A typical dual pane window has a R-value of R2 to R3. Intus Windows' triple pane lineup have an average R-value of R7."

There are a number of choices that can be made, and there is no single choice that is best under all circumstances. Perhaps the best advice is that unless you are an expert on windows, it pays to have the help of someone who is.

Cities Across America Lower Greenhouse Gas Emissions

Boston and NYC Make the Top Dozen of U.S. Cities with the Most Energy Star-Certified® Buildings

Boston skyline. Photo source: www.vsmodels.net

On March 30, 2016, the EPA released its annual list of U.S. metropolitan areas with the most certified Energy Star buildings in 2015. Boston is in the top dozen of national metropolitan areas and is recognized for its continuing commitment to cut greenhouse gas emissions and save money through energy efficiency.

For 2015, Boston ranked number 11 on the list of top 25 U.S. metropolitan areas, barely ranking above Philadelphia by one building. Boston had 157 buildings that were Energy Star certified. Thanks to these buildings' owners and managers, Boston is cutting greenhouse gas emissions equal to emissions from 38,000 passenger vehicles and saving more than $75 million in annual utility bills.

Ahead of Boston on this year's list are Washington D.C., Los Angeles, San Francisco, Atlanta, New York City, Chicago, Dallas-Fort Worth, Houston, Denver and Phoenix. By the end of 2014, the more than 25,000 Energy Star certified buildings in cities across America have helped save more than $3.4 billion in annual utility bills and prevent greenhouse gas emissions equal to emissions from the annual electricity use of more than 2.4 million homes.

"Every year, more cities are turning to energy efficiency not only to protect the environment, but also to strengthen their local economies. Boston is demonstrating that energy efficiency is a cost-effective way to improve public health and build a brighter future for their youngest residents," said Curt Spalding, regional administrator of EPA's New England office.

EPA's Energy Star Top Cities list shows how cities across America, with help from Energy Star, are embracing energy efficiency as an effective way to save money and reduce greenhouse gas emissions that fuel climate change.

Energy use in commercial buildings accounts for 16% of U.S. greenhouse gas emissions at a cost of more than $100 billion per year. Since 1999, more than 27,000 buildings across America have earned EPA's Energy Star certification, which signifies proven superior energy performance. On average, these certified buildings use 35 percent less energy and are responsible for 35 percent fewer carbon dioxide emissions than typical buildings. These buildings have saved more than $3.8 billion on utility bills and prevented greenhouse gas emissions equal to the emissions from the annual electricity use of more than 2.6 million homes. Many common building types can earn the Energy Star, including office buildings, K-12 schools, hotels, and retail stores.

New York City. Photo source: www.gnarbear.biz

For more than 20 years, American citizens have looked to EPA's Energy Star program for guidance on how to save energy, save money and protect the environment. Behind each blue label is a product, building, or home that is independently certified to use less energy and cause fewer of the emissions that contribute to climate change. Today, Energy Star is the most widely recognized symbol for energy efficiency in the world, helping families and businesses save $300 billion on utility bills, while reducing greenhouse gas emissions by two billion metric tons since 1992.

Links: Full list of top Energy Star cities: http://energystar.gov/topcities.

How to earn the Energy Star label for commercial buildings: www.energystar.gov/buildingcertification.

Green Building Targets the Indoor Environment

as Health Becomes a Top Priority

By Heather Breslin, Steven Winter Associates, Inc. www.swinter.com

The Melody's amenities include a gym, outdoor fitness circuit, playground, music- and art-filled stairwells, and signage to promote smart exercise choices – earning it the nation's first LEED innovation credit for Active Design.

Close to 90% of our lives are spent indoors. This statistic should mitigate any questions about the extent to which the places that we live, work, and play affect our health. These indoor environments are directly linked to our physical and mental well-being; in turn affecting almost every facet of our lives.

There is already a correlation between buildings that are designed and constructed to elevated standards of energy efficiency and better indoor air quality (IAQ). Often in pursuit of green building certification, buildings use low-emitting materials and employ better ventilation methods such as energy recovery ventilation (ERV) and compartmentalization of spaces. IAQ is a great start but does not address the full spectrum of health-related issues arising from the high percentage of our lives spent indoors.

The top human health risks in buildings, as defined by the EPA, include: environmental tobacco smoke, biological contaminants (e.g., mold, pet dander, etc.), combustion byproducts, household products and practices, toxic materials, radon, safety and security, and diet and exercise. Tackling all of these issues is not easy, particularly since we cannot entirely control the behaviors of people.. The most effective strategy is two-fold: first addressing health factors during design and construction, and then through applying adherence (and accountability) to operational policies and procedures.

Green building programs have made significant strides over the past few years to incorporate measures that congruously address sustainability and health. One of the newest programs, the WELL Building Standard®, is entirely devoted to improving human health and well-being. The system created by Delos incorporates ratings for traditional green building categories such as air and water, but also includes categories for light, mind, and comfort; topics unparalleled in any existing industry programs. The Mayo Clinic recently entered into a partnership with Delos to quantify the effects of design on human health. The research will be conducted at a new 7,500-sf laboratory constructed at the Mayo Clinic's Rochester, Minnesota campus. Clearly a substantial symbolic and financial undertaking, the results of this study hope to arm the industry with unprecedented data to justify the need to reevaluate priorities within building design and construction.

Now, let's jump from the newest to the oldest standard for addressing health: the EPA's Indoor airPLUS™ program. Although this standard itself is not a household name, it is a companion to the ENERGY STAR® Homes certification. Unfortunately labeling for Indoor airPlus is currently only available for low-rise residential developments. However, at Steven Winter Associates (SWA) we strive to have all of our projects meet their requirements. The measures are practical and can be implemented relatively quickly; their guidelines include clear measures and checklists entirely geared toward builders. For those seeking a less intensive avenue to adopt some high-impact, lower-cost ways to improve indoor environments, the Indoor airPLUS program is an excellent place to start.

Midway between the two aforementioned programs, both LEED® version 4 and Enterprise Green Communities (EGC) address a gamut of health-related issues. Many of the measures linked to health, however, are embedded into optional credit areas like the inclusion of Active Design concepts. These credits focus on design that encourages healthful habits in everyday life such as using stairs versus elevators and traffic-calming strategies to increase safety.

While the design and construction of buildings that prioritize healthy indoor environments is a huge step in the right direction, the efficacy of these designs and overall impact they have is largely contingent on the enforcement of practices after units or buildings are occupied.. Ensuring the continued use of formaldehyde-free and low-VOC materials, proper maintenance of ventilation systems, utilizing integrated pest management (IPC), and strict enforcement of non-smoking policies are just some of the operational responsibilities essential for maintaining healthy indoor environments.

Educating building operators, management, occupants, etc., is also vital to the success of healthy practices. A good example of this is The Melody, an affordable housing complex in Bronx, NY, which our team at SWA was heavily involved with a few years ago. Built by Blue Sea Development, it was the first multifamily building in the nation to earn a LEED Innovation credit for Active Design and achieved LEED for Homes Platinum. Each resident is provided with a one-hour educational walkthrough detailing the green and healthy features of their apartment and the building as a whole, along with a manual outlining all green practices. The Melody was one of the sites that participated in a Mt. Sinai Hospital study evaluating the health impact of green buildings on asthma sufferers in the South Bronx. The study is ongoing but initial findings show significant improvement of asthma symptoms, a decrease in doctor visits, and an increase in resident awareness of respiratory health.

Excepting readers who work for the forest service, operate a farm, or live in an open-air yurt, it is likely that the 90% statistic we mentioned at the beginning applies to you. Whether achieved through a green building program or not, making improvements to our indoor environment has the potential to substantially impact our overall health and well-being.

NHEC Launches A New Demand Response Program

By Seth Wheeler

PLYMOUTH, NH – In an effort to curb the impact of rising peak period electricity costs in New England, New Hampshire Electric Cooperative (NHEC) is offering its members new incentives to reduce their power consumption when regional demand for electricity is highest.

The Go Beyond the Peak! program rewards members for curbing their usage during peak demand periods. Members can choose from three options: installing load control devices on appliances and heating or cooling systems, a new rate plan that charges daily on-peak and off-peak rates, or a voluntary load reduction alert that notifies them when peak demand events are occurring. The ultimate goal of Go Beyond the Peak! is to reduce electric rates for all members by reducing peak demands. Complete program information and enrollment are available at www.gobeyondthepeak.com.

Peak demand events occur infrequently, usually during especially hot or cold weather, but they have a disproportionate impact on electric rates. NHEC must pay "capacity cost" to generation and transmission providers for the capacity to deliver peak amounts of electricity, even though that quantity is only needed for approximately 150 hours per year. If NHEC can reduce the amount of power its members need during peak demand periods, it can reduce rates year-round by reducing capacity costs.

Go Beyond the Peak! combines financial incentives with public awareness to encourage NHEC members to reduce their electric usage during peak demand periods. Go Beyond the Peak! consists of three voluntary programs: Peak Plus, Peak Planner and Peak Days.

Peak Plus (Direct Load Control):

Members who enroll in Peak Plus will have load-control devices installed on appliances in their home (window air conditioners, central air conditioners, water heaters, storage space heaters, other resistance space heaters). During peak demand hours, NHEC will send a signal to the appliance via an internet connection, which will reduce the amount of energy the appliance consumes. Once the peak demand event is over, a signal will be sent to the device to resume usage as normal. The member will receive a seasonal incentive from NHEC for each appliance he or she allows NHEC to control.

Peak Planner (Time of Use Rates):

Members who enroll in Peak Planner will pay electric rates that vary by time of day between ON-PEAK hours and OFF-PEAK hours. On-peak rates will be higher than the standard residential rate and will be in effect from 2 p.m. to 7 p.m. on summer weekdays, and from 5 p.m. to 9 p.m. on winter weekdays. Usage during all other hours, including weekends and holidays, will be charged at off-peak rates, which will be lower than the standard residential rate. In addition, there will be a CRITICAL PEAK rate that is charged only during five-hour periods when demand for electricity is unusually high. Critical Peak rates will be significantly higher than the standard residential rate (more than $5 per kWh), but will only occur a maximum of 15 times during the summer season. NHEC will notify participants by email, text or voice call the day before an expected Critical Peak event so that they can plan to reduce their usage during those hours.

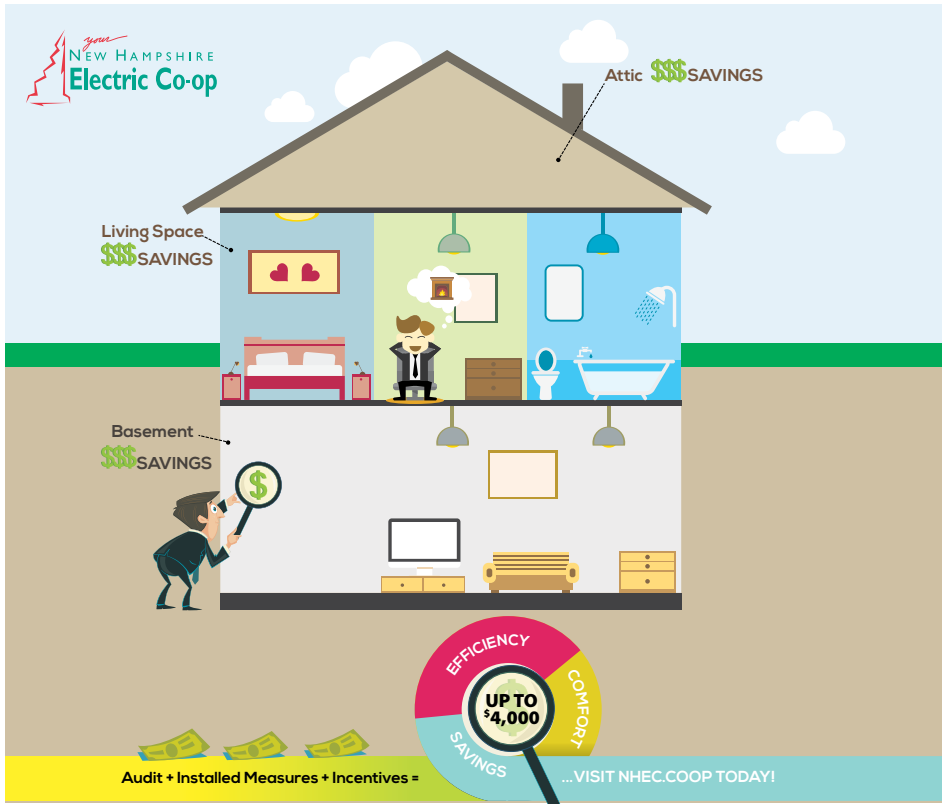
Peak Days (Peak Demand Alerts)

Manage the peak and we all save – that's the message NHEC is using to encourage enrollment in Peak Days. Members who enroll in this program will receive email, text or voice alerts the day before anticipated Critical Peak events so that they can plan to voluntarily reduce their electric usage. If we manage the peak, we all win!

NHEC is a member-owned electric distribution cooperative serving 83,000 homes and businesses in 115 New Hampshire municipalities.

Seth Wheeler is the Communications Coordinator at New Hampshire Electric Cooperative. Learn more about energy efficiency programs available for members at www.nhec.coop/energysolutions.

Right edge column icons: NHEC's Go Beyond the Peak! program offers members a variety of ways to reduce electric usage during peak demand periods, from time-of-use rates and direct load control of appliances to voluntary conservation alerts.



New Hampshire Legislative Update

Cont'd from p.7

of the legislative body, and provides for assessment of the land use change tax for certain eminent domain takings of land for energy infrastructure. HB 1148 and 1660 will have public hearings in the NH Senate on April 13th, 2016.

NH rarely crafts energy policy in a comprehensive manner; we prefer an eclectic approach. Accordingly, there were various bills that were [thankfully] defeated that would have rolled back or weakened our Renewable Portfolio Standard (RPS) and our dedicated Renewable Energy Fund (REF). There is a bill that calls for a Sterling Energy demonstration project at a state building and a bill to add biodiesel fuel producers as eligible recipients of Renewable Energy Credits under our RPS. These latter two are moving forward, as is an important bill that would reverse a prior budget raid on the dedicated REF and thereby restore $2.2 million dollars to that fund this biennium.

Getting back to energy efficiency, this time looking to the regulatory arena, NH continues to navigate the waters of establishing a statewide Energy Efficiency Resource Standard (EERS) at the Public Utilities Commission. What does this mean for the Granite State? A successful outcome would likely include achievable, comprehensive electric energy savings targets. These targets would better enable all of us to invest our ratepayer dollars into targeted efficiency. It is widely shown that "buying" a kilowatt-hour of efficiency is much cheaper than buying a kilowatt-hour of generation, and a statewide EERS in is a proven policy to better capture the benefits of cost-effective efficiency for all consumers.

It's been another busy year in Concord, and the activity won't be over anytime soon.

New Hampshire Net Metering Cap Increase Imminent

Exeter, NH (April 11, 2016) – Solar policy in New Hampshire is now on a more secure foundation. The New Hampshire Senate has passed HB 1116, legislation which increases the statewide net metering cap from 50 to 100 megawatts. Regulators have also been directed to open a proceeding to develop an alternative rate structure for net metering.

The bill is now on its way to Gov. Maggie Hassan for her signature, and she has already made her support clear. "Solar is one of many clean energy resources in New Hampshire that contributes to a diverse and reliable energy supply, and businesses and families across the state are utilizing solar to lower their energy bills and to increase their energy independence. The success of New Hampshire's clean energy economy is creating good-paying, high-quality jobs, spurring economic development and helping combat climate change, and New Hampshire recently ranked as one of the top-five renewable energy states." More than 70 solar companies work throughout the value chain in New Hampshire, which translates into more than 900 jobs statewide.

Until the bill is signed into law, solar companies are accepting new solar contracts and placing those projects on utility wait lists for prompt installation, once the Governor signs HB 1116 into law. A rush on demand is expected, and interested customers should contact solar companies as soon as possible. Existing net-metering customers are grandfathered in the policy at a one-to-one retail rate through 2040. More than a dozen studies of the value of solar electricity have found that power exported to the grid is worth more than the retail cost of the electricity.

News story contributed by Revision Energy. www.revisionenergy.com

Another website where you can learn more is at Solar for New Hampshire. *The site is to help you to stay informed about New Hampshire solar policy developments. Visit them at www. solarfornh.org.*

ZERO ENERGY NOW (ZEN) COMES TO VERMONT

By Allan Bullis

We at BPPA-VT (Building Performance Professional Association of VT) along with our sponsor GMP (Green Mountain Power) are very pleased to share with you the establishment of a pilot project called ZEN! (Zero Energy Now). In 2011, the State set a goal of reducing fossil fuel use by 90% by 2050, but the current trajectory does not come close to meeting that goal. ZEN! has the potential to help achieve that goal by providing a comprehensive approach to addressing energy use in buildings. We would all love to make all buildings operate carbon-free now, but it will be a transition to get there. ZEN! does not achieve carbon neutrality but is an aggressive move towards this goal.

Currently energy upgrades tend to take a piecemeal approach and are falling short of meeting the State's goals. As a way to address the shortcomings, BPPA came up with ZEN!. We chose a holistic approach that is financially attractive. ZEN! will make it attractive for the building owners by providing financing options and an energy savings guarantee. It provides flexible means to help buildings cut their energy use and carbon footprint by meeting the ZEN! requirements. Minimum ZEN! requirements are:

- Reduce the heat loss of the building by 10% through weatherization;
- Provide 50% reduction of combined electrical and fossil fuel use;
- Ensure that 50% of energy is from renewable sources. (Currently 45% of VT's electricity is renewable). The beauty of ZEN! is that there are multiple options that can be tailored to best suit the needs and desires of the homeowner.

There are a number of ways to achieve the goal of 50% energy reduction and 50% from renewables. Typical measures include but are not limited to:

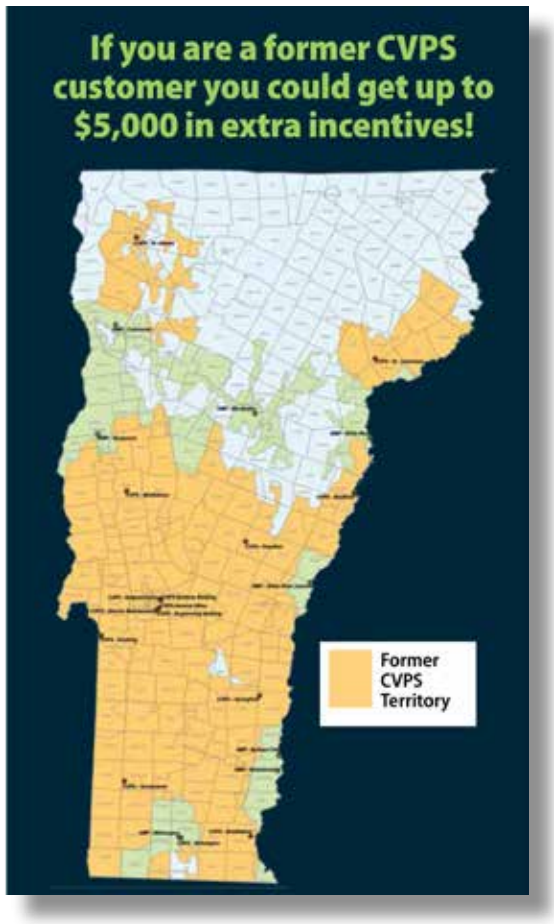
1. Solar panels (community solar counts)
2. Solar hot water
3. Heat pumps
4. Geothermal
5. Biomass (wood/pellet) heating
6. Heat pump water heaters
7. Heating system replacement, and
8. More aggressive weatherization.

Another aspect of the program is to provide "concierge service" to pull together all the different aspects of the energy upgrades to make it easy for building owners to complete a comprehensive energy upgrade. Part of the ZEN! funding has paid to develop energy modeling software for the energy auditor to use to input different upgrade options in order to offer the owner various options. We will also offer a DOE energy score card that Efficiency Vermont is piloting which will highlight the low energy usage and add value to the building making it more attractive to potential buyers.

One critical component to successful energy projects is obtaining financing. To address that, we have done a few things. First is to make the projects 'cash-flow-positive' - meaning that energy savings will more than offset the loan payments. Given the current low fuel prices, this will not always be possible but easily achievable at 2014 price levels. Second is to help present various options for low interest financing. Third is that ZEN! participants will receive up to $5000 in additional rebates on top of existing rebates and tax incentives. It is important to acknowledge that anyone may participate but only former CVPS customers are eligible for the additional rebate. Finally ZEN! provides an energy savings guarantee so if projected savings are not met, ZEN! will pay the difference. Go to zen-vt.com or call 802-477-5249 to learn more about this wonderful program.

Weatherization is key to reducing your energy usage. Courtesy photo (ZEN).

HISTORY of ZEN!: When GMP proposed acquiring CVPS, the Vermont Public Service Board (PSB) agreed with the stipulation that $21,000,000 be spent on clean energy measures. To comply, GMP established CEED (Community Energy & Efficiency Development) which is the program to vet projects and disseminate those funds. See more at: (http://www.greenmountainpower.com/innovative/ceed_fund/). Projects are being awarded on an annual basis starting in 2013 with 2017 being the final year. Each year organizations have been invited to present ideas for saving energy and those with a high net societal benefit were approved by GMP and then forwarded to the PSB for final approval. Multiple projects have been funded each year. In 2016 ZEN! received $700,000 in funds for their initiative. The CEED projects are only available for former CVPS customers, but the goal is to replicate CEED projects statewide and we hope that ZEN! will set the course for Vermont's energy future!



Allan Bullis CEM, LEED AP is an electrical engineer turned energy auditor. He has a passion for saving energy and has been an energy auditor since 1990, and founder of Energy Alternatives and Common Sense Energy.

Vermont Technical College Going Solar

Continuing on their Sustainabile Path ...

By George Harvey

Vermont Technical College's main administration building. Photo courtesy of Vermont Technical College.

Vermont Technical College has increased its supply of renewable energy and reducing its operating costs with the installation of a 500-kilowatt solar farm. Installation began as soon as the Certificate of Public Good was granted by the Vermont Public Service Board, late last year, and it was completed in just a few weeks.

The project on Vermont Tech's campus in Randolph Center is comprised of one hundred 5-kilowatt (kW) dual-axis solar trackers, manufactured by AllEarth Renewables, Inc., of Williston, Vermont. The trackers keep the solar photovoltaics on them aimed directly at the sun all day for most efficient use of sunlight.

As one of its programs, Vermont Tech offers a bachelor's degree in renewable energy. It also offers a number of courses and workshops focused on the renewable energy industry in its continuing education division. Through these programs, students can get first-hand training and experience.

Vermont Tech has the only training in the state that is acknowledged by the Interstate Renewable Energy Council, giving it national recognition for its training and credentials. One of the college's stated goals is to be a model for local renewable energy education and training. This is seen as particularly important because clean energy is becoming such a large part of Vermont communities.

Students at Vermont Tech will have the opportunity for hands-on experience with tracking hardware, and this is made even more useful by the fact that AllEarth Renewables, which manufactured the trackers, is a local Vermont company. The college has other facilities available for the students to study. It has its own 375-kW anaerobic digester, affectionately known to students as "Big Bertha."

Apart from the educational value of its renewable infrastructure, Vermont Tech will get net- metering credits, saving it money on electric costs. The solar array is expected to provide it with a million kilowatt hours of electric energy per year. When this is combined with Big Bertha's output and other campus initiatives, the college operations are just about fully covered for electricity.

AllEarth Renewables will maintain the array it installed with no state investment, saving taxpayers the energy costs over twenty years. The Renewable Energy Credits for the Vermont Tech projects are retained and retired in-state.

We might note that the solar system provides electricity to Green Mountain Power at just the time of day when demand is highest. Big Bertha has its own good points, one of which is that it can operate just about full time, providing renewable base-load power.

Vermont Tech President Dan Smith said, "I am enthusiastic about this project and the future of this college as a hub for teaching and learning the vital skills connected to clean energy in Vermont. Degree programs in agriculture, horticulture, environmental engineering, and energy position Vermont Tech graduates to play a vital role in Vermont's environmental and energy future."

David Blittersdorf, president and CEO of AllEarth Renewables, said, "We are thrilled to be partnering with Vermont Tech to provide solar power at the Randolph campus. The college site is an ideal location not only to create renewable energy, but also invest in the next generation Vermont workforce."

It was Nancy Rae Mallery, publisher of Green Energy Times, who got in the last word, when she observed, "Vermont Tech is one totally neat little college."

8th Annual Upper Northeast Regional Summit

Mt. Washington Hotel
Saturday, April 30, 2016

The NH Chapter of the U.S. Green Building Council is hosting the 8th Annual Upper Northeast Regional Summit April 29 through May 1, 2016. The Upper Northeast Region is comprised of Chapters from all New England states and Upstate New York. The majority of events will take place on Saturday, April 30th.

Discount for NH's Local Energy Leaders:

If you are a member of a local energy group or if you are working with your local municipality or school on clean energy and energy efficiency solutions, you may register for the Saturday event at a discounted rate of $40 for the whole day (breakfast and lunch included)!

To register at the discounted rate:

1. Register at www.usgbcnh.org
2. Request to be invoiced later
3. You will be emailed an invoice which can be paid online or at the door at the summit. Contact: info@usgbcnh.org

ELMORE ROOTS' PERMACULTURE KNOW-HOW

BACKYARD ELDERBERRIES

Low Maintenance Elderberries For An Effortless, Bountiful Harvest

by David Fried of Elmore Roots

Using our experience from 36 years of growing elderberries on a rugged hillside, in Elmore, Vermont, Zone 3, we offer this effortless recipe for a successful start to a fruitful ending, for growing this nutritious, native berry.

Start with well-rooted plants either in pots or freshly dug with lots of roots. We use three gallon pots or the equivalent. The height of the plant is not as important as abundant, healthy roots.

Choose your area where you are going to plant them. Along a stream bank they will double as a riparian zone native plant and a shelter and food source for birds and other beings. As a hedgerow or screen planting they will soften the view and sounds from the road or from the neighbors.

Plant them about six to eight feet apart and know that they will take a few years to fill in.

The elderberry bush will put up shoots as far as six feet from its base. The shoots look for light and when they find it, they thrive there, and you will have a new large bush in a few years.

PLANTING TIPS:

We always put rock minerals in the bottom of the hole when planting our elderberries. A combination of rock phosphate, greensand or another natural potassium source, kelp meal, Sulpomag or an equal works well. Sulpomag is a potash fertilizer containing potassium 22%, 10.8% magnesium, and 22% sulfur. It has a very low percentage of chloride (under 2.5%), which minimizes the potential for fertilizer "burn." Add about two full trowels to each planting hole.

A row of elderberries just planted in a field with a high water table at Elmore Roots organic fruit farm.

Fruit of the native elderberry. Photos by D. Fried.

For wetter areas, please do not dig hole to plant but use this method we developed. Place the root ball you have slid out of its pot right on top of the earth where you want it, and pin it to its spot with a five-foot bamboo or wooden stick which also serves as a marker. Then dump some good earth and compost around the base to cover all the roots. These plants will now have well drained conditions for a couple of years until they are more established and more vigorous and can send their roots deeper into wetter earth.

You only need to keep the grass competition down for about two to three years. After that, they are tough enough to make it on their own by having extensive roots and by shading out competition. We put a wheelbarrow of compost around the base of each bush, spring or fall, then a layer of cardboard box or newspaper, and then bark mulch on the top. Earthworms and soil fungi love this "sandwich" and the bushes will need a lot less water and a lot less coddling to take off and grow.

After three years, you should be getting some nice crops that should continue for 25 years or more. At first it is good to mow around the outside of the mulched bases, but after they are well-established, they will not care. We have been harvesting our elderberries for 35 years from the same bushes and doing nothing for them for the last 30. This is a fruit that is native in Vermont and therefore requires less than most berries for success. Plant, harvest and enjoy!

Gardening Freedom. Take Your Summer Back!

Cont'd from p. 20

Please contact me if you have a solution besides my cats or snakes. They aren't doing the trick.

The covered beds actually performed as they claim. My time spent weeding was reduced tremendously — on the beds that I used them on. The only problem was on the uncovered portion of the garden, and that I am planning to remedy this year, with more mats to cover as much of the garden as possible. The neighbors were all jealous of my freedom from weeding last year, but just wait until they see me out sipping sumac lemonade and just watching everything grow! I have many plans way beyond the veggie garden, too. It's time to take my summer back!

Learn more at gardenmats.com or call Peter Comart at 802-498-3314.

Top: Peppers thriving without competition from weeds. Bottom: in the lower left corner, take note that the sweet potatoes are growing beautifully mid-summer. Courtesy photos.

RESOURCES

350-Vermont: General group that coordinates a variety of statewide actions.
To join this group go to: **http://350vermont.org**
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
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 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

WRIGHT BUILDERS

Contact: **413.586.8287**
48 Bates Street, Northampton MA
The Pioneer Valley's LEED and ENERGY STAR expert, with over 40 years of green construction expertise, for your new home, institution or commercial building.
www.wright-builders.com

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36 acres PRIME Northern New Hampshire property. Located in remote small town, surrounded by State property. Proposing Solar Field Project with southern slope exposure, former gravel pit Reclaimed. Accessibility behind locked gate. Mile Plus from 130V (three phase) power line. With the potential of Three Fields in neighboring properties.Contact Bob: robertkidder34@yahoo.com

SECONDHAND SOLAR

Sunnyside Solar Store's Secondhand Solar "There is always a deal" at Sunnyside Solar Store in W. Brattleboro, VT 802-280-7319. One - 12V, 102W, Evergreen Solar PV module, Monocrystal/ribbon, glass, alum frame: $125.00. One - 12V, 145W, Solartec PV module, Monocrystal, glass, alum frame: $175.00. One - 24V, 210W, Solar Power Industries PV module, Polycrystal, glass, alum frame: $295.00. Great for starter system, camp, or RV.

SOLAR/WIND POWERED HOME 4 SALE

Totally remodeled with conservation upgrades, 2 bed, 2 bath 1450 sf house on 9 acres. 5.6 kW solar, 2.7 kW wind plus woodstove and heat pump for heating/ cooling. Greenhouse, fenced garden and orchard, outbuildings. 2 hours from Albany & Syracuse, 15 mins. from Cooperstown, 45 mins. from Oneonta & Utica, NY. 607-267-3232. RealtyUSA.com MLS #102278

PERMACULTURE

Permaculture Design Certification Course in Western MA with Sowing Solutions: 3 Weekends in total this Fall : Sept 23-26, Oct 21-23 & Nov 18-20. Learn about edible landscapes, community resilience, water harvesting, energy efficiency, natural buildings, and ecological design practices for your own home! Attend this inspirational event at Snow Farm New England Craft Program and Nine Mountain Retreat Center! (Five college credits are available/optional) www.PermacultureSeries.org

GUIDE TO ADVERTISERS

Ingredient of the Month

By Larry Plesent

PFOA discovered in VT, NH, NY

There's a lot of talk in the news about perfluorooctanoic acid or PFOA in Bennington County, upstate NY wells, and in two communities in southern New Hampshire. What is PFOA and its half dozen or more cousins? Is it harmful, should you be concerned, and what can be done about it? Here is the abbreviated version.

PFOA is the shiny nonstick surface found on candy wrappers, waxed food service papers, microwave popcorn bags, carpets, treated textiles, floor wax and dental floss. Teflon is one of its many cousins that can and will break down into PFOA over time. In fact there are 615 compounds known to break down into PFOA. It is primarily fluorine, an element humans need in amounts that are measured in parts per million rather than in macro dosages. Your teeth which are mostly calcium and phosphorus need about five parts per million of fluorine to stay strong, and that is an invisible amount undetectable without specialized instrumentation.

PFOA is one of those invisible chemicals found throughout our civilization, influencing our health without our knowledge or a complete understanding of its impacts. It would take about six years to naturally eliminate the PFOAs in your body right now, assuming you could end all contact with them from this breath onward. This would be highly unlikely given their dispersion throughout the entire planetary ecosystem. PFOAs bio-accumulate in our bodies faster than we can get rid of them. This is not cool, and it is the part that really ticks me off. The PFOA upside is that your cheap candy bar won't stick to its wrapper. Downside is it takes six years to pass out the molecules that stuck to your chocolate bar and got eaten in the process. PFOAs are measured in the blood in parts per billion. We are not talking about a lot having a big effect here.

PFOA, a known carocinogenic, is found in microwave popcorn bags. Photo: Wikipedia.

According to Wikipedia, "PFOA is a carcinogen, a liver toxicant, a developmental toxicant, and an immune system toxicant, and also exerts hormonal effects including alteration of thyroid hormone levels. Animal studies show developmental toxicity from reduced birth size, physical developmental delays, endocrine disruption, and neonatal mortality."

Some good news is that a carbon filter appears to work well in removing PFOAs from your water. Bad news is that these puppies are everywhere on the planet now.

But the real crux of the biscuit is that there even exists a mindset that allows novel persistent chemicals to be introduced in mind boggling quantities in the first place, AND then disperses those molecules throughout the planet. All this goes on without any long term understanding of their influence upon living systems.

This, in my humble opinion, is an epitome of complete and utter madness, a dementia that crosses all national borders and appears to be both unending and inexorable in its scope and influence. This is a true evil among us.

The emperor is naked and winter is coming.

All the Best,
Soapman

Disturbing News of 1.5 Degrees

Cont'd from p. 1

grew more than two ppm. The fastest rise scientists can trace in the fossil records is being outpaced by a factor of 200.

Elsewhere, the EPA has found it necessary to revise its estimates of methane emissions upward by 27%. This is because of faults found in systems of measurement and accounting. It is not good news, as much of the methane leaks from fracked fields, a problem that is most likely to continue indefinitely.

These trends are continuing this year. According to NOAA, February of 2016 had the highest temperatures, relative to average, of any month on record. This continues the record setting period of 2015. February temperatures were, on average, 1.21° C (2.18° F) above the 20th century average. Second and third place months were December of 2015 and January of 2016. NASA figures were very similar, as they said February was 1.35° C (2.43° F) above the average for 1951 through 1980.

We can be sure that a large part of the reason why February was so much above average was a particularly powerful El Niño event. Nevertheless, that only explains part of the warmth, scientists say.

One discouraging part of the bad news is that some scientists believe the climate change problem may be even worse than had been thought. A study published by researchers at the University of Queensland and Griffith University in Australia projected that global warming could occur much more quickly than previously believed. The model forecasts an increase in the global average temperature by 1.5 degrees as early as 2020.

The COP21 agreement signed last December had a goal of stopping warming from greenhouse gas emissions at well below 2.0° C (3.6° F), with a hope of stopping it at 1.5° C (2.7° F). It hardly looks as though that could be possible now, unless we start to act on the problem a good deal more aggressively than we currently do.

We can hope. We must act.

PFOA Alerts in New England Are On the Rise

. . . And just one of many environmental toxins.

By George Harvey

A toxic substance, PFOA, has been in the news after it was discovered in water wells in a growing number of towns in Vermont, New York, New Hampshire, and elsewhere. Truth be told, however, PFOA is found all over. It can come from spills at chemical plants, but it is found in many other places, such as foods raised in fields fertilized with chemically treated municipal waste and foods in oil-resistant wrappers. It can be found in the blood of about 98% of all Americans.

PFOA is a cause of a large number of health problems. With chronic exposure to small quantities, it can build up in our bodies and lead to serious problems. According to the article in Wikipedia on PFOA, these problems include "kidney cancer, testicular cancer, ulcerative colitis, thyroid disease, hypercholesterolemia (high cholesterol), and pregnancy-induced hypertension." [http://bit.ly/wikipedia-pfoa]

But there is a larger issue. The problems do not end with PFOA. Many people are aware of Flint, Michigan, and its troubles with lead. Other communities have had to deal with trichloroethylene. Phosphorus supports algae in our lakes, making the water toxic. Even pristine-looking waters where we would like to fish or swim are polluted with mercury from coal burned in ages past. According to the United Nations Development Program, a child dies from water pollution, somewhere on this planet, about every 17 seconds.

And this does not end with water. Air pollution kills as many people and shortens the lives of nearly everyone. Toxic materials haunt our houses because of ingredients in paint, treatments for cloth in curtains and carpets, which can off-gas such things as formaldehyde, and preservatives for wood. BPAs and other similar substances are in linings for cans of food we buy. They seem to be everywhere.

Most of these materials were either once considered safe, or were thought to be present in inconsequential quantities. But when tiny amounts of highly toxic materials build up over decades, things get very much out of control. This is made worse by the so-called "free market" economics, which touts the absence of regulation as a cure for all ills. Such thinking is unsupportable, not only morally, but also economically because environmental destruction endangers the entire system. People cannot stay healthy in toxic environments, and economies cannot be healthy when the people in them are not.

We are warned not to eat fish from much of the Hoosic River. Photo by Beyond My Ken. CC BY-SA 4.0

The World Health Organization recently released a study, "Preventing Disease Through Healthy Environments." According to the study, one out of every four of us will die of health issues caused by some sort of pollution. Please note the optimistic title, however. Certainly, while the problem is far worse than most people realize, we actually can make things much better.

Vermont Smoke & Cure

Is Cooking with more Solar Power

Green Energy Times staff article

One of the three local projects helping produce emissions-free solar energy for Vermont Smoke & Cure. Photo courtesy of AllEarth Renewables.

Vermont Smoke & Cure, of Hinesburg, Vermont, has been making smoked meats and meat snacks since 1962. Over the years, it has shown itself to be very environmentally aware, with additions of renewable power. Lately, however, it has sharpening its already green image, teaming up with AllEarth Renewables, of Williston, Vermont, on a renewable power project to supply more of its electric power needs.

The new addition is the company's third solar system, and it will be getting almost two-thirds of its power from the sun. The three projects include a 150-kilowatt (kW) orchard in Hinesburg, a 156-kW project in Essex, and an 88-kW system in Marshfield. Together, they will produce about 610,000-kilowatt hours annually of emissions-free solar energy for the food company.

All three projects were built with AllEarth Renewables' Vermont-made solar trackers. Chris Bailey, CEO of Vermont Smoke & Cure, said, "We are very proud of our partnership with AllEarth renewables, as it helps us achieve our mission to use local and sustainable resources in our products and our business operations whenever possible."

David Blittersdorf, president and CEO of AllEarth Renewables, added, "It's extremely gratifying to be working with great Vermont businesses like Vermont Smoke & Cure with national and international markets on greening their energy portfolio and helping them save on electric costs." He added, "Vermont Smoke & Cure's solar mix demonstrates how well solar is working to help these companies gain a competitive edge and do right by the local environment."

Vermont Smoke & Cure's sustainable action record goes beyond just building solar systems to cut costs. Whenever possible, it uses humanely raised meats and simple, local ingredients. It will retire the Renewable Energy Credits produced by its project. It employs around 70 people, and its team of employee-owners makes everything in its Smokehouse in Hinesburg, Vermont. Its website is vermontsmokeandcure.com.

AllEarth Renewables makes a dual-axis solar tracker that uses innovative GPS and wireless technology to follow the sun through the day, producing up to 45% more energy than a rooftop solar. The company has manufactured and installed more than 3,800 solar tracker systems. Its website is www.allearthrenewables.com.

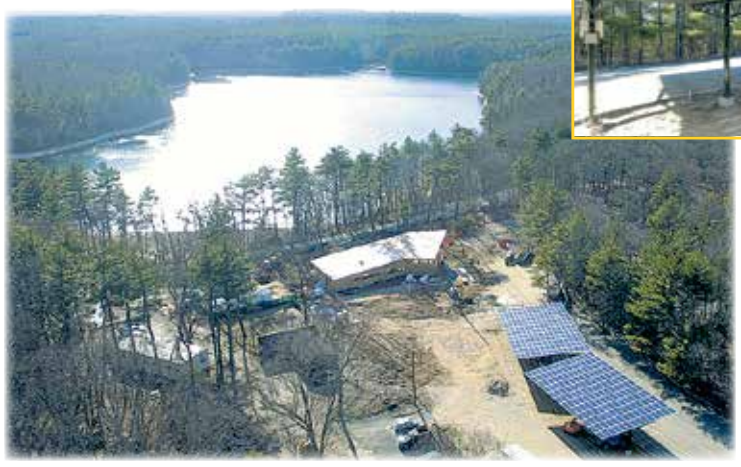
A NET ZEROSOLAR CHALLENGE AT WALDEN POND

Cont'd from p.1

by his "japanned lamp" and heated by wood. But the picture comes to a wonderful resolution in the new Walden Pond Visitors' Center. It provides an immediate view of the environment and is marvelously sustainable. Much to the point, it is engineered to be a net-positive energy producer, not only providing for its own lighting and heating, but supplying power to charge visitors' electric vehicles while they park. There is even a reasonable hope that the center will have extra power to share with the town of Concord.

The historic nature of the site and care for the environment shaped the architect's design response. The DCR asked that only trees necessary to accommodate the new building be removed with all others surrounding left standing. The 80-foot tall trees limit the potential for passive solar heating but provide welcome shade for the summer visitors reducing climate-conditioning energy use during the busiest season.

Maryann Thompson Architects, a Boston-area firm well known for sustainable design, kept year-round energy use at the visitors' center to a minimum by applying Passive House building standards. Insulation is R-60 in the roof and R-30 in the walls. The large windows, which provide wonderful views of Walden Pond and its surroundings, are to be triple-glazed. Air sealing will be done with the greatest possible care. What climate-conditioning load remains will be satisfied by environmentally-friendly, high-efficiency air-source heat pumps. There will be no fossil fuels used on site.



An aerial view of Walden Pond with the new net-zero building for the visitor's center and the solar canopy located in the parking lot. Inset shows the solar canopy from below, installed by Solar Design Associates. Photos courtesy of Steven Strong.

The center's siding is of locally harvested ash specially heat-treated to make it suitable for the purpose. DCR foresters carefully selected the ash trees from the woods surrounding the reservation, confirming them already dead before they were taken. Landscape architect Michael Van Valkenburgh provided gentle swales around the center to manage runoff and limit erosion in the vicinity of the pond.

The Walden Pond Visitors' Center will be powered by a solar photovoltaic (PV) system designed by Solar Design Associates of Harvard, Massachusetts. Since the new building is surrounded by mature trees and thus not suitable for rooftop PVs, it was decided to field the solar as parking-lot canopies at an existing parking lot that already had good solar access.

Like the building, the parking lot canopy is unusual – very unlike a typical mall parking lot. Rows of cars on the edge of the lot are shaded by woods and there are eighteen feet of plated space between rows. The solar canopies were placed to span the median. The capacity of the overall system is 105 kilowatts, DC, and the expectation is that it will provide 120 megawatt-hours per year. The parking area will also feature four charging stations, each with hookups for two vehicles.

Another important project participant is the Town of Concord Municipal Light Plant. The MA DCR appreciates their cooperation in providing the proper service connection to connect the solar to the visitors' center and the local utility distribution grid.

Given the great consideration for nature, we might think Thoreau would approve heartily.

Spring Cooking in the Solar Oven*

Nothing announces springtime like locally-grown asparagus. And nothing feels more like springtime than cooking outdoors, using only the power of the warm spring sun. With a flavor meld of puff pastry, sun-roasted asparagus and rich Gruyere cheese, this asparagus tart looks and tastes company, best yet requires only the effort of an everyday basic. Serve with spring greens dressed with a light vinaigrette for an unforgettable Sunday brunch!

Solavore Asparagus Tart

INGREDIENTS:

1 pound asparagus, trimmed
1 sheet frozen puff pastry (about 1/2 pound), thawed
All-purpose flour, for dusting
1 cup grated Gruyere cheese
1 tablespoon minced shallot
1 egg beaten
1/8 teaspoon freshly grated nutmeg
Kosher salt and freshly ground pepper
2 teaspoons extra-virgin olive oil
1/2 teaspoon finely grated lemon zest

DIRECTIONS:

Remove your puff pastry from the freezer to thaw. Set the solar oven outside to pre-heat.

Wash the trimmed asparagus and put it in your graniteware pot. Cover and place in the oven. Let the asparagus cook for about 20 minutes.

Place the puff pastry on a floured surface and roll into an 8-by-10-inch rectangle. Transfer to a parchment-lined baking sheet (a 9-by-13 baking sheet works well and fits in the Solavore Sport). Prick the puff pastry all over with a fork. Bake until it puffs up, approximately 30 minutes. Let cool slightly on the baking sheet.

Meanwhile, mix the Gruyere, shallot, egg, nutmeg and a pinch each of salt and pepper in a bowl until combined. Spread the cheese mixture evenly over the puff pastry, leaving a one-inch border on all sides. Toss the asparagus with the olive oil, 1/4 teaspoon salt, and pepper to taste. Arrange the asparagus on the tart and bake until the edges are nicely browned, 75 to 90 minutes. Sprinkle with the lemon zest. Serve warm or at room temperature.

Recipes available at LocalSavour.com.

**See Solavore Solar Oven ad on page 37.*

G.E.T.TING OUTDOORS IN NH GETS GREENER

NH Camp and Appalachian Mountain Club Lodge Go Solar

By Green Energy Times staff

Outdoor recreational facilities in the northeast are taking on the solar challenge. Two in New Hampshire are noteworthy. Both were built by ReVision Energy, which has offices in New Hampshire and Maine.

Copper Cannon Camp

A 13.52-kilowatt (kW) array went on the roof of the Copper Cannon Camp's newly-constructed dining hall in Bethlehem, NH. The solar array will offset about 15,500 kilowatt hours (kWh) of the camp's electricity and reduce its carbon dioxide emissions by over 14,000 pounds annually.

Copper Cannon offers tuition-free summer camp for children in need. Peter Christnacht, the camp's executive director, said, "As a teaching tool, it will be a great educational opportunity. We want to incorporate aspects of it in with our farm-to-table garden plot and conservation activities."

Copper Cannon plans to have campers monitor the power usage and provide daily updates on production and consumption as a learning experience. Christnacht hopes that doing so will help the campers become "able to connect the dots with energy generation and energy consumption."

Copper Cannon Camp is a 501(c)3 non-profit organization. It abuts the White Mountain National Forest. It offers traditional summer camp activities but also focuses on themes that encourage continued learning, healthy lifestyles and building social capital.

The Appalachian Mountain Club (AMC) moved further toward its goal for reducing its carbon footprint by installing a 73.2-kW solar array outside AMC's Cardigan Lodge in Alexandria, NH.

A 13.52 kW of solar on Copper Cannon Camp's dining hall in Bethlehem, NH will reduce its carbon dioxide emissions by over 14,000 pounds annually. Photo: Revision Energy

Appalachian Mountain Club

The Appalachian Mountain Club (AMC) moved further toward its goal for reducing its carbon footprint by installing 240 solar electric modules and seven inverters outside AMC's Cardigan Lodge in Alexandria, NH. The 73.2-kW, fixed ground mount is located next to the lodge, which is adjacent to Cardigan Mountain State Forest. The system was installed last December.

The grid-tied array was installed by ReVision Energy and is owned and operated by IGS Solar. The system was financed through a Power Purchase Agreement, which allows AMC to buy renewable power at a price below usual grid retail cost.

The array is expected to generate about 87,000 kWh each year. This reduces carbon dioxide emissions by the amount released by burning157 barrels of oil. The reduction is equivalent to the amount absorbed by 15 acres of pine trees.

Through group net metering, Three Mile Island Camp on Lake Winnipesaukee also benefits from the solar array at Cardigan Lodge. AMC will receive credit for the excess it produces and plans to share a portion of the credit with the camp.

AMC has a long history of minimizing environmental impacts in its operations. It has a goal of reducing its total carbon footprint 80% by 2050. Paul Cunha, AMC's Vice President of Outdoor Operations, said, "The solar array is an important step in the effort to reach that goal by replacing carbon-emitting systems with sustainable, renewable energy systems."

A number of AMC's cabins, huts, and lodges have been recognized for environmental leadership. Eight in New Hampshire's White Mountains have off-grid power. In Maine, the Gorman Chairback Lodge is one of only a handful of backcountry facilities in the nation to be LEED registered.

ReVision Energy is seeking organizations to form more partnerships. "The PPA is a powerful and innovative tool that allows towns, schools and non-profit organizations to install state-of-the-art renewable energy systems at no upfront cost that will generate clean energy and produce cost savings for decades and decades," Jack Ruderman, Director of Community Solar Initiatives, said.

Info at Revision Energy.com. 207-221-6342.

That 'thingCHARGER' Thing ...

By Ticia Y. McGean

I sometimes feel a twinge of guilt loving a piece of inanimate technology, but then I get a text message from my daughter with a silly photo attached, or I am out with my adorable niece taking videos of her antics, or I say something starting with "I wonder" and then don't anymore thanks to the magic of Google. I don't want to waste paper (or risk losing the boarding passes, as I am wont to do) and love using the e-tickets to get on the plane, in the movie, play, show etc. I love not needing books that also waste paper, as I use my Kindle app to read all of the time, even at night without keeping my husband up. I love that I have a flashlight immediately when I need it. I love getting my email and other notifications and being able to immediately respond, or track my family on flights. I love that my niece and my mom get to do "facetime" even though they are 3.5 hours away, and she knows her Mamu (Gramma) immediately. I could go on and on (and yes, I do also enjoy using it as a phone, sometimes).

But the key issue here is that the phone only works if it has a charge. In a house with three smart phones, there used to be a scarcity of chargers, but no more! This thingCHARGER has really made a difference, and it does not ever get lost. We really enjoy the versatility of it, too. It has come in very handy in the kitchen, when I need to read a recipe at the same time as charging. It is handy to have the ability to switch both the charger type, as well as the orientation of the charger, with just a push in of the button. Conveniently, the other plug adaptor is stored on the inside for when iPhone friends come to visit.

The thingCHARGER is handy in the kitchen when needing a recipe while charging. Courtesy photo.

There are only two issues that we have noticed.

One is that some phones do not have their plug in the middle, as is the case with my husband's phone. The port for his phone is on the side, so we have to put a penny under it to not make it shift, so that it will work.

The second is something my brother and his wife experienced while living in an older building where the outlets were all sideways and down near the floor. The thingCHARGER really needs to be up on the wall or a counter. They moved to a newer home and are now able to plug it into a wall socket where it works perfectly.

Oh, we also love the USB ports on the bottom to have all the charges going on!

Learn more at thingCharger.com.

Ticia McGean is the Manager of Product Development for Map Info Pro at Pitney Bowes.

GET-TING KIDS OUTDOORS:

AN ECO-FRIENDLY SCOOTER THAT GROWS WITH THE CHILD: MICRO KICKBOARD®

By N.R. Mallery

Four-year old Bodhi from Bradford, VT enjoys the Deluxe Mini MicroBoard Scooter model. Courtesy photos.

We recently became aware of Micro Kickboard®, a neat, award-winning, eco-friendly company that provides great scooters so kids can get outside for some exercise and parents can have the satisfaction of buying something worth spending money on.

One thing that caught our attention is the green practice they call "Reduce to the Max." In keeping with the practice, they use the best materials for strength, endurance and longevity, yet their products are lightweight. The sustainable designs use modular construction, so every part is replaceable. Their products use minimal materials, all of high quality that can be maintained virtually forever. Even their shipping policies reflect a desire to reduce waste, using less packing material and keeping them out of the waste stream.

Micro Kickboard offers a scooter that grows with a toddler taking him or her up to five years with one product. A toddler starts with sitting on a removable seat that can be used as a storage unit. The handle extends to accommodate the growing child's height.

We had the opportunity to try a Deluxe mini Microboard with a four-year-old neighbor boy. As you can see by the smile on Bodhi's face, he is having a lot of fun on this model that is designed for children from two to five. This neat three-wheeled scooter has some great features. The turning mechanism incorporates a safe lean-to-steer design. The brake is engaged simply by pressing on it with your heel. The wheels are smooth, quiet, and non-marking. The deck is flexible and made with reinforced fiberglass. The handlebar can be adjusted for height as the child grows and makes the scooter easy to carry. Other models accommodate ages from five to 12, eight years and over, and teens and adults.

This is a great way to get kids outdoors – having fun and exercise that helps to develop balance and coordination used in many sports. The scooters are great while camping, on bike paths, at home or in your neighborhood.

Micro Kickboard® is the US distributor for Micro brand scooters and is based in Grand Rapids, Michigan. The owners work with the world-wide headquarters for Micro-Mobility in Zurich, Switzerland. This innovative company was founded in1999.

The original version of the scooter was actually designed for an adult. The story behind the creation of the first Micro scooter starts with Wim Ouboter, a young inventor living just outside Zurich. He regarded his favorite lunchtime sausage shop, the Sternen Grill, as too far to walk but too near for a car or even a bike. Recalling the scooter of his youth, he and his wife, Janine, set about designing a foldable scooter large enough for an adult. The resulting Razor scooter triggered a worldwide boom starting in 2000. (Read more in Wikipedia: Kick scooter: folding scooters.) Wim and his team went on to create many other award-winning innovations in the years that followed, and continue to do so today. The CEO of the company, Hans-Peter Bolliger was the early innovator in the sport of freestyle riding (also known extreme or stunt scooters) and today he leads the global Micro team, one of the top teams in the world!

Today they offer scooters for every age, starting with the MINI2GO for toddlers right up to the business world with an electric version called the eMICRO ONE, a folding electric hybrid scooter that uses the power of the electric motor and your own kick/push power.

Read more at www.microkickboard.com, or call them at 888-236-5657. See the discount coupon for GET readers in their ad on page 39. Stay tuned for more from this earth-friendly company, in future issues of Green Energy Times.

Here is a 2-year old with her MINI2GO for toddlers.

ASK THE SOAPMAN

Hey Soapman,
I like using natural oil salves and balms but sometimes they get grainy after they get too hot. What's up with that?
-Silky but Befuddled

Dear S&B,
If your salve or balm melts (over 110˚F) it will separate into a liquid and solid layer. When it cools and re-solidifies, the product will be grainy and less desirable; though still usable. This happens because the heated beeswax separates from the other oils when they melt. When the salve reforms the beeswax stays separated from the oils forming little grains of wax. That's the weird texture you feel. You can fix grainy salves, balms and moisturizers by gently warming them back to liquid, stirring the contents until smooth, and immediately placing the jar into a freezer for about an hour.

Tip: Place your lidded jar in a sturdy non-plastic bowl and cover with boiling water. It may take several changes of water to fully melt the product. Stir thoroughly and place into a freezer. The colder the better. The idea is to get the product to set up quickly. This insures a smooth, creamy finish and lower melt point when applied. Keep your salves and balms in the refrigerator to greatly extend the useful life of your organic moisturizing products. Discard any organic personal care product that has a sharp rancid aroma or color change.

Moisturizing (oiling) skin is the key to aging gracefully. Apply twice a day and let the compliments roll in!

All the Best,
Soapman