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SAVE $ THIS WINTER pp. 20-24 / APPLES, BEARS, TURBINES p. 24

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LOCAL SCHOOLS ARE GOING FOR SOLAR

With Help from Norwich Technologies

By N. R. Mallery

Norwich Technologies has been long interested in education as a driving force for widespread adoption of renewable energy technologies. It comes as no surprise that projects for schools have become a large portion of Norwich's business. To date, they have built or contracted to build ten solar projects for schools in the area, and expect to keep the projects coming.

Troy McBride and Joel Stettenheim co-founded the company. "When Troy and I founded Norwich Technologies, we had both been educators and saw the power of education as a key to our clean energy future," said Stettenheim, now Norwich Technologies' president. "We adults often think of solar as cutting edge and novel. But our hope is that kids will grow up wondering why we used to dig up and burn resources for so much of our electricity. Solar needs to be mainstream, the default rather than the exception. Helping make that happen is what gets us out of bed each morning."

As part of these solar arrays, Norwich designs and provides educational materials for schools including interactive components that can be easily integrated into a school's curriculum. McBride, now Chief Technology Officer, commented, "There is great material on renewable energy out there that we can help schools to access and bring into their lesson plans; teachers up here are often aware of them and may include discussions of renewable energy in their classes. What we can bring is that hands-on, on-site laboratory that really helps it to come to life for kids. At this point, we can provide lesson materials about renewable energy to all grade levels, with students able to do detailed experiments using the materials specific to the Norwich solar arrays."

Cont'd on p.33

Rooftop solar system on Kumball Union Academy's Miller Bicentennial Hall. Meridan, New Hampshire. Photo courtesy of Norwich Technologies

This IS A BIG Deal: The Paris Accord Is Now the Law!

This is What Momentum Feels Like

By Carl Pope

United States Secretary of State John Kerry signed the Paris Agreement on April 22, 2016 with his granddaughter in his arms. Photo: UN Photo/Amanda Voisard/CC BY-ND (Flickr)

For years climate reporting had two strands. On the one hand, climate science got more alarming as we got closer and closer to exceeding various warming thresholds. On the other, climate diplomacy and public policy were a relatively unbroken saga of disappointment and delay.

Both strands of the pre-2014 climate story nourished an appetite the mass media have for bad news, conflict, grid-lock, and failure. Beginning in 2014, however, the climate story grew more hopeful, though it has also become more complex and harder for the media to summarize.

Greenhouse gas concentrations continue to increase at an alarming rate, and projections of the risks of these concentrations become steadily more grave. In the first week of October, we were told that the planet was hotter than it has been in the last 100,000 years. Current climate commitments fall far short of what is needed to avoid catastrophe, and this causes concerned observers to argue that the world is not taking the problem seriously.

But on the solutions front, progress is accelerating. Climate diplomacy and public policy are not only galloping ahead at an unprecedented speed, their pace is increasing. Many people are missing that. Stories that head in two directions are often difficult to cover, so there were challenges in the media's attempts at covering events that took place in the first week of October. The importance of those events may be lost on some, but they are a decisive turning point in the fight for climate protection.

First, with ratification by the EU the Paris Accord **came into legally binding effect, five years earlier than originally envisaged**. Media coverage of this event has focused on

Cont'd on p.25

Polluted Water Troubles Bring Erin Brockovich To Town of Hoosick Falls, NY

By George Harvey

Erin Brockovich, during her visit to Hoosick Falls, NY. Photo by Dhance, via Flickr

In 2014, Michael Hickey had lost his father and a teacher to cancer, and he wanted to understand why. He did a web search on cancer and the name of a product his father had made in a chemical plant, Teflon®. It only took about five minutes to find the connection. It was PFOA, perfluorooctanoic acid, which is used to make Teflon®.

Molecules of PFOA have eight carbon atoms in a row, with fluorine atoms attached to all but one. The last carbon atom at one end has two oxygen atoms attached, one of which is also bonded to a hydrogen atom. There are other, related compounds with similar structures and properties, including one called PFOS.

PFOA is toxic to humans and animals. It causes cancer of the kidneys, liver, and testicles. It causes thyroid and liver problems. It leads to genetic and developmental issues. One of its worst characteristics is any amount that is released is permanently present in the environment, because it does not degrade and is not subject to natural sequestration. In other words, as long as it is being manufactured, it only builds up in nature.

It took some work for Michael Hickey to find out whether there was PFOA in the drinking water in Hoosick Falls, where he and his father had lived. There are few laboratories prepared to test for it, and the tests are expensive. Nevertheless, he found a lab and paid several hundred dollars to have the water tested. The level in the town's drinking

Cont'd on p.36

IN THIS ISSUE:

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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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ANOTHER ONE OF OUR G.E.T. TEAM GOES SOLAR

Following our story about Michelle Harrison's DIY ground-mounted solar installation in the August issue of Green Energy Times, we are pleased to share this story about another member of our G.E.T. team that has officially gone solar, as well.

The installation for one of our volunteer distributors began on August 23, 2016, for a 6kW solar PV system. It finished in just one day. The team from Frase Electric and Solar completed the array consisting of 19 Solar World 320 watt panels on the roof of his Tamworth, NH home the following day.

Cont'd on p.34

TABLE OF CONTENTS

G.E.T. Wants to Hear from You

TAKE OUR SURVEY

1. Help improve G.E.T. by taking a short 10-question survey found at the top of our home page www.greenenergytimes.org. Of course, comments are welcome anytime as well! Thank you for helping to keep G.E.T a great sustainable education resource.

2. If you have a story to tell, let us know! Others can benefit greatly from your experience. Please do not hesitate to let us know all about your achievements that are helping our ailing planet. Together, we each can make the difference that matters in the end!

Send us a note at info@greenenergytimes.org or call us at 802.439.6675.

Solutions: A CARBON CAMPAIGN

A Proposal for Sustainable Global Carbon Dioxide Emissions

by Roy Morrison

The author, Roy Morrison. This picture was taken in a tropical rainforest. Photo taken by his wife, Luanne Bakero

The following is a grassroots campaign to support a sustainable global carbon dioxide emissions standard of three tons of carbon dioxide per person per year.

The Proposal is a Town meeting and city council resolution campaign to instruct local, state and congressional representatives to support detailed community planning, action, and investment on local, state, national levels to reach a sustainable global personal carbon dioxide standard of three tons per person per year.

Globally, 21 gigatons is roughly the amount of carbon dioxide sustainably removed by natural carbon sinks in the ocean, soil, and biomass. With a global population of more than seven billion, three tons of carbon dioxide per person a year means close to a sustainable 21 gigatons of carbon a year.

The three tons per person per year goal can be pursued by a household, a neighborhood, a city, a state, a nation. A greenhouse gas audit is the first step toward liberation. The next step is developing plans for reduction, sustainability, and justice. The plan is designed to lead to local action and organizing that will pursue ecological economic growth and social justice. The essential role of government is to provide the financial tools, technical support, market, laws, regulatory rules to help every town and city to follow this ecological growth path. This is the 21st century application of thinking globally and acting locally.

Currently, the world's people emit, on average, 4.8 tons of carbon dioxide per person per year, and the number is rising. But the average hides very uneven responsibility and the magnitude of what is required in different places. In the United States, the average is 17.0 tons carbon dioxide per person per year (2011), China's average is 6.7, Costa Rica's is 1, Bangladesh's is 0.3.

Reaching the three tons of carbon dioxide per person per year standard rests on investing many trillions of dollars in the global efficient renewable energy and ecological production infrastructure. This means putting millions to work at good jobs, building sustainable communities and a prosperous future for all. If we do not do this, we are inviting ecological catastrophe and self-destruction later, and economic contraction and global depression now. Ecological global growth is about building a real economy to replace the financial bubble economy of collapse and bailouts. As many gigawatts of cost-effective renewable energy systems are phased in, for example, gigawatts of polluting fossil fuels will be phased out.

This global 21 gigatons global-emissions limit needs to be combined with ecological practices in agriculture, forestry, and aquaculture to remove more carbon from the atmosphere to achieve long term sustainability. This means sequestering carbon dioxide in soil and biomass, both on land and at sea, on a enormous scale. It also means richer soil, more sustainable food production from agriculture and aquaculture, more trees, and more sustainable forests. This is a key part of local ecological planning for three tons of carbon dioxide per person per year.

Three tons carbon per person per year is the clear goal. Where are we right now? How do we get to 3 tons and below? These are the key questions, but from an immediately practical viewpoint, we need to ask more questions. What needs to be done? What tools, capital, and new laws help us to make these changes? Local action plans means addressing questions of long term planning for ecological and social justice, for good jobs and healthy stable communities.

A global convergence on three tons person per year carbon dioxide emissions will be an expression of an ecological civilization. The planning and work for this can proceed from the household, village, city, state, and national levels. We all can participate, starting where we live. Individually and collectively humanity can become part of the solution to the ecological consequences wrought by the conduct of industrial business as usual.

Bernie Sanders addresses a town meeting in Derry, NH. Source Wikimedia Commons

Ecological global growth (EGG) is a radical reform, and uses the means at hand for ecological ends. It is the agenda for both doing good, and well for all of us. EGG is meant to act as an organizing strategy and direction for building an ecological civilization from where we are, rich or poor, undertaken with or without the blessings and support from politicians and bankers, regardless of who sits in the White House.

Why Three Tons of Carbon Dioxide per Person per Year Matters?

Right now most people probably have no idea of our personal, business, neighborhood, or state carbon dioxide emissions per person per year. Many people know in general terms how much energy they use at home. Most people get billed every month, usually for fossil fuel related energy purchases, unless we have our own renewable resources, like wood, or an ultra-high efficiency passive house, or our own solar and wind generation. Almost none of us has a good idea of what we emit and what changes we can make to reduce our carbon dioxide emissions.

Similarly, on a cumulative basis, we have no idea of global carbon dioxide balance, and what are the effects and consequences of specific polices. What does it mean to phase out coal in ten years or twenty? What does it mean to plant ten million of trees per year? Grabbing onto plans for 3 tons of carbon dioxide per person per year on all levels will begin to inject realism, discipline, and urgency to move ahead toward an ecological future and away from climate catastrophe.

Working for EEG is meant to make everyone part of the solution instead of part of the problem. There are lots of low hanging fruit. This is not just the job for individuals, but communities. The benefits are designed not just for people with money, but everyone. This is not just

Cont'd on p.7

Streamlining Efficiency in Corporate Fleets

by Hope O'Shaughnessy

Hybrid powered Coca-Cola delivery truck in Washington, D.C. will be the type of vehicle that will come into greater use with new mandates regarding mid to large size vehicles. Photo by Mariordo (Mario Roberto Duran Ortiz) (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

Recently, the U.S. Environmental Protection Agency (EPA) and the National Transportation Safety Board (NTSB) mandated a new fuel-efficiency standard for medium and heavy duty vehicles with a 25% reduction mandated for 2018. The new rule will cut carbon while improving fuel efficiency. According to the EPA's press release, "the final standards are expected to lower CO2 emissions by approximately 1.1 billion metric tons, save vehicle owners fuel costs of about $170 billion, and reduce oil consumption by up to two billion barrels over the lifetime of the vehicles sold under the program."

According to statistics from the U.S. EPA, between 1990 and 2013, freight activity grew by over 50 percent and is projected to nearly double again by 2040, producing more greenhouse gas and air pollutant emissions. The EPA also notes that experts project that by 2050, global freight transport emissions of CO2 will surpass emissions from passenger vehicles.

Technology such as the EPA's SmartWay will be one of the ways companies can start to tackle carbon use. SmartWay brings together freight and transportation stakeholders with the EPA to measure and improve logistics operations to aid efficiency.

The SmartWay tool is being used by a total of 128 companies in NY, NH, VT, MA and ME. New York tops the list with 74 SmartWay partners. In New Hampshire, six companies use this tool to provide better data on their fleet's energy consumption including such companies as Stonyfield Farm in Londonderry. Seventh Generation in Burlington is the sole company using the tool in Vermont. Massachusetts tops out the list with 38 companies using the tool. Maine has nine companies using SmartWay including Oakhurst Dairy.

States like New Hampshire have initiated collaborative efforts to increase fleet efficiency. The NH Department of Environmental Services promotes The Granite State Clean Cities Coalition that brings business, government and residents together to tackle carbon use.

The Granite State Clean Cities Coalition (GSCCG) includes 120 public and private interests who support the goals of reducing dependence on foreign oil and improving air quality, through the use of domestically produced, cleaner-burning alternative fuels and other fuel reduction strategies.

This summer the GSCCG gathered fleet managers, businesses and the public for its fourth Green Your Fleet! Conference and Advance Technology Vehicle Exhibit. Attendees learned more about alternative fuels, including electricity, propane and natural gas, as well as advanced-technology vehicles, such as electric and hybrid-electric cars.

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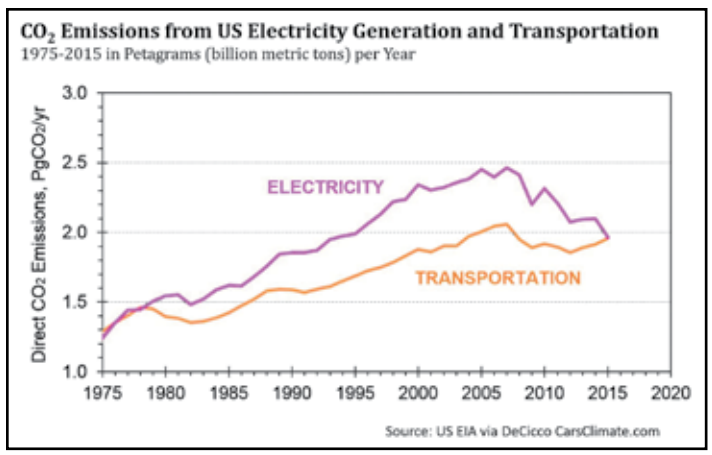
Transportation Emissions Up -

Electric Cars and Renewable Energy Set to Reverse the Trend

Drive Electric Vermont

By David Roberts

Transitioning to more efficient and renewably powered transportation is a fundamental step to reducing one of the northeast region's largest sources greenhouse gases (GHG) and other harmful pollutants. As evidence of the need for transportation action, the chart below shows GHG emissions from transportation in the United States recently exceeded those from electric generation for the first time in nearly forty years.



CO2 emissions from U.S. electricity generation and transportation 1975-2015 in petagrams (billion metric tons) per year. Source: U.S. EIA via Decicco CarsClimate.com

The chart is from a recent analysis by John DeCicco at the University of Michigan Energy Institute who found CO2 emissions from the transportation sector increased at an average rate of 1.8% per year over the past four years while emissions from electric generation decreased as reliance on coal waned. Vehicle efficiency gains are slowing growth in transportation emissions, but not enough to reduce overall CO2 emissions as transportation demand rises with increasing economic activity and lower fuel prices.

Public transportation, walking, bicycling (including electric bikes), ride-sharing and other ways of getting around are important and necessary ways to cut down on car use. For those who are not able to take advantage of these options, the growing availability of affordable plug-in electric vehicles can provide a great way to reduce the energy and carbon footprint of household transportation.

The price of plug-in electric cars continues to come down, and the auto industry is on the verge of transformational products which provide over 200 miles of electric range at a price point of around $30,000 after incentives. As an example, the Chevrolet Bolt is due to arrive by the end of 2016 and will offer over 238 miles of range according to the official EPA rating. Cold winter conditions in the northeast states might reduce range by 20 to 30%. Range of over 170 miles in nearly all conditions should be plenty for the vast majority of drivers' daily needs. Tesla has also announced their Model 3 which will have over 200 miles of range and a price around of $35,000 when it is available in late 2017.

Many other automakers are working on long distance all-electric cars to be available in the next few years. In addition, the current wide availability of plug-in hybrids which can run on gasoline or electricity like the Chevrolet Volt, Ford CMax Energi or forthcoming Toyota Prius Prime means there is no need to wait if you are in the market for a new car and existing all-electric models are not suitable for your needs. Plug-in hybrids offer efficient electric drive for 15 to 50 miles depending on the model and then switch over to gasoline for longer trips when needed.

The pollution-reduction benefits of driving an electric car depend on the source of electricity used to charge the vehicle. Fortunately the relatively clean electric power grid in the Northeast means an electric car gets the equivalent of about 86 miles per gallon or better according to the Union of Concerned Scientists, which has extensively researched this issue.

Courtesy photos of the Chevrolet Bolt and Tesla Model S with Powerwall shown

Want to do better than 86 mpg? Consider powering an electric car from renewable energy sources. You may have options for this through your electric provider, or do it yourself with solar PV, which could bump you up to an estimated equivalent of 350 miles per gallon of gasoline or better.

Tesla is likely to streamline the components and process needed to create a fully renewably powered home, including enough energy to cover electric car charging. Their CEO, Elon Musk, recently tweeted a message the company was aiming for an October 28th announcement of an integrated system consisting of a solar roof, Powerwall battery home energy storage and Tesla electric vehicle charger. This type of system could allow for direct current (DC) charging straight to electric car batteries, which would further increase the efficiency by avoiding the energy losses in converting DC power to AC power common in net-metered solar PV installations. Honda demonstrated similar

Cont'd on p.6

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**

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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**

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

THE CORADIA iLINT TRAIN

is justa rollin' down the tracks.....

By George Harvey

The Alston Coradia iLint has reduced train emissions to almost nothing as a light, innovative, local rail vehicle. Alston photo.

Things have changed since the old days, when coal-powered steam engines chugged through the countryside, polluting everything in sight and occasionally setting farm fields on fire. Nevertheless, they had their advantages, and these remain. It is far less expensive to transport by rail than it is to use road vehicles, and with modern power units carbon emissions are far lower.

Now, however, we can say that in one case the carbon emissions have been reduced to nearly nothing. Alstom, a French company specializing in manufacturing for rail systems, announced that its new train model, the Coradia iLint will run on a regular schedule for the first time, between Buxtehude, a small city near Hamburg, and Cuxhaven, a town on the coast of the North Sea.

The Coradia iLint is a new member of Alstom's Lint line, whose name is an acronym of "Leichter Innovativer Nahverkehrstriebwagen," German for "light, innovative, local rail vehicle." One thing that makes the Coradia iLint especially innovative is its propulsion. It is the world's first hydrogen-powered train to be put into regular operation.

The Coradia iLint is a two-car passenger train. It has a fuel cell, which generates electricity from the hydrogen in an on-board tank and oxygen from the air, producing water as a by-product. The on-board hydrogen tank contains enough fuel to run the train for 390 to 500 miles, at speeds of up to 87 miles per hour.

> This train runs on waste. It is quiet, and it is clean.

Hamburg and Cuxhaven are about 50 miles apart, and there are two additional stops on the route, so it is likely that the train could make eight round trips on a single tank of fuel.

From an environmental point of view, the train has two important advantages. The first is that it is about as close to silent as a train could be. It is said to make only two sounds in normal operation. One is the sound of the wheels on the tracks. The other is the sound of the rushing of the wind it pushes as it rolls down the track.

The other environmental advantage is its fuel. The hydrogen is processed into water by the fuel cell, which would suggest that it is environmentally neutral, aside from the electricity used to make the hydrogen from water. In the case of the particular train in question, however, no electricity is used to make the hydrogen. It is a by-product of a chemical operation, waste that is now trapped and compressed to power a train.

This train runs on waste. It is quiet, and it is clean.

Transportation Emissions Up *Cont'd from p.5*

technology with their Smart Home pilot launched in 2014 (http://www.hondasmarthome.com/).

Other automakers are also hard at work on ways to increase the efficiency of their electric cars and make it easier to power them from renewable energy sources. With all these exciting developments it can be tempting to wait on investing in an electric car and renewable energy generation to power it. If you're in this boat and looking at a new vehicle purchase in the coming year, we suggest considering an electric car lease for two to three years. There are some great lease deals available for monthly payments in the $200 to $300 range as the federal plug-in vehicle income tax credit of up to $7,500 is usually included in the lease. When the lease ends in a few years, there should be more options to consider for even more drastic reductions in your home and transportation energy footprint.

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

Solutions: A CARBON CAMPAIGN

Cont'd from p. 3

about shopping and new consumption patterns, but direct community action and social change.

GHG Reduction Plans and Self-Protection Plans

A local point of entry to global ecological transformation is local and regional plans for greenhouse gas (GHG) mitigation and adaptation. Greenhouse gas mitigation plans are a frank admission that the affects if climate change are already upon us. The best we can do is to mitigate inevitable future consequences by reducing GHG to sustainable levels and take steps to adapt to minimize the effects of climate change. We must recognize that adaption without reducing GHG is futile. But even the best mitigation actions will not prevent inevitable increase in damage from climate change that will require adaptation to protect ourselves. As terms of art, mitigation and adaptation could have been better. Instead, we will use **GHG Reduction Plans and Self-Protection Plans** instead of Mitigation Plans and Adaptation Plans.

Whatever they are called, these plans are open local efforts to first understand local situation and vulnerabilities and develop opportunities for sustainable energy, economic, and social transformation.

It is the local door to a sustainable and prosperous ecological future that, by their nature, will address what the community is and what it wants to be, and therefore engage issues of social and ecological justice. What exists and what is needed and wanted locally, in sum, is the basis for helping inform and guide the development of state, national, continental, and global policy to meet the sum of local needs. This is engaged do-it-yourself local action with grassroots political implications and potential impacts far beyond. It can be an invitation for local organizing and action, for national, and global organizing.

The desperate need that inspires work for ecological change can share the same spirit as grassroots risings against all odds that motivated the Colonists who met in taverns and farmhouses and made a revolution; or those that occupied Tahir square; or Wall Street. This is spirit of "Acres of Clams" that we sang while occupying the construction site of the Seabrook nuclear plant, "Why sit home and wait for a meltdown? Come fight for your freedom and land, my friends. Come fight for your freedom and land," written by Clamshell Alliance activist and song writer Charlie King (music from the traditional tune "Rosin the Bow.") A non-violent global rising that starts from many local seeds is likely what is needed to move us quickly enough to prevent climate catastrophe and to prod politicians, of all stripes and flags, from good intention to action.

Assessment of Community GHG

Building Community GHG reduction and self-protection plans (or mitigation and adaptation plans) begins with an assessment of community GHG emissions along with climate change self-protection needs. Local change is at the root of the global. Dealing with fine local details is very much engaging with the thousands or things that will be the basis for measured data collection. It is also the basis for development of local plans and goals as the focus for local organizing and community economic and social development. Community plans are the basis for finance and support. This is very much global ecological economic growth in action that can engage all relevant aspects of community life.

There are about 100 global mega-cities, each with four million or more people, and in total about 10% of global population. Obviously dealing with a mega-city is quite different from a New England village of 2,000.

And large cities are collections of neighborhoods that have their own sense of community and integrity. Copenhagen is a good example of urban sustainability planning with substantial local power and input given to neighborhoods in the planning process. It is far different from the top down planning typified by the efforts of master builder Robert Moses in New York City in the mid-20th century that created monstrosities such as the Cross Bronx Expressway and urbanization at the expense of mass transit and local neighborhoods, local economies and culture.

Good execution of the plan must also be more flexible. The Dodgers left Brooklyn after their proposed new stadium site was rejected for the sake of following Moses' plan, which called for the property to be a parking lot.

Local GHG emission profiles may differ substantially from typical direct and indirect emissions patterns determined by the IPCC. This is led by fossil fuels, which account for over three quarters GHG; agriculture, forestry, and other land uses (AFOLU) accounting for less than one quarter GHG; the balance from other GHGs such as refrigerant fluorocarbons.

The first goal is assessment and inventory of community GHG emissions, and survey of particular climate change vulnerabilities. The assessment serves as a basis for reduction and can include a wide range of economic, health, and social benefits for the community. Planning for GHG reduction and self-protection can represent a powerful impetus for the development and improvement of long range community plans and community organizing and economic development.

Community GHG assessment, reduction, and self-protection tools need to be of broader scope than institutional or industrial facility based GHG reporting. An accessible methodology is the World Resource Institute's Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. This is a good place to start. (http://ghgprotocol.org/files/ghgp/GHGP_GPC.pdf).

This is a comprehensive tool developed for cities and considers for reporting stationary energy, transport, waste, industrial processes and product use, and AFOLU.

For self-protection, communities need to engage in a comprehensive vulnerability assessment and sensitivity analysis. The United Nations Framework Convention on Climate Change Assessing Climate Change Impacts and Vulnerability: Making Informed Adaptation Decisions provides broad guidance. Of direct relevance to U.S. municipal planning is the University of Washington Guidebook for Local, Regional and State Governments, Chap. 8 Conducting a Climate Change Vulnerability Assessment (http://cses.washington.edu/db/pdf/snoveretalgb574ch8.pdf).

Important considerations include:

- Are the systems associated with this area already able to accommodate changes in climate and to what extent? For example, what is the ability of plants and animals to respond to climate changes; are water systems designed to respond to decreases in rain by using reclaimed water resources?
- Are there barriers to a system's ability to accommodate changes in climate? For example, do we rely on 100 year stream flow records to judge flood risks, when climate change is rapidly making these historic records no longer accurate? Are there multiple uses for our

Cont'd on p.32

A Carbon Campaign Warrant:

To See if the Town will Support Policies Reducing Carbon Dioxide Emissions to a Sustainable 3 Tons Per Person Per Year

Whereas carbon dioxide released from combustion of fossil fuels beyond sustainable levels maintained by soil, forests, and oceans, poses an existential threat to our town and to all towns;

and

Whereas we can reduce, over the next two decades, average carbon dioxide emissions to a globally sustainable rate of 3 tons per person per year through the use of efficient renewable electricity and improvements in agriculture, forestry, and aquaculture;

and

Whereas the transformation to efficient renewable energy and sustainable agriculture, forestry, and aquaculture represents a policy for ecological economic growth. This will create jobs, strengthen our economy, and lead to the health and regeneration of natural capital and sustainable prosperity.

and

Whereas a global convergence, by all, on 3 tons of carbon dioxide per person per year will lead to a globally sustainable level of 21 gigatons of carbon dioxide emissions per year, the Town acting locally in support of our well-being and futures does therefore:

1. Call upon the Selectmen to establish a Town Committee for Green House Gas Reduction and Ecological Economic Growth to develop plans to attain an average carbon dioxide emissions of 3 tons per person per year for our Town within 20 years.

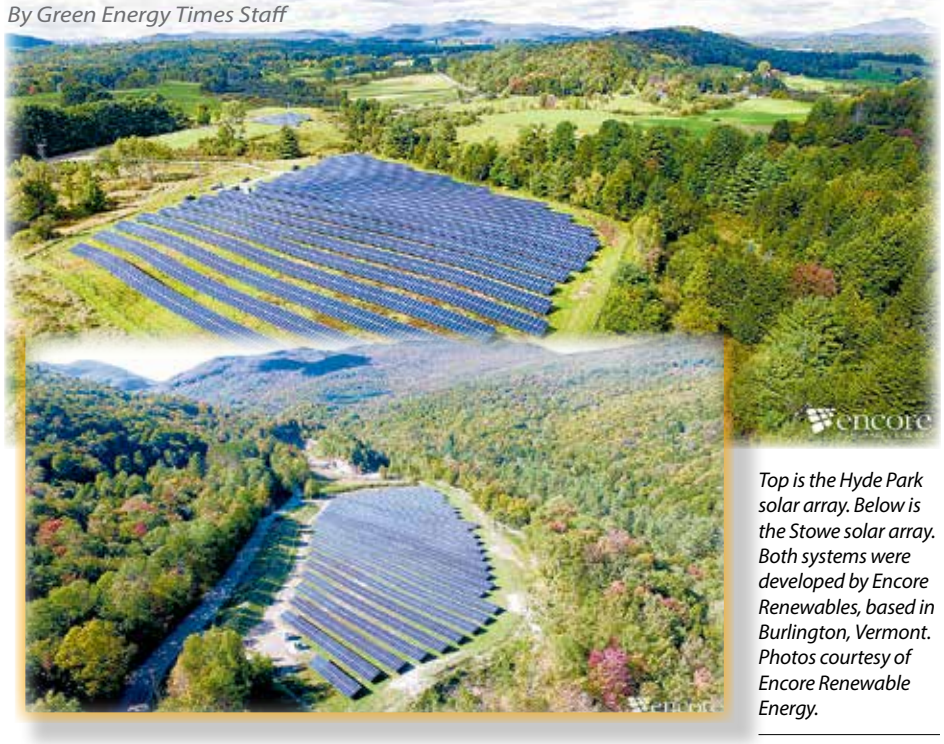
2. The Town Committee will conduct a complete inventory of our local carbon dioxide and other greenhouse gas emissions; develop plans for efficient renewable resource development and use, develop Town plans to support ecological economic growth, and recommend necessary steps for adaptation and self-protection from climate change.

3. Urge our State Legislators and Congressional Representatives to take all necessary steps to provide technical, financial support, and investment for reaching a sustainable average carbon dioxide emissions of 3 tons per person per year through ecological economic growth and an efficient renewable energy transformation.

Two Utilities Are Stowe-ing Away Impressive Solar

Progress in Lamoille County, Vermont

By Green Energy Times Staff



Top is the Hyde Park solar array. Below is the Stowe solar array. Both systems were developed by Encore Renewables, based in Burlington, Vermont. Photos courtesy of Encore Renewable Energy.

A lot has been going on in Lamoille County, Vermont. The Electric Departments of Stowe and Hyde Park have both commissioned solar arrays, each providing one megawatt AC capacity. Governor Peter Shumlin joined with state and local leaders to celebrate the event.

Both arrays were developed by Encore Renewable Energy, which was responsible for coordinating and managing all aspects of the projects. Encore, based in Burlington, Vermont, attended to siting, design, permitting, financing, construction, and commissioning activities associated with each project. The actual construction was performed by Namaste Solar of Boulder, Colorado, who utilized a number of locally based electrical and site civil contractors. Namaste was chosen under a competitive procurement processes overseen by Encore, and the concurrent construction of the two projects allowed for significant cost savings as compared to having each project constructed independently of each other.

Project financing came from the federal Clean Renewable Energy Bonds program issued by the US Treasury and facilitated by the Vermont Economic Development Authority and Union Bank. In both cases, the arrays provide power at costs well below those of solar power through power purchase agreements with third parties for similarly sized projects.

Both Hyde Park and Stowe have their own electric departments, which function as small, local utilities. The Stowe project is sited at a gravel pit owned by the Town of Stowe in an area no longer used for gravel extraction. Such land has very few good uses and siting a solar array on it is a particularly attractive way to provide value to the Town from an otherwise underutilized property. The Hyde Park project is sited next to the largest commercial customer within the municipal electric service territory.

Stowe's array is capable of supplying 2.2% of the town's electric needs, enough for about 229 local households, according to the Stowe Electric Department. The array in Hyde Park is the same size, but will supply 14% of the electrical needs of the smaller community. The arrays will help both the towns and the state of Vermont move toward elimination of fossil fuel use and provide mitigation from mandatory compliance payments required under Vermont's recently enacted Renewable Energy Standard.

Stowe has done more to eliminate use of fossil fuels than just setting up a solar array. The town's electric utility has installed ten electric charging stations at as many locations in the town. There are nine level 2 stations and one, at the Alchemist Brewery, which is level 3 and can charge a car in 30 minutes or less. All stations are available to the public 24 hours per day.

They are as follows:

- Green Mt. Inn, 2 Park Place
- Spruce Peak, 206 Spruce Peak Road
- Stoweflake Mountain Resort and Spa, 1208 Cape Cod Road
- Stowe High School - 413 Barrows Road
- Stowe Kitchen and Bath - 1813 Mountain Rd
- Stowe Rec. Path - Rec. Path parking lot in Village
- Stowe Village - 2 Park Place
- Sun & Ski Inn and Suites - 1613 Mountain Rd
- Town and Country Resort - 876 Mountain Rd
- Trapps Brewery - 1333 Luce Hill

Jen Kimmich, owner of the Alchemist Brewery, commented on the charging station at her business. "All of us here at The Alchemist are thrilled to have an electric vehicle fast charger on our property. We are grateful the Stowe Electric Department provided us with this opportunity. This is not only a great resource for our visitors and community members, but also an incredible incentive for our employees, as we all focus on decreasing our dependence on fossil fuels."

Links: stoweelectric.com, hydeparkvt.com/hyde-park-village-water-and-light and EncoreRenewableEnergy.com.

The Bondville Solar Farm

How do four Vermonters put together a solar farm?

By George Harvey

Aerial view of solar farm. Photo courtesy of Joshua Wylie.

The Bondville Solar Farm is named for the unincorporated hamlet of Bondville, which is part of Winhall, Vermont, in the south-central part of the state. It started in January of 2013 with a walk through a property largely made up of a somewhat overgrown field where sheep had once grazed and adjoining woods. William Jerome, an attorney, and Bill Wylie walked over the land, considering its future. They were interested in promoting solar power and took an active interest in the project.

The land is relatively flat, which is an advantage for a solar developer. It also had another big advantage, which was that the former field was invisible from anywhere nearby. This was a site that could be developed without disturbing anyone.

In Vermont, the question of whether a large site can be developed for solar is subject to review under the Public Service Board. The criteria used for the review are spelled out in Section 248 of Title 30, and they can be used almost as a checklist. Most of the items on the list were of no interest, because they did not apply to the site. Fish, for example, have to be protected, but there were no fish. The presence of "gorges, rapids, waterfalls, or other significant geologic features" is another consideration, but the site had none.

As the work of preparing to file for a Certificate of Public Good (CPG) progressed, the developers went through the issues they could see. Clearly, as a solar array, noise would not be a problem. Since there would be no increase in water usage and runoff could be controlled through swales and other features, water runoff would not be a problem. Aesthetics, a potential issue for nearly any solar project, would not be an issue here, because the panels would only be visible from the highest slopes of a ski area, which was three miles away.

It was a good site, but that does not mean development would be easy. Josh Wiley, one of the original developers, said, "The project was done on a wing and a prayer, and a belief that we could make a difference." Some potential investors said the project was impossible. After all, they were just four Vermonters who thought they had a project they could do. Even some state employees who got involved said it would probably never happen. Once it did, those naysayers who were still around confessed that they were wrong, and said the fact that the project went to completion amazed them.

Strangely enough, some of the very issues they thought were non-issues cropped up forcefully. For example, one neighbor who got intervenor status under Section 248 complained that the solar project would be too noisy. Legal counsel for a neighbor put together the idea that the project should not be allowed to use property it owned, because of obscure wording in an archaic law. The idea that the solar panels would cause water runoffs from storms to increase had to be investigated and dealt with. Despite the fact that the solar array would be completely invisible to neighbors and passers-by, issues were raised about aesthetics. Some objections suggested that someone just wanted to feel power as an obstructionist, or possibly to be paid off.

One quite real issue resulted from the fact that the developers themselves pointed out a vernal pool to a representative from the Vermont Agency of Natural Resources. The state had not known this, because the pool was not on the maps. This was hardly surprising, because the pool was ten to fifteen feet across and about fifty feet long. As a habitat for breeding frogs and salamanders, however, it had to be protected by a buffer zone, where nothing could be built.

Different official opinions emerged, with the extreme position the presence of the pool would make the entire 20-acre project impossible. The issues were particularly difficult, not because the laws were strict, but because the standards were not clearly stated. The term, "vernal pool" was not clearly defined. Eventually, careful thought prevailed, though protecting a habitat where amphibians breed wound up costing $150,000, hundreds of dollars per square foot. A side benefit of the exercise is that code on vernal pools has been clarified somewhat.

Yet another issue was getting access to power lines. Two neighbors tried to block this. Three other neighbors, however, wanted to see the project go forward and went out of their way to facilitate the project, making it possible to continue forward, though the route they provided was more expensive.

As work on the issues progressed, Vermont Solar Farmers passed the Bondville Solar Farm to RegionSolar, of Sarasota, Florida. This company did design and installation, using mostly local labor. Eventually, the Bondville Solar Farm got its CPG and entered into a power purchase agreement with Green Mountain Power, which would buy the output of the solar farm.

At the end of its lifetime, the solar farm will be decommissioned. A bond for decommissioning has been posted with the state, providing the funds to remove the equipment, recycle it, and clean up the site. At the end of its life, the land should be in better shape than it was before the solar panels were installed.

Asked about the future for Vermont Solar Farmers, Josh Wiley said, "Our whole system model is focused on doing it well, working in the communities we are in. Most of our projects are not ground-mounted anymore."

Brad Carlson, of RegionSolar, said that company is also looking to develop more solar power in the Northeast and in Vermont as part of Vermont Solar Farmers, the actual legal proponent and developer of the Bondville Solar Farm. "One of the weak links is that there is no ground to put solar on and the rooftops are cluttered, so we are looking at carport structures." Asked if they would consider floating arrays, he said the concept will run into resistance with state natural resources people, but Regionsolar is considering retention basins.

Josh Wiley said of his experience, "I need to make sure that the picture I paint includes some very positive stuff and positive energy. Even with all the problems, there were some pretty terrific people out there."

A Pollution Solution: Copeland Furniture's Solar Update

By N. R. Mallery

The 500kW solar installation is meeting expectations for Copeland Furniture's manufacturing plant in Bradford, VT. Catamount Solar installed the system. The plant is seen in the upper left corner. Photo: Isaac Copeland.

The August issue of Green Energy Times led with an article on a solar array at Copeland Furniture in Bradford, Vermont. The array was, at that time, nearly ready to come online but had not yet been connected. The moment of commissioning had come, but Tim Copeland had not yet had the experience of seeing his "meter run backwards." Now, everything is operating, and we wanted to revisit to ask him how it feels to see that.

The initial production is a short summertime experience, of course, with bright sun and long days. It is hard to project annual production from that. Nevertheless, the initial output report of 95,000 kilowatt-hours (kWh) lets you know that something is happening right. That little sliver of a year produced a bit over $18,000 worth of electricity, under net-metering.

We can also think of that 95,000 kWh in terms of the number of coal it would have taken to produce it. According to the EPA, it takes 1.04 pounds of coal to produce 1 kWh of electric energy, so Copeland's array saved over 95,000 pounds of coal. (Yes, we know; Vermont's electricity does not come from coal, but reducing use in Vermont has implications for the entire grid. That is a story for another time.)

When we asked Copeland how the experience went, he spoke of his installer, Catamount Solar. "They came well-recommended by our neighbor, Farm-Way." He summed up how they met his expectations by saying, "The folks at Catamount struck me as honest, straight forward, competent and responsive to our concerns. Our opinion of them has not changed."

The Energy Clinic at Vermont Law School

Bringing Solar To NH Resident-owned communities

By Liz Doherty

Solar photovoltaics are the fastest growing renewable distributed generation sources, but despite falling prices, solar remains widely unattainable for many communities. Low-income communities are particularly disadvantaged because they have limited access to capital, often rent their residences so have limited authority to install solar, and often live in cities and don't have their own space for solar. Here at the Energy Clinic at Vermont Law School, we're exploring solutions to this issue of solar access, with a vision for community solar that includes direct community ownership of the economic and environmental benefits associated with the solar facility, and an emphasis on the local economy.

A solar carport canopy at Rocklin Estates in California is one example of how solar could be deployed at a mobile home park or an ROC. Credit: Del Sol Energy

To this end, the Energy Clinic has partnered with New Hampshire Sustainable Energy Association (NHSEA) to design a community solar model for resident-owned communities (ROCs) in New Hampshire. In 2008, the New Hampshire Community Loan Fund partnered with three national nonprofit organizations (Corporation for Enterprise Development, NCB Capital Impact, and NeighborWorks® America) to create an organization focused on resident ownership, known as ROC USA®. The ROC USA model of ownership focuses on transitioning manufactured home communities from third-party ownership to resident-owned communities. After these communities have become resident-owned, ROC USA remains a resource by providing loans and ongoing technical support for improvement projects. The Energy Clinic is creating a comprehensive business and financial model that can be adopted by ROCs across New Hampshire to install community solar systems.

We believe that the ROC model has good potential for community solar, and is developing resources to help guide ROCs through the process. ROCs have the property ownership and green space necessary for ground-mounted community solar and are accustomed to community governance.

The Clinic's guide will lead the ROC through the process of obtaining financing and the technical and legal aspects of community solar ownership.

Ordinarily, to purchase solar panels for a home the consumer must own the home and have the financial ability to invest in residential solar in one of three ways. First, a consumer may have enough capital to buy their solar system outright. Second, he or she may have the tax appetite necessary to take advantage of federal and state tax credits, along with sufficient start-up funds, to purchase solar PV. Third, the purchaser may have a credit score healthy enough to take out a loan, or home equity line of credit, to finance the solar installation.

The Energy Clinic has identified financing as the key barrier currently facing ROCs that want to go solar. Most residents in resident-owned communities cannot fit into any of the three listed financial categories because they are typically low-income communities. The Energy Clinic is exploring several different avenues for the communities to obtain funding: a ROC USA loan, federal loan programs, a partnership-flip model, and more. A primary goal of this project is to make sure the solar facility is actually owned by the community members, and not a third party. This

Cont'd on p. 18

Melanson Companies: That's a Lot of Solar!

By George Harvey

PV panels at the Melanson headquarters, Keene, NH

When Robert W. Therrien, Sr. and his brother, Maurice, bought The Melanson Company in 1952, it was a well-respected, 20 year old roofing and duct business in Gardner, Massachusetts. They soon moved it to Keene, New Hampshire, where it grew and prospered. Branches opened up in four other locations in New Hampshire and Vermont, doing various kinds of work related to roofing.

The Melanson Company's approach to roofing is a bit more inclusive and diverse than that of most roofers. The company specializes in all types of low and steep slope roofing, precision metal fabrication, precision machining, acoustical ceiling installations, duct work, and wood processing equipment.

In an effort to continue to grow and diversify for its customers, it was natural that the business started to turn toward a new sort of product that was being mounted on top of the roofs they were installing, solar photovoltaic (PV) panels. And so, Melanson's solar PV subsidiary, Solar Source was acquired and came to Keene.

Installation of rooftop-mounted solar PV systems is best completed after a new roof installation. Otherwise, the roof may need to be replaced before the PVs do, adding expense to the project and lost production from the panels. Clearly, the perfect time to install a rooftop PV system on an existing building is the same time an old roof is replaced.

Melanson headquarters, Keene, New Hampshire

Now we can see that Melanson is a company that practices what it preaches and has been doing precisely what it has been telling its customers was the best approach to energy. It has been putting solar PVs on its own roofs.

Rob Therrien, the company's current president, explained that the long term goal of the company includes installing substantial solar PV systems and other energy upgrades at all of the company's campuses. So far, it has completed the PV systems on the company's headquarters building in Keene, along with the locations in Bennington and Williston, Vermont.

The upgrades are not the dramatic deep energy retrofits we sometimes read about, but they have the advantage of being realistic representations of what ordinary people and businesses face in such installations. Starting with energy audits, so nothing is missed, Melanson is doing what work it can, when it can do it. It is an ongoing process that Therrien called "taking the opportunity to continue to improve what you are doing." He explained, "As sections of our facilities are re-roofed, we look at installing solar as part of that project when it is feasible."

The first campus to get a solar array was the A.C. Hathorne Company in Williston, Vermont. This is a 29.12 kilowatt (kW) DC array installed in April of 2011. It consists of 130 Sharp solar panels, each of 224 watts. Its performance has been established at 31,600 kilowatt hours (kWh) per year which offsets 25 tons of carbon emissions per year.

Solar panels at the A. C. Hathorne, Williston, Vermont. Photos courtesy of Melanson Company

This campus, at which about 45 people are employed, is getting about 62% of its electric power supplied from its solar system.

The Vermont Roofing campus in Bennington, Vermont was next to get its solar system. There are about 35 employees at this site. There were 132 Sharp panels installed, each of 240 watts output, producing a total capacity of 31.68 kW DC. This system was installed in May of 2012, and has shown production of about 35,000 kWh per year, or about 70% of the electricity used in the building. This equals an offset of 27 tons of carbon emissions per year.

The next big project has been Melanson's main business office in Keene, New Hampshire. In addition to the offices, this site houses Solar Source, the company's solar division, one of its roofing divisions, one of its precision metal fabrication divisions, a duct division, and Tri-State Acoustical Inc. It has about 90 employees, and unsurprisingly, it has the largest of these solar systems.

The Keene campus' solar installation was completed in September of 2016. The array has a capacity of 86.68 kW DC and is made up of 197 Ten K Titan solar panels, each of 440W. The array is expected to produce about 112,800 kWh per year offsetting 87 tons of carbon emissions per year. This is about 42% of the electricity used at the campus.

The addition of solar panels is not the only energy work Melanson has been doing. Each site's work has started with an energy audit, and the most important issues raised have been addressed. The progress has been toward dealing with the greatest problems, if any, and the low hanging fruit, so work remains at each site, to be addressed in due course. The work done has included insulation, switching to high efficiency lighting, work on heating plants and heat efficiency, and, of course, upgrades on roofing, where it is needed. The work is also done with a view to the adage, "reduce, reuse, recycle." Rob Therrien said, "We use a lot of recycled insulation for our own roofs." And yes, Melanson does help customers with that, if they want it.

Therrien said that a goal is to have solar installed at every Melanson campus as roof systems are replaced, replacing a high percentage of the company's use of fossil fuels. Clearly, the work on energy and efficiency at The Melanson Company is an ongoing effort, whenever they get a chance, as they help customers with similar goals.

The Melanson Company website is www.melanson.com.

The Solar Source website can be found at www.solarsourcene.com.

Solar Photovoltic panels at Vermont Roofing, Bennington, Vermont

Artist Colony Adopts Solar

By Emma Rumple

The MacDowell Colony, in Peterborough, New Hampshire, provides an inspiring environment in which artists can develop their skills. Every year, over 275 artists take part in the Colony's residency program. They include visual artists, composers, writers, theater artists, filmmakers, architects, and interdisciplinary artists.

Now, MacDowell Colony has set a precedent as the first artist residency program in the country to adopt solar power. It has begun collecting electricity from its solar installation, offsetting 74% of its electric power needs. It is a major move that is part of an on-going effort to reduce fossil fuel consumption. Other work at the Colony has included improving energy efficiency of the buildings.

The Colony's solar array covers half an acre of the 450 acres in its property. The system has a capacity of 82 kilowatts, and is expected to produce about 185,000 kilowatt-hours of electricity each year. This will supply enough to cover the power needs of the Colony Hall, the largest power consumer among the Colony's buildings. Colony Hall houses the administrative offices, kitchen, dining area, laundry, and a common space for artists to gather in. The power offset represents over 140 tons of carbon dioxide not being released into the atmosphere each year.

The MacDowell Colony has been actively pursuing renovation of its buildings since 1992, with a view to reducing inefficiencies and dependence on fossil fuels. Providing an example, Resident Director David Macy said, "Eastman studio, our most recent renovation effort is an indication of where we'd like to take all of the buildings on the property." That renovation started with a drafty artists' studio. The walls and roof had their thickness doubled, so they could be given good insulation; old windows were replaced with modern energy efficient models, and an air-source heat pump was added.

According to Macy, that was only a beginning. "We started talking solar panels on Colony Hall during renovation planning in 2007." Now, a ground-mount solar array is installed in a field adjacent to Colony Hall. Not only has the Eastman studio's heating system been replaced by a heat pump, but the Colony is moving toward supplying the heat pump's electric power entirely from renewable sources, without any fossil fuels.

Executive Director Cheryl A. Young commented, "From our energy-conserving steps during construction of our new library to on-going studio renovations, we've committed to reducing the Colony's impact on the environment while ensuring its mission to provide ideal working conditions for artists." She added, "As a leading contemporary arts center, we want our physical plant to be as cutting-edge as the artists who come to work here. The MacDowells would be proud – they liked modernity of the practical kind."

Non-profit organizations all share a problem relating to federal tax incentives, and the MacDowell Colony is no exception. They have no profits, so they pay no income taxes, and this means that a tax incentive is lost on them. Bob Larsen, one of the Colony's board members, brought in ReVision Energy of Exeter, New Hampshire, just as the Colony was looking for a solar installer.

ReVision, a certified B Corporation, is one of the largest solar developers in New Hampshire and Maine. It works with IGS Solar, another provider, which invests in renewable energy projects for nonprofit organizations. IGS provided the investment and will own the solar array, selling power to the Colony under a power purchase agreement. IGS, as a for-profit company, can get the tax incentives offered by the federal government, and it uses these to keep costs down for the end customer.

Looking toward the future, David Macy said, "After six years, MacDowell will have the opportunity to purchase the system outright." The MacDowell Colony has a new goal, to raise the funds for that purchase by 2022. This is the first Artist Residency Program in the nation to go solar.

The IGS Solar website is IGSsolarpower.com. ReVision Energy's website is revisionenergy.com. The MacDowell Colony website is macdowellColony.org.

Above: MacDowell Colony's Alexander Studio. Photo: Victoria Sambunaris; left: MacDowell Colony Hall. Courtesy photo: MacDowell Colony. Top rt: The 82 kW solar system will reduce their carbon emissions by 140 tons each year.

How Your Grid-Tied Solar Array Can Pay You Back in MA and NH

By Michelle Harrison

Image: http://www.progressive-charlestown.com

Going solar has many benefits. Some are financial, such as lowering or eliminating your electric bill, and others are for the greater good of our planet by reducing our carbon footprint. One of the questions most commonly asked is whether one should buy or lease. This was addressed in the February 2016 issue of Green Energy Times and often comes down to a financial decision. When considering going solar in New Hampshire or Massachusetts, do not overlook revenue from solar renewable energy credits (SRECs) if you own your system.

What is a SREC? A SREC represents 1,000 kilowatt hours (1 megawatt hour) produced from a registered renewable energy facility. Some states require electricity suppliers to produce a portion of their electricity from renewable resources. To meet this requirement, utilities buy SRECs generated from these facilities to avoid being fined. SRECs are generated based on the total solar production of the system regardless of whether the electricity is used by the owner of the system or placed back to the grid. Therefore, net metering does not interfere with SREC production!

In order to sell SREC's, the system needs a state certification and an account set up with the New England Power Pool Generation Information System, a third party which issues and tracks all SRECs in New England. Individual homeowners and businesses cannot report production directly. An independent verifier will report your system's production. Work with your solar installer and a reputable solar aggregator to help you through this process. After completing some simple paperwork, your system will be set-up properly and ready to sell SRECs.

Now you may be wondering, how do you see money coming back to you? Quarterly, the owner of the system reports the electricity production. The solar aggregator collects all the production from individual systems and combines them to sell the SRECs in bulk to utilities, so they can satisfy their renewable energy production requirements. The sale is done through an auction, so the SREC price varies quarterly. After the auction, your payment comes to you! The value of the SREC varies by state.

While the federal and state rebates are great, they are one-time revenue streams. The SREC program provides a continuous revenue stream from your solar array. All these benefits need to be considered when going solar and the decision to buy versus to lease. Take advantage of all the solar incentives available and go solar today!

SolarUp New Hampshire Enters Round Four

The SolarUp New Hampshire program sponsored by the Southern New Hampshire Planning Commission has completed three successful campaigns. They are now entering the fourth and final campaign. The program runs September 26, 2016 through December 31, 2016.

Three communities are participating in round four. The communities and the chosen installers are Londonderry and Granite State Solar, Derry and NuWatt Energy, and the west side of Manchester through the Rimmon Heights Community Association and NuWatt Energy.

After this campaign, the goal is to take the program out to other regions working with the other eight planning commissions in New Hampshire.

^ Downtown Derry, NH. Derry is participating in round 4 of SolarUp NH. Photo courtesy of Adan Hlasny of the SNHPC.
< A 28 panel, 8.4kW solar installation in New Boston from a previous SolarUp NH campaign. Photo courtesy of Milhouse Enterprises.

CREW Solar: Spreading Sunshine across the Country!

By N. R. Mallery

CREW (Clean Renewable Energy Worldwide) is a different kind of solar company. This is because of a fairly simple philosophy: REDUCE, then PRODUCE. CREW's mission is to help people reduce their energy consumption, then produce their own power and save money with solar. Reduce, then produce.

Jim Campbell, CREW's local senior solar expert, explained, "Our Solar Systems, in conjunction with our proprietary Energy Efficiency package, reduce 'dirty energy' in the home and then produce 'clean energy' for the home. By integrating an Energy Efficiency package into our Solar System design, we can reduce the customer's net system cost, reduce the number of panels needed in their system, substantially reduce energy usage in their home, and help them achieve total ownership of their system sooner." They can even do this with a $0-down solar loan program, effectively giving the power and money back to the people while they decentralize the energy production.

The company's goal is to protect the planet by helping homeowners and businesses save a lot of money with their own solar power electric generation systems, all while having an important positive impact on the environment.

Campbell said CREW is active in many states now and is expanding, setting their sights on helping homeowners go solar in every state across America. Because of low prices, it is an ideal time for homeowners to switch to solar energy. Solar power can dramatically reduce utility bills and can protect customers from rising utility rates for years to come.

Recent CREW install in Haledon, New Jersey. The homeowner will immediately experience a home value Increase of $29,000, and a 25 year electricity savings of $31,000. Photo courtesy of Raciel Dimaren

Recent CREW installation in Massachusetts. Photo courtesy of Josh May

CREW's model is also simple but powerful: whether you're talking about banks too big to fail, a political dictator, or a nuclear power plant, the concentration of power is a recipe for disaster. Because CREW is being focused on decentralization, that way of thinking is actually part of their corporate foundation. They decentralize their business model by cooperating with local installers, because everyone wins when dollars stay in the local community. Campbell said, "My goal is to do everything in my power to save people as much money as possible."

All of CREW's professional installers are NABCEP-certified and have successfully completed over 1000 solar installations. Their solar systems which are backed up by four separate layers of warranty protection.

The company specializes in both residential and commercial installations, using a new approach to help homeowners and businesses upgrade to solar. They focus on making the journey to solar as positive, stress-free, and simple as possible. They try to make solar a valuable investment – not just another monthly expense.

"I love this job, and I love this company," says Campbell. "I really enjoy educating people about their solar energy options while typically saving them thousands, if not tens of thousands of dollars on energy costs. Every time I help a homeowner or business go solar, I'm able to contribute and make a positive impact on the environment for future generations to come." The philosophy keeps focused on one core fact, which is that with solar power, everyone involved can benefit.

Jim Campbell lives in Saratoga Springs, and teaches in Cambridge, NY. Learn more about CREW Solar at www.OwnTheSwitch.com/Today, or contact Jim at 518-812-6460 or at Jointhepowergrid@outlook.com.

Long Island Increases Solar by 320% Since 2012

35,000 SOLAR INSTALLATIONS COMPLETED ON LONG ISLAND!

Solar On Long Island Avoids 200,000 Tons of Carbon Emissions Every Year

Long Island Solar Farm is the largest solar power plant in the eastern United States. It consists of 164,000 solar panels that provide up to 32 MW of electricity. Credit: Brookhaven National Laboratory.

On September 28, 2016, Governor Andrew M. Cuomo announced the completion of Long Island's 35,000th residential solar project, which marked a 320% growth in solar over the last four years. Long Island is the state's largest residential solar market, nearly twice as large as the next region, and supports the Governor's Clean Energy Standard to supply 50% of the state's electricity from renewable energy resources by 2030.

"Clean energy is our future, and Long Island is leading the state in growing our clean tech economy and achieving our climate change goals," Governor Cuomo said. "The continued success of the solar market is fueled by the economic and environmental benefits of clean energy as we reduce emissions, help residents save on their energy bills, and drive local job growth across the state."

As part of NY-Sun, the $1 billion initiative launched by Governor Cuomo to advance the solar industry and create jobs, Long Island has led the state in residential solar projects and now saves 200,000 tons of carbon emissions per year - the equivalent of removing 38,000 cars from the road. New York's statewide solar industry now employs nearly 10,000 workers.

To learn more about Reforming the Energy Vision, including the Governor's $5 billion investment in clean energy technology and innovation, please visit www.ny.gov/REV4NY

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 – PER 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®)

- ENERGY STAR LEDs supported by Efficiency Vermont incentives available at Vermont retailers for as low as $1.95.

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 - $600 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 $600 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

Category 1:

≤100 kW AC incentive levels for PV systems:

- $0.65/watt (lower of AC and DC) for new solar electric facilities (Step 1 application received prior to September 1, 2016);
- 0.65/watt (lower of AC and DC) for new solar electric facilities (Step 1 application received on or after September 1, 2016);
- Expansions to existing solar systems are not eligible.

≤100 kW AC equivalent incentive levels for solar thermal systems:

- $0.12/rated or modeled kBtu/year for new solar thermal facilities fifteen collectors in size or fewer;
- $0.07/rated or modeled kBtu/year for new solar thermal facilities greater than fifteen collectors in size; and
- Expansions to existing solar systems are not eligible.

Category 2:

> 100 kW AC and ≤500 kW AC incentive level for PV systems

- $0.55/Watt AC for new electric facilities.
- Expansions to existing solar systems are not eligible.

Contact CISolarRebate@puc.nh.gov or at (603) 271-2431.

For C&I solar program details, go to: http://www.puc.nh.gov/Sustainable%20Energy/RenewableEnergyRebates-CI.html

PACE- 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://cpace-nh.com/index.htmlfor more information.

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

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.
- 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

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.

- **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 refrigerators ($20).

Visit www.nhsaves.com/ 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, Unitil (Fitchburg Gas and Electric), Eversource or a participating Municipal Light Plant community.

Homeowners are eligible for a base rebate amount of the lesser of $4,500 or 40% of the installed cost. The system may also be eligible to receive additional funding ("adders") which increase the amount of the rebate. Adders are detailed in the program manual at http://files.masscec.com/get-clean-energy/residential/commonwealth-solar-hot-water/SHW_Program_Manual_Small_Scale.pdf

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. Call 866-527-7283 for a free home energy assessment.

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 pv 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.masssolarloan.com.**The most updated loan principal buy down rate based on household income ican be found at **www.masssolarloan.com/loan-support-incentives.**

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 hot water or PV system.

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.

MA SREC II POLICY

Massachusetts' Solar Renewable Energy Credits Program, SREC II prioritizes sites, 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 brown- field 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. On Jan 8, 2017, these factors will be reduced by 20% till the new incentive program starts. Expect a New incentive program in late 2017.

http://bit.ly/Mass_SREC_II.

MA State Incentives can be found at: www.masscec.com/get-clean-energy

NEW YORK

RENEWABLE ENERGY INCENTIVES OFFERED THROUGH nyserda

Welcome to the 2016 New York solar incentive and rebate information:

https://solarpowerrocks.com/new-york/

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/nysuniniitiative/dashboard.aspx

Renewable Energy Generation Breaks Records Every Month in 2016

By Mike Gaworecki, http://ecowatch.com/

Electricity generation in the United States from wind, solar and other renewable energy technologies has set monthly records every month so far in 2016, based on data through June released by the U.S. Energy Information Administration (EIA) on August 24th.

"Both hydroelectric and non-hydroelectric renewables have contributed to this trend but in different ways. After a lengthy west coast drought, hydro generation has increased and is now closer to historical levels. Non-hydro renewable generation continues to increase year-over-year and has exceeded hydro generation in each month since February 2016," the EIA said.

According to EIA's data, net U.S. electricity generation from non-hydroelectric, utility-scale renewables—biomass, geothermal, solar and wind—through June 2016 was 17% higher than in the first half of 2015. Electricity generation from conventional hydropower also rose, by nearly 12%. Combined, production from all utility-scale renewable sources was up 14.5% compared to the same period in 2015.

Not only has electricity generated by renewables exceeded previous levels in every month so far in 2016—in other words, more renewable energy was produced in January 2016 than any other January on record, more renewable energy was produced in February 2016 than any other February, and so on—but renewable utility-scale electricity generation hit an all-time high of 16.55% of total domestic generation.

Those weren't the only records broken, either. Utility-scale wind rose 23.5% in the first half of 2016, setting a new six-month record of 5.96% of total generation.

Meanwhile, generation from utility-scale solar thermal and photovoltaics grew by 30.3% and accounted for 0.87% of total utility-scale electrical output. The EIA also estimates that distributed solar photovoltaics or rooftop solar systems, or similar, expanded by 34.3%. Taken together, utility-scale and distributed solar comprised 1.26% of total generation. A year ago, solar was responsible for just 0.94% of electricity generation.

Together, wind and solar grew by nearly 25% over the first half of 2015 and now provide almost as much electricity as conventional hydropower. Biomass and geothermal were the only renewable sources tracked by the EIA that have experienced declines so far in 2016.

Of course, renewables aren't the only record-breakers out there. July 2016 was the 15th record-breaking month in a row in terms of global temperatures, data from the U.S. National Oceanic and Atmospheric Association showed. And Gavin Schmidt, director of NASA's Goddard Institute for Space Studies, reported that July 2016 was also "absolutely the hottest month since the instrumental records began."

Electricity generated from coal plummeted by more than 20% and nuclear power stagnated, growing just 1%, per the EIA data. Generation fueled by natural gas, on the other hand, was up by 7.7%.

Still, Ken Bossong, executive director of the SUN DAY Campaign, noted that renewable energy has continued to defy projections.

"Renewable energy's share of net electrical generation for the balance of 2016 may dip a little because electrical output from wind and hydropower sources tends to be highest during the first six months of each year," Bossong said. "Nonetheless, the data thus far is swamping EIA's earlier forecast of just 9.5% growth by renewables in 2016."

Reprinted with permission from ecowatch.com. Read more at http://bit.ly/ecowatch-renewable-records.

Nation's Largest Wind Project Gets Approval

Climate Nexus, http://ecowatch.com/

The Iowa Utilities Board approved the nation's largest wind energy project (1), which will power 800,000 homes once completed. The 2,000-megawatt Wind XI project should be completed by the end of 2019.

"Wind energy helps us keep prices stable and more affordable for customers, provides jobs and economic benefits for communities and the state, and contributes to a cleaner environment for everyone," said Bill Fehrman, the CEO of the utility behind the project.

Bruce Nilles, senior director for Sierra Club's Beyond Coal campaign (2), agrees. Nilles said in a statement, "This is an amazing example of how the unstoppable transition towards a 100% clean-energy economy (3) is moving faster than many expected. This is a landmark moment not only for the burgeoning wind energy industry in Iowa, a state which already runs on more than one-third wind energy and employs thousands of hard-working Iowans, but for the entire nation, as the largest wind project ever approved in the country. Iowa and MidAmerican's rapid transition from dirty coal to affordable and renewable wind energy offers a clear path for utilities nationwide to make major strides towards 100% clean energy in a way that provides family-supporting jobs and without rate increases."

Macksburg Wind Project. Courtesy of MidAmerican Energy

"This also represents a huge leap forward for one of Warren Buffett's three utilities (4) and is a model for how his other two can quickly follow suit, particularly Pacificorp, which operates the largest coal fleet in the west. We still have tremendous work to ensure that this transition keeps moving full speed ahead, but one thing is certain, with announcements like this one, we aren't ever going back to dirty fossil fuels."

Article reprinted with permission from EcoWatch at http://bit.ly/ecowatch-largest-wind-farm

Resident-Owned Community Solar

Cont'd from p. 11

direct ownership allows the communities to directly earn the environmental attributes of their energy generation, known as Renewable Energy Credits (REC's). Another benefit of direct ownership is the communities' ability to take advantage of government incentives for solar. Finally, direct ownership means that once the community has recouped its installation costs, the community will own its electricity generation outright.

The Energy Clinic's ROC community solar guide will also examine which business structure is best suited for community solar projects in resident-owned communities. Most ROCs are registered cooperatives with bylaws and boards of directors. Ideally, a community solar project would work within this cooperative framework with only a few additions to the bylaws. Most community solar projects that are not for communities already within a registered cooperative use a limited liability company (LLC) structure instead of creating a cooperative. An LLC model would protect the individual members from liability and would streamline the decision-making process, because they would not need unanimous approval for decisions.

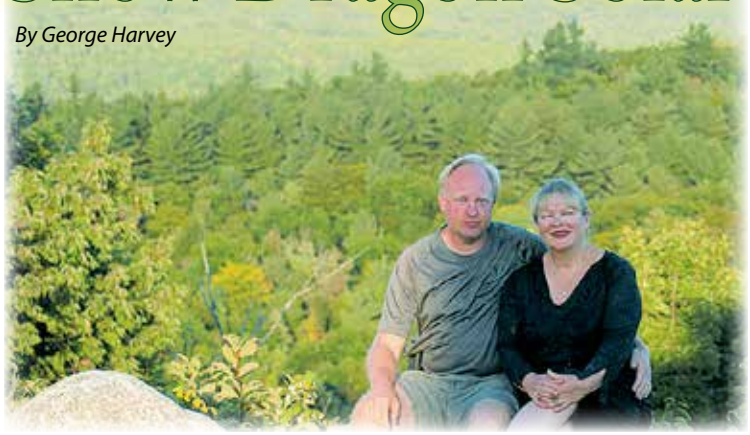
The guide will be largely impacted by the outcome of the net-metering rules currently under consideration by New Hampshire's Public Utilities Commission. The changes to net-metering rules may make community solar more easily attainable or push solar further from their reach.

The Energy Clinic is working hard to make this guide to community solar widely adaptable to many different ROCs across New Hampshire, and we hope across other areas of the country as well.

Liz Doherty is a student clinician at the Energy Clinic at Vermont Law School and is working towards her J.D. in 2018.

Meet Your Solar Installer: Snow Dragon Solar

By George Harvey



Meet the owners of Snow Dragon Solar, Albert and Donna Ducharme. Located on a mountain in Meredith, New Hampshire, the Ducharmes live in a net-zero off-grid home they built. This valuable experience led to the foundation of Snow Dragon Mountain Builders in 2002 and Snow Dragon Solar in 2007.

The Ducharmes solar home efficiently-built with Insulated Concrete Forms (ICFs). All photos courtesy of Donna DuDucharme.

A visitor to Snow Dragon Solar's website is immediately presented with a rather interesting statement, "Snow Dragon Solar sets new standards in sustainable building and offers everything from a simple solar array installation to building an energy efficient home." Clearly, this company, operated by Albert and Donna Ducharme, goes beyond the ordinary.

Donna's approach to living is based on a simple set of beliefs that could best be described as spiritual, though they are not based on a religion. They include such practices as yoga and meditation, but imply a strong set of ethical values, including environmental and social sustainability. Her ideals include such things as use of natural foods. Not passive about their interests, the Ducharmes came to grow organic food commercially and were certified organic farmers for a time.

Like Donna, Albert has a highly varied background. He was a field engineer in the graphics industry, has been swinging a hammer since he was five, and has been building and designing homes for over 15 years. When they decided to build their own home, he began to concentrate much more in building technologies. One of his areas of greatest focus was solar power, and this included passive solar heating, solar thermal hot water, solar photovoltaics (PVs), and the efficiencies that enhance solar power to make it the best practical choice.

Following a thought that she should take a closer look at the neighborhood where they lived, in Meredith, New Hampshire, Donna visited the top of Snow Dragon Mountain and was taken by what she found. A large parcel of land there was up for sale. The land was also a bit of a wreck, because it had been clear cut. Donna said it was all "slash, debris, and devastation." Nevertheless, she took Albert to it, and somehow they together could see, with hard work, that they could reclaim the fields and restore the mountain's beauty.

Building their home, the first of three they built on the mountain, was a valuable experience in off-grid and net-zero living. Their home is entirely powered by PVs, including almost all heat. An 850-gallon tank in the basement, heated with a solar thermal array, supplies heating to the house. A wood boiler was added for those times that the sun does not shine, and this is fired up weekly, but it uses very little wood – about a cord and a half per year. The house is ICF (insulated concrete form), making it super energy efficient and warm.

Naturally, they liked to show their home energy systems off. Visitors were more than impressed; they wanted to have systems like what they saw for themselves. And so, in 2007, Snow Dragon Solar was founded as an offshoot of Snow Dragon Mountain Builders, which was founded in 2002.

Over the past 12 years, Albert went for and got, some very serious professional certification. He is qualified to create a complete system, including new homes, retrofits, and additions. He can create complete building packages to meet the needs of customers. He is a member of the U. S. Green Building Council, participates in the LEED for Homes program, is certified by the North American Board of Certified Energy Practitioners, and is a member of the New Hampshire Sustainable Energy Association.

When the solar business started up in 2008, they were ready to hit the ground running. The results of their intense interest and involvement show in their work. They are very versatile and can do nearly anything a family might want. For example, instead of specializing in one design, they build photovoltaic systems that are grid-tied, off-grid, or hybrid. This means that they can adapt designs to the specific needs of clients.

A stunning example of their work was a set of systems they recently finished. A family with an existing home wanted to have a separate house on the same property. The existing structure was to be retrofitted for solar PVs, and the new home was to be custom-built.

A 47-kW solar system powers the two large homes. It has 175 Solarworld modules of 270 watts each. There are three Solectria PVI grid-tied inverters, five Schneider XW series hybrid inverters, and nine Schneider MPPT 80 HV charge controllers. Two battery banks include one of 1,700 amp-hour Trojan lead-acid batteries and one of 1,100 amp-hour Aquion salt water batteries. PVs also supply power for two electric vehicles. The house heat is supplied by solar thermal, in-floor radiant heat, supplemented by the outdoor wood boiler.

Snow Dragon Solar is in Meredith, New Hampshire. The website is www.snowdragonsolar.com. Phone: 603-630-3003.

The new Snow Dragon home with roof-mounted solar on the back of the house.

Above: additional ground-mounted solar system for a community solar project. Below: front main entry to Snow Dragon's home.

Wood You Like to Save Money this Winter?

TAX CREDITS & INCENTIVES

Financial incentives come in different shapes and sizes, and every type is found with wood and pellet stoves and furnaces. Exemptions, deductions, credits, rebates and vouchers all work differently, providing incentives that may be more valuable for one homeowner's situation than for his or her neighbor's.

Individuals can also benefit from both federal and state incentives, lowering the ultimate price of a stove or furnace.

Tax credits are the most valuable end-of-year benefit, because they directly reduce the amount of taxes owed dollar for dollar. By subtracting directly from taxes owed, instead of from income calculations, a tax credit can be three or more times more valuable than a tax deduction. For example, a tax credit of $500 for someone in the 28 percent tax bracket is equivalent to a tax deduction of $1,700.

Tax exemptions are worth a set dollar amount and are subtracted from taxable income at the end of the financial year. They are worth about 28% of their dollar value for most tax payers (depending on your tax bracket).


Image: Flickr

Tax deductions are also subtracted from taxable income, but they reflect an expense and are only valuable if you itemize your deductions, instead of taking the standard deduction. If you itemize, a deduction will probably be worth about the same as an exemption – 28% for many households; less for lower tax brackets and more for higher tax brackets. Renters and those who do not invest large amounts of money often do not find itemized deductions worthwhile.

Property taxes are often exempted for the value of renewable energy systems. For example, in New Hampshire, towns can exempt the value of biomass systems from local property taxes. In some states, property tax abatements or credits apply to renewable energy systems.

Rebates and vouchers save a consumer money directly when they purchase an item, or quickly thereafter, so they are more immediate for households than the end-of-year incentives. These incentives are much more valuable to low income households who may not pay taxes at the end of the year anyway, or those who couldn't afford to wait that long. For change-out programs, rebates and vouchers are much more effective than tax incentives. A rebate could be instant, point-of-sale or may involve waiting a few weeks or more to get the rebate back in the mail.


Image: Flickr

Vouchers work like instant rebates, but you are usually issued the voucher earlier and must submit it as a cash equivalent at the time of purchase. They are then redeemed by the retailer at a government office or other issuing organization.

You still have a several weeks left to take advantage of the U.S. Biomass Tax Credit. A $300 federal tax credit applies for residential biomass heating products that meets the 75% efficiency requirement and are purchased from January 1, 2015 – December 31, 2016.

Look carefully at the type of incentives available in your area when calculating your potential savings, and check to see that you have correctly budgeted around them. Much of this information is shared with you below. You can also check http://www.forgreenheat.org/incentives/state.html to find incentives for your state and pages 16 and 17 of Green Energy Times.

The following information on biomass boiler and furnace incentives in NH, MA, VT, and NY is shared with us from Jim Van Valkenburgh of Froling Energy.

VERMONT

Flat Rate Incentive For All Project Types: $3000 max for single boiler/furnace systems; $70,000 lifetime incentive cap

Custom Incentive for All Project Types: $1.25 per ft2 of space heated by biomass system; $60,000 maximum incentive; Thermal storage tank adder $10/1000 Btu/hr output - maximum adder of $10k; $70,000 lifetime incentive cap; This program applies to systems with multiple units

Customer Incentive for Public Serving Institutions: $1.25 per ft2 of space heated by biomass system; $80,000 maximum incentive; Thermal storage tank adder of $10/1000 Btu/hr output - maximum adder of $15k; $95,000 lifetime incentive cap

All programs cover wood pellets, chips, boilers, and furnaces. Woodchip systems must meet an 80% (HHV) efficiency standard and limit total particulate matter emissions to no more than a 0.10 lb/MMBtu output. All systems need a minimum of 21 days' worth of pellet storage.

For more information visit, rerc-vt.org/

NEW HAMPSHIRE

Residential, Pellet: 40% rebate on installed systems, $10k max; Fuel Storage Adder, $500 max for 8 tons

Commercial, Pellet: 40% rebate on installed systems, $65k max; 30% rebate on thermal storage, $5k max; Thermal REC Equipment Adder, $5k max; Maximum boiler output, 2.5 MMBtu

Commercial Grant Program, Pellet/Chip: To be released in Fall 2016; For larger systems that don't qualify for rebates, riteria varies usually including wood chip systems

Thermal RECs, Pellet/Chip

For more information visit, www.puc.nh.gov. Look for the Sustainable Energy Division

MASSACHUSSETTS

Residential and Small Commercial, Pellet: 40% rebate on installed systems, $10k max; Thermal Storage Adder, $2k max; Maximum system output 120,000 Btu/hr & less; Additional incentives for low income households

Non-Profit, Pellet: 50% rebate on installed systems, $25k max; Includes public and affordable housing

Commercial, Pellet/Chip: 35% rebate on installed systems, $175k max; 5% Thermal Storage Adder, $25k max; 2.5% Cascading Systems Adder, $12.5k max; 2.5% Distribution Efficiency Adder, $12.5k max; 5% Non-Profit/Public/Aff Housing Adder, $25k max; Maximum rebate $250,000

Public Schools, SAPHIRE Program By Mass DOER, Pellet/Chip: Grants for schools fitting the criteria may reach 75%; Maximum grant is $350,000; Bond financing assistance available; Up to 75% of feasibility study costs up to $25k

Thermal RECs (AECs), Pellet/Chip: A new program with rules being finalized by 2017; REC sales net reduction in biomass fuel costs

MassSave Heat Loans Available: 0% interest loan for 7-year term for up to $25,000

For more information, visit www.masscec.com/learn-about-biomass-heating

NEW YORK

Residential Wood Pellet Stove: $1,500 (up to $2,500 for income qualified homeowners)

Residential Cordwood Boiler Systems: 25% of installed cost up to $5,000 per unit; $5k adder for recycling of old outdoor or indoor wood boiler; $2.5k adder for recycling whole house wood furnace; Thermal storage tank is required.

Residential Wood Pellet Boiler Systems: 45% rebate on installed systems, $36k max; Indoor boilers only less than 300k Btu/hr output; $5k adder for recycling old indoor or outdoor boiler; $2.5k adder for recycling whole house wood furnace; Thermal storage tank is required.

Small Commercial Cordwood Boiler: 25% rebate of installed cost, $5k max; $5k adder for recycling old outdoor or indoor wood boiler; $2.5k adder for recycling whole house wood furnace; Thermal storage tank is required.

Small Commercial Wood Pellet Boiler: (<300MBtu/h, 88kw) 45% rebate of installed cost, 36k max; $5k adder for recycling old outdoor or indoor wood boiler; $2.5k adder for recycling whole house wood furnace; Thermal storage tank is required.

Large Commercial Wood Pellet Boiler Systems: (>300MBtu/H (88kW) 40% rebate on single boiler systems, $200k max; 45% rebate on tandem boiler systems, $270k max; Indoor boilers only; Thermal storage tank is required.

For more information at bit.ly/NY-heat-info

How Solar Saves You $ - Even in the Winter

By Green Energy Times staff

You may be reading this article because you are very interested in solar technology but just are not sure the upfront investment is worth it if you wish to own your solar energy system. There are many benefits of generating electricity from the sun including financial energy independence and environmental stewardship, but what about the financials? Below are a few points to consider in your financial quest.

Keep your panels clear of snow for maximum efficiency in the winter. Photo credit: solarworld4u.com

1. Solar does work in the winter. The panels are more effective when they are cooler which allows for a great energy transfer from the sunlight to the panels. Cold and bright conditions are ideal. The downside of the winter season is the sun is lower in the sky and there are fewer daylight hours. Therefore, less energy will reach the panels over time. If you are on the grid, you can have credits built up from the summer production that covers for the fewer hours of production in the winter which can negate your utility charges. Energy efficiency can really add to the success of accomplishing your energy goals.
2. Solar builds equity over time. A solar array may cost from $15,000 - 30,000. Many would not think twice about such an investment for a vehicle that just depreciates over time. Your solar investment builds equity as time goes on. While many panels have a twenty-five year performance warranty, no one really knows why they will not keep working longer and possibly for your lifetime or longer, as long as the sun keeps shining.
3. Great incentives are available. If you own your system, there are federal and state rebates available. The current Federal tax credit at 30% of the solar array including parts and labor. State rebates vary and can be found in the incentive section of Green Energy Times (pages 16 and 17).
4. You can make money while on vacation. If the sun is shining and you are not at home using electricity (other than the amount to run the refrigerator and other necessary appliances), you are gaining credit if you are net-metering and also producing kW which can earn you renewable energy credits (SREC's) for those living in a state which offers them (MA, NH). More information on SREC's can be found in the article on page 14 of this issue.
5. Energy independence. You are immune to rate hikes which only make your payback period calculations decrease for your solar project.

Property value can increase. Solar energy may increase the value of your home and make it more attractive to buyers. According to the Homebuilder's Guide to Going Solar, solar-powered homes sell twice as fast as homes equipped with conventional electricity. A report by the National Bureau of Economic Research suggests that (especially in more liberal states) homeowners can recover up to 97% of their initial solar investment costs with selling a home with a solar array.

Lower vehicle operating cost. If you make excess power, it can be used to charge electric vehicles for free.

The cost of going solar has dropped every year since 2009. Not only are the prices of panels dropping, so are the costs associated with installation.

The amount of money you can save with solar depends upon many things such as your electrical consumption which determines the size of the array you need, if you choose to buy or lease your system, and how efficient the panels are given the direction the panels face and how much sunlight hits them. Your savings also depend on the electricity rates set by your utility and how much the utility will compensate you for the excess solar energy you send back to the grid.

There are many variables to consider when figuring out the financial impact of a solar installation. However, one thing is certain, solar will keep our planet green and will keep more green in your wallet, too!

Does Your Home Have A Heat Loss Problem?

Revised with permission from Bruce's HVAC TipsBlog: http://bit.ly/heat-loss-problem.

During winter months, heating costs make up the bulk of your fuel bills.

Thus it makes sense for your heating system to work as efficiently and as effortlessly as possible, and you can enjoy the warmth it produces without the worry about how rapidly the dial on your energy meter is spinning.

Unfortunately, wintertime heat loss is a common source of waste in most homes. Even well-constructed buildings are far from airtight, and it is amazing how much heat can escape into the open air if sources of leakage are not tended to.

Your bills may seem out-of-proportion in comparison to friends' and neighbors'. Do you notice your furnace kicking on and off more frequently? Are there rooms in your home that seem noticeably colder than others?

All of these indicate you probably have a heat loss problem significant enough to have a measurable impact.

Identifying the Sources of Heat Loss Trouble

Air leaks in homes can happen just about anywhere. The best way to detect them is to find a professional to do a free heat-loss audit. Some utilities offer this service for free. You can always hire a private home energy auditor. In Vermont, you can find useful information from Efficiency Vermont at www.efficiencyvermont.com or (888) 921-5990.

In the meantime, look around on your own home to check:

DOORS AND WINDOWS

Cracks and spaces here are fairly easy to find. Just feel around the perimeter of your doors and windows and see if cool air is coming in. Some repairs to door and windows can be done by the average person. It is often fairly easy to fix door and window gaps with caulk or weather stripping that you can buy and apply yourself.

Other locations where gaps may be causing air leakage include electrical outlets, plumbing cuts beneath sinks, or anywhere, and dryer exhaust vents. All can be plugged with caulk or foam sealers.

< Attic heat loss can be remedied by proper sealing and then insulation. Photo: depositphotos.com.

There are many locations in one's home where air leaks can occur. Photo courtesy Flickr.

FILTERS AND VENTS

HVAC units will not move air properly if filters are clogged or vents plugged or blocked. It is fairly easy to clean or replace air filters.

• Attic Heat Loss

This can be traced to unsealed wall partitions and penetrations from electrical lines and plumbing vent stacks that channel heat from below or even poor attic ventilation. AFTER that, insulation should be considered – it's almost always good to increase it.

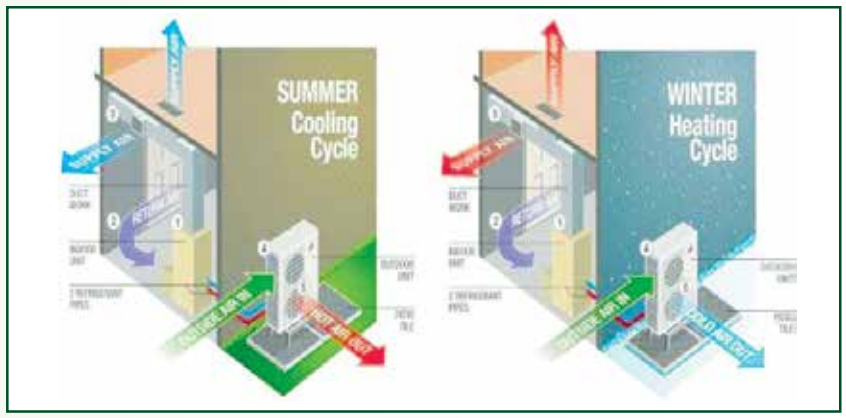
INSULATION

For the most part you won't be able to tell if the insulation in your walls, floors and ceilings is adequate or has somehow been compromised. Bad insulation is a big source of heat loss, however, and it is one problem a home heat loss audit can help you uncover.

Heat Loss Is Your Loss! Heat loss will make you colder, cost you money and put undue stress on your furnace to the point where its life span may be reduced. It is time to do something about it now.

Heat Pumps for Heat? Imagine That!

by New Hampshire Electric Cooperative



With the advent of multi-head, ductless heat pumps that maintain their efficiency in sub-zero temperatures, New Englanders are using heat pumps for more than just supplemental heat during the "shoulder" months. They're using them as a primary heat source and moving away from fossil fuels.

This new way of heating requires a new way of thinking. That's why New Hampshire Electric Co-op (NHEC) recommends a whole-house approach that maximizes the value of your heat pump investment.

Seal It FIRST

Whether it's provided by an oil furnace or a heat pump compressor, or any other method, warm air can escape a leaky house easily. It's crucial to make sure your home is adequately insulated and air-sealed before you install a heat pump system. The Home Performance with ENERGY STAR® Program, offered by all four of New Hampshire's largest electric utilities, provides a home energy audit and up to $4,000 in incentives towards the installation of recommended weatherization measures. At NHEC, we offer an additional program incentive of $250 per ton (a measure of energy capacity) to members who have or are planning to install heat pump systems.

Size It Right

You don't need to have existing ductwork to install heat pumps as your primary heat source. A properly sized compressor can direct heat to three or more "heads," which can be installed in as many rooms throughout your house, each with its own individual temperature controls. In effect, each room can become its own heating zone. It's important to size your system properly, though, so you'll have heat (and cooling) where you need it, when you need it. Some things to consider when designing the system include the square footage of the home, the number, size and location of air ducts, as well as properly sizing the equipment to best meet the heating and cooling needs of the home in the most efficient manner possible. As with the Home Performance program, check with your utility to see if it offers incentives you can take advantage of to reduce your costs. NHEC offers its members an incentive of up to $500 per ton (a measure of energy capacity) for the installation of heat pump systems. We offer an additional incentive of $250 per ton if the system is sized to meet 80% or more of your home's heating needs.

Use It Right

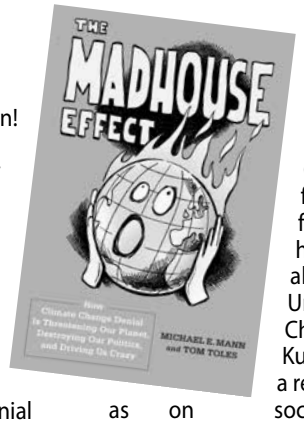
A properly sized heat pump system can replace your existing heat source entirely, but remember that it's not business as usual. When you turn up the heat with an old oil or electric system, you're getting heat in the living room where you want it, but you're also typically heating other spaces and rooms that are part of the same zone. It's much more economical and practical to heat only the space you're occupying, if possible. With the ability to adjust remotely the temperature of each heat pump head, you can turn up your bedroom heat while you're still cozy in the living room – even on your smart phone!

The Madhouse Effect

How Climate Change Denial Is Threatening Our Planet, Destroying Our Politics, and Driving Us Crazy

By Michael E. Mann and Tom Toles, Columbia University Press, 2016, 186 pages, $24.95

Book review by N.R. Mallery



I just want to start with saying that I wish everyone I know (or don't know) would read this book, before the election!

With one candidate denying climate change -- or denying that it is caused by humans --the effect on our future of our ailing planet is being jeopardized. Mann and Toles both understand this clearly and have brilliantly addressed how real the threat of climate change is, backing it with the facts that cannot be denied.

The combination of a climate scientist and cartoonist seems like an odd match to seriously tackle the climate denial industry. This is explained at the start, where they say in the preface, "What would bring a pointy-headed, lab-coat wearing, left-brained scientist and a laid-back, artistic, right-brained editorial cartoonist-satirist to collaborate on a book?"

"The answer is simple, climate change."

Bill McKibben, founder of 350.org reviewed this combination beautifully when he said:

> Michael E. Mann is one of the planet's great climate scientists, and Tom Toles may be the great climate communicator—together, they are a category 5 storm of information and indignation, wreaking humorous havoc on those who would deny the greatest challenge humans have ever faced.

Award-winning climate scientist Michael Mann has authored many books, including, The Hockey Stick and the Climate Wars: Dispatches from the Front Lines,that featured the now famous hockey-stick graph. He also wrote Dire Predictions: Understanding Climate Change with scientist Lee Kump, and is very active as a research scientist as well as on social media.

Tom Toles is the Pulitzer Prize-winning cartoonist of the Washington Post. His main focus seems to include politics, but he has a particular interest in climate change and works consistently to advance understanding on this subject at the same time. Andy Scuce from Critical-angle.net says,"His cartoons have often featured climate science and the absurd lengths that many American politicians go to in avoiding the facing up to the reality of global change."

With this incredible background, the authors have created a well-thought-out arrangement for how to best tackle the problem of denialism. They have outlined and addressed it from brilliant angles, and have successfully done this in eight chapters.

1. Science - How It works;
2. Climate Change: The Basics
3. Why Should I Give a Damn?
4. The Stages of Denial
5. The War On Climate Science
6. Hypocrisy: Thy Name Is Climate Denial
7. Geoengineering, OR What Could Possibly Go Wrong?
8. A Path Forward

This is the kind of book that you can simply not put down. You end up putting markers all through it on the things you want to share with others. My copy probably has more pages dog-eared than not. I think I am going to have to go out and buy enough copies to pass out to my family and friends. Every library and bookstore should have it on display for all to see, borrow or buy.

As the authors say at the start of chapter two, "The basics of climate change are actually very simple and always have been. Carbon dioxide in the atmosphere traps heat, and we are adding more CO2 to the atmosphere. The rest is details."

Here is where the team of Mann and Toles really shines: the scientific facts are irrefutable. They absolutely show that unless you are smarter than what scientific research proves, it just does not make any sense to deny this reality. It's time to let greed and fossil fuels gotta go. Toles' cartoon illustrations have an important impact that really drives home the reality and the insanity of denial with a delightful humorous tone. How important this is, as we face what is the most serious issue humanity has had to face.

One illustration shows a man at a gas station about to fill his gas tank, At the top of the gas pump is a sign that says, "CHEAP ENERGY." Step one is to "SELECT RESPONSE." The options are: "SAVE CLIMATE" or "DESTROY CLIMATE." The man has his hand over his mouth aghast at the decision he has to make in order to get the gas for his vehicle.

The cartoon clearly shows how we must now face our future by making the right choices as we confront the war on climate change. We must face it head-on and win this battle.

Read this book and share it far and wide!

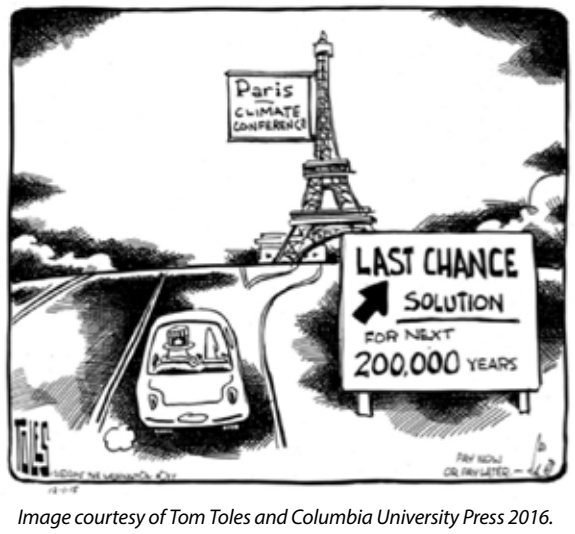
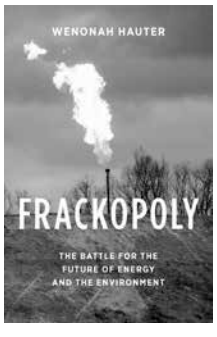


Image courtesy of Tom Toles and Columbia University Press 2016.

Frackopoly: The Battle For The Future Of Energy And The Environment

By Wenonah Hauter, The New Press, June 2016, 346 pages, $27.95

Book review by Tammy Reiss

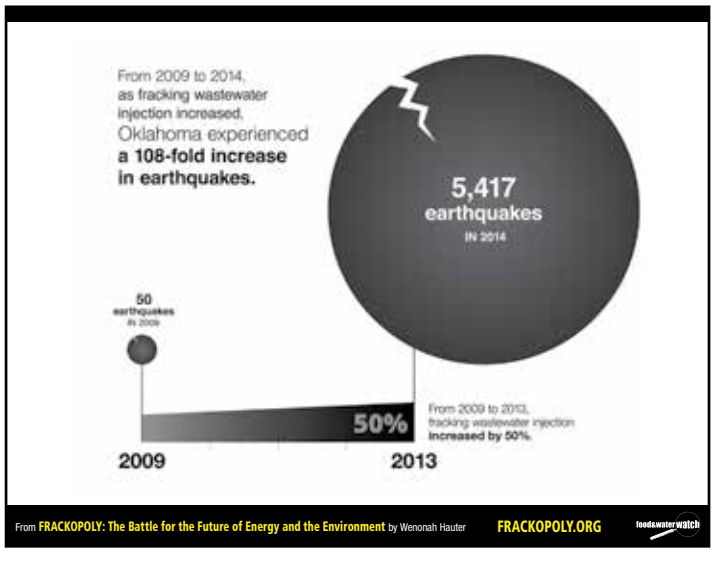


Every registered American voter should read Frackopoly because nothing scares corrupt corporations, lobbyists, and politicians more than a well-informed voter. Frackopoly is full of fearlessly exposed history and detailed information. It can enlighten any American who takes pride in the country and wishes to take part in a political movement powerful enough to challenge the status quo.

Frackopoly shows us how the United States became, and is remaining, one of the largest carbon and methane producers on the planet. The author examines the historic crossroad at which our industrialized nation stands, as we decide how to power our electrical grids. Her insights show how current rules favor gas-fired electricity plants and pollution-trading schemes. She shows that while we sit at that crossroad, asleep at the wheel, other sustainable opportunities in the global economy are passing us by, while outside interests are laying claims to our current and future property rights. We can see that a better future can come to be if we keep fossil fuels in the ground, instead of cutting deals and compromising with polluters. We come to understand that it is crucial for all of us to get involved with reshaping our country's energy future.

The New York Mercantile Exchange started trading natural gas futures on April 4, 1990. Since that time, natural gas and utility companies have been deregulated, fracking has been exempted from national environmental laws, and the oil export ban has been lifted.

Positions advocated by oil and gas industry scientists have influenced some environmental groups to take the position that natural gas, even fracked gas, can be viewed as environmentally beneficial. Low cost gas from fracking has removed incentives for using less energy, and impeded the sustainability energy transition from flourishing. The U. S. Energy Information Administration (EIA) has recently predicted that solar will still make up 1% of electrical generation and wind 7% in 2040. (Editor's note: the most recent data from the EIA shows solar at 1.26% and wind at 7.9% of electrical generation for the first half of 2016. EIA projections have historically been very far off the mark 100% of the time.) Without a dramatic change in energy policy, the outlook appears bleak.



The other side of Frackopoly is the story of a growing number of Americans who will not allow themselves be defined by apathy. They work hard to shine light on so many destructive phenomena caused by the fossil fuel industry. Ordinary citizens fight to rescue their families, homes, and communities from supposed "rights to pollute" our planet. Voters have started changing the conversation and laws so electricity is viewed as a resource to be used judiciously, not deregulated. Frackopoly's message clearly tells us that as consumers, voters, and taxpayers, it is crucial we demand a clean environment from our leaders. I agree with the author's opinion, "a mass movement with the political power necessary to create a truly sustainable energy future is needed if we are to survive."

I proudly worked alongside a number of people mentioned in Frackopoly, and an even larger number not mentioned in the book, in stopping natural gas pipelines, compressor stations, and banning fracking, not only in my hometown but our entire State of New York. The unwavering commitment by so many fearless citizens to stop their communities and states from turning into "sacrifice zones," gives me hope for the survival of not only our species but the Earth.

Frackopoly can appeal to all who might take interest in its message. If you have been in the trenches fighting for years, you will want to read it. If you are just getting involved with taking back our county's democracy and our nation's once clean water, soil, and air from short-sighted, greed-driven decisions, you will want to read it. The same is true if you want to see the country stop abandoning, delaying and weakening our nation's environmental protections, or even if you simply want a better future and want to find out what is needed.

Sustainability practices and renewable energy technologies are referenced continually in the book. Proving it is no longer necessary to continue using extreme energy practices or subject our economy and electric bills to deliberate supply and demand manipulations made by the energy industry. If more Americans muster the will to act, there will be no need to support and expand an industry that breeds war and conflict or is continually allowed to contaminate our world.

Author Wenonah Hauter is the founder and executive director of Food & Water Watch, a watchdog group with offices around the United States that focuses on corporate and government accountability. Food & Water Watch was the first national organization to support a ban on the extreme energy mining process known as hydraulic fracturing, or fracking.

Tammy Reiss is a conservationist who teaches and promotes energy efficiency and independence through renewables in the Marcellus Shale region of New York State.

Libertarian Ideology Alleges that Climate Change Is a Hoax

Align our interests with the earth, not the wealthy!

By Dr. Alan K. Betts

Earth-sky photo: http://globalwarmingisreal.com

In a letter to the American Meteorological Society in 1976, I argued that if earth scientists, who had at least some understanding, did not accept some responsibility for the earth, who would? It certainly would not be the political and economic system that was influenced only by short-term interests.

Forty years have passed, and now we see a very sophisticated network, funded by a group of libertarian billionaires, has bought control of the Republican Party in the US Congress and many state legislatures. Part of their doctrine is that climate science is a hoax. How has this happened and what motivated this fraudulent claim?

The 'libertarian' ideology is that government is to have a very limited role: primarily to protect wealth and property, and preserve the rule of law. It helps if you can also write the laws! The libertarian political agenda believes that the freedom to exploit the earth and its resources should not be limited by environmental regulation. This brings it into conflict with the earth's ecosystem on which life depends, because the impact of our industrial society is now global.

Environmental regulation of the massive waste streams from society and industry is viewed with hostility. Global regulation to limit the burning of fossil carbon to protect the future of the earth's diverse ecosystem is a clear threat to their fossil fuel assets. So it was a good business plan to use one percent of their wealth to take over Congress, and subsequent tax cuts largely paid for this investment. Indeed their opposition to climate science, and their claim that climate change is a hoax, can be viewed as simply propaganda that is driven by their fear of government regulation, and the need to protect their wealth, assets and property at all costs. Pope Francis pointed out last year: the exploitation of the earth and the poor are now inseparable, and both are immoral.

The trouble with this plan is that the earth is far more powerful than our primitive self-centered ideologies. In fact, preventing or simply delaying a smooth transition to an efficient sustainable society, based of renewable sources of energy, greatly increases the risk that our societies will collapse in the face of climate extremes. And that rising seas will flood the coastal cities as the irreversible melting of the ice-caps accelerates.

Another deep issue we face is that the libertarians' web of lies undermines democratic society. For the most part the scientific community stays above the fray with the naïve hope that more research and clear simplified explanations of climate science will eventually be heard. Instead, the increasing din drowns their reticence, and scientists who speak out are vehemently attacked as part of a global conspiracy.

So let us step back and look for a way forward. Even more so than 40 years ago, the earth, earth scientists and all of us have a common interest. The earth with a certain beauty and grandeur is simply absorbing and adapting to a changing atmosphere and oceans, and climate change is accelerating. The earth's ecosystem in all its richness and complexity is adapting to change as fast as possible. But many life-forms will go extinct, and new ones will emerge.

We set this in motion, but almost none of it is under our control. All that we can do is slow down the pace of change by rapidly shifting from fossil fuels to renewable sources of energy, so that the earth as well as our societies will have more time to adapt.

As scientists we study with honesty and integrity the evolution of a system that is far more complex than we can imagine. It is a global challenge, so we reach out to the global network of scientists that we trust: to share what we understand, and what we find puzzling. Every month new facets emerge that add insight into this amazing web of life that we are part of.

Every month my neighbors ask for my help and guidance. We long for simple answers as we face an uncertain future, but the truth, like reality itself, is complex. We must all look beyond our fears, dreams and ideologies to the earth itself for guidance, because the earth gets its stability by being fully connected. And we must keep improving energy efficiency and building renewables!

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

Dr. Bett's Climate Prediction is for a "warm fall."

The Paris Accord is a Big Deal

Cont'd from p.1

one defensive motivation, which is to ensure that a possible future Trump Administration could not pull the US out of the agreement. Even so, it is clear that major emitters of greenhouse gases wanted to ratify Paris in early 2017 at the latest, a step which not only locks in the US but also accelerates all of the processes embodied in the bottom-up Paris agreement. This is a critical factor in maximizing the odds that the next round of global commitments, due in 2019, is as ambitious as possible.

Second, in Kigali, just as Green Energy Times is going to press, the world for the first time is poised to commit to the **total phase-out of one of the six major climate pollutants, HFC refrigerants.** While these chemicals, whose use is an unintended consequence of the Montreal Protocol phase-out of ozone-layer-destroying chemicals they replaced, have thus far contributed only a small part of temperature rise to date, their use is growing rapidly. Their phase-out is expected to cut mid-century temperatures by a startling 0.5 to 1 degree, avoiding the emissions of HFCs with the warming potential of 200 billion tons of CO2.

Third, the global community for the first time established an effective global **emission limit for an entire sector of the economy, aviation.** At the Montreal meeting of the International Civil Aviation Organization, 60 countries representing 80% of the world's aviation agreed to cap global emissions from air travel at the 2019-2020 level, requiring emissions growth after that date to be offset. There are significant limitations to this agreement, as we will need to phase out all emissions by 2050, not just emissions growth. There are also concerns that the use of offsets, while offering a promising funding mechanism to reduce deforestation, postpones the problem of eliminating aviation's reliance on fossil fuels. Still, this is a powerful precedent, and the airline industry actually favored a faster timeline.

With ratification by the EU, the Paris Accord became legally binding five years earlier than originally envisioned.

Canada, which only a year ago was viewed as a major barrier to climate progress, became the first industrial nation outside the EU to embrace a national carbon price, putting in place one of the ingredients for an eventual global financial regime capable of achieving a "decarbonized" world economy by 2050.

The Netherlands concluded it would shut down its almost brand new fleet of coal power plants, because the nation could not meet its Paris climate pledge without doing so.

Some developments have been covered by the media, but in a low-key, low-intensity way. The reason is that they relate to things that were avoided, and the press does not usually jump up and down and pointing out the things that did not happen:

1. The Polish government, which badly wants to delay fading out coal from the EU's energy mix, did not choose to blockade early EU ratification of the Paris agreement.

2. A fractious, challenging US-China relationship on security issues was not allowed to get in the way of the two countries coming together on the aviation deal in Montreal.

3. India's legitimate anger at the US over how the Trade Representative is handling WTO complaints against India's efforts to build its domestic solar industry did not cause India to refuse to ratify Paris this year or decline to permit the phase out of HFCs.

4. The major developing countries agreed, voluntarily, to participate in capping aviation climate pollution without waiting for climate finance from the industrial world, which they were seeking, even as they still have many important reforms to implement.

5. Canadian Prime Minister Trudeau chose to commit his government to carbon pricing without waiting for the reluctant, slower provincial governments such as Manitoba to agree.

6. The Dutch government did not hide behind Europe's post-"Brexit" financial uncertainties to delay the decision on shutting down its coal plants.

Road blocks not thrown up and excuses not offered, do not solve the problem. Nevertheless, they are significant and consequential signals that countries, including the biggest emitters and the historic laggards, are now serious above moving forward. And since forward momentum in the climate space creates its momentum (through economies of deployment), this first round of action will speed the next round, giving us a serious shot at meeting the de-carbonization imperative.

So far, October has shown us what momentum feels like – and we need to find a way to better celebrate momentum, because it is the single process with the best shot of rescuing a stable climate.

See links at www.greenenergytimes.org

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A veteran leader in the environmental movement, Carl Pope is the former executive director and chairman of the Sierra Club. He has published three books and is now the principal advisor at Inside Straight Strategies. He continues to serve as a board member or adviser for a long list of environmental organizations.

SNOW LOADS VS INSULATION

By Bob Tortorice

Photo: Flickr

INSULATION, ROOF, SNOW.

What do these three parts of a house have in common? As with the human body, the house is a system; when you change one part there will always be some unintended change in another part of the house.

For instance, one of the unintended consequences of adding attic insulation to a house is a greater build-up of snow on the roof, adding to the potential of roof collapse. One of the advantages of very little insulation in the attics of older homes was the heat loss that melted the roof snow. It was a very effective and inexpensive way to ensure that snow never built up on the roof.

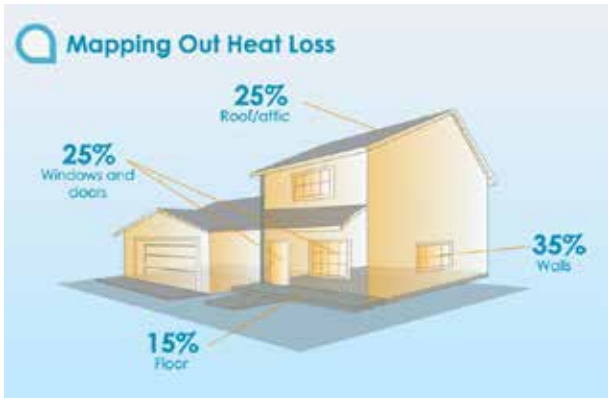
In today's economy, fuel of any type cannot be wasted so we do a great job of insulating our homes. New homes in New Hampshire are built under the state's building code, which identifies snow loads in every New Hampshire town. New homes built in the last 20 years should be designed and built for heavy snow build-up, but this is not so for older homes which have been upgraded to high energy efficient insulation levels.

The construction of new roofs has changed dramatically, but reinforcement of existing roof systems has not. Many attics totally rely on heat escaping from the living space to reduce the roof snow and prevent roof collapse. The question is what can you do to prevent a very serious life-threatening roof collapse without heating the neighborhood?

An existing roof can be reinforced before you install additional heat and energy saving insulation. A qualified carpenter can usually easily reinforce most attic roofs, although cathedral ceilings can be costly to insulate and reinforce.

Older homes have a simple rafter roof system, where each rafter is nailed into its opposing rafter. These rafters are usually no more than 2 inch x 8 inch, some as small as 2 inch x 6 inch lumber. This type of construction is the most dangerous, because a small load of snow build-up could separate the top of the rafters and cause the roof to separate or with long undersized rafters, the roof could sag in the middle. The use of a ridge beam, collar ties and "sistering" in larger rafters can be done by a qualified carpenter.

To avoid roof collapse, when you plan on adding insulation to your home, but you don't plan on hiring an energy auditor, seek out the advice of a qualified carpenter to inspect your present roof construction and reinforce it (if necessary) before you add insulation.



Maclay Architects Designs VT's Largest Net-positive Office Building

By Green Energy Times Staff

SunCommon, one of Vermont's earliest Benefit Corporations, is Vermont's largest solar installer, serving nearly 3,000 Vermonters with solar at home or as Community Solar Array members. The business' mission statement starts with the belief that every person deserves a clean and safe environment. SunCommon's mission is to remove the barriers to renewable energy so every Vermonter can get solar power.

SunCommon was founded in 2012 in Waterbury Center. The company began with 16 employees in a net-zero building, and over four years its workforce had grown to 80 and it needed a larger space. A move to Waterbury village strengthened SunCommon's relationship with the town, a connection that was important to the company in the course of recovery after Tropical Storm Irene. With the new location more central to the village, employees enjoy shorter commutes and the option to bike or walk to get lunch.

SunCommon has a mission-driven commitment to people, planet and profit, so a design for net-zero energy use or better was important. SunCommon teamed with Bill Maclay of Maclay Architects to start working on the building design, together with the owner, Malone Properties providing for construction. Maclay Architects is located in Waitsfield, Vermont and has been constructing high-performance buildings with renewable energy since 1971. Malone Properties is a commercial real estate developer based in Montpelier, Vermont. With net-zero building design, heat pumps, and a rooftop community solar array, SunCommon's building is Vermont's largest net-positive office building, as it produces more energy than it uses. It was finished in the spring of 2016, with its 16,000 square feet including 8,640 square feet of office and 6,120 square feet of warehouse.

The office area is open, divided into functional "neighborhoods," so employees are stationed near those with whom they work most. The exterior walls have glass for solar gain, views, and optimal daylighting. This makes it possible to have a building that is not merely energy efficient, but also esthetically pleasing.

The building's heat pumps provide both heat and air conditioning, for a very simple, and surprisingly cost-effective, approach to maintaining comfortable temperatures. Bill Maclay said that given the design of the building, with solar gain, good insulation, and good air sealing, it was not considered necessary to have backup heating systems.

When a building's shell is constructed with good air-tightness, it has greater need for a heat recovery ventilation system, and here it was especially important. It brings fresh air into the building, using outgoing air to preheat it in an exchange that extracts most of the heat from the exhaust air. The combination of fresh air and increased comfort of a very efficient building provides a healthful environment for people to work in.

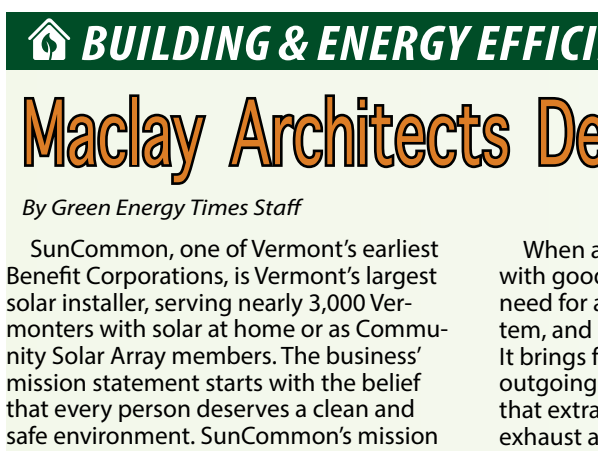
SunCommon's goal with the building was to be net-positive, producing more energy than it uses. To do this, Maclay designed a single, large shed roof, completely covered with solar photovoltaic panels, combined with a solar canopy for a patio. These provide 150kW (kilowatts), about twice the power needed to provide the business' electricity requirements. The extra energy is exported to the grid and will provide for about thirty Vermont homes, which subscribe as members of this community solar program.

The SunCommon headquarters is a showcase where people can learn about the implications of net-positive energy construction. Bill Maclay pointed out that the increase in construction costs produce a relatively small increase in the monthly payments for financing. That increase is more than offset by the reduction in costs for electricity and heat. This net-energy-positive building was less expensive than conventional construction right from the beginning. Maclay said of this, "What the public does not really know yet is that we are in the renewable era."

This is a project that has plenty of praise going around. Maclay said, "The only reason we do great projects is that we have great clients."

Jessica Edgerly-Walsh, the Organizing Director of SunCommon, was excited about Maclay's design, but also about the leadership in her own company. "I am really proud of our business. We are going to make clean energy happen for Vermonters, for our climate, and for our economy, and the building is a symbol of that commitment."

Vermont's largest net-positive office building was designed to produce more energy than it uses, as SunCommon's new headquarters. Photos courtesy of Maclay Architects.



New open office space designed to support the needs of the 65 employees at SunCommon, for community events, and networking get-togethers. Photo courtesy of Maclay Architects.

Button Up Vermont Day of Action

Efficiency Vermont is once again encouraging you to Button Up your homes to save money and energy this fall. Button Up Day is a statewide effort in Vermont to cut energy use and keep families warm and healthy this winter.

Button Up Day of Action is coming on November 12th. Before that day, there will be a multi-media awareness campaign. The day of action will see neighbors helping neighbors to prepare their homes for winter.

The campaign encourages Vermonters to take action on sustainable living, saving money in the process. They are encouraged to use an online checklist to identify energy-saving tasks that they can complete for the campaign. They are encouraged to send photos and participate in the statewide community event on November 12.

A large number of retail partners of Efficiency Vermont are also taking part in the event, stocking weatherization, lighting, and other efficiency products.

Learn more at buttonupvermont.org

Q&A: What You Need to Know About Air-Source Heat Pumps

By Robb Aldrich

More and more homeowners are investing in air-source heat pumps (ASHPs) to heat and cool their homes and move away from fossil fuels. Manufacturers and distributors have seen double-digit growth in the northeast for the past 5-10 years, and there are few signs of this slowing. Our team at Steven Winter Associates has looked into these systems from many perspectives, and we hope this article answers some questions that we often hear.

First: What is an air-source heat pump?

It's basically an air conditioner that can operate in reverse. During the summer, it uses electricity to move heat from indoors to outdoors. In the winter, it moves heat from outdoors to indoors.

What do ASHPs look like?

They come in many shapes and sizes, but one of the most common is a ductless, mini-split system. These have one outdoor unit and one indoor fan coil that provides heating and cooling to a space. This indoor fan coil is often mounted high on a wall, but there are also ducted systems, ceiling-mounted fan coils, and floor-mounted fan coils. "Multi-split" systems have one outdoor unit connecting to several indoor fan coils. There's too much variety to describe here, but the operating principles are very similar.

Can they really extract heat from cold, outdoor air in the middle of winter?

Yes (usually). It's true that ASHPs have been typically used farther south (they're pretty standard in Florida). But new technologies are appropriate for colder climates. Many manufacturers list performance down to 5°F, and some go down to -15 or -20°F. In our testing, we have seen them performing down at -24°F.

Of course, the colder it is outdoors, the harder it is for ASHPs to extract heat. So they deliver less heat at lower efficiencies under very cold conditions.

How efficient are these heat pumps in the winter?

That is the big question, and the answer is complicated. Heat pump efficiency is often expressed as a coefficient of performance (COP). COP is defined as energy out (heating) over energy in (electricity). In a study funded by the Department of Energy and in partnership with Efficiency Vermont, we were able to study some ASHPs in homes around New England. Efficiencies varied quite a bit, but we found that heating season COPs averaged around 2.0. That means for every kWh of electricity used, two kWh of heat were delivered. This is twice as efficient as electric resistance heat, but we'd hoped to see COPs closer to 3.

Efficiency depends on many, many variables, and we're still coming to grips with all of them. See the supporting information for more on this.

This passive house utilizes only one ductless heat pump for all of its cooling and heating. To left: Indoor and outdoor parts of a ductless heat pump. Photos courtesy of Steven Winter Associates.

Can these systems provide all the heat needed in a home in the northern US?

Sometimes. In many very efficient new homes, heat pumps provide all the heat needed without any problems. In old, leaky farmhouses, the size of the ASHPs you'd need to provide all the heat could be substantial (and expensive). Also, in VERY cold areas (where temperatures stay below -10 or -20°F for extended periods of time) some backup heat may be needed.

In many older homes, people install ASHPs to offset a portion of the heating needs. A ductless ASHP installed in a central living space, for example, can provide cooling all summer. When fall comes, it can heat this space and delay the use of an oil-fired boiler or furnace. When it gets cold enough, or when you really want heat delivered to the bedrooms, you can turn up the central heating's thermostat. Many people install ASHPs to displace oil or propane heat rather than replace it. Oil or propane use can be reduced significantly, but the fuel-fired system is still there for when you need more heat.

Do these systems cost less to operate?

It depends on energy prices! A couple years ago, when oil was around $4 per gallon, the answer was typically YES. When oil dipped down to near $2 per gallon, it was much less certain. Savings depend on the application, the existing system efficiency, details of the heat pump installation, etc. At current prices, heating with natural gas is usually less costly than using ASHPs. But ASHPs always save energy when compared to electric resistance.

In new homes, we're seeing a trend where people don't use any fossil fuels. While ASHP energy costs might be a bit higher than gas heating costs, there's lots of savings associated with oil tanks, propane tanks, gas plumbing, not to mention the ongoing meter and service charges.

Do ASHPs reduce carbon emissions?

It depends on how you heat now and where your electricity comes from. With electricity that is largely carbon emission-free (solar, wind, hydro, nuclear), heat pumps can lead to significant emissions reductions. If your electricity mix has a lot of coal, reductions are questionable.

More information on any of these questions, links, reports and resources – search for "heat pumps" on http://blog.swinter.com/.

Robb Aldrich is a Senior Mechanical Engineer, Steven Winter Associates.

LED Streetlights: Get The Facts

US Department of Energy information on downlights can be found at bit.ly/DOE_downlights_info.

Your community can join others which have significantly reduced their town's electricity usage as well as saving tax-payers money with a smart move of replacing street lights with LED lights. Photo: www.cleanenergyresourceteams.org

The American Medical Association's (AMA) recently adopted community guidance on street lighting adds another influential voice to issues that have been discussed in the lighting field for some time now, regarding light at night, its potential impacts on human health and the environment, and how best to minimize those impacts. While the AMA's guidance is intended to reduce the harmful human and environmental effects of street lighting in general, it focuses on LEDs in particular. But it's important to note that these issues are neither new nor restricted to LED technology.

As explained in the DOE Fact Sheet True Colors, there's nothing inherently different about the blue light emitted by LEDs; that is, at the same power and wavelength, electromagnetic energy is the same, regardless of source type. And as the potential for undesirable effects from exposure to light at night emerges from evolving research, the implications apply to all light sources – including, but by no means limited to, LEDs. Further, these research results are often also relevant to light we receive from televisions, phones, computer displays, and other such devices.

While there's nothing inherently dangerous about LED lighting, it should be used with the same prudence with which we use any other technology. This means that although LED lighting is an energy-efficient way to illuminate streets, it's important to direct the light only where it's needed; to make sure the emitted spectrum supports visibility, safety, and the health of humans and other living creatures; and to limit glare for pedestrians, bicyclists, and drivers.

In that regard, LEDs have a number of distinct advantages over other lighting technologies. For one thing, their dim-ability means LED street lighting systems can now provide only the level of illumination needed at any given time – which is nearly impossible for conventional street lighting products. And LEDs also offer a high degree of control over the pattern and evenness of light on the ground. By contrast, conventional lamp-based technologies produce light in all directions, so more than half of the output is typically redirected toward the desired target by means of reflectors and lenses. This results in a considerable amount of light spilling in unwanted directions and spreading unevenly across the area, which not only wastes energy but may also cause light-at-night problems, such as impacts on wildlife. When an LED replaces an incumbent product, such as a high-pressure sodium streetlight, the LED can often meet the illumination requirement with only half of the total lumens (light output) of the incumbent lamp.

What's more, unlike other lighting technologies, the spectral content of LEDs can be tailored to order – which means that, for example, the blue light emitted can be minimized. As noted above, there isn't anything special about the blue light emitted by an LED. The "blue" spectrum of visible light actually covers a range of wavelengths, from blue-violet to blue-green, although there's no specific definition of "blue light." Correlated color temperature (CCT) is a rough measure of the balance of energy in a spectrum, with lower values indicating relatively less blue content. While CCT doesn't explicitly characterize the potential for nonvisual effects, it's generally able to indicate the spectrum-specific potential for these effects, which also critically depend on quantity and duration of exposure. In point of fact, if one compares the blue content of an LED source with that of any other source, with both sources at the same CCT, the LED source emits about the same amount of blue. This applies to halogen, fluorescent, high-pressure sodium, metal halide, induction, and other source types.

LED street lighting products are available in a range of possible CCTs. Exterior LED lighting products with lower CCTs are now relatively easy to find (although, typically, they're slightly less energy-efficient than those with higher CCTs). At extremely low CCTs, such as the 2200K of high-pressure sodium, the light no longer appears white, and colors of surfaces and objects can be substantially distorted, reducing visibility. Low CCTs may be beneficial for reducing nonvisual impacts, but they may also reduce the effectiveness of the lighting, potentially even requiring designs with more lumens – which may completely negate the effects of reducing the relative amount of blue light emission.

Some media coverage of concerns about blue light, light at night, and dark-sky issues can give the impression that LEDs are the enemy, when in fact they're a critical part of the solution, which the AMA acknowledges. It's important to remember that these issues have been around for decades, long before the emergence of LED technology. The key takeaway from the AMA's guidance is the importance of properly matching lighting products with the given application, no matter what technology is used. More than any other technology, LEDs offer the capability to provide, for each application, the right amount of light, with the right spectrum, where you need it, when you need it.

ENERGY SAVINGS AND COMFORT GO HAND-IN-HAND

By Bob Tortorice

Are you confident in your knowledge of renewable energy options for new and remodeled homes?

I ask this question because I meet people who are building or remodeling and are very excited to incorporate geo-thermal heat, which qualifies them for a 30% tax credit. What isn't well understood, though, is that it isn't enough to install geo-thermal heat or another renewable energy source and think that's all that needs to be done. You will have a warmer home in winter and a cooler home in summer, as well as achieve significant savings, by following EPA Energy Star construction guidelines during your building or remodeling project. And, along with a more comfortable home, adhering to Energy Star guidelines makes you eligible for a $4,500 rebate from your utility company.

Another misconception is that energy efficient construction results in a house that is "too tight" and "doesn't breathe." Homes built to EPA Energy Star standards are designed to eliminate drafts — and don't we all want that — as well as provide proper ventilation.

Current technology can control and improve air quality in an energy efficient home, both new and remodeled. An air exchanger or HRV (heat recovery ventilator) removes stale air from the home every 15, 30 or 60 minutes each hour, bringing in fresh air to replace the stale air. The benefits can be profound for families with allergies or other breathing problems.

Photo: publicdomainpictures.net

To achieve the best results — energy savings, plus the comfort factor — when thinking about building a new home or making improvements to an existing home, don't hesitate to ask your builder or the salesperson who is promoting solar, geo-thermal or new windows, "What else could I be doing to make the proposed improvements even more beneficial."

Bob Tortorice has over 30 years of green building experience. He is the owner of Building Alternatives, Inc. and Alternative Energy Audits in Franconia. Call 823-5100 or visit www.buildingalternatives.com or www.epsbuildings.com to learn more about "Building Life Long Savings."

Perfecting the Search for Green Homes

By Hope O'Shaughnessy

Home buyers may benefit from using the U.S. Department of Energy's (DOE) Home Energy Score. This free tool enables home seekers to check the energy use and potential improvements for prospective homes. Photo: DOE Better Buildings Solution Center.

Today's home buyers are becoming increasingly interested in a prospective home's energy efficiency and now that quest is becoming easier.

In a recent webinar, C.R. Rollo, Vice President of Environmental Affairs for Meritage Homes, described the key role that real estate agents play in providing home seekers with data such as a Home Energy Rating System (HERS) index.

"Green home real estate is an opportunity to help consumers to make a more sophisticated decision than their parents did," Rollo said. By utilizing various tools, consumers can compare homes based on energy performance as well as other factors such as air quality and future potential energy efficiency improvements.

After the 2008 economic downturn, home builders needed to differentiate their products and provide added value to home buyers, according to Rollo. Marketing and promoting the value of a healthy and energy-efficient home has now become a major focus in many real estate transactions that include more highly educated consumers. "People will vote with their purchase," Rollo said, and "There is tremendous opportunity for realtors to invest in green training to define value." In France, prospective home buyers are provided with a home's "green value" as part of the home's documentation, which allows French consumers to make a better-informed decision.

In the last seven years, Meritage Homes has received numerous awards, including the EnergyValue Housing Award, Best Green Building Program Award, NAHB Builder of the Year and the four time U.S. EPA's ENERGY STAR Partner of the Year–Sustained Excellence Award.

Rollo's webinar, sponsored by Green Builder Media, emphasized the value of having available a home's entire energy cost year to year as well as for 15 or more years out. By capitalizing on various energy-efficiency data, home buyers can use the savings they reap in energy and use those dollars for expenses such as vacations or education. The Residential Energy Services Network (RESNET) is a source to find professionals who can assess the home design and energy savings potential for existing homes. RESNET also has a quick finder for a home's energy rating.

The federal government also has resources including the Better Buildings U.S. Department of Energy scoring at http://bit.ly/bldgsolutionscenter released in August 2016, which scores homes' energy performance.

Real estate agents have joined in as well with sites focused solely on green homes such as Colorado's Green Home Finder at http://www.greenhomefinder.com.

As Rollo pointed out, "Today's green homes last longer, cost less, and are healthier," which translates into "More health, more comfort, and more disposable income."

Little green house image from Flickr.

Hope O'Shaughnessy is a New England-based writer who has written for western Massachusetts publications including The Daily Hampshire Gazette (Northampton, MA) and The Republican (Springfield, MA). She also works for Green Energy Times

Top Five Green Remodeling Trends for 2016

By Erin Vaughan

Let 2016 go down as the year of the green remodel! This year, homeowners are overwhelmingly opting to install products and materials that save energy and reduce their environmental impact. In fact, when the National Association of Home Builders surveyed homeowners this year, they found that green features topped the list of homebuyer preferences.

Inspired homeowners are making many changes that include the switch to more eco-friendly appliances and materials when they remodel. Here are some of the freshest and greenest trends for the year, that you can make, too—whether it is a brand-new appliance or a major addition—as sustainable and low-impact as possible.

Smarter Greener Appliances

For many homeowners, giving their homes an energy update is as simple as switching out old, wasteful appliances for newer, more efficient replacements. Installing ENERGY-STAR-rated devices, like washers, dryers, water heaters, dishwashers, refrigerators and water heaters, is popular among those remodeling—and these products were some of the most requested green updates buyers sought out in new homes, according to the NAHB's findings. There are also new options available for those hoping to cut energy costs or water use in their homes. Smart thermostats and automated lighting controls, for instance, while still relatively new, can save homeowners around 10 percent on their energy bills, according to the Consumer Technology Association. With more smart products available on the market than ever before, you can expect a huge increase in installations in the near future.

Upcycling Goes Mainstream

This year, homeowners are paying more attention to the "re-use" part of the three R's of conservation, meaning a huge increase in reclaimed materials used in home remodels. Dressers missing drawers are re-envisioned as bookcases, bureaus find new life as islands, chests are transformed into kitchen islands. Reclaimed wood is particularly popular, and materials from old homes, discarded pallets, or salvage stores have made their way into weathered bookcases and stately shiplap walls, allowing homeowners to perfectly capture a mixture of old-world industrial and trendy rustic.

A New View on Windows

With the potential to save homeowners up to 25 percent on their heating bills, windows today do a lot more than just look pretty. In particular, homeowners looking to pare down energy expenditures have gravitated to a bevy of new, energy-efficient window models—triple-pane windows, which feature panes with a third panel of glass to help insulate homes, or argon in the spaces

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Solutions: A CARBON CAMPAIGN

Cont'd from p. 7

Vermont town hall meeting in Huntington. Source Flickr

water and forest that cannot be adequately accommodated under climate change? Habitat can shift only so far up the mountain; sea walls and dikes have inherent limited ability to protect from rising water.

- Are the systems associated with this area already stressed in ways that limit their ability to accommodate climate change? For example, an already stressed hemlock population may be unable to withstand further temperature and insect insults. An economically distressed community may have inadequate air conditioning resources and little ability to obtain them.
- Is the rate of projected climate change likely to be faster than the adaptability of the systems in this area? This is obviously relevant to both plants and animals, and human social fabric. The speed as well as the magnitude of change is crucial.
- Are there efforts already underway to address impacts of climate change related to systems in this planning area? We need to evaluate the efficacy of existing adaptation efforts.

Agriculture and Forestry

The aim is to develop and implement best practices for crops and land, pasture, energy, forest, and manure and fertilizer management in order to enhance productivity, soil health, sustainability and profitability. The use and integration of these programs for both GHG reduction and self-protection is clear. This includes:

- ***Crop and land management:*** Long-term rotation of annual and perennial crops (e.g. alfalfa or grass hay), cover crops, switching from conventional to zone tillage combined with cover crops (at least 30% residue cover after planting), no-till combined with cover crops, irrigation improvements, change from annual to perennial crops and conservation set-asides.
- ***Fertilizer Management:*** The 4R concept, right source, right time, right rate, and right placement when implemented will reduce potential emissions;
- ***Manure Management:*** This can include composting, and use of methane digesters for farm to energy programs quite relevant to broader GHG efforts. There is methane and nitrous oxide reduction by changing the diet of ruminants. More easily digested feed and/or feed that has a high polyunsaturated fatty acid content can reduce methane emissions, as well as improving efficiency through improved grazing management, improving genetics and other practices.
- ***Pasture and Grazing Management:*** Pasture and grazing management practices has potential to reduce agricultural GHG by increasing carbon sequestration and decreasing methane emissions. Increased carbon sequestration can be greatly improved using managed intensive rotational grazing (MIRG). According to Juan P. Alvez, of the Gund institute for Ecological Economics, at UVM, "Grazing animals emit more methane than confined ones. However, grazing (particularly MIRG) farms have lower net CO2 emissions because they do not heavily rely on grain for feed. Confined livestock feedstock requires soil tillage, cultivation, irrigation, fertilization, pesticide application, and machinery, transport, drying, packaging and delivery."
- ***Forest Management:*** Maximum GHG emission is from deforestation and soil disturbance. There is a wide range of good management and log impact logging practices as well as conservation easements to both increase biomass and reduce GHG.
- ***Farm Energy Management:*** The farm represents an energy intensive sector to target both fossil fuel reduction and the use of biomass from farming and renewables.
- ***Forestry and GHG Mitigation:*** The millions acres of forest and representing an enormous amount of sequestered carbon and can also be the basis for a sustainable future. In 2012 there were 766 million acres of forest in the U. S. Globally there are slightly fewer than four billion hectares of forest (or 10 billion acres, with 2.47 acres per hectare). The pre-industrial world had 5.9 billion hectares. Forestry acreage loss is decreasing annually, 46 million acres in 2014, down nine percent from 2013 and down 20% compared to 2012. This is moving in the right direction, but for global survival and ecological justice we need to be replanting and caring for our forest globally as basis for sustainable lifestyles, ecosystem health and habitat. It is essential to develop clear management plans for good logging and management practices including reforestation, minimizing soil disturbance, protecting riparian areas to support increase of biomass and minimization of GHG emissions.

Tools for Meeting Renewable and Efficiency Targets

There are a wide range of tools that can be used and adapted for large scale mass implementation of renewables and efficiency. States like California, Vermont, Hawaii, New York, and now, the District of Columbia, that have strong commitments for an increasing use of efficient renewables and a reduction in carbon have a number of useful practices. These include plans such as an efficiency utility in Vermont, "Efficiency Vermont" that is able to invest in efficiency, and California's Renewable Auction Mechanism (RAM) that uses competitively bid feed in tariffs for meeting renewable goals. But these current plans need to be expanded to assure a quick and economically beneficial efficient renewable transformation for both the rich and the poor.

These include mass retrofits for efficiency and renewables, done through competitive bidding. The technology is now being used to perform infrared scans of all buildings to identify insulation and infiltration retrofits and create a computer generated three-D map. The technology for scanning houses for Google Earth and Google Map and by cable companies for free riders can be put to socially useful purposes. Over a period of several years we can dramatically improve building envelopes, appliance efficiency, lighting, reduce water use, install renewables, vehicle to house electric car charging and battery storage, air to air heat pumps and ground source heat pumps to replace all fossil fuel fired boilers and furnaces.

This can be financed in a number of ways including creative use of existing or new utilities. For example, instead of investment in power plants to be added to the rate base, the old utility model before retail competition, a 21st century could be allowed to invest in efficiency and renewables, and put that into the rate base after fair competitive bidding . Or the utility could be limited to distribution only and be required to purchase a combination of distributed renewables and efficiency either from renewable or efficiency companies, or as a bundled power – efficiency product. Amory Lovins' plans for buying and selling efficiency "negawatts" are quite applicable. There is already a strong Energy Performance contracting industry globally that can become an active partner in developing mass efficiency and renewable retrofits.

The Cholla Power Plant, near Joseph City, Arizona. Wikimedia Commons.

Alternatively, large scale renewable purchases can easily be financed through the use of renewable energy hedge finance agreements between renewable developer and energy users. I designed, with my associate Pentti Aalto a 6.2 megawatt renewable hedge between SNHU and the Iberdrola wind farm in New York State. The renewable hedge is based on a long term fixed price, e.g. 10 to 20 years, for energy agreed to between user and developer. The energy user gets long-term predictable prices; the developer an assured income stream. The renewable hedge is applicable on a very large scale though hedge agreements – for example, for a whole class or utility customers, or a whole town or city. No money is paid up front. Finance is done by banks or finance institutions, public or private. There is little risk, and interest rates should be low.

The whole city hedge using distributed renewables and efficiency eliminates the basic risk of renewable pricing based on far way markets. This type of hedge could be structured to be closer to the fixed bid price of the RAM in California for feed in tariffs. The experience of an efficient renewable world is free of the wildly fluctuating prices based on varying prices of fossil fuels on the margin. We would pay affordable and relatively fixed costs with energy used much more efficiently.

Municipalities can be a logical basis variously for mass efficient-renewable energy hedges, energy purchases from efficient renewable energy providers, and development of public power renewable-efficiency companies. I wrote the first draft of the New Hampshire's law authorizing municipal aggregation for electric utility retail competition, the first such law in the nation. The NH law should be changed to be an opt-out, as opposed to the opt-in basis that limited its use in NH. This concept with opt-out clauses is now increasingly used in several states such as MA, to facilitate purchase of electric energy for all municipal residents in an opt-out basis. It can be used now for the mass purchase of efficient renewables.

This can be undertaken on any level from one building to a town, a state, or a nation. Please share with relevant activists and politicians.

The author is ready, willing, and able to discuss, answer questions, and attend meetings for those interested in organizing.

Roy Morrison's latest book, Sustainability Sutra will be published by Select Books in NY in March 2017. He is working on solar farm development with Greater Boston Capital Partners. You can reach him at roy.morrison114@yahoo.com, 603-496-4260

Roy Morrison has been an energy consultant, author, and activist for over thirty years. He has worldwide experience. He drafted the nation's first law on municipal aggregation for retail electric competition. His book, Ecological Democracy, was first book to discuss an ecological civilization.

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LOCAL SCHOOLS ARE GOING FOR SOLAR With Help from Norwich Technologies

Cont'd from p.1

Kimball Union Academy's ground-mounted solar array Meridan, New Hampshire

The cost of solar energy systems has dropped by nearly 70% in the last seven years making them increasingly affordable for all users. It happens, however, that schools, like other non-profit organizations, do not qualify for the biggest incentive for solar, the 30% federal tax credit for investments in renewable energy systems. This is because non-profit organizations do not pay tax that can be reduced. So even at low costs, directors of a school in favor of renewable energy may have to think hard about the costs.

"Funding these projects is a crucial piece to making solar a true win-win-win solution for schools," said John Langhus, who arranges project funding for Norwich Technologies."Schools can have zero upfront costs and immediately save money on electricity when we bring in a solar investor. The solar investor can take advantage of the tax credits, own the array, and share the economic benefits of the solar system with the customer for several years." In the past, such arrangements were challenging to develop for projects smaller than 500 kilowatt (kW), a large system. But now, Norwich has partners who are willing to fund projects less than 100 kW. "We can now fund pretty much any size school at a price that provides the school a discount on their power and the solar investor a fair return on their investment," said Langhus. "Plus we always provide a purchase option after the tax period, so that the school can buy it directly in a few years if it wants to."

Here are short descriptions of several of Norwich's school projects to date:

The solar array at the Thetford Elementary School Thetford, Vermont

Four schools in the Bradford, Vermont area have solar that is installed or underway. Thetford Elementary School (TES) is a public school serving about 200 students. Norwich installed a 140-kW project for the school in 2014, sited just down the road from the school on land that hosts the septic leach-field. "The array is close to the school so classes can come down," said Stettenheim. "At the same time, it is hard to see the array from the road, so it's nicely blended in with the surroundings."

Oxbow High School with River Bend Technical Center, Bradford Middle School, and Newbury Elementary are also in the Orange East Supervisory Union. When administrators in the Union, such as Assistant Superintendent Keith Thompson, saw the savings that schools could achieve by hosting solar projects, they solicited bids for projects and ultimately chose Norwich Technologies. The Norwich team had met Thompson during the Thetford Elementary project and was very excited at the opportunity to work with him again. The project was proposed to be 650 kW across two locations, but the smaller section will wait until next year when the state's net-metering cap is raised. Work will commence this month on the larger component, a 500-kW array to be located on the grounds of Oxbow High School and will include support from River Bend Technical Center students. The project will allocate electricity to each of the three participating schools, which will together form a net-metering group. The electricity generated will save the schools significant money relative to the prevailing electricity price.

Thompson pointed out the educational advantage. "The solar array is being made into part of the curriculum for math and science," he said. "It is already used for Thetford's fifth and sixth grade students and will also be used at high school level, once it is installed."

The project was designed to meet nearly all of the school's load, on a dollar-basis, taking advantage of Green Mountain Power's "solar adder" that paid solar customers an extra six cents for each kilowatt hour (kWh) produced, relative to the ordinary residential rate. TES did not take advantage of Norwich's funding capabilities, but instead was able to secure a significant grant from the state of Vermont thanks to the hard work of its school board members.

The Mountain School of Milton Academy is a small independent semester program that provides about 45 students per semester from across the country the opportunity to live and work on an organic farm in Vershire, Vermont. Now, with help from Norwich Technologies, The Mountain School also derives most of its power from solar energy. Norwich's project is 83 kW, which combines with existing rooftop solar to offset all of their electricity costs. The school has a full environmental dashboard and is already using the solar system as a teaching aid.

Kimball Union Academy (KUA) is getting ready for its fourth Norwich Technologies solar array in two years. A private boarding school in Meriden, New Hampshire, KUA is responsible for over 300 students. Their first solar project was a 50-kW net-metering project on one of the campus' newest buildings, Miller Bicentennial Hall. "This was an early project for us before we had the funding relationships we have now. As a result, one of our employees decided to finance the array, partly to help the school adopt green energy and partly because it was a good investment," says Stettenheim, himself a KUA alumnus. Since then, KUA has constructed a 120-kW array on one of their fields, and they are about to break ground on a smaller 70-kW array to supplement the first array on Miller Hall. They will also end the year placing a small system on a new residence hall.

Cardigan Mountain School (CMS) is a boys' independent boarding school for boys grades six through nine, located in Canaan, New Hampshire, with over 200 students. After considering several possible options for solar energy development, CMS went big, selecting Norwich to build a 963-kW solar array right on its campus. "We are very proud of this project," said McBride. "When completed, this array will produce about two-thirds of the amount of electricity used by CMS each year. It's a really strong commitment."

Dublin School is a private preparatory school in New Hampshire with a student body of 159 students in grades 9-12, and is just beginning their solar adventure. Dublin selected Norwich this past spring to build an over 400-kW array on its campus. The project will be commissioned before the end of the year. "Dublin School has shown great leadership with this project," said Stettenheim, adding "Not only will this be enough solar to match their entire annual load, but they will save significant money over the term of the power project relative to the expected trend in energy prices."

Plainfield Elementary School (PES) is a public elementary school in Meriden, New Hampshire. Not knowing what electricity prices will do in the future, PES wanted a fixed discount to whatever the electricity price becomes in the future – so no matter what, they'll be saving money with their solar array. "That can be a hard way to finance solar projects, and some funders are not comfortable not knowing exactly what they'll be paid for their electricity," said Langhus. "We have sufficient options available to us that one of our partner funders agreed with the price structure." The plan is that the system will be built at the beginning of 2017.

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

CLASSIFIEDS

ALAN PHENIX GOES SOLAR

Cont'd from p.2

Phenix had contemplated going solar for over a year, while researching his options, prior to making his choice to take the plunge. He uses 6kWh of electricity per day and expects to be able to bank about 30kWh each day that the sun shines. Alan noted, "I will use the banked credits in the winter to power some electric space heaters in my house along with my wood stove. I also will make about $300/yr in REC credit payments they tell me. EverSource will install a new meter for the net-metering in a week and then I throw the breaker and watch the meter go backwards!!! Can't wait!"

Alan Phenix has voluntarily shared G.E.T. with those who live in and around the region where he has lived in Tamworth, New Hampshire since 2014. He is also an artist specializing in sterling silver jewelry that is on display at Artistic Roots in Plymouth, NH. He is also a musician, is skilled with videography, and is an enthusiastic gardener and outdoorsman.

Green Energy Times would like to congratulate Alan for choosing to reduce his carbon footprint in an effort to lower his cost of living, to g.e.t. off of fossil fuels, for his own energy independence and his love for the future of this planet. Thank you, Alan!

GUIDE TO ADVERTISERS

Vermont Research Climate Change News

Climate Change, Wine Industry, Apples and Bears with Wind Turbines

From Vermont Research Climate Change News: a summary of recent Vermont research related to energy and climate change.

Species' ability to adapt to a warming climate has significant implications for future ecological systems. A study led by researchers at Yale University examined grasshopper populations in Vermont and Connecticut finding that species in regions where temperature drastically varied throughout the year would more successfully acclimate to changing conditions.

ENERGY & THE ENVIRONMENT

The Vermont start-up business Packetized Energy has proposed a new way of saving energy by converting water heaters into battery-like appliances that could utilize solar energy and turn off when sufficiently recharged. While the common water heater presently works by turning on and off at programmed times, instead by absorbing available renewable energy throughout the day it could ultimately save power later during prime energy consumption time.

The Vermont Fish and Wildlife Department **has asked hunters not to hunt the black bears included in their Deerfield Wind Black Bear Study Update in regard to wind energy's impact on bear activity.** The report examines concerns that the implementation of the Deerfield Wind Energy Project could reduce the population of American beechnuts and therefore alter foraging patterns.

Vermont orchards are expecting smaller apples **this fall due to the dry summer weather, particularly from farms without irrigation systems**. The number of fruit harvested, however, is similar to that of last year; it's estimated that 4,000 bushels will be picked over the next several weeks.

SCIENCE

Research on Vermont's burgeoning wine industry examines the issues in growing a hardier variety of grapes, less susceptible to the state's cold winters. The winegrape cultivars, mostly derived from Minnesota and Cornell, also have a greater immunity to disease and are resistant to insects, according to the research by UVM's Lorraine P. Berkett.

Pre-verasion grapes at Fresh Tracks Farm, Berlin, VT.

STUDENT RESEARCH

Examining past climate changes can often help scientists design global models that give insight into future climate patterns. In his 2016 thesis, **Middlebury graduate Andrew Gorin** examined the climate of Weybridge, Vermont and conducted a paleoclimate reconstruction of a speleothem from Weybridge Cave.

The Research on Adaptation to Climate Change project has conducted a study focusing on the water quality of Lake Champlain. The report argues that the Lake Champlain Basin should be viewed as a social ecological system that is in the process of adjusting to climate change in order to best address the steady decline in water quality.

Ultimately, the project's goal is to closely monitor the changes in the Lake Champlain Basin's ecosystem and propose policy changes that reflect the likely increase in daily precipitation and air temperature due to climate change.

Lake Champlain's health has been undeniably harmed in recent years, drastically altering the wildlife ecosystem.

A group of researchers collaborated to study the effect of the introduction of alewife fish, which are non-native in Lake Champlain, on the native rainbow smelt.

The report suggests that cannibalism is the main threat to year-old rainbow smelt, as their early hatching causes a difference in optimum conditions for adult and first-year fish. While later hatching has historically prevented

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Regional Greenhouse Gas Initiative (RGGI)

The nation's first regional program to limit carbon pollution from power plants

By Catherine Corkery

By leading the nation in reducing climate disruption-causing carbon pollution, New Hampshire and the other Regional Greenhouse Gas Initiative (RGGI) states have already achieved public health benefits exceeding $10 billion, more than $2.9 billion in new economic value, and more than 30,000 new job-years of work throughout the region thanks to the program. Now, New Hampshire has an opportunity to build on RGGI's track record of success by setting an example for the other RGGI states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New York, Rhode Island, and Vermont) to follow.

Image: officeroftheWatch.com

Currently, RGGI is determining the future of the program as they explore possible paths to reduce carbon pollution in the region through 2030. Critically, all of the states involved in RGGI--the Nation's first regional program to limit carbon pollution from power plants--have already set ambitious economy-wide goals to reduce carbon pollution through 2030, and now they need the regional support to make those pledges a reality. This process is vital to the economic future of the region as it charts a course for carbon pollution reduction that inevitably power producers in all RGGI states must meet.

According to the Investment of RGGI Proceeds Through 2013, utility customers in New Hampshire received $9.7 million in direct bill assistance. The funds also helped to weatherized 444 income-eligible homes, completely with a heating system if theirs had failed, and upgraded 455 business and municipalities to highly efficient equipment. The projected lifetime energy savings of these upgrades is expected to be roughly $83 million.

But if we're to continue this good work, we need to up the ante. Initial analysis by Synapse Energy Economics shows that the RGGI states must achieve at least a five percent reduction in carbon pollution from power plants annually from 2020 levels through to 2030 in order to meet their carbon reduction pledges. According to the Synapse report, achieving states' 2030 goals in the most cost effective manner, including reducing power sector emissions by half between 2020 and 2030 would generate about $2 billion in energy savings for consumers in the region and create nearly 5,900 job-years throughout the state.

It is critical that New Hampshire and the RGGI states continue to advocate for a future program structure that will help them meet their state climate goals, reducing pollution from power plants at least five percent annually from 2020 levels through 2030.

In so doing, RGGI will give its participating states the necessary tools to make deeper investments in clean energy, energy efficiency and other critical programs while rolling back carbon pollution. Additionally, a strong commitment to carbon pollution reduction gives clean energy developers the market certainty they need to continue moving forward with large renewable energy projects in the region.

New Hampshire and the RGGI region have the opportunity to set the gold standard for the nation in the struggle to turn back the clock on climate pollution.

Catherine Corkery is the Chapter Director of the New Hampshire Sierra Club.

Top Five Green Remodeling Trends for 2016

Cont'd from p.31

between panes with better insulation qualities than the air that is typically used. Low-E (emmisivity)glass coatings, reflect heat back into a home's interior; and other treatments can reflect light and heat away to the exterior. Residential window glass is the essential ingredient in a wide range of forthcoming tech, as well; developers imagine using it for everything from organic photovoltaics to third-wave computing. So expect new advances for window technologies in the years to come.

Solar Energy's Bright Future

It's been a banner year for solar PV power, due mainly to the historically low cost of solar panels across the US. Solar energy systems are no longer a niche item, reserved for the rich or the extremely energy conscious—they have become much more commonplace and mainstream. Initial estimates show that solar panels reached record installation numbers in the first quarter of 2016, a trend that's not expected to slow. This is especially true since the federal government has extended the Residential Renewable Energy Tax Credit, which returns homeowners up to 30 percent of their system costs, out through the end of 2022. As systems grow more popular, you can expect PV panel prices to drop further as installers and manufacturers compete for residential dollars. That should make the next six years a very interesting time indeed, for the solar industry and homeowners alike.

Greener Means More Water-wise

With reports of record-level droughts making the news, homeowners are turning an eye to their home's water consumption, and that means moving beyond low-flush toilets to newer water efficiency measures, like WaterSense labeled faucets, better water heaters, and more efficient dishwashers. Residents have also been considering their landscaping water use, and so have invested in water harvesting systems, drought-tolerant plants and trees, and alternatives to grass lawns, like xeriscaping and hardscaping. Considering that the EPA estimates that around one-third of residential water use goes directly to lawncare, these changes stand to have a huge impact.

Homes are definitely getting smarter and greener overall, and with any luck, these developments won't be just passing trends—they'll signal a new eco-conscious era in homeownership.

Erin Vaughan Erin Vaughan is a blogger, gardener and aspiring homeowner. She currently resides in Austin, TX where she writes full time for Modernize.com, with the goal of empowering homeowners with the expert guidance and educational tools they need to take on big eco-friendly home projects with confidence.

Learn more about solar, windows, heating and AC and roofing at modernize.com.

RGGI public meeting at UNH Law School Concord, NH on September 28, 2016. Courtesy photo.

Elmore Roots' Permaculture Know-How

BERRIES FROM OTHER LANDS

by David Fried

Harvest Painting by Gabriel Tempesta

It is now possible to grow delicious and nutritious berries in Vermont that people in other countries have been raving about for years.

In Sweden in the 1970's, I worked on a farm where wooden clogs were worn in the kitchen where we enjoyed a meal of flatbread and a yogurt topped with "lingonsylt." This is lingonberry preserves, the national fruit of Sweden. Related to our American cranberry and blueberry, we can grow them here easily, provided the right conditions are met. Like blueberries, they require an acid soil (low pH) and lots of organic matter. We grow them as an understory for blueberries in a not too hot exposure. They have streams of lightly colored spring flowers and make an evergreen ground cover. A lingonberry is to the Swedish as an apple pie is to an American. They bring up warm feelings.

Whenever someone from England comes to our nursery, I show them our black currants. Most Americans do not love the strong flavor of the black currant, but people from England cannot get enough of it. It grows easily here and is the most resistant of any of the currants to insects or diseases. We grow some of the traditional cultivars and also some that were given to us to try many years ago by the late and great fruit aficionado, Lewis Hill, of Greensboro, Vermont. Black currants like well-drained earth and lots of organic matter and deep mulch. The leaves, roots and fruit all have a strong musky wild aroma, so you know you are working in the black currant patch whenever you are there. We like to mix them with apples for drinks, sauces, jams, ice cream toppings, etc.

Haskaps have been growing in Alberta, Saskatchewan and Japan for many years but are new to the United States. They look like a football-shaped blueberry. They are probably the earliest berry, ripening in late June or early July. Birds returning from the south are delighted to find them. I have seen cedar waxwings covering a haskap bush chirping with delight. The haskap is an edible honeysuckle medium-sized bush and is not invasive. You need two different cultivars for pollination. They often begin fruiting in two or three years, preferring well-drained earth to grow in. Friends returning from Japan have reported that dried haskaps are popular there and are found in many stores, selling for $12 for four ounces.

In Denmark they have holidays where the elderberry queen is waited for and all her entourage is seen in a parade on midsummer's eve. We have the native elderberry in Vermont which is easier and more productive to grow here. Elderberries can be planted on marginal wetter areas of land, where other crops will not grow. The elderberry has proven to be a berry that keeps colds away or shortens healing time by half or more. I think there will be a high demand for these berries one day, and many of us may be able to pay our land taxes with the profits from 30 bushes or so.

Gooseberries are common in Denmark and Holland. I used to stop on my bicycle at the grocery stores in the flat lands of Holland to buy a drink in the dairy case made of oatmeal, raisins and gooseberries. I wish I knew how to find or make it now! Gooseberries come in purple, red, yellow and green. They prefer well-drained earth, lots of organic matter and deep mulch. They are self-fruitful and grow to five feet tall. They have thorns, but the berries are so good you will not mind the adventure of harvesting them. They are great fresh, amazing in pies and very nice in jams and syrups.

Aroniaberries are the "acai of the north". Why import berries with healing qualities from Brazil or Peru when you can grow something just as good right here in your backyard? Aronia is a Vermont native bush, super easy to grow and the berries contain 10 times the nutriceuticals of broccoli. The leaves turn orange and red in the fall. This tough bush can be grown in moist or well-drained earth, on top of hills or in valleys.

No need to travel all over the world to taste these berries. You can grow them right here in Vermont. We have 37 years of success, and we are happy to share that you too can grow these tasty healthful berries.

David Fried is the propagator, grower and writer at Elmore Roots Nursery in Elmore Vermont.

POLLUTED WATER TROUBLES BRING ERIN BROCKOVICH TO HOOSICK FALLS

Cont'd from p.1

water was excessive.

We might think the issue would end, once he could go to the health authorities with proof of a problem, but that is not the case. The municipalities are dependent on the New York State Department of Health, which is dependent for its science on the United States Environmental Protection Agency (EPA). But that is where things get tricky; the EPA had never determined safe limits for PFOA. This meant that, like it or not, many officials were stuck with having to treat PFOA almost as though it were safe.

Unfortunately, we now get to the really hard part. PFOA is virtually everywhere. It can spread in ground water, but it can also spread in the air. While it can be found in excessive amounts in the municipal water in some communities, it can be found in even greater amounts in some private wells. We have been told that the municipal water in North Bennington, Vermont, has low levels of PFOA, but many homeowners' wells have high levels. And as long as it is manufactured, the levels will only grow higher.

While PFOA is used to manufacture Teflon®, it can also be the end result of other products breaking down. One of these is used in bags for microwave popcorn, others are used in candy wrappers, and pizza boxes often are coated with such materials.

PFOA is often worst around the plants where it is manufactured or used, but it can become widely spread around those areas. It can become concentrated in animals and plants that grow locally, and as they are used, compost made from the waste can become fertilizer for other, more distant, fields. PFOA that gets into the environment around a factory in Indiana could wind up on a farm in Wisconsin, where it is consumed by cattle that produce milk for families in Illinois, or which are used for meat sold in New York.

About 98% of Americans have detectable traces in their blood, mostly at levels not considered dangerous. The level of PFOA in the blood is typically about 100 times as great as whatever level is in the drinking water, which means that to be safe, the levels in the water must be kept low. Since PFOA does not appear naturally, all of the pollution was produced industrially.

Proving that the PFOA was in the drinking water was only the beginning of a monumental effort by Michael Hickey. It took a year just to get some traction on moving governmental agencies to act on this toxic substance. It was a year in which Hoosick Falls continued to deliver water with PFOA in it, and local people continued to drink it. Dr. Marcus Martinez, a local physician who had noticed elevated levels of cancer in the area, said, "I do believe our citizens were advised incorrectly to consume water that was unsafe for at least for 12 months."

Changes have come. In May of 2016, the EPA finally issued advisories on the limits for PFOA, at 70 parts per trillion. This meant that state and local governments finally had numbers they could use, and they could advise people on the safety of the water they drank.

This year, the state of New York got a new law making it easier for residents to sue over PFOA. Saint-Gobain Performance Plastics and Honeywell International have been identified as the companies responsible for the water problems in Hoosick Falls. Attorneys Weitz and Luxenberg are working on a class action lawsuit. Erin Brockovich, the famous environmental advocate, went to Hoosick Falls to help publicize the matter, so everyone knew how to become active in protecting his or her health.

As all this developed, the situation with drinking water in Hoosick Falls has improved. Early on, free bottled drinking water was being distributed to all residents. Though one manufacturer of household filters told us their products should not be relied on to remove PFOA, it can be removed by special filtration, and the town water once again has low levels of the chemical. The EPA has proposed making the town a superfund site, making it eligible for aid from the federal government.

Hoosick Falls resident Michael Bailey, a member of the board of trustees for SolarFest, told us the thing that bothers him most about the problem is that the situation in the town is just a small part of a much bigger problem. It is not just that there are many towns and cities with this problem, many worse than Hoosick Falls, it is not just that there are very few laboratories that can test for PFOA and that the tests are expensive. "There are 80,000 chemicals we don't have tests or standards for," Bailey said. Many of them might be just as bad, or worse.

Perhaps we should be thinking about a better system, one in which human beings come first.

PFOA's came from a Teflon manufacturing facility.

Ingredient of the Month KRATOM . . .

By Larry Plesent

Kratom is in the news this month as the DEA announced its push for the tropical tree to join heroin, LSD, MDMA and marijuana as a Schedule 1 drug. No prescription may be written for Schedule 1 drugs, nor may clinical trials be run to determine potential health or treatment benefits. Schedule 1 status essentially means that there is no socially redeeming value to a plant or molecule, so there is no point in studying its effects on human beings.

Kratom or Mitragyna speciose is a plant found in Thailand, Indonesia and other places with tropical Asian ecosystems. Kratom contains several chemicals that bind with opiate receptors in the brain. Its effect is somewhat similar to opioids but with allegedly fewer side effects. Kratom has a long history of use in controlling pain (in traditional Asian medicine) and is sometimes used in the West as a self-help management scheme for people attempting to wean themselves off of more powerful opiate based drugs. And yes, regular Kratom use can lead to addiction.

The threat of lifelong opiate addiction, though a huge deterrent for most; has not curbed the epidemic of opioid use in the United States. Closing the door on a species of plant- that has the potential to treat opiate addiction seems at minimum to be dangerous and short-sighted. Caving in to rich and powerful pharmaceutical companies who enjoy a monopoly on the treatment of millions of opiate addicted citizens may be business as usual in Washington, but also as usual, real people living real lives must bear the brunt of the foolishness of our selected and elected big money influenced government officials.

Kratom Tree
Wikimedia Commons

Methadone, a synthetic opiate, is the drug of choice in the U.S. as a treatment for plant based opiate addiction. It is considered by some drug treatment experts (who asked not to be named in this article) as being significantly more addictive than heroin. It is strange beyond belief that a potential source for powerful new drugs and drug addiction treatment has been eliminated without a single clinical trial. To see scientific studies on Kratom from around the world go to www.speciosa.org.

This is the Soapman reminding you that botany is NOT a crime (except when it is). Let's put the science back into medicine by ending the Schedule 1 designation altogether and allowing clinical trials for powerful plant substances.

VERMONT RESEARCH CLIMATE CHANGE NEWS

Climate Change, Wine Industry, Apples and Bears with Wind Turbines

cont'd from p.35

this phenomenon, the introduction of alewives, which prey on late-hatching smelt, could alter this pattern. The fish have additionally been hatching at increasingly earlier rates due to the gradual water temperature increase.

This systems-based approach striving to consider all aspects of environmental shifts has been utilized loosely throughout the country in the form of climate assessments by region. National climate assessments are essential for addressing climate change on a large scale, but they often aren't ideal for state and local application due to lack of detail.

Using their research from the Vermont Climate Assessment, researchers from the Gund Institute wrote a report presenting a framework for engaging knowledge brokers and decisions makers in state climate assessments (SCA). This article will help other states create their own effectively structured SCAs by encouraging them to "provide relevant, actionable information to state and local authorities, and to generate primary sources, build networks and inform stakeholders."

Despite temperature increases, **Ranch Brook near Stowe was found by the Vermont Department of Environmental Conservation (VT DEC) to support an extremely healthy ecosystem.** High levels were reported of macroinvertebrate species which rely on clean water to survive, although in recent years the density has been slowly declining due to increased peak flow from the changing climate.

Much can be done in terms of preserving the stream's health, though, as Ranch Brook still has two to three times lower macroinvertebrate density compared with similar-sized streams sampled across Vermont over the last three years.

In horticultural news, **Vermont farmers have turned to milkweed as a potential new cash crop despite its long-held reputation as an agricultural nuisance**. The plant is known for sustaining Monarch butterflies while they are caterpillars, but has no use once the adult butterflies fly south for the winter.

The Canadian company Encore3 plans to convert milkweed to "American silk" to line high-quality Canadian parkas, and the milkweed pods are proposed to be used as ultra-absorbent battens to aid in cleaning up oil spills. See the Burlington Free Press article for more information.

The Vermont Research News is a bi-monthly curated collection of Vermont research, focused on research in the Vermont "laboratory," that provides original knowledge to the world and research that adds to understanding of the state's social, economic, cultural and physical environment. For links, more information, or to receive the Vermont Research News go to www.uvm.edu/~crvt/?Page=news.php.

Deerfield wind energy project is participating in a bear population study. Photos courtesy of VT: Fish and Wildlife Department; Grasshopper: Wikimedia.org

Littleton Food Co-op

Expansion Promises Increased Energy Efficiency

3-D perspective drawing of Littleton Food Co-op's energy-efficient project, from the expanded parking lot.

Image courtesy of GBA Architecture and Planning

By Hope O'Shaughnessy

The Littleton Food Co-op (LFC) held a groundbreaking ceremony this August to herald their store's 9,500 square foot building expansion. The store's General Manager Ed King explained in a recent news release that, "The five year goals of the project are to increase our annual sales by more than $4 million, increase local purchases to $3 million annually and create 30 new jobs."

Also central to the vision for the $3.3 million project is a drive toward energy efficiency. By combining expertise with synergy with the co-op board, the new expansion will provide added warmth and vision to the community. Essential to that effort is the engagement of GBA Architecture and Planning of Montpelier, VT as the architect of choice. GBA Architecture and Planning designed expansions of two other Vermont food co-ops: Montpelier's Hunger Mountain and the Brattleboro Food Co-op. Trumbull-Nelson is the general contractor on the project.

The Littleton Food Co-op begins construction on their 3.3 million dollar expansion project which will add 9,500 square feet of community and retail space to the current store. Photo: Minnie Cushing.

The energy efficiency solutions are numerous throughout the new addition and pavilion, according to Diantha Korzun, AIA LEED AP at GBA. The building has a very good thermal envelope with a roof that is R60 while the walls are R40 and the floors R20. The roofs are built from structural insulated panels. The high roof is a cold roof with a thermoplastic roofing membrane, and the low roofs are standing seam metal cold roofs. The standing seam roof allows for easy installation of the photovoltaic panels that were designed for the new addition and pavilion.

Since the LFC has a well-insulated thermal envelope, mechanical systems could be reduced in size because of the reduced loads. The co-op solved the high energy usage issue of freezer and cooler cases by providing highly efficient fixtures inside. The store also has a FreeAire refrigeration system for mechanical needs.

"Our lighting designer, Jim Stockman, and electrical engineer, Tim Gaston from Yeaton Associates, provided beautiful and very energy-efficient LED fixtures for both the interior and exterior of the store," Korzun explained. The fixtures are strategically placed to provide enough light without giving off excess. Even vehicular transportation is taken into account, and the store will have multiple electric vehicle charging stations.

The new teaching kitchen and a thirty seat combined indoor and outdoor cafe will provide opportunities to gather in community. Retail and receiving areas will expand while current off-site administrative offices will be brought into the expanded space. The design includes porches with both ample display space and places to gather. The extended outdoor living space is embellished with permanent outdoor benches for sitting, plantings and green space.

The co-op and its membership were key to the process of developing a vision for the new construction. The goal according to Korzun, who was part of the process, was to better reflect the values of the co-op and its members in the new space. One of the key themes was a new focus with the community room and cafe, which was designed to have a warm glow especially at night and will welcome people into the store.

The development of the final plans included an exploratory process of working with the co-op's board to create the final design and include important input. "It's a fantastic creative process of discovery, and it gets everyone invested in the design of the building. In the end, the final design ends up being a place special to the client, not a space that could be anywhere in America," Korzun said.

A recent statement from LFC Board Members Tom Southworth and Marni Hoyle, also sums up the contribution of this new construction. "The result will be a store that uses less energy, saves operating costs, and contributes to the sustainability of the environment. As members and shoppers, we can be proud of our co-op for its energy conscience, alongside all the other contributions the co-op makes to the local food community and the economy of our region."

Southworth's and Hoyle's announcement goes on to add "As part of the expansion, rigorous energy systems analysis will be undertaken for both the old and new buildings to find ways to improve lighting and heat recovery, optimize building tightness and ventilation, and tune the efficiency of the systems that properly store our food. Many of the energy-saving opportunities will be immediately implemented as part of the expansion; others will follow as part of a comprehensive long-term plan."

The Littleton Food Co-op will stay open during the seven-month construction. For more information, please visit www.littletoncoop.com.

Which States are the Most Energy-Efficient?

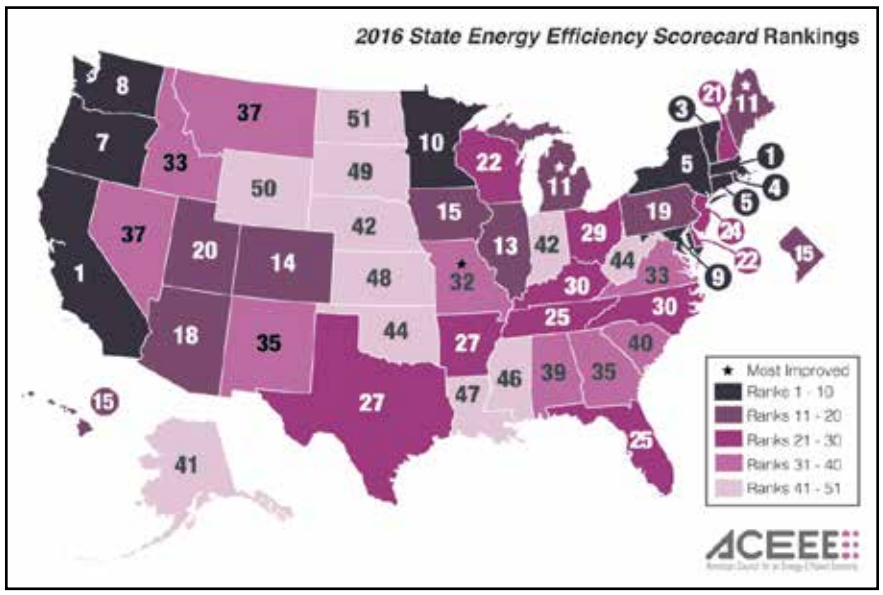
A "Dramatic Photo Finish," and a Tie for Top Honors

By John Rogers

Some people get excited about fall because of the beautiful foliage, the delightful blend of sunny days and crisp cool nights, and the bountiful harvests of apples and other tasty treats. I love all that, too. But I also enjoy this time of year because it brings the annual assessment of how states are doing on energy efficiency. And this year was more of a nail biter than most.

Whoever's on top, though, it's clear that when states make progress on energy efficiency, we all win.

The just-released 2016 energy efficiency scorecard from the American Council for an Energy-Efficient Economy (ACEEE) is the latest in ACEEE's annual assessments of state commitments to, and progress on, energy efficiency, their "annual benchmark of the progress of state energy efficiency policies and programs."



Who's on top?

Massachusetts had reigned supreme for quite a while, earning the #1 spot in each of the previous five years. So the real question—particularly for those of us in a Massachusetts-based office "competing" against our colleagues based on the West Coast—was whether the Bay State could avoid getting beaten by the Golden State.

The answer? Sort of.

Here's how ACEEE put it when unveiling the results: "In a dramatic photo finish, California and Massachusetts both won the top spot in the 10th edition of the 2016 State Energy Efficiency Scorecard published by the ACEEE. This marks Massachusetts's sixth consecutive year in first place, but the first time it shared the spotlight with the Golden State, which last held the title in 2010."

As shown in the ACEEE's full report, each of the top states scored an impressive 45 points out of a possible 50, and the scores of each represented an increase over last year's (1 point and 1.5 points, respectively, for Massachusetts and California). California scored a perfect score in five of ACEEE's six categories. Massachusetts scored 19.5 points out of 20 in the remaining category and got full marks in two other categories.

Other findings from this year's assessment:

- The top 10 spots feature the Northeast and the West Coast, but also the Great Plains and the Mid-Atlantic: "Vermont (#3), Rhode Island (#4), Connecticut and New York (tied for #5), Oregon (#7), Washington state (#8), Maryland (#9), and Minnesota (#10).
- Missouri, Maine, and Michigan earned "most improved" marks, with both Maine and Michigan just missing the top-10 list, going up three spots to tie for 11th.
- ACEEE called out progress on building codes in particular, noting that top scores went not only to California and Illinois, as in last year's rankings, but also to Massachusetts, New York, Texas, Vermont, and Washington.
- A solid pack of states from around the country got kudos for taking "major steps" toward adopting U.S. Department of Energy-certified building codes for homes and businesses, including Alabama, Delaware, Hawaii, Illinois, Maryland, Massachusetts, Michigan, New York, New Jersey, Texas, Utah, Vermont, and Washington.

More to come!

The biggest takeaway for me is that states keep upping their game on energy efficiency, pushing the envelope toward better, stronger, more effective policies and programs and showing the nation as a whole how to do things. The lead author of the scorecard, ACEEE's Weston Berg, put it this way, "Over the last 10 years, we have seen that many, if not most, innovative policies and programs that promote energy efficiency originate at the state level. As a cost-effective compliance option, efficiency is a valuable addition to any state's policy toolkit, saving money, driving investment across all sectors of the economy, creating jobs, and reducing the environmental impact of energy use."

And if competition among the states helps drive that progress, all the better.

Just know, California colleagues, that we're going to be pushing for Massachusetts to be #1 again next year. Just try to keep up, will ya?

John Rogers is a senior energy analyst with expertise in renewable energy and energy efficiency technologies and policies. He co-manages the Energy and Water in a Warming World Initiative (EW3) at Union of Concerned Scientists that looks at water demands of energy production in the context of climate change.

Source: http://bit.ly/ucs-energy-efficient-states.