Wallace Broeker's FINAL WARNING

Wallace Smith Broecker, the man some people have called the “grandfather of modern climate science,” died on February 18, 2019. He was 87 years old and had been suffering from heart disease for decades. He worked despite his illness, and he addressed other climate scientists in an important discussion only a week before he died. Speaking to them, he gave the people of our planet a warning. Because of his health, he was not able to meet his colleagues face to face. Instead, he had to give a recorded message. He sat in a wheel chair and breathed air enriched with oxygen from a tube. He knew he was in rough physical condition, but he told his audience, “My mind is running pretty smoothly.”

His message was simple. We are not moving fast enough to stop climate change, and we have to work much, much harder. To do otherwise is unacceptable for the sake of the survival of humanity. He also spoke of one way we might stop it, although he only considered it as a last ditch effort. It would be a possible option even if we wait too long for emissions reductions and conventional carbon draw-down methods to work. That way is called “geo-engineering.” It is not the most desirable approach but may be what we will have to do, if we wait too long.

Cold nights and warm days bring in maple sugar season in Vermont. Many operations today use tubing, but there are still a few sap buckets around that find their way back to the old maples year after year.

George Harvey

The Sap is Rising!


Broecker had worked a long time in the field of climate science and in disciplines to which it is related. In 1975, he published a paper called, “Climate Change: Are We on the Brink of a Pronounced Global Warming?” The title was the first mention of global warming that made any impact on the minds of many people. Broecker also brought popular attention to the failing experiments, as we fail to steward the environment’s ability to support our lifestyle.

The GND addresses the issue of sustainability by setting goals we can achieve for the environment, our health, and employment. It says we will be carbon-neutral in ten years, we will offer health care to all, and we will make sure that everyone can earn a livable income.

The hardest part of the GND may not be paying for it. In fact, it may pay for itself. The energy side of the GND could turn out to be easily achieved. Falling costs of renewable energy have already hit parity with fossil fuels. Electric vehicles are already competitive with those dependent on gas and oil. Heat pumps already save money over carbon-based systems. Efficiency beats all else. And the nature of the technological learning curve (Wright’s Law) is that the failing costs will continue to fall for some time, quickly making fossil fuels impractical.

We could save hundreds of billions of dollars each year just by eliminating air... be energy independent!

IT'S ALL ABOUT THE KIDS!
Go to pages 20-21

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IT'S ALL ABOUT THE KIDS!
Go to pages 20-21
Green Energy Times (G.E.T.) will be celebrating our 10-year Anniversary in our May 3rd edition!

May 4, 2009 — May 3, 2019

We need your support to continue for the next ten years. Our mission-based resource publication is making a difference all around us, but we have a long way to go and much to do.

Please consider donating directly online on-greeneetimes.org or send your donation to 1749 Wright’s Mountain Rd., Bradford, VT 05033.

You can align yourselves with Green Energy Times and all that you read in each edition of G.E.T. Don’t hesitate to join in our efforts.

Sponsorships, advertising and donations will help us keep going.

There is no Planet B and the time is now to help us educate all those who pick up Green Energy Times or read it online. Let’s keep it free.

With your support, we can continue for another ten years.

Green Energy Times Team
We at Green Energy Times (G.E.T.) want to take some time to remember and appreciate Jeffrey Wayne Skelskie, 70, who passed away at his home on February 17, 2019.

Jeff started his battery company, Special Services, as a Saab, Jaguar, Volvo, and Porsche mechanic, but he turned it into a distributor business for wire and cable connections. His knowledge of both batteries and solar power was extensive, and he spent a lot of time educating people in seminars on battery maintenance. He became known as the “battery doctor” for diagnosing battery bank problems for off-grid homes. He was known for his precise custom cables and wiring of battery banks that were said to look like works of art.

For years, Jeff and his wife, Wenda Luff, volunteered at Sugarbush Resort in Waitsfield as adaptive ski instructors. This, however, was just one instance of his helping others.

He was involved with SolarFest since the 1990’s, as a member of the Board of Trustees, advisor, technician, educator, exhibitor, and all-around participant in the fun. Most recently, he ran the information table at the 2018 SolarFest and offered guidance for 2019 planning. The SolarFest team said that Jeff’s knowledge and enthusiasm will be greatly missed.

In years past, Skelskie dedicated a lot of his time to the Northeast Sustainable Energy Association (NESEA) with Tour de Sol. It was here that he clearly believed in doing all he could to help us transition to a fossil-free sustainable future. He was in charge of setup andakedown of the various stops on the Tour de Sol, and he helped with Junior Solar Sprints for many years. He received the NESEA Service Award for his contributions.

Pictured is Jeff’s Chevy S-10 truck that he converted to run on battery power. It was 120-volt DC, and he used it as a power source at many venues, including the GarlicFest in Orange, Massachusetts.
He ran power for off-grid stages at Pete and Toshi Seeger’s Clearwater Festivals. Jeff and Wenda voluntarily helped Green Energy Times with distribution in the Pioneer Valley of Massachusetts for many years, spreading the word on clean energy. He was always willing to provide assistance and believed in my mission. Jeff proudly kept a copy of every edition since G.E.T.’s inception in 2009. We valued him immeasurably. He will be missed greatly by all those whose lives he touched. The funeral service was held on February 23rd and will be a short graveside committal on May 11th at 3:00pm in Rochester, VT at Woodlawn Extension Cemetery.

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

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

Solar Power works! anywhere under the sun!

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Green Energy Times would like to thank everyone who has submitted articles or helped in any way to make this all a reality. We want to also thank our advertisers & ask that you support them. Some of our local advertisers include: Green Energy Times.

In 2017 all G.E.T. morning schools towards a green, renewable future — one where our children & grandchildren will be able to breathe & grow, live & love on this beautiful planet where we live. Thank you for reading G.E.T. Please send your comments & suggestions to info@greeneetimes.org

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

*G.E.T.’s Carbon Footprint Disclosure: Green Energy Times is mostly locally sourced products. The printing process uses rainwater-based inks. There are no total green printers in the area that we are aware of, so it would mean trucks to them MUCH further to have G.E.T. published in a totally green G.E.T..

We chose to move from printing that used soy based inks in years past, spreading the word on clean energy, as a consequence. We chose to move from printing that used soy based inks because the soy is only used for the colors - not black, which is the most prominent color. Dye distribution inks, are also kept to a minimum, as well. With the wonderful help that we got from many companies, it keeps our carbon footprint to a lower a footprint. Hopefully our footprint is offset because we are 100% solar powered! Because all our employees work from home, our carbon footprint is kept to a minimum. We grow most of our food organically and live as sustainably as possible. We DO walk our talk! Peace.

G.E.T.’s COMMUNICATION TEAM:
Peace!

2019 Vermont Businesses for Social Responsibility
29th Annual VBSS Conference May 15th, Burlington
Join 300 forward-thinking business professionals, network with 40+ exhibitors, enjoy a localvore lunch, choose from 15 workshops, and stay for a cocktail reception. To register, visit: vbsr.org.

Vermont Businesses for Social Responsibility
G.E.T. EXPLAINS THE GREEN NEW DEAL (Cont'd from p.1)

As Vermont's Greenhouse Gas Emissions Continue to Rise, ACTION ON CLIMATE IS MORE IMPORTANT THAN EVER

Our nation’s economy is tied to fossil fuels and a pursuit of American greatness in obsolete technologies. The result of this is that countries like China and India have surpassed us in vital economic activities ranging from vehicle production to computer engineering. Today, America is trying to enter the future by living in the past, hardly a path to greatness. New York Governor Andrew Cuomo’s and Vermont’s Green New Deal to save us from inevitable failure of a system that pretends its own sustainability is unimportant.

If our nation can become a place where everyone is employed and healthy, living in a clean environment, then we will have a nation wealthy and robust. Today, America is trying to enter the future by living in the past, hardly a path to greatness. The Green New Deal proposes to expand our current sustainability agenda to include a binding national commitment to carbon neutrality across all sectors of the economy, stating his goal for 100% carbon-free electricity across the state by 2040, a unprecedented increase from his 2016 REV proposal. This new plan is ambitious but, if pursued, would ensure a more sustainable future for New York. The key points include an increase to 70% renewable energy by 2030, another $1 billion towards clean energy technology and projects, and a whopping $250 million commitment to electric vehicle infrastructure. There are plans to strengthen and build energy codes and appliance efficiency standards, develop a “Net-Zero Roadmap” to bring us closer to state-wide carbon neutrality in buildings, and ensure state agency facilities uphold strong sustainability and energy efficiency standards. The project energy from the REV will increase dramatically with New York’s offshore wind target quadrupling to 9000 MW, energy storage doubling to 3000 MW, and solar projects also doubling to 6000 MW. Finally, the Green New Deal proposes to expand the Clean Energy Communities program that incentivizes communities to buy and produce clean energy, as well as increasing funding for workforce development. And economic problems that the plants represented. “This is the Green New Deal,” he said. “Not in concept, not in the future, but now” (http://bit.ly/LATimes-GND).

Los Angeles is not the only place where progress is being made. Support for climate action and the other goals for the GND is so widespread and extensive that it is hard to keep up with its current status locally.

Of course, environmental groups have run a number of closely related programs for years. One of the best known is the Sierra Club’s Ready for 100 campaign. (http://bit.ly/ready-for-100) This is an issue that can succeed without support of the federal government. We, the American people, can bring it about by acting at the state, local, and personal levels.

New York’s Green New Deal (For Dummies)

Jenna Batchelder

On January 15, Governor Cuomo of New York announced his bold plans for the “Green New Deal,” (not to be confused with the recent proposal of the same name made by congresswoman Alexandria Ocasio-Cortez) as a response to pressure from progressives concerned about rapid climate change.

This comes on the heels of the “Renewing the Energy Vision (REV)” proposal made by Cuomo in 2016. The proposal was aimed at creating major changes to New York’s energy usage. The REV proposed a switch to 50% renewable energy statewide by 2030, a 20% cut to energy usage in state buildings by 2020, an investment of $1 billion in clean energy technology and projects, a commitment to producing 2400 MW of wind energy, 3000 MW of solar, and 1500 MW of energy storage. The proposal also outlined plans to create new jobs and support clean energy transportation.

This bold plan was met with enthusiasm from progressives and clean energy advocates alike. In his 2019 Justice Agenda, Governor Cuomo called for even more aggressive steps to be taken towards clean energy reform, stating his goal for 100% carbon-free electricity across the state by 2040, an unprecedented increase from his 2016 REV proposal.

This new plan is ambitious but, if successful, would ensure a more sustainable future for New York. The key points include an increase to 70% renewable energy by 2030, another $1 billion towards clean energy technology and projects, and a whopping $250 million commitment to electric vehicle infrastructure. There are plans to strengthen and build energy codes and appliance efficiency standards, develop a “Net-Zero Roadmap” to bring us closer to state-wide carbon neutrality in buildings, and ensure state agency facilities uphold strong sustainability and energy efficiency standards. The project energy from the REV will increase dramatically with New York’s offshore wind target quadrupling to 9000 MW, energy storage doubling to 3000 MW, and solar projects also doubling to 6000 MW. Finally, the Green New Deal proposes to expand the Clean Energy Communities program that incentivizes communities to buy and produce clean energy, as well as increasing funding for workforce development.
Vermont Considers Regulating Electric Car Charging

David Roberts

Greater availability of new and used plug-in electric vehicle (EV) models combined with purchase incentives, charging infrastructure investments and growing consumer awareness are supporting transportation electrification across the region. The advent of longer range and more affordable plug-in electric vehicles (EVs) continues to boost sales in the northeast.

Many states are struggling with reducing transportation greenhouse gas emissions and have recognized the important role electrification can play in meeting climate and energy goals when done in concert with broader transportation efficiency programs to reduce vehicle travel. As an example, the State of Vermont’s comprehensive energy plan calls for 10% renewable powered transportation, or about 50,000 EVs by 2025, growing to 90% of vehicles to meet the goal for 90% renewable energy across all energy sectors by 2050. As EVs grow from less than 1% of registered vehicles to 10% (or more), there are unique issues many states and electric utilities are ensuring this shift brings the greatest benefits at the lowest possible cost to society. State public utility commissions have a special role in these efforts as they oversee a variety of regulatory programs affecting electric utilities and consumers.

The Vermont Public Utility Commission (VT PUC) was directed by the Vermont legislature to launch an investigation into EVs by Section 25 of Act 158 of the 2017-2018 session (https://legislature.vermont.gov/bill/status/2018/H.917). The full charge to the VT PUC on EVs covered thirteen specific areas - the seven issues listed below are potentially of greatest interest for EV owners and those seeking to advance their adoption:

1. Reducing barriers to EV charging deployment, including strategies such as time-of-use rates to reduce costs;
2. Strategies for managing the impact of EVs on the electric transmission and distribution system;
3. Electric system benefits and costs of EV charging and electric utility planning for EV charging;
4. The recommended scope of government regulatory jurisdiction over privately owned charging stations;
5. Pricing of public charging and transparency to the consumer of rates;
6. How EV users will contribute toward the cost of maintaining the State’s transportation infrastructure; and
7. How EV users will contribute toward the cost of maintaining the State’s transportation infrastructure.

VT Green Transportation Challenge Incentivises K-12 Schools

Deb Sachs

**MAY 22 DEADLINE TO SIGN-UP AND EARN POINTS FOR A CHANCE TO WIN**

Way to Go! to School, an award winning, incentive-based program encourages everyone to make smart travel choices to school (i.e., walk, bike, carpool and take the bus). Already, 72 schools and more than 20,000 faculty, staff and students are participating in the 2018/19 Way to Go! School Challenge. Schools are battling the growing carbon pollution problem by demonstrating how active or sustainable transportation habits really add up to hundreds of thousands of pounds of greenhouse gas emission savings!

Organizers have designed this interactive program to support green transportation efforts in Vermont K-12 schools. Beyond travel behavior, Local Motion, Vermont Energy Education Program and others are helping develop school travel plans and organizing pop-up demonstration projects to improve infrastructure for walking and biking.

Edmunds Middle School in Burlington, for example, installed a pop-up protected bike lane, and Rutland’s Christ the King School added curb extensions to calm traffic. In both cases, the school and community came together to install temporary materials to improve safety for students wishing to travel to school on foot and by bike.

There is still time for others to sign-up and earn points until May 22. A special incentive to all schools is offered if they sign-up by Wednesday, May 22 for a chance to win 25 pairs of Darn Tough Socks (to be raffled to six lucky schools). We encourage administrators, public health professionals, educators, parents and volunteers to check the status of their school at http://www.waytogovt.org.

**How It Works:** Participation in Way to Go! is easy and free. It’s designed to engage all ages and Vermont schools to make incremental steps to save money and reduce environmental impacts through greener travel options, including riding the bus and carpooling. Identify a school coordinator, sign-up, select a fun activity like ‘snowshoeing to school’, or simply choose to do one or more transportation-related activity from the broad menu of activities.

Report all activities and earn points for great incentives like free helmets and bike racks. Fifty points gets your school in the running for grand prizes: AllEarth PowerFlower and QOR360 active chairs! Learn how it works, how to earn credits and earn prizes at http://bit.ly/HowItWorks_WaytGo. We are ready to support the good work you are doing with technical expertise and incentives, rewards and recognition for actions that make a difference, no matter how small.

It’s Go Time! Upcoming events to help you in your work are listed below. Mark your calendars!
**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://climatedevelopment.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, tourists, 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. advance-transit.com

**CARROLLOU COUNTY TRANSIT** – Services and connections to Belknap County. 888-997-2020 tcap.org/rtc.htm

**City Express** – Serves Keene. 603-352-8497 hsserves.org/services/transportation/cityexpress.php

**SCS TRANSPORTATION** – Services for Sullivan County. 603-542-9609. SCSHELPS.ORG

**CONCORD AREA TRANSIT (CAT)** – Serves Concord 603-225-1899 concordareatransit.org

**CONTUCCOOK VALLEY TRANSPORTATION (CVTC)** – Monadnock Rideshare for the southwest region 877-428-2982

**COOPERATIVE ALLIANCE FOR REGIONAL TRANSPORTATION (CARTR)** - 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 dartmouthbed.com

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

**MID-STATE REGIONAL RIDE RESOURCE DIRECTORY** - Services elknapp-Merrimack Counties, excluding Hocksett and the towns of Deering, Hillsborough and Windsor of Hillsborough County. 603.225.3295 x1201. midstatecar.org

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

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

**IN VERMONT**

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

**Vermont Public Transportation Public Transit** – Lists transit, ferries and more at aot.state.vt.us/PublicTransit/providers.htm

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

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

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

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

**GREEN MOUNTAIN RAILROAD** – Day trips from White River, Champlain Valley, Bellows Falls and Rutland. railvt.com

**GREEN MOUNTAIN TRANSIT AGENCY** - Local service in Barre, Montpelier, Grand Isle, Stowe and Lamoille. 802-223-7237 gmta.org

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

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

**MARBLE VALLEY REGIONAL TRANSIT** - For Rutland, Killington, rural Manchester, Poultney and Rutland to Bellows Falls. City routes Free on Sunday. 802-733-3244 thebus.com/

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

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

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**The Cheap Gas Station in Your Garage**

What if you could go to a new gas station and fill up for 60¢ per gallon? How much would that save you and your family on fuel every month? Well, there's no need to go to the gas station to get this great deal. Now, you can fuel up for the equivalent of 60¢ per gallon right in your own garage thanks to Burlington Electric Department’s (BED’s) new residential electric vehicle (EV) rate, and do so with 100% renewable-sourced energy.

How's it works:

- **Get an Electric Vehicle** - Purchase or lease an EV by taking advantage of the purchase and lease rebates that BED makes available to customers, as well as financing support through three local partner credit unions. BED offers an increased rebate for low- and moderate-income customers to help make EVs more accessible for all.

- **Install an Eligible Home Charging Station** - If you purchase or lease a new EV, you may receive a BED incentive toward the purchase and installation of qualifying charging hardware that makes you eligible for the new EV rate. If you already own an EV, or have a plug-in hybrid, you still may sign up for the EV rate after installing the qualifying hardware (without the incentive). Currently, the qualifying hardware includes a level 2 home charging station from a participating charging station partner.

- **Charge Up Off-Peak at the Equivalent of 60¢ per gallon** - Once you have installed your home charging station and signed up for the new rate, schedule your vehicle to charge at home between 10pm and 12noon (the following day), and you will receive a bill credit that reduces your EV charging rate to 60¢ per kilowatt-hour. With BED’s new, special rate, the cost of charging your EV is roughly equivalent to 60¢/gallon of gas.

Once you are signed up for the EV rate, you still may decide to charge outside the 10pm to 12pm timeframe, but your charging rate for that entire month would be the standard residential rate. Then, you would be eligible for the special eight cents per kilowatt hour EV rate again the following month.

With many new EV and plug-in hybrid vehicles coming to market, including more all-wheel drive and four-wheel drive options, BED customers have increasingly affordable and practical choices. In addition to the new home charging rate, EV drivers also have options to charge around the

City at one of BED’s 14 public charging stations that offer 26 charging ports. For all the details on EV rebates and the EV charging rate, including eligible hardware choices from a participating charging station partner, and a map of public charging stations, please visit www.burlingtonelectric.com/EV.

The new EV rate and our EV incentives are part of a vision for the future where we utilize the electric grid to meet more of our transportation needs. Mayor Miro Weinberger has outlined, and BED has adopted in our 2018-20 Strategic Direction, a goal to make Burlington a Net Zero Energy City by 2030. In addition to the new EV rate, BED is helping the City move toward the Net Zero goal by providing incentives to bring electric transit buses to Burlington and by offering incentive rebates on electric bikes at local retail shops.

BED’s efforts to support EVs provide a benefit for both our environment and our economy.

Environmentally, EVs and plug-in hybrids reduce air pollution and greenhouse gas emissions relative to conventional vehicles. This is especially true when EVs are charged on BED’s grid, which is powered by 100% renewable energy. With transportation now making up the largest source of greenhouse gas emissions in Vermont, EVs and other modes of electric transportation offer opportunities for meaningful emissions reductions.

Economically, the new EV rate is a great deal for EV drivers at the equivalent of 60¢ per gallon of gas. But the best part about our EV rate, however, is that it will help more EV drivers charge off-peak and use the grid more efficiently. When our community uses power off-peak, we avoid the need for additional grid infrastructure investments and avoid additional costs, providing a benefit to all BED customers and ratepayers. In addition, Vermont sends over $1 billion annually out of state to import fossil fuels. Electric transportation provides the opportunity to use our own resources - the local electric grid and local EV charging stations - instead of distant and finite fossil fuels.

Electric transportation represents a significant part of our Net Zero Energy City strategy for Burlington and helps us contribute toward meeting the goals of Vermont’s Renewable Energy Standard. BED’s new EV charging rate is another opportunity to make driving an EV more affordable for Burlingtonians. We hope you will consider driving electric in the future.
Randy Bryan, Drive Electric NH

"Ford focusing on trucks and SUVs"
"GM drug dealers for trucks and SUVs"
"Ford giving up on U.S. car business"
"Cadillac EV three years out"

PEVs do you see filling the lots of car dealers? Hardly any.
I am saving my biggest disappointment for General Motors (GM) and Ford.Both have announced to the world that they no longer will produce sedans and will focus on gas guzzling trucks and SUVs to make money for the transition to electric vehicles (EVs). That means we may have to watch five years of non-stop truck and SUV ads.

That might work for a year or so, then the makeup starts to melt. Unfortunately, they have little choice now that they foresee the car market years before they had viable EV designs ready. It will take 3-5 years to get those designs to market in volume.

So, one asks, if Tesla made a profit by producing in volume, why doesn't GM start producing 200 thousand Bolts and Volts per year and clone the drivetrain to other vehicles to get profitable? The answer is complex, but basically, I don't think they can. They shut down the Volt future when they announced the end of plug-in hybrids and the Cruze (car frame for the Volt). The drivetrain port to Cadillac didn't sell. The Bolt is a good effort at pure EV design but still not low enough cost to make in volume for...
There are some companies that keep coming up with good news. Two of them, both companies that Green Energy Times (G.E.T.) has covered in numerous articles and on-line postings, are ReVision Energy and Energy Emporium. On February 4th, they announced that they are merging.

In some ways, the two companies were very different. ReVision Energy has five offices in three states and 250 employee-owners. Energy Emporium had a single office in New Hampshire, run by co-owners Kim Quirk and Anita Gonzales, along with three employees.

Even so, there are reasons why the merger makes perfect sense. Despite the clear difference in size, the two organizations share a common approach to their work that is deeply important to both. They both work to benefit their customers to the best of their abilities, reducing both fossil fuel use and energy costs, and in that they are a clear match.

ReVision Energy is a certified B-Corp. This means that the bottom line for the company is not profit but making a difference, benefitting the community, customers, and the environments wherever it works. It is also an employee-owned cooperative.

ReVision Energy has been increasingly active in the Upper Valley area of New Hampshire and Vermont. Its work in that area include large systems installed at Dartmouth College. ReVision Energy’s work shows up in nearly every issue of G.E.T. One example is in the article, “New Hampshire’s First Multi-Family Passive House,” which appeared in the June, 2018 issue (bit.ly/G.E.T-NH-1st-passive-house). ReVision Energy co-founder, Dan Clapp, made the scope and scale of the company’s goals clear when he said, “ReVision’s mission is to transition our region to 100% renewable energy, solar and solar-powered complementary technologies, and the Upper Valley is critical to that effort.”

Energy Emporium of Enfield, New Hampshire, founded by Kim Quirk, has been focused very closely on customer benefit and satisfaction. Though it has not been a B-Corp, its values are very much to the benefit of the customers and communities. The business was the subject of one of G.E.T.’s “Getting to Know Your Solar Installers” articles (bit.ly/G.E.T-EE-solar).

It has also been held up as an example of an effective organization run by women in a field some people think of as male-dominated, as G.E.T. reported in the April, 2017 story “One Woman’s Amazing Story: Solarizing In The Upper Valley.” That article described how Energy Emporium provided solar systems for fifty-three homes taking part in a solarize campaign in one year (bit.ly/G.E.T-EE-solarize).

We asked Anita Gonzales, an employee at Energy Emporium, about the merger, and she made it clear that the largest part of the reason was ultimately to benefit the customers. “We really like our customers,” she said, “We want to be able to ensure that they are taken care of in the long term.” ReVision Energy will continue to serve Energy Emporium’s customers as its own. The service will, in fact, come from the same physical office in Enfield, though with a different name on the sign. And it will be done by the same people, because Quirk and Gonzales will be employee-owners of ReVision Energy.

Other benefits for the customers include greater access to service and offerings than Energy Emporium could provide. The merger will allow the customers to get the benefit of experience and knowledge in a wide range of technologies beyond solar systems, including solar powered heat pumps and vehicle charging systems.

In the merger, ReVision gains an Enfield office with connections to local communities in the Upper Valley, into which they were already expanding. For its part, Energy Emporium became part of a larger B-Corp, which means that its values have become official parts of the corporate charter, and its people are now employee-owners. For the customers, it means that service continues as before, with added benefits.

The new ReVision Energy office, formerly Energy Emporium’s, is in Enfield, NH. It is in a house built in the 1850s, which Kim Quirk had retrofitted to be a zero-net-energy building. ReVision Energy also has offices in Portland and Liberty, Maine; Brentwood, New Hampshire; and North Andover, Massachusetts.

Drive Electric New Hampshire

Cont’d from p.6

the existing price point. Also, their battery chemistry is still loaded with cobalt which is expensive. It will take years to get the cobalt out with street-worthy chemistry. With EVs remaining a money loser, GM will keep the volume low. Even worse, GM’s federal tax credit is running out. And for risk, they announced Cadillac as their new lead brand for electric vehicles, then promptly admitted the EV transition may be Cadillac’s last chance to get it right (Saturn redux anyone?). Ford’s story is similar to GM’s. They started a few months earlier but have a longer way to go. Don’t even bring up Chrysler. Maybe Apple will rescue them.

To be sure, there is some good news here. GM and Ford have committed to serious EV transitions and focusing sales and production on trucks and SUVs will be kept them profitable for a while. GM leading with the Cadillac brand might be smart with upmarket potential for early profit on performance EVs. But can Cadillac get it right? When will they ship the first EV? A recent trade article predicted three years. Ford said they will focus early on the Lincoln brand (yawn). GM and Ford also announced they will develop PEV trucks and SUVs. Hooray! I see promise there but still over three years out.

So, again, sorry, we’re in for five years of mind numbing truck ads! Enjoy.

Randy Bryan is one of the co-founders of Drive Electric NH. Bryan has been an advocate for electric cars for eight-plus years. His company, Converdant Vehicles, has converted vehicles to plug-in hybrids, including his own Prius in 2008, and developed and sold inverters that turn a Prius into an emergency generator.
Bellavance worked for the DC Sustainable Dairy Farm. Before returning to his clean energy roots to boost the sustainability of his family’s farm by limiting risks to the operation and low-angled space for optimal solar electricity production. Additionally, the newly-constructed barn will provide long-term energy savings and stability. The newly-constructed barn has 18,000 square feet of unshaded roof from the elements and extend its life.

Bellavance added, “The way solar produces peak power mid-year matches perfectly the cycle of when a dairy farm uses the most power. Peak consumption is a hot July day, and with ventilation fans running nonstop at full speed there are significant energy costs.” Solar power will cut his Alburgh power bills by two-thirds. “Federal and state tax incentives and a USDA REAP grant cut my out-of-pocket cost dramatically,” said Bellavance.

Sunset Lake’s PV system is expected to produce 195,555 kWh per year, enough to cover the energy costs for the milking parlor and fresh cow barn. Other sustainability attributes include offsetting about 8,900,000 lbs. of CO2, the equivalent of planting 102,483 trees or 9,204,000 miles not driven over 25 years.

Bellavance says solar also gives him more choices for future operations at the farm such as greenhouses, kilns, or cheese-making.

Steve Snyder works for Norwich Solar Technologies. To learn more visit norwichsolar.com. Contact Steve at 802.359.7406 or steve.snyder@norwichsolar.com.
Even Greener Recycling at TAM Waste and Recycling

Jessie Haas

Trevor Mance of Pownal, VT has always considered himself “the ultimate environmentalist.” This led to starting a business, TAM Waste and Recycling, when he was still in high school. As a 17-year-old, he couldn’t legally own a corporation, so his father had to be president for a year, but at 18 Trevor deposed his father and took over. Twenty-three years later, his business has grown from 60 stops on a Saturday, to a fleet of 40 trucks handling 50,000 tons of waste, 8,000 tons of recycling, and a large compost yard.

Mance wanted to “go solar” for years, but the time was never quite right. At one point a few years ago, he made the choice to ‘go down the composting path’ for environmental reasons. But with the recycling market in the doldrums, solar became imperative both for environmental reasons and to reduce costs. When TAM built a large building to house a tip-floor, they also did the engineering necessary to make the roof strong enough for an array. The extra cost was small, so they went ahead. Two more years passed while they applied and re-applied for a U.S. Department of Agriculture (USDA) grant. When that didn’t come through, Trevor went ahead and self-financed the project.

To design and install it, he turned to Bhima Nitta, of Power Guru Electric Systems in Bennington. Nitta, a native of India, came to this country in 1987 for graduate school. He worked in the chemical industry for years but had a growing longing to do something for the environment. He moved to Vermont in 2008 and began his solar business with a small installation on his own garage. From a slow beginning of a couple of installations a year, his work increased steeply, and he now averages fifty a year.

For TAM he installed a 92kW array of 288 Hanwha modules, 144 SolarEdge optimizers, and one 100kW SolarEdge inverter. The project had to move quickly so the credits could apply to TAM’s 2018 bottom line. Nitta “went on a war footing” with a crew of eight people, including two designers. As the installation had been long-planned, TAM had the net-metering registration and certificate of public good in hand. The installation took two months and went live on schedule, around the 20th of December. Through group net-metering, the output will be split between TAM’s Pownal and Shaftsbury facilities. It should supply 90% of TAM’s electricity needs. Images: Power Guru Electric Systems

Most people don’t realize, Mance says, that recycling uses a lot of energy, starting with the trucks. “We use a boatload of power, just plugging our trucks in. “Each block-heater uses 15000 watts, and, in the winter, they all need to be plugged in to be ready to roll in the morning. Though Mance has worked hard to stagger the load and minimize the time each truck is plugged in, it still amounts to a lot of electricity.

Recycling itself is also energy-intensive. TAM has a monthly electricity bill of around $2600. That’s something Trevor Mance thinks about a lot—the many elements of our personal energy footprints, including the power used by the stores and factories that provide us with goods and services. To understand our true impact on the environment, we have to become informed consumers. People in the Bennington area can feel good knowing that their waste, recyclables, and compost are being handled by someone with decades of practical concern for the environment.

Mance is a believer in rooftop solar, yet on a 38-foot-tall building, his array has received little public attention. Mance would like his customers to feel good knowing that not only are they recycling, but that the power needed is coming from the sun.

The Largest Solar Array in Vermont

George Harvey

Not long ago, the largest solar project in Vermont had a capacity of 2.2 megawatts (MW). For a long time, however, there was no one array that was largest. There were a lot of 2.2 MW solar arrays, because that was the largest size allowed under net-metering. A change came along when the net-metering law was renewed, specifically allowing one 5 MW net-metered array on a landfill in Brattleboro. That array was tied to the grid last June, and it was formally commissioned on October 11, 2018 (bit.ly/brattleboro-solar). It looked like the solar array on a landfill in Brattleboro might be the largest in the state for a while. There was no state incentive to have larger solar systems, there was comparatively little activity going into developing them, and there was no guarantee that any of them would be completed.

The costs of renewable energy have been continuously declining, however, as a result of what is popularly called the "learning curve." formalized as Wright's Law, it tells us that as we do more work with a technology, we learn more about it, and it becomes less expensive. As a new technology is increasingly adopted, its costs decline in a fairly predictable manner. The costs of solar photovoltaic (PV) systems exemplify this. The result is that it is possible to develop solar systems in many places that would not have been cost effective without state incentives only a couple years ago.

We started hearing rumblings about possibilities for much larger solar arrays planned for Vermont back in 2015. One of them was the Coolidge Solar Project, to be built mostly in Ludlow, with a small part in Cavendish. At 20 MW, it was planned to be four times the size of Vermont's largest solar system. Initially developed by Ranger Solar, development passed to NextEra Energy, and it was approved by the Vermont Public Service Board in March of 2018.

Work on the array started quickly. A very few months passed in which groundwork was done, and construction materials were arriving in August. The Coolidge Solar Project has approximately 83,000 PV panels in it. They were installed by a work force that grew temporarily to 115 people.

Ludlow has a population of a bit less than 2,000. Since it is not a large community, special arrangements had to be made for such simple things as parking for the installation workforce. During the late summer and fall, some of the local businesses were kept pretty busy, keeping up with demands of the increased numbers of people in town.

The project was completed in the middle of December, at which time it began feeding power to the grid. Its energy is being sold to customers in Connecticut, along with the renewable energy credits, but that is more a fact of accounting than of the flow of power on the grid.

While the work was good for the community economically, there are other, more enduring benefits. The site will permanently employ a small workforce to service the system. Between installation and ongoing employment, the project will provide $15 million spent on local labor through the end of its first twenty years. The site will pay taxes of $4 million over the same time, benefitting both Ludlow and the state of Vermont. Economic activity will add $25 million to the gross domestic product of the state over the same time.

The village of Ludlow will have direct economic benefits as a result of negotiations with Ranger Solar. Two payments were made when the solar array went live, one of $100,000 to the community and one of $75,000 for a new gymnasium floor in the elementary school. Payments to Ludlow will continue at $35,000 per year for the first five years and then at $25,000 per year until the array is forty years old. The total contributions to the village will come to $1,225,000, which is an import benefit for a small municipality.

Scott Murphy, the municipal manager for Ludlow, told us, "The Town fully supported the development and permitting of the Project. It is a comfort to know that Ludlow is helping to bring clean, renewable, and cost-effective energy to the region as well as the jobs and economic benefits from the construction of the facility."

American Made Solar Prize

We just learned about a competition being run by the National Renewable Energy Laboratory designed to revitalize US solar manufacturing.

To read more about the American Made Solar Prize go to:
Chris Gillespie

Last March, the residents of Newport, New Hampshire, made statewide headlines for approving the largest municipal solar project in the Granite State. This March, Newport is garnishing attention for a solar installation that is much smaller in scale but perhaps even more meaningful for many in western New Hampshire.

The Hoyt Community Care Center, which is home to the Newport Food Pantry and a community learning center, recently started harnessing solar energy to power its facilities, thanks to the help of their neighbors at Sol-Air.

“We’re a locally owned and operated company,” said Sol-Air Systems Design Specialist Ian Pahl. “As a small company, we truly care about giving back to our community organizations.”

For the team at the Hoyt Community Care Center, partnering with Sol-Air for the project was an obvious choice. Founded in 2006 as New England Solar Concepts, Sol-Air specializes in the residential installation of photovoltaic solar panels, heat pumps and solar energy battery solutions. Originally, Sol-Air only serviced New Hampshire, however, they have recently expanded into Vermont.

“Start-to-finish, every step of the installation went smoothly,” said Pahl. “We were a little delayed by a winter storm, but other than that, everything went very well.”

The Hoyt Community Care Center’s rooftop array is currently live. The forty-two panel, 12.81kW photovoltaic system is expected to yield 1,300 kilowatt-hours a month, equaling approximately 15,000 kilowatt-hours a year. Overall, Sol-Air estimates that the array will cover roughly 60% of the Hoyt Community Care Center’s energy load.

Providing over half of the Hoyt Community Care Center’s energy is no small feat, as the Newport Food Pantry utilizes quite a few heavy-duty kitchen appliances, including several large electric refrigerators which store perishable goods such as meat and produce.

In fact, now that they will be spending less to power the refrigerators, the Newport Food Pantry team plans to redirect those savings towards purchasing more food to put inside the refrigerators.

“We’re going to save money in one place and spend it in another,” Newport Food Pantry director Jim Demers told the Claremont, NH Eagle Times in November.

The additional food is sure to make a difference for families in Newport, as well as in the nearby towns of Goshen, Croyden, Lempster, Grantham, Sunapee, Washington, Acworth, Unity and Springfield, who are also served by the Newport Food Pantry.

“Working with the Hoyt Community Care Center has been incredibly rewarding for all of us here at Sol-Air,” said Pahl. Sol-Air also helped the Hoyt Community Care Center apply and get approved for an interconnection agreement with Eversource, which will allow the Hoyt to transfer excess solar energy back into the utility when sunshine is abundant.

Pahl has firsthand knowledge of how accessible solar energy can be even for those who are operating on a budget, as Sol-Air has installed several systems for local nonprofits, such as Lake Sunapee Protective Association and Sanctuary Dairy Ice Cream of Sunapee.

“A lot of people think that solar energy is really expensive and is therefore unobtainable for charities or nonprofits, but there are grants out there that will help make it all possible.”

The solar installation at Hoyt Community Care Center, for example, was completed with funding from the New Hampshire Charitable Fund, specifically $30,000 from the Thomas W. Haas Fund and $10,000 from the Newport Charitable Fund.

Pahl contends that, in addition to saving money, charities and nonprofits can also stand to gain positive attention and nonverbally promote their mission by installing solar panels.

“[Going solar] is a great way for charities to stand out in their communities and be ‘put on the map,’ so to speak,” said Pahl. “I think it really conveys the values of a charity; mainly that they are serious about helping people and that they really care about the environment.”

Chris Gillespie is a contributing writer for Green Energy Times. He can be reached at chris@greenenergytimes.org.
City Council approves measure to convert the city entirely to renewable energy joining Concord, Cornish, Hanover, and Plainfield, New Hampshire.

On January 17, 2019, the City Council of Keene, New Hampshire voted 14-1 to establish a goal of transitioning the city to 100% clean and renewable energy. Keene joins the communities of Concord, Cornish, Hanover, and Plainfield to become the fifth municipality in the state to establish the goal.

The resolution adopts a goal of using 100% renewable energy for electricity by 2030 and for all heating, cooling, and transportation, by 2050. Keene is the 104th city in the United States to commit to 100% clean, renewable energy. A full copy of the resolution can be read at http://bit.ly/KeeneRenewableEnergyResolution.

Through numerous efficiency measures implemented over the past 20 years, the City of Keene reduced emissions from municipal operations by 25%, while cutting operating costs significantly. Homes and businesses can often reduce their energy needs 20-30% through weatherization and other efficiency measures.

Already many area businesses and homes are powered with clean energy through competitive electricity suppliers. The Monadnock Food Co-op’s solar panels generate 50,000 kilowatt hours per year. Keene State College, the Savings Bank of Walpole, Target, MOCO, and the Keene Unitarian Universalist Church are just installed a 662-kilowatt solar array (DC) on the rooftops of the Keene Ice Center and the adjacent Public Works Department building. Image: ReVision Energy.

Since the resolution was introduced, leaders from business, education, faith, nonprofit and other sectors have voiced their support for the 100% renewable goal, including Keene State College and Filtrine Manufacturing Company.

Existing and emerging technologies make the 100% renewable energy goal achievable and offer economic benefits and opportunities. New Hampshire obtains more of its electricity generation from wind power than from coal-fired power plants, according to the U.S. Energy Information Administration, a trend that could expand greatly with offshore wind.

Renewables are the fastest growing energy source in the United States, comprising 67% of new electric generation capacity installed in 2016, and clean energy jobs are the fastest growing job sector.

“Looking back on this move, we anticipated it would make a difference,” said Julie Dickson, a Keene resident, on behalf of her two grandchildren, ages 1 and 6. “In the Monadnock Region, we are thoughtful and collaborative about our future, change is happening… This can be an important element of our brand as a city, a region, a state,” said Greater Keene Chamber of Commerce CEO Phil Suter in a statement to City Council, citing the many area businesses that support renewable energy.

Other municipalities and states have demonstrated that increasingly-affordable battery storage can lower peak demand charges for utility customers. Using a distributed battery network, Green Mountain Power is saving Vermont customers money — $600,000 was saved by using stored power during a heat spike in August, for example.

To learn more about what Keene is doing, visit: cleanenergykeene.org.

Many thanks to our sponsor: Monadnock Food Co-op

Commercial-scale Solar Project Adds to Keene’s 100% Renewable Energy Goal

As it happens, one small but important step in the work of getting to that goal was already underway when the city council voted. Encore Renewable Energy was installing a solar photovoltaic array with a capacity of just over 123 kilowatts (DC) on the rooftop of an old commercial building at 160 Emerald Street.

The system is being readied for a ribbon cutting ceremony. It was built by ReVision Energy on the roof of the Keene Public Works building and the adjacent Keene Ice Center on Marlboro Street.

The Keene Public Works array has a capacity of 643.2 kW. It will generate about 740,000-kilowatt hours of electricity each year and this will offset roughly 777,000 pounds of carbon pollution each year, according to a statement from ReVision Energy. This is the equivalent of taking 76 average cars off the road, or preventing 817 barrels of oil from being burned each year. See another way, the carbon emission reduction is the equivalent of 416 acres of forest sequestering carbon.

On January 17, 2019, Keene became the fifth municipality in New Hampshire to commit to a 100% renewable energy goal. By a vote of fourteen to one, the city council committed the city to get 100% of its electricity from renewable sources by 2030 and to get 100% of its energy, including transportation, from renewable sources by 2050.

Encore’s first commercial solar project in New Hampshire. Encore was awarded a grant by the Public Utilities Commission to help maximize the financial returns to the project owner. As this is written, the array is nearly complete.

The system is 357 Hanwa Opus panels, each of 345 watts. It has two Solectria PVI 50TL inverters. The system is 123.165kW DC commercial-scale roof-top solar project is located at 160 Emerald Street in Keene, New Hampshire. Image courtesy of Encore Renewables.

Municipal Solar Project Adds Even More to Keene’s 100% Renewable Energy Goal

Enough is going on in Keene, New Hampshire, that it might be easy to lose track of the projects. While the commercial 123-kilowatt (kW) array is going up on Emerald Street, a somewhat larger, municipal array is being readied for a ribbon cutting ceremony. It was built by ReVision Energy on the roof of the Keene Public Works building and the adjacent Keene Ice Center on Marlboro Street.

The Keene Public Works array has a capacity of 643.2 kW. It will generate about 740,000-kilowatt hours of electricity each year and this will offset roughly 777,000 pounds of carbon pollution each year, according to a statement from ReVision Energy. This is the equivalent of taking 76 average cars off the road, or preventing 817 barrels of oil from being burned each year. See another way, the carbon emission reduction is the equivalent of 416 acres of forest sequestering carbon.

The Keene Public Works...
Community Solar Means Clean Energy for Everyone

Travis Tench

City dwellers may laugh at the idea of putting solar on their roofs, but there’s an alternative: community solar.

This arrangement goes by many names, including shared solar, community shared solar, and community distributed generation (CDG), but the concept is the same. Instead of buying and installing solar panels on your home or property, you subscribe to a piece of a large local solar project built nearby, often along with a few dozen to a few hundred other people who live in the same area. A portion of the electricity generated by these projects gets credited directly to your utility bill, you get a discount on electricity, and you don’t have to pay anything to join.

Community solar allows households, small businesses, and places of worship to receive the benefits of solar energy without the cost or hassle of a rooftop installation. Roughly half of residences in the U.S. can’t host a solar installation because the occupants don’t own the property, or because the roof is too old, too shady, or facing the wrong way for optimal sun exposure. Community solar eliminates these issues, making solar power more accessible to more people than ever before.

In order to be eligible, a resident must live in the same electric utility zone as the project. This might seem like a limiting factor, but it also ensures that the project a group of subscribers is supporting is a local one and that all the energy produced is going into the local grid system. And because this local, clean electricity generation helps out with things like transmission losses and congestion on the grid, potentially alleviating the need for costly grid upgrades, this energy is highly valued and that’s passed on to subscribers in the form of savings.

“Too many people either don’t have access to renewable energy or don’t think renewables are a real option for them. This is how we change that,” said Mark Chambers, Director of the NYC Mayor’s Office of Sustainability. “Community shared solar is one of the best ways to ensure that clean, affordable energy is available for everyone.”

In addition to allowing people to participate in solar projects, community solar is also helping states meet their climate and clean-energy goals. New York State, for example, has ambitious goals of meeting 50% of its energy needs from clean energy resources like solar and wind by 2030 while reducing greenhouse gas emissions by 40% from 1990 levels. In order to hit this target, the state will have to add 13,700 megawatts of distributed solar within 12 years—about nine times the total solar installed to date, according to the Acadia Center’s EnergyVision 2030 report. This is a tall order, but community solar will play an important part in helping to reach this goal by increasing the number of people who can participate in solar projects.

Although community solar has only been around nationwide for about a decade and in most states it’s only been an option for a few years, it’s quickly growing in popularity. According to the Solar Energy Industries Association (SEIA), 1,294 MW of community solar has been installed in the U.S. through the third quarter of 2018, and nineteen states now have legislation to support community solar projects for their residents. The solar industry now also employs over 242,000 people nationwide, a number which is expected to increase in 2019, according to The Solar Foundation’s 2018 Solar Jobs Census report.

The clean energy transition is underway, but it will take all of us doing our part. With community solar, that is now easier than ever before.

Travis Tench is Director of Outreach at Powermarket, an NYC-based company that works with solar developers to establish and manage community solar programs. A list of current community solar projects is available at powermarket.io.
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 – Renewable 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 funds 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 improvement, 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/ NHVTHome.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, forestry products, and agricultural waste materials
- Create jobs and enhance economic development in rural America
- For more information go to www.rurdev.usda.gov/Biopower

NEW ENGLAND GRASSROOTS ENVIRONMENTAL FUND
MODEST GRANTS ARE AVAILABLE FOR COMMUNITY-BASED ENVIRONMENTAL WORK IN CT, MA, 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-$5,500
- Go to www.grassrootsfund.org/grants/ or call 802-223-4622 for more info.

NEW HAMPSHIRE

Renewable Energy Incentives Offered Through the NH Public Utilities Commission

Commercial Solar Rebate Program
Incentives are limited to 25% of the total project cost or $50,000 if less than the AC incentive payment otherwise calculated, whichever is less. The Program is for non-residential structures with a commercial solar electric meter located in New Hampshire. Incentive levels for PV systems are as follows:
- $0.40/watt (lower of AC and DC) for new solar thermal systems as are as follows:
- $0.12/1,000 m2/year for new solar thermal facilities fifteen collectors in size or fewer;
- $0.07/1,000 m2/year for new solar thermal facilities greater than fifteen collectors in size;
- Expansions to existing solar systems not eligible;
- Incentive levels for solar thermal systems are as follows:
- Must meet thermal efficiency and heating improvements
- Expansions to existing solar systems not eligible;
- Contact: CIGSolarRebate@puc.nh.gov or at (603) 271-2431 for more information.

Residential Solar/Wind Rebate Program
- Effective January 2, 2018, this program offers rebates to qualifying NH residents who install photovoltaic (PV) or wind turbine electrical generation systems. Rebate levels are $2.50 per watt of panel rated power up to $1,000, or 30% of the total facility cost, whichever is less. Check for updates at bit.ly/2NHResidentialRebate

Residential Solar Water Heating Rebate Program
- $1500 - $1900 per system based on annual system output

Commercial Bulk Fuel-Fed Wood & Pellet Central Heating Systems
- 40% of the heating appliance(s) and installation cost, up to a maximum of $65,000. An additional 30% up to a maximum $5,000 is available for thermal storage. Systems must be on million BTU, less than 10kW
- Residential Wood Pellet Boiler/Furnace
- NHEC offers rebates to qualifying NH residents who install photovoltaic (PV) or wind turbine electrical generation systems. Rebate levels are $2.50 per watt of panel rated power up to $1,000, or 30% of the total facility cost, whichever is less. Check for updates at bit.ly/2NHResidentialRebate

LOCAL INCENTIVES
Some towns provide property tax exemptions for renewables – visit 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

NH Electric Cooperative Incentives for Electric Vehicles and Electric Car Charging Stations
- NHEC offers a $1,000 incentive on a Battery Electric Vehicles (BEV), $600 on a Plug-In Hybrid Electric Vehicles (PHEV), and $300 on Electric Motorcycles.
- NHEC offers incentives for Level 2 Electric Vehicle Charging Stations.
- For Commercial and Municipal Members

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.
INCENTIVES

**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 Energy Saving 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 valid comprehensive energy audit for $100 (rebated if improvements installed), and 50% instant rebate for eligible weatherization improvements (up to $4000 savings) after January 1, 2018. See also individual utilities for additional incentives.

- Visit www.NHSaves.com/HPWES for rebate for eligible weatherization improvements installed, and 50% instant rebate for eligible weatherization improvements (up to $4000 savings) after January 1, 2018.

**NH WEATHERIZATION INCOME-EIGIBLE PROGRAMS**


- FAQS and local program contacts.

**Commonwealth Solar Hot Water (SWH) Programs**

- Applicants must be served by National Grid, until Fitchburg Gas and Electric, Eversource or a participating Municipal Light Plant community.
- MassSave is 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 www.masssave.com.
- Visit the program website at www.masssave.com/swh.
- Visit the program website at https://www.masscec.com/programs.

**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 MassSave and pay interest as you go. See the program details and application information at www.masssave.com/heat-loan.

**MassSave Home Light Loan**

- 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 MassSave and pay interest as you go. See the program details and application information at www.masssave.com/heat-loan.

**Incentives for new homes which meet ENERGY STAR guidelines. Incentives include**

- HERS rating fees paid by the utility, rebates for ENERGY STAR lighting, appliances, and heating.
- See also individual utilities for additional incentives.

**NHSaves Residential ENERGY STAR® certified Products Program**

- Mail-in/rebate rebates and available toward the purchase of the following ENERGY STAR® certified products: Clothes Washers, Clothes Dryers, Room Air Conditioners, Room Air Purifiers, Refrigerators, Dehumidifiers, and Pool Pumps. For current rebate information and forms go to www.NHSaves.com/appliances.
- Rebates are available to residential electric customers of the four NH Saves utilities.

**NHSaves Online Store**

- Our extensive online store offers discounted pricing to the residential electric customers of the four NH Saves utilities on a large variety of LED light bulbs and fixtures, as well as offering additional products to make your home more efficient, such as lighting controls, advanced power strips, thermostats, water saving devices, and various weatherization products. Orders and product fulfillment are handled by our vendor, EFL.

**PAREI**

- To explore the possibility of a solar installation. Plymouth Area Renewable Energy Initiative. www.plymouthenergy.org
- NH Solar Shares: www.nhshareshares.org
- www.nhsaves.com

**ENERGY STAR® Residential Heating, Cooling, & Water Heating Equipment Rebate**

- Program details and application at www.NHSaves.com/heating-cooling

**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.


**Business Programs**

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

**Massachusetts**

- www.nhsaves.com
- To explore the possibility of a solar installation. Plymouth Area Renewable Energy Initiative.
- NH Solar Shares: www.nhshareshares.org
- www.nhsaves.com

**Mass Save Residential ENERGY STAR® certified Products Program**

- Mail-in/rebate rebates and available toward the purchase of the following ENERGY STAR® certified products: Clothes Washers, Clothes Dryers, Room Air Conditioners, Room Air Purifiers, Refrigerators, Dehumidifiers, and Pool Pumps. For current rebate information and forms go to www.NHSaves.com/appliances.
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**NH Weatherization Assistance Income-Eligible Programs**


- FAQS and local program contacts.

- Commonwelth Solar Hot Water (SWH) Programs

  - Applicants must be served by National Grid, until Fitchburg Gas and Electric, Eversource or a participating Municipal Light Plant community.
  - MassSave is 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 www.files.masscec.com.get-clean-energy/residential/commonwealth-solar-hot-water/SWH_Program_Manual_Small.Scale.pdf.

- 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 MassSave and pay interest as you go. You can borrow up to $25,000 at 0% interest for a 7-yr term.

- Energy Efficiency

  - After conducting a free residential Energy Audit, eligible customers are eligible for rebates of up to $25,000, commercial loan up to $100k at 0% interest heat loan with terms up to 7 years to cover following the energy efficiency improvements: attic-wall-base ment 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.

- Mass. 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 works with banks and credit unions to provide a $50 bonus for each loan and reduce the cost of borrowing. In addition, the sticker price of the loan must be under $50,000 to qualify for the program.
  - Visit the program website at http://mass-ev.org/

**NEW YORK**

**RENEWABLE ENERGY INCENTIVES OFFERED THROUGH NYSDERA**

Welcome to the 2017 NY solar incentive and rebate information: 169 programs and incentives at: http://sireusa.org (enter your zip code) Programs and Services from NYSDERA. http://ny-sun.ny.gov/All-Programs.

**EV Incentive from National Grid**

National Grid, in partnership with BMW, is bringing eligible customers an incentive on a BMW i3 or BMW i8 EV. Form is at https://www.NG-BMWIII. Energy Rebates: https://NG-energy-rebates

**National Grid**

- Home Energy Waste
- Heat Pump Rebates

**RENEWABLE ENERGY/NY-SUN**

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 info on the status of block and current incentive levels by sector and region. Block status is updated as applications are submitted, so check for current status. http://ny-sun-block

**Residential and Small Business**

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

**Commercial and Industrial**


**Commercial Energy Storage**

NY-SUN is providing $350/kWh of energy storage capacity in addition to the current NY-Sun solar incentive. https://ny-sun.ny.gov/2FvS6L1

**Community Solar**

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

**Commercial/Industrial PV Installer**


**Residential/Small Commercial Solar PV Installer**


**Financing Options**


**Clean Power Estimator**


**Rural Geothermal**

- $19 Million Available to Accelerate the Use of Clean Energy Technologies On Farms. Learn more at: http://ny-sun-ny.gov/NYSERDA-Farm-Clean-Energy

**National Grid**

K-12 Schools Incentivised
Cont’d from p.4

April 11th is the Safe Routes to School, Safe Routes for All Annual Gathering, where Way to Go! allies are invited to network and learn. Participants will gather at the Granite Museum, Barre, Vermont. RSVP and learn more at https://www.localmotion.org/safe_rts-school. 2019. This event is free and open to all. Breakfast and lunch will be served.

May 6-17th is the Way to Go! School Challenge, two weeks for all K-12 schools to enjoy active transportation, encourage everyone to travel green and send us your pictures and stories.

May 2019 Vermont Bike Walk Challenge. Learn more and join Green Rewards Program at GoVermont.org.

June 5th is the safe route to Go! School Challenge Awards and Transportation Parth Fair at the Statehouse in Montpelier. Join schools across Vermont for a fun day of learning and recognition. Those achieving 50 points or more will be recognized by Way to Go! and invited dignitaries.

Way to Go! is sponsored by the Vermont Agency of Transportation and Chittenden County Regional Planning Commission and supported by a broad network of statewide entities, NGOs and business partners including Local Motion, Vermont Energy Education Program, Department of Health, Net Zero Vermont and Place Creative. Together we are leveraging resources, sharing experiences through the growing network of educators.

Liberty Utilities Residential Time-of-Use Rate for Energy Storage

Table 1 – Illustrative Time-of-Use Rate

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Energy Supply</th>
<th>Transmission</th>
<th>Distribution</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>8pm-8am</td>
<td>$0.03 / kWh</td>
<td>$0.08 / kWh</td>
<td>$0.05 / kWh</td>
<td>$0.15 / kWh</td>
</tr>
<tr>
<td>8am-3pm</td>
<td>$0.03 / kWh</td>
<td>$0.02 / kWh</td>
<td>$0.05 / kWh</td>
<td>$0.10 / kWh</td>
</tr>
<tr>
<td>3pm-8pm (Critical Peak)</td>
<td>$0.15 / kWh</td>
<td>$0.10 / kWh</td>
<td>$0.08 / kWh</td>
<td>$0.33 / kWh</td>
</tr>
</tbody>
</table>

Municipal Solar Project In Keene
Cont’d from p.12

array cost about $1.35 million. It was financed by a group of local impact investors, through ReVision Solar Impact Partners, which own the array. Electricity from the array is sold to the City of Keene at a reduced price through a Power Purchase Agreement. The overall cost of the system, it is expected to save the taxpayers about $3.5 million. The financing and saving will enable the community to foster other economics developments.

This array is the largest ReVision Energy built in New Hampshire last year. Its 2010 solar panels bring the solar capacity of the City of Keene to over two megawatts. Of course, there is a lot more to do to get the system to its goal of 100% renewable.

It happens that ReVision Energy has a series of smaller projects under development, each single example is a set of projects that is to be built for the affordable housing nonprofit organization, Keene Housing. This organization has added solar systems and heat pumps to a majority of properties in Harper Acres as part of a transition to energy efficiency and reduced consumption. The work is to be continued this year, and it will have ReVision Energy install solar systems at 25 more properties.

ReVision Energy’s website is revisionenergy.com.

The progress on tackling climate change being made in Keene should serve as an inspiration for other communities. The solar arrays that appear in this issue of G.E.T. and the commitment to a goal of getting 100% of its energy from renewable resources, are not only just environmental policy. They also provide an economic environment that encourages more opportunities for businesses to flourish.

Commercial-scale Solar Project In Keene
Cont’d from p.12

racks are by Panel Claxx. Over the 25-year life of the project, it will offset about 2.375 metric tons of carbon dioxide. This is the equivalent of annual 2.6 million pounds of coal or eliminating 5.8 million miles of automotive driving.

Encore Renewable Energy is based in Burlington, Vermont. It has a proven track record of reclaiming undervalued real estate for community-scale photovoltaic systems. Its web site is encorenewableenergy.com.

The Flexible Capital Fund of Vermont (Flex Fund), Coastal Enterprises of Maine, and New Hampshire Community Loan Fund recently announced a joint investment of $1 million in Encore. The investment will provide permanent working capital, which will enable Encore to make targeted new hires to support their ongoing geographic expansion in the Northeast. The financing is a collaboration of three New England Community Development Financial Institutions, a model which the Flex Fund would like to encourage more use of, to align values and missions.

K-12 Schools Incentivised
Cont’d from p.4

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The Federal Tax Credit allows you to deduct 30% of the cost of the Solar Installation from your Federal Taxes in 2019. This applies to both Residential and Commercial Systems.

Solar trackers at Pooh Corner Farm. Photo courtesy of Maine Solar Solutions.
Strong Growth in Renewable Energy Generation in 2018

Renewables Poised to Overtake Nuclear Power in 2019 or 2020

Sun Day Campaign

On March 4, 2019, an analysis by the SUN DAY Campaign was made available regarding the latest data released by the U.S. Energy Information Administration (EIA). The data confirms continued strong growth in electrical generation by renewable energy sources (e.g., biomass, geothermal, hydropower, solar, wind) in 2018.

According to the latest issue of EIA’s “Electric Power Monthly” (with data through December 31, 2018), renewables increased their electrical output by 4.46% and accounted for 17.64% of the nation’s electrical generation in 2018.

Non-hydro renewables grew by 9.83% with geothermal up by 5.6%, wind by 8.1%, and solar by 24.4%. Biomass electrical production remained virtually unchanged. However, these gains were partially offset by a 2.9% drop from 2017’s level in hydropower electrical generation. Moreover, total generation by all electricity sources (including fossil fuels, hydropower and fossil fuels, especially natural gas) grew by 3.67%. Thus, renewables’ share increased only slightly, up from 17.51% in 2017.

But the seemingly modest gains reported by EIA for renewables in 2018 mask the dramatic growth in wind and solar over the past decade. Wind-generated electricity was five times higher in 2018 than it was in 2008. And electrical generation by solar (utility-scale and distributed, combined) in 2018 was more than 100 times greater than that reported by EIA a decade earlier.* Meanwhile, geothermal, hydropower, and biomass have each increased their electrical output by just over 1% annually, on average, during the past ten years.

Further, wind in New England is now playing a stronger and more competitive role with hydropower with the latter’s output gain led by 6% in 2018. When generation continues its current rate of growth (8.1% in 2018) it will likely close the gap with hydropower at some point in 2019 or early 2020 and become the #1 renewable electrical source, even if hydropower returns to its near-record 2017 level.

EIA’s data also reveal that solar ended the year topping 2% of domestic electrical generation for the first time (specifically, 2.29%). As noted, solar has enjoyed explosive growth in recent years. If it sustains the rate of growth it experienced in 2018 and earlier, solar could triple its output and account for nearly 7% of the nation’s electricity within five years.

Finally, hydropower seems poised to return to its historically higher levels in 2019. EIA data, for example, document that hydropower production was 6.0% higher in December 2018 than in December 2017. Consequently, electrical generation by the mix of hydro and non-hydro renewables may soon permanently overtake nuclear power.

While renewables out-produced nuclear power during several months in 2017 and 2018, that development seems likely to become true on a year-round basis as well either this year or next year. Nuclear power grew by just 0.3% last year and ended 2018 only 8.7% ahead of the electrical generation by the mix of renewable sources. If hydropower bounces back and if non-hydro renewables continue to grow at roughly the same annual rate as in 2018 (i.e., 9.83%), they will collectively generate about 6.0% higher in December 2018 than it was in 2008. And electrical generation by solar (utility-scale and distributed, combined) in 2018 was more than 100 times greater than that reported by EIA a decade earlier.* Meanwhile, geothermal, hydropower, and biomass have each increased their electrical output by just over 1% annually, on average, during the past ten years.

The SUN DAY Campaign is a non-profit research and educational organization founded in 1992 to aggressively promote 100% reliance on sustainable energy technologies as cost-effective alternatives to nuclear power and fossil fuels and as a strategy for addressing climate change. To learn more contact Ken Bossong, 301-270-6477 x.6

Vermont Businesses Cut Carbon Output and Costs

2018 and 2017 Innovation Projects Offset 200 Million Pounds of Carbon

Green Mountain Power’s Business Innovation Team is helping Vermont businesses offset 200 million pounds of carbon emissions. They are offering free consultations including analysis of business operations, technical advice, and financial incentives that help businesses make significant transformations to cut their carbon output and costs, and so benefit all customers.

GMP’s team worked with 15 businesses that completed projects in 2018 and, over the lifetime of those projects, will offset 80 million pounds of carbon. That’s on top of the 120 million pounds of carbon being offset by projects GMP completed in 2017. Bolton Valley Ski Resort invested in new electric-powered snowmaking equipment with help from GMP Efficiency Vermont, and skiers and riders who bought five Year Green Passes. The expert advice and financial incentives were key for us in making this improvement,” said Lindsay DesLauriers, COO of Bolton Valley. “We get to ditch about 20,000 gallons of diesel we were burning each year. It’s a big transformation Bolton has wanted to make for a while. Our snowmaking is even more efficient, and we’re making a difference for the environment.”

Flying Cow Coffee in Springfield replaced a propane-fueled roaster with a new electric roaster. The company now has a smaller carbon footprint to bring fair trade certified, organically sourced coffee to customers. “The business will get credits via GMP to offset the cost of the transformation. It’s awesome because we can roast more coffee than we did before, but I’m not paying more for energy. We are burning propane to heat this greenhouse. GMP’s cleaner energy is allowing us to cut back on fossil fuels and to increase our tomato production. And in 2019, GMP will help us install heat pumps to make our greenhouses even greener.” The business will get credits on its GMP energy statement to help offset the cost of the transformation.

Vermont businesses interested in a free consultation to learn how they can transform their operations and what incentives are available are encouraged to contact Jeff Wonder of GMP’s Innovation Team at jeff.wonder@gmpvt.com or 802-770-3392.

VT Regulating EV Car Charging?

Contr’d from p. 4

7. Strategies to encourage EV usage at a pace necessary to achieve the goals of the State’s Comprehensive Energy Plan and its greenhouse gas reduction goals.

The VT PUC launched investigation 6-O-18 in March 2019 to respond to this charge and has held two workshops to date with another scheduled in mid-March 2019. They are required to report back to the Vermont Legislature by July 2019. Additional details on their deliberations are available on the VT PUC’s website. The state’s small jurisdiction does not extend to EV charging stations.

The exception to this would be where electric utilities are investing in electric vehicle infrastructure in ways that affect ratepayers collectively if a utility proposed using EV charging in their “rate base.”

Vermont legislative committees are currently considering the VT PUC jurisdictional recommendation and other issues associated with EV adoption, including Vermont Governor Phil Scott’s proposal to develop a state EV incentive program geared to low- and moderate-income Vermonters. Stay tuned to future issues of Green Energy Times for updates on their work.

In the meantime, the VT PUC continues deliberations on other aspects of their EV regulation. Their next workshop in March will explore how EV drivers should contribute to transportation infrastructure. Shortfalls in transportation funding over the past several years are primarily due to gasoline taxes not keeping pace with increases in vehicle efficiency. EVs in Vermont also already provide registration fees and sales and use tax exemptions on transportation funding, but long-term solutions will be needed to make up for reduced gas taxes. Options for this include additional registration fees for EVs, assessing a per-kWh tax on energy used in EVs (like a per gallon gasoline tax), or possibly moving to a more wholistic approach of a road user charge based on vehicle miles traveled.

Recent research from the University of California at Davis (https://escholarship.org/uc/item/627z2449) highlights the need for careful consideration of EV’s per-mile taxes. Their analysis found adding fees on EV ownership could decrease EV sales by as much as 20%, which would present significant challenges as states will need to accelerate EV adoption in concert with other measures reducing vehicle travel to meet climate and energy goals.

David Roberts is the Drive Electric Vermont coordinator. He has driven an all-electric Nissan LEAF for the past six years and says, “If you have to drive, drive electric.” http://www.driveelectricvt.com.
Precautions Before You Green-Up Your Investments

Todd Walker, Greenvest

With all the talk of divestment in the air, many investors are looking to rid themselves of investments in fossil fuel companies – or other socially offensive firms – and switch to greener companies such as clean energy.

But before you sell everything at once to go green, it’s important to avoid some possible costly consequences. In fact, before you make wholesale changes to any investment portfolio – green or not – you should always consider these factors:

- Taxes. Gains on securities are subject to capital gains taxes of up to 23.8% (including the Net Investment Income Tax), if they have been held for more than one year. (Gains on those held less than a year are taxed at ordinary income tax rates.) So, instead of selling in one swoop, you may want to sell appreciated securities over several years to mitigate capital gains taxes. Another tactic is to use any security losses to reduce or eliminate gains. One thing many people don’t realize until too late is that on securities that are given to you when the donor is alive you usually assume the original “cost basis” of those securities. In other words, the original purchase price of the securities is used in calculating the tax. So, before you sell a bunch of securities given to you by your parents/grandparents during their lives, you should understand your cost basis to avoid a potentially huge tax hit. Securities inherited from a will follow different rules, and typically there are no gains taxes on sales in a qualified retirement plan such as an IRA.

- Loss of Dividend Income. Are you depending on a portfolio for income? Then something else to consider is that selling high-dividend “non-social” stocks such as oil companies, utilities and tobacco/alcohol may reduce your dividend income unless you replace them with greener income alternatives, such as clean energy power producers, real estate investment trusts, socially-screened preferred stocks and bonds more.

- Timing. The latest market environment is another factor to think about. Is this the best time to sell/buy various types of securities? For example, those who sold everything in 2008 obviously regret it, since the market has more than recovered since then. Or you may want to avoid some overvalued sectors right now. Or a major election or tax law change is just ahead. The point is that you should not ignore what’s going on in the economy/marketplace before you act.

Fees. Depending on the type of investment account you own, what it costs to realign your portfolio might also be a consideration. While transaction costs may be low in a fee-based account (where commissions are waived in lieu of an annual management fee), in a commission account your costs may be 2-5% on both sales and purchases. One solution to this is to convert to a fee-based account before you green up.

Research. Finally, it goes without saying that both security sales and purchases should be carefully researched before proceeding. If you are dedicated to investing with your values, this requires both economic and social screening. It’s important to invest with your heart, but as with most things in life, let the head have a say, too.

So, as you divest, divest intelligently! Whether you invest on your own or use a financial advisor, make sure to include all these critical steps as part of any portfolio realignment.

That way you won’t unnecessarily lose green … as you go green!

Todd Walker is a Financial Advisor and Co-founder of Greenvest, a Vermont-based personal financial advisory firm specializing in socially and environmentally responsible investing. Securities offered through Vanderbilt Securities, LLC, member, FINRA, SIPC, registered with MSRB. Advisory Services offered through Vanderbilt Advisory Services, LLC. Clearing Agent: Fidelity Clearing & Custody Solutions. Supervising Office: 55 Main St, Suite 415, Newmarket, NH 03857 (603) 659-7626.

The Ultimate Power Couple: Energy Management and Data Technologies

Ethan Rogers

Strategic energy management (SEM) programs are expanding beyond the industrial sector to commercial and institutional customers. These programs and data management technologies are two of the biggest opportunities to reduce energy use at large facilities. Not only do they save energy and decrease carbon emissions, they also help utilities build long-term relationships with clients and introduce them to additional efficiency programs.

In a new report released January 10, 2019, The American Council for an Energy-Efficient Economy (ACEEE) analyzed 26 programs in the United States and Canada to evaluate how they are merging EMIS (Energy Management Information Systems) with SEM to help customers increase energy savings by automating data collection, integrating analysis of energy and manufacturing process information, thereby enabling data-driven process control. Integrating EMIS into SEM programs can boost the effectiveness of both approaches and ensure persistence of energy savings by embedding standard practices in facilities.


Ethan Rogers is the ACEEE Program Director, Industry

The American Council for an Energy-Efficient Economy (ACEEE) acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors. For information about ACEEE and its programs, publications, and conferences, visit aceee.org.

China Moving Ahead on Solar Power

Last year, over half the solar panels installed in the world were put into Chinese solar projects according to Bloomberg New Energy Finance. A Chinese investment of $132.6 billion in renewable energy put over 53 gigawatts of solar capacity online in the country. By comparison, the United States renewable energy investment was $56.9 billion.

The Chinese approach differs from what we have in the United States partly because of Chinese strategy that seems to be to produce as much renewable energy generating equipment as possible in China. The country produces wind turbines and solar panels to provide for its own needs with enough left over to supply many other countries. Though China does not dominate sales of wind turbines elsewhere, it certainly manufactures most of the solar photovoltaic cells and panels used worldwide.

One company, JinkoSolar, has about 20% of the world market for solar panels, according to Nikkei Asian Review. In the face of the United States trade tariffs, it is simply selling the panels in other countries. It expects these sales to increase 30% this year, despite the tariffs. China is also manufacturing over half of the electric cars and the great majority of heavier vehicles.

The United States has fewer than a thousand electric buses by our last count. By comparison, China has manufactured them at a rate of over 100,000 per year for the last three years. These buses represent a $75 billion world market in which the U.S. is not participating.

Image: Chess, from simetrix.com

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Vermont Office: Todd Walker | Todd@greenvest.eco
Vermont Institute of Natural Sciences Goes Solar

Steve Snyder

Ever since his arrival at The Vermont Institute of Natural Science (VINS) four years ago, Executive Director, Charlie Rattigan, and the Board of Directors wrestled with the question “How can we get VINS to go solar?” The team struggled with figuring out how a nonprofit, 501(c)(3), organization could raise the capital required to fund the project. "VINS will not only see solar power from the arrays improve our financial bottom line, but also further our educational mission," says Rattigan. "PV very much fits our mission of supporting the education of individuals in the community and sustaining the environment." Clean technology also ties into their STEM programs of the Next Generation Science Standards they provide to 28 Upper Valley schools, as well as their mission as an educational institution overall.

NST handled all details and major steps of the VINS project, including the permitting, construction, and, ultimately, maintenance.

VINS is headquartered in Quechee, VT, on 47 acres of forest, meadow, and rolling hills. VINS features 17 state-of-the-art raptor enclosures that house hawks, eagles, falcons, owls, and other birds of prey. The facility includes four major centers: The Visitor Welcome Center and Nature Store, the Center for Wild Bird Rehabilitation, the Center for Environmental Education, and the Center for Environmental Research from which operates an active Citizen Science program. VINS also has a classroom-meeting space, interpretive nature trails, and a newly renovated four-season pavilion designed for exhibits, events, meetings, and live raptor programs.

VINS now has an 86-kW DC system producing 111,000 kilowatt-hours of electricity per year. Image: Norwich Solar Technologies.

If they do decide to purchase the system with a low-interest energy loan, "it will be paid off in roughly 12 years, giving them 13-18 years of no electricity costs so many generations of VINS will enjoy the power," Rattigan added. NST’s Davis noted that although solar panels are warranted for 25 years, modern modules have an expected lifespan of 30 to 40 years.

VINS now has an 86-kW DC system producing 111,000 kilowatt-hours of electricity per year at their Nature Center in Quechee, Vermont and plan to use the yearly savings on electricity costs to sustain their mission of providing environmental education, research, and avian rehabilitation. NST provided guidance to VINS in choosing the most appropriate locations for the PV arrays, which are on the roof of one building and in a parking lot. Although it is common to have the arrays to fit in with VINS’s overall plan for sustainability, NST was able to maximize the design of onsite arrays to fit in with VINS’s overall plan for the project.

Without any capital expense or upfront cost, VINS is now expected to save over $3,000 in year one and more than $85,000 over the next 25 years. In addition, the VINS solar array will offset nearly 86 tons of CO2, the equivalent of 191,000 miles driven, or 43 tons of coal not burned every year. Since the arrays are in an employee parking lot and on a rooftop, they don’t intrude on the aesthetics of the site or the visitor experience, something important to VINS and an essential part of our design,” says Davis.

“VINS will not only see solar power from the arrays improve our financial bottom line, but also further our educational mission,” says Rattigan. “PV very much fits our mission of supporting the education of individuals in the community and sustaining the environment.” Clean technology also ties into their STEM programs of the Next Generation Science Standards they provide to 28 Upper Valley schools, as well as their mission as an educational institution overall.

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Learn more at vinsweb.org or 802-359-5000.

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802-359-7405 sales@norwichsolar.com

Upper Valley Aquatic Center
500kw solar project

Call us for more information
802-359-7405
Feature: Sustainability at Local Museums

Museums in Our Region Support Solar & Sustainability

Jessie Haas

Energize 360’s solar contractor. The Museum building was already LEED Silver certified. There are plans to improve efficiency further. The next project is to convert all lighting to LEDs. The Museum is actively seeking funding to help make this conversion which will increase the contribution of the solar panels and “help us invest more in our public programs and education,” says Bard.

The Fairbanks Museum in St. Johnsbury, VT converted to LED lighting in 2015, replacing 400 fixtures. Lower energy costs were immediate. So, too, was an improved aesthetic experience, as the new fixtures were less obtrusive. And LEDs are better for many exhibits, as they emit fewer infrared rays and no ultra-violet.

Fairbanks went on to invest in solar panels, starting with three in the parking lot, supported by a USDA grant. Now investments in solar parks, including the Solarfect Fairbanks Solar Park in St. Johnsbury, offset all the Museum’s energy use. The electricity bill in

WHERE’S WINTER?

By Erin Rounds, Billyfish Books, 34 pages, $7.99 (Kindle edition), $9.99 (paperback) or $15.99 (hardbound)

Book review by N.R. Mallery

Where’s Winter? is a little book that packs a big message. Every parent, grandparent, and child should know about Erin Rounds’ inspiring new book.

Where’s Winter? is a children’s book about a bear who goes into hibernation for the winter, but when he wakes up, he finds that winter never happened. He wakes into a time unlike any spring he has ever seen. There are no flowers, no bees, and no berries for him to eat. The reason for this is that the world has changed into something unlike it has ever been before. The climate has changed.

After engaging the minds of children and helping them understand the nature of climate change, Where’s Winter? gives them guidance on a variety of steps they can take to counter the problem. Armed with these ideas, they can understand that there are things they can do, and that they have the power to make a difference. Erin Rounds, the author of Where’s Winter?, also illustrated it. The pictures, which are intended for children, are of high quality, using a photo-montage for background images overlaid with artwork. The well-constructed story is supported by clear language which makes the global warming crisis understandable for its intended audience, children aged six through ten.

Children seem to be very taken by Where’s Winter? becoming eager to put its lessons to use. We have seen reports of children becoming environmentally active, partly because of the book.

Where’s Winter? is not Erin Rounds’ first book. Before it, she published Charlotte’s Bones, which she wrote but did not illustrate. It is about a fossil of a Beluga whale that lived 11,000 years ago in an inland sea that

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The Benefits of Geothermal Energy

Sick of high heat bills in winter and outrageous cooling costs in the summer?

There is a solution that cools and heats your home more quickly and for less money. It’s called geothermal energy. Geothermal systems take advantage of the unlimited, free energy from the earth. They provide even, constant temperatures year-round as well as complete humidity control for your home—and they’re the best option for unparalleled energy savings and operating efficiency.

How it Works

The earth absorbs approximately 47% of all incident solar energy and stores this free thermal energy beneath our feet. So, even though the air temperature is hot in the summer and cold in the winter, the ground temperature just a few feet below the surface is relatively constant year-round. Geothermal systems take advantage of this by transferring the warmer energy into our homes in the winter and reversing the process in the summer. In essence, the earth is a large solar collector and storage battery, with more than enough thermal energy for everyone.

How the Geothermal System Works

Three basic components make up a geothermal system. They are:

1) The ground loop heat exchanger,
2) the ground source heat pump and
3) the distribution system (ductwork, radiant flooring, fan coil, etc.).

The ground loop is the interface with the earth that transfers energy via a freeze-resistant solution pumped through the exchanger at a high velocity. Several ground loop types and designs are available to match the unique properties of each project (see below).

The ground source heat pump utilizes a refrigeration circuit to extract thermal energy from the ground loop and transfer it to the distribution system during the winter months to warm the home. During the summer, this process is reversed to cool the home.

The distribution system quietly delivers heat throughout the home, creating a very even and controlled temperature. Air-based systems use duct work, while radiant flooring or fan coils distribute heat with a water-based hydronic system.

Environmental Benefits

According to the EPA, geothermal systems are the most environmentally friendly way to condition our homes since they need only a small heat pump to operate and give off no combustion emissions. Further, since a geothermal system only moves heat from beneath us into our homes, no energy is created by burning fuels or by using standard electrical consumption. Removing the combustion process from heating reduces our dependence on foreign oil and eliminates the potential for carbon monoxide poisoning.

Cost Savings

Geothermal systems can reduce heating costs up to almost 80%. The EPA shows that homeowners using geothermal energy save an average of roughly $1,500 annually compared to those using traditional heating or cooling methods.

Another significant cost-savings benefit of geothermal systems is the longevity of the equipment. Geothermal components last on average for 25 to 50 years; that’s typically at least 10 years longer than an average furnace or conventional AC unit. The EPA also shows that homeowners save roughly $1,500 annually compared to conventional systems.

A geothermal system can bring you the cost savings and low environmental impact that you’ve been looking for in a heating and cooling system. It’s reliable, consistent and easy to maintain over time. And it may just be the solution you need.

To learn more please visit: https://geothermhvac.com/geothermal-heating/

Jesse Cook is the owner of Geotherm, New York’s most trusted renewable energy experts.

The company is committed to high-quality, cost-effective energy reduction solutions for home owners, builders, municipalities, business owners, and communities. As the premiere resource for “green” energy alternatives, they help homeowners significantly reduce utility costs with environmentally responsible systems and products.

Which Geothermal System is Right for Me?

Horizontal Closed Loop

The most common loop design utilizes an excavator to bury the heat exchanger horizontally in the ground approximately 6ft deep.

Open Loop

An abundant supply of high-quality water can be used to operate the heat pump. Water is pulled from a well and discharged into either a pond, stream or another well.

Vertical Closed Loop

This loop allows smaller properties to take advantage of geothermal technology. A drilling rig is used to bury the heat exchanger vertically in the ground.

Pond/Lake Loop

The most cost-effective strategy submerges the heat exchanger in a large body of water (because no digging or drilling is needed). Most homes require a half-acre pond with a ten foot minimum depth for proper operation.
ThermoLift Heat Pumps

George Harvey

Some things are both counter-intuitive and extraordinary. To understand them, we really need to have a grasp of science. So I hope no one minds if I start with explaining a couple of things about science.

First, gases behave according to certain physical laws. Compress a gas, and it gets hot by a predictable amount. Decompress it, and the precise opposite happens.

This is how a refrigerator works. First off, gases behave according to certain physical laws. Compress a gas, and it gets hot by a predictable amount. Decompress it, and the precise opposite happens.

First, gases behave according to certain physical laws. Compress a gas, and it gets hot by a predictable amount. Decompress it, and the precise opposite happens.

Second, there are things that we can do in the world where, if you do it one way, you end up with one result. If you do it another way, you end up with the opposite result. And this is where we come to the first of the counter-intuitive things I mentioned. Using the same amount of energy, a heat pump can deliver a good deal more heat than the 100% efficient resistance heater. This is because it is moving heat instead of making it. Avoiding calling things more than 100% efficient, we use a very slightly different concept and terminology to describe how well it does this, the coefficient of performance, or COP. Now comes the exciting part. There is more than one way to drive a heat pump. Most of the heat pumps on the market use electrically driven compressors. A very few, however, use other means.

ThermoLift, a startup company in Stony Brook, New York, is in the last stretch of bringing a new kind of heat pump to market, and it has some really impressive features. ThermoLift aims to reduce the cost of heating and cooling by 30% to 50%, using equipment that promises to have costs on par with existing equipment.

Advanced building simulation by the National Renewable Energy Laboratory and testing by Oak Ridge National Laboratory (ORNL) are proving the concept. The Department of Energy (DOE) looked at over 300 technologies for heating and cooling and gave the ThermoLift heat pump the highest rating. It has been financed in part by grants from the DOE and the New York State Energy Research and Development Authority.

ThermoLift’s prototype heat pumps are powered primarily by combustion of natural gas, though other fuels could eventually be used in practice, including renewably produced hydrogen. The heat from combustion is captured in a chamber at the top of the unit containing helium. (We should note that no refrigerants are used, and helium is not a pollutant.) The helium and the heat are moved by a piston-like device called a “displacer” to a central, warm chamber from which it can be released into an area being heated. Meanwhile, a lower, cold chamber is drawing heat out of its own environment, and this heat is also pumped by a displacer into the central chamber. The displacers are moved by the systems internal gas forces and synchronized by magnets, instead of motors and rods.

In a laboratory, the cold chamber of the machine can be made colder than -150° F. The machine is actually extracting heat energy from an environment at that temperature and delivering it as what we perceive as heat. Because 

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Is The Glen House the Greenest Getaway in the White Mountains?

HOW THE RECENTLY OPENED HOTEL IS MODERNIZING A CENTURY-OLD LEGACY OF SUSTAINABILITY

Chris Gillespie

If you’re looking for a year-round destination to enjoy the natural beauty of New Hampshire’s Presidential Range that is both stunning in its scenery and cutting-edge in its energy conservation, The Glen House is the hotel for you.

Although various iterations of The Glen House have come and gone in Pinkham Notch over the years dating back to 1852, the recently completed hotel exemplifies sustainability and next-generation energy efficiency so much that it has received recognition from Senator Jeanne Shaheen.

Development of the modern incarnation of The Glen House started a decade ago but was cut short by the Great Recession. When the team at Mt. Washington Auto Road decided to resume development of The Glen House in recent years, they were afforded the chance to “start from scratch” and “really head in the direction of sustainability,” under the guidance of Mt. Washington Auto Road and Great Glen Trails general manager, Howie Wemyss.

“I pushed pretty hard for it to be sustainable,” said Wemyss, who started working as the general manager of Mt. Washington Auto Road over thirty years ago. “Sustainability is a personal philosophy of mine, so it has been rewarding to have been able to steer the company in this direction over the years.”

Since opening on September 12, 2018, The Glen House has become the latest achievement in sustainability for the Mt. Washington Auto Road. The company has a long history of embracing conservation, from utilizing hydropower from a nearby water source in increasing efficiency since the late 1800s, to becoming one of the first businesses in New Hampshire to install electric vehicle charging stations in 2013.

“We are fortunate to be stewards of a piece of property here that is on the edge of the wilderness, and I feel that it is incumbent on us to take as good care of the property as we can,” said Wemyss. “With modern technology, it’s much easier to make the business case to go in this direction, and, coupled with being better for the environment, it’s a pretty easy sell, in my opinion.”

Mt. Washington Auto Road’s commitment to sustainability is truly manifested at The Glen House: the entire facility, from the guest rooms to the parking lot, is outfitted with exclusively LED lighting and is heated and cooled using geothermal energy. The Glen House even features state-of-the-art elevators whose motors double as generators that yield enough energy to drastically reduce the elevators’ operating costs. The construction management of this eco-friendly hotel was done by Martini Northern of Portsmouth, NH.

All of these sustainability measures, while impressive, are just the beginning for The Glen House. In the near future, Wemyss and his team plan to look into installing solar panels on the property and expand their hydropower system to better utilize the currently underutilized upper two-thirds of their waterway. The goal, Wemyss says, is to use solar power to cover whatever electric demand is not covered by hydropower.

“Within two years from...”

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AeroBarrier™ – An Air Sealing System That Fills the Gaps

Seann Flynn

THE PROBLEM

As a custom home builder in the high-end market for the past 20-plus years, I have watched the emphasis on energy efficient building practices grow to the point where a blower door and tape roller have become as standard in the toolkit as a block plane and a circular saw. On every house we build, we have been engaging in rigorous taping and sealing procedures – from the foundation through the roof – to great effect, and often achieving ACH50 (a measure of how much air leaks per hour) numbers well below 1. However, from a cost-per-square foot basis on a complex project, these wins often come with a significant price. These numbers often prove very difficult to achieve, even when code dictates that they must be reached and verified. To that end, we are constantly searching for new products and practices to streamline the air-sealing process and achieve our results with less cost and a knowerable result.

THE SOLUTION – AEROBARRIER™

AeroBarrier™ is an aerosol air sealing system we recently added to our toolkit to try and address these issues. In essence, the system involves blower door pressurization of the house (to +100 Pascals), a series of tripods with spray nozzles on them and the introduction of a fine mist of specialized acrylic caulk. From there, much like a balloon with pin holes in it, the pressure drives the sealant to all the cracks in the building and seals them up. During installation, we monitor the air changes per hour on our screen and watch the needle drop as the various holes and cracks throughout the house fill with sealant. When we reach our leakage target we turn off the machine, clear the air with a few fans and open windows and clean up. In most situations, we can take a house from around 7 ACH50 down to below 1 in under two hours of spraying, with set up and clean up on either end amounting to another few hours. The space can be worked in again within about thirty minutes, and once cured, the sealant is a non-toxic, low-VOC substance that is GreenGuard Gold certified for use in schools and hospitals.

We can install at two different points in the building process: 1) Up against the exterior sheathing plane, after all mechanical penetrations are complete. In this case, it is important that there be insulation applied to the exterior of the sheathing, in order to keep the wall assembly dew point away from the air barrier. 2) Up against the sheetrock plane (after mudding and tapering, before finish paint). This method sometimes requires more protection before spraying (see figure) but ensures that the air barrier is as far away from the dew point as possible. This method is also used in multi-family projects, as it ensures air-space separation between units. AeroBarrier™ will, in principle, fill a hole of any size given unlimited time and material, but in practice, it is limited to gaps of around 1/2” or less in width. The product does not stick to any vertical surfaces, but it will adhere to horizontal ones. So, while window sills and sashes are easily covered with tape before spraying, finished floors, counter tops, appliances etc. require protective covering. From a cost perspective, AeroBarrier is usually about $150-$200 per square foot of floor to install.

In general, this system has changed the way we approach air-sealing and could change the way we think of insulation practices. However, it is not an all-in-one approach to good building practices. We continue to take care to keep our sheathing planes continuous, gasket or spray foam building penetrations and in general build our houses tightly and soundly. What we have moved away from is excessive use of tapes, wraps, and sealants for air-sealing, freeing up more of our time to be carpenters and craftspeople. Learn more about AeroBarrier™ at https://aerobarrier.net. Contact Sean at zone6energy.com or (802) 324-1493.

Next issue, we will share some local stories about projects sealed with the AeroBarrier™ system, as we learn about this amazing new innovation that is transforming the way we achieve airtight high performance construction.

Sean Flynn is the owner of Silver Maple Construction in Middlebury VT. His company specializes in super energy-efficient, high-end custom homes and unique commercial projects. He lives with his wife and three young boys in Weybridge VT.
The Climate Crisis - More Complex Than Simple Solutions

George Plumb

There have been many commentaries recently about what is happening to the Earth caused by climate change. Most of the commentaries focus on what needs to be done about reducing our greenhouse gas emissions and include suggestions such as putting a carbon tax on fossil fuels, moving to renewable energy, or weatherizing our homes. However, the issue is more complex than those relatively simple solutions.

We must address all the underlying causes of global warming, and the other devastations we are doing to the Earth, such as the Sixth Extinction. This is best understood by using the equation: \( I = P \times A \times T \).

This equation was first proposed in the early 1970s by two scientists, John Holdren and Paul Ehrlich (who had written The Population Bomb in 1968 and whose predictions were then demeaned but are now coming true), as a way to calculate the impact of humans on the environment.

Their equation explains that a population's environmental IMPACT \( I \) is a result of the size of the POPULATION \( P \) times the population's AFFLUENCE \( A \) times the TECHNOLOGY \( T \) used by that population.

By way of example, if the population of a country is the size of the current U.S. of 326 million, is quite wealthy, and uses a technology of highly fossil-fuel consumptive vehicles, then its environmental impact via carbon dioxide \( CO_2 \) emissions is going to be very high. On the other hand, in 1800 when the U.S. population was only 5 million, income was generally very limited, and the technology for transportation was largely by horses, then the carbon emissions from transportation and other sources were minimal.

According to the UN's scientific experts, the world must cut climate pollutant emissions by 45% below 2010 levels by 2030. And by 2050, it must reduce them to zero to avoid catastrophic global heating. We are on track to see at least 6.3°F warming by 2100 and much more after that.

Numerous reports have shown that it is highly unlikely that civilization as we know and expect it is possible at an increase of 6.3°F.

We obviously can't do much about reducing our population size in such a short period of time. However, thinking long-term, we must nonetheless stress the need to reduce our population numbers. For example, having one fewer child reduces a parent's carbon footprint by 64 tons of \( CO_2 \) a year.

Regarding the Affluence factor, this relates to our economy and politicians. Developers and most economists keep saying, 'we have to grow the economy.' Not only does this generate more greenhouse gas emissions, it degrades the environment in many other ways, such as decreasing wildlife habitat. Instead, we should be moving towards what is called a 'steady-state economy,' one that is more sustainable and benefits all people, not primarily the rich. A steady-state economy doesn't use natural resources beyond their renewable level.

Finally, the technology used, such as renewable energy, is critical as many climate-change advocates discuss but do not personally always follow. As an example, even most environmentalists use the technology of jet planes to enjoy their travel to foreign lands instead of limiting their recreation to enjoying the nearest forest land. So, we need to think of \( I = P \times A \times T \) at two levels. One is the systemic level involving governmental and corporate dimensions. For this level's two dimensions there is a need to have a more in-depth conversation about what is happening to the Earth, what the moral responsibility is, and what can be done about it, such as a tax on fossil fuels.

The other level is the personal and spiritual one. What does the \( I = P \times A \times T \) equation mean for each of us? I know several people who live a lifestyle that conforms to this formula, and they are quite happy people. My personal heroes are still Helen and Scott Nearing, who lived largely off the land here in Jamaica, Vermont from 1932 to 1952 and then in Brooksville, Maine for the rest of their lives. They wrote the book, Living, which is a (1942) that inspired thousands of people.

As a couple, they had no children, although Scott had two sons by a previous marriage. Their family formula is four hours of hard work growing their own food and living largely off the land with limited income by producing maple syrup while in Vermont and then blueberries in Maine, four hours of professional work, and then four hours of personal enjoyment such as playing music, reading, and writing poetry. It certainly led to a healthy lifestyle for them with Scott living to 100 and then choosing to die by not eating, and Helen lived to 91, but died as a result of a car crash.

We can deal with climate change and other environmental issues, although to do so we do need to take a broader look at the causes accomplishing this with the \( I = P \times A \times T \) equation as our lodestar.

George Plumb, of Washington, VT, is a board member of Better (not bigger) Vermont and the organizer of the 2014 report “What is an Optimal/Sustainable Population for Vermont?”

Vermont Ski Museum Hosts Climate Change Discussion

Roger Lohr

The Vermont Ski & Snowboard Museum in Stowe, Vermont is hosting a Red Bench Discussion on April 11th at 6:00pm on the topic of “Actions to Slow Climate Change.”

Participants in the discussion will include a representative from the Protect Our Winters organization, which is a non-profit climate advocacy group in the winter sports community building a movement against climate change; Nick Sargent of SnowSports Industries America, a member organization of a new coalition called the Outdoor Business Climate Partnership including SnowSports Industries America (SIA), Outdoor Industry Association (OIA), National Ski Areas Association (NSAA), and state ski area groups from California, Colorado, Vermont and others; Burton Snowboards on sustainability, Craftsbury Outdoor Center, and others.

Climate Change Discussion

In December 2018, NASA and Stratton Mountain hosted a North American Weather Summit to begin a dialogue between ski areas and meteorologists in the region, and at the event there was interest in discussing the issue of climate change. While the topic was intentionally kept off the program agenda, because it did not correlate with the event goals, the topic was briefly discussed following a comment by one of the meteorologist presenters. The back-and-forth was highlighted with an outburst by an attendee asking whether meteorologists consider themselves scien-tists, not exactly a productive dialogue.

The snowsports industry is somewhat divided on the issue of climate change for a number of reasons. Beyond labels such as “deniers” and “warmists.” One of the elephants in the ski industry’s room is the amount of energy it takes to run a ski area that uses snowmaking, multiple high-performance lifts, slope grooming, heating, and so on. There have been great strides with energy labor, and on all fronts, and many ski resorts are exploring sustainable practices in various aspects of their operations. The industry has a multitude of programs such as the NSAA Sustainable Slopes and Climate Challenge and there are a number of snow sport organizations that lobby the government.

Will bankers be reluctant to provide financial support to ski industry businesses, because they don’t understand snow-making and their concern that the more southerly ski areas’ days may be numbered due to global warming? Many ski areas have invested in renewable energy credits (RECs) or power purchase agreements, and there is some resentment about that practice when it is juxtaposed against on-site emission reductions, energy savings and/or energy production.

Writers such as Allen Best in Denver and Alan Betts in Vermont recognize solar and other forms of renewable energy, but they’ve questioned RECs. “The buying and selling of RECs does not help the Earth at all. It is a delaying tactic providing a fig leaf, so that states can pretend they are making the transition, when they are not shutting down fossil fuel plants fast enough, and building renewable alternatives. No amount of honest or fictitious bean-counting can hide this critical and disturbing fact.”

Of course, information and education are key, and there is need in the ski industry to become aware of the prominent issues associated with climate change starting at every company.

ThermoLift Heat Pumps

Paul Schwartz (center), CEO/Co-Founder of ThermoLift, with a prototype unit.

A section of the 35-trooper solar farm at Smugglers’ Notch Resort, with the ski trails on Madonna Mtn. in the background. Image: ‘Smugglers’ Notch.’

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ThermoLift’s heat pumps can heat a building when it is really, really cold out-side. A COP of 1.3 is achieved by extracting heat from air that is at -13°F. The first test units are being put to use. Twenty of them are being installed on government sites, including military installations, to be tested. And ThermoLift is getting ready for commercial release, possibly in 2020. We will be following developments.

ThermoLift’s website is www.tm-lift.com.

Many thanks to our sponsor:

ThermoLift
Global ocean temperatures set a new record in 2018, beating the previous record set in 2017. New studies show that both the Antarctic and Greenland ice sheets are melting faster than ever, so that sea-level rise is accelerating. In the third week of January, the weakening polar vortex gave us bitter cold weather and heavy snow (and as I write more is falling). However, our spinach and lettuce in cold-frames are doing fine, as the snow cover has protected them.

That’s the real world. But here in the U.S., the new surreal world continues. I remarked last month that the President refused to read the fourth National Climate Assessment mapping out how bad climate change will be for the U.S. If we stay on our present fossil fuel energy system, the EPA head also said he was too busy to read this report, which his own agency helped produce. His extraordinary excuse was that much of the science in the report came from the time of the Obama presidency. Am I to suppose by implication that the next NCA report will be filled with Trump science?

The Federal government shutdown affected a lot of government science along with so many other “non-essential” government branches. Science is considered worse than non-essential, because much is incompatible with right-wing doctrine. The shutdown prevented the weather service from upgrading models and updating codes to receive all 2019 global data. It prevented many scientists from reviewing recent climate data. Slowly but surely, government by ideology and blackmail is pushing the U.S. into third-world status.

Both snow and missing data have meant that I have had time to read and think deeply. Reading the extraordinary book, "Oil, Power and War" by French author Matthieu Auzanneau, has given me a new global perspective on how our dependence on oil has led to far-reaching conflicts over the past century. I learnt a lot about the central role of oil in warfare – and the millions that have suffered and died for oil. The U.S. military and economic dominance has been closely tied to the control and access to global oil supplies. This still continues in the ongoing turmoil in the Middle East, and the latest struggle to regain control of the large Venezuelan oil reserves.

I thought I was well-informed, but now I realize the immense secret power of the U.S. oil monopolies has ruled government policy for the past century, rather than the reverse. In parallel to the military role of oil, the rapid material growth of the U.S. economy in the decades after World War II was also enabled by the U.S. global control of cheap oil supplies. Remember the magnificent icon of our growth and prosperity was the gas-hungry 1950s V8 Cadillac with fins.

But because we refuse to make the transition from oil, the crash is coming closer. In a tragic microcosm across the border in Mexico, people risk their lives by tapping pipelines for gasoline. The poor are desperate for fuels, and it is a $3 billion-a-year business for organized thieves.

I see much more clearly how accelerating climate change is linked to the power of oil in both our industrial society and our military dominance. The EPA has recently been told to roll back efficiency standards for cars once again to keep us trapped in this spiral of demand driving supply that is profitable for the oil industry. Right now the U.S. has record oil production, but we ignore the fact that in a decade or so, when this shale oil extraction peaks and the crash comes, the climate impacts will be irreversible.

Yet plug-in hybrid cars can right now deliver an 80% reduction in gasoline use, with standard savings off the road in maintenance costs to the owners, large gains for the climate, and a smooth transition away from oil. However, both society and the automobile industry are reluctant to really market them, because oil consumption and inefficiency control policy.

But shifting back to the renewable world, Vermonters are starting to tap trees for maple syrup as they have done for centuries, and soon we will be eating fresh spinach again.

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

Here’s a question: how dangerous is it to operate a gasoline engine in a closed garage? The answer is very dangerous, life-threatening in fact. The carbon monoxide emitted by the engine – your lawnmower or snow blower – can reduce the amount of oxygen to the brain causing CO intoxication and lack of reasoning. At first, the “sleep” comes a little later on after the CO concentrations reach the immediately Dangerous to Life and Health (IDLH) concentration of 1,200 parts per million (ppm) in only seven minutes when a small five-horsepower gasoline engine is run in a 10,000 cubic foot room.

Now consider the IDLH concentrations of a 135 horsepower automobile running in a single car garage of 1,600 cubic feet. If one can accept the facts above, here are some sobering follow-up statistics:

- The number of registered vehicles (cars, trucks, buses and motorcycles) in the United States in 2018 was 276.1 million, up 6 million from 2017.
- The automotive trade journal Ward’s Auto has estimated that the total number of vehicles in the world crossed 1 billion vehicles sometime during 2010. Less than four years later there were more than 1.2 billion cars on the road.
- By 2035, a record 2 billion cars will be exceeded. According to a report from Macquarie Bank, 88.1 million cars and light commercial vehicles were sold worldwide in 2016, up 4.8% from a year earlier.
- Not included in these statistics are gasoline or jet aircraft.
- You don’t have to be an atmospheric scientist to get the picture. Calculating the total number of motor vehicles on the planet is an inexact science but that the number of CO emitting vehicles is growing rapidly cannot be denied. Nor can the resulting impacts on human health.

Our planetary garage is simply not big enough to prevent CO2 pollution from killing people. Lots of people. One has only to look at photographs of the fog of pollution in Beijing, Mumbai and Los Angeles to know that breathing that air is less than healthy.

CO2, combined with particulate pollution (PM2.5), contributes to an estimated 7 million premature deaths each year according to the World Health Organization. The biggest source of particulate pollution known as PM2.5, according to the WHO study, is from heating and cooking, since meals are prepared and homes heated by mostly cow dung, wood or other biomass.

Agriculture is the next biggest contributor to premature deaths from air pollution. Ammonia from livestock and fertilizer cause the formation of ammonium nitrate and sulfate particles, which contribute to air pollution.

China is the largest emitter of carbon dioxide in the world. The country emits more than 10.375 million metric tons per year, which causes serious health problems for the population, especially in the big industrial cities. Beijing is the most polluted city in the world where there are literally weeks when locals don’t see the sun because of the smog. Many citizens wear protective masks when they go outside and the local authorities have installed giant screens, which show sunrises and sunsets, to prevent depression. Nevertheless, air pollution in China causes millions of deaths every year and although the country has a thriving economy, it is also the biggest polluter in the world. That’s why the Chinese government has announced plans to take up to 6 million vehicles that don’t meet new emission standards for cars once again to keep us from reversing the climate change. He invites exchange. He invites contributions from anyone who wishes to join in the discussion. He invites comments and dialogue at john01370@gmail.com.

In America, vehicular traffic combined with industry-erosion accounts for 5.414 billion metric tons of CO2 emitted into the atmosphere every year. Image: la.crbred.com
SWA’s Top 10 Tips for a Healthier Indoor Environment – Part 2
Lauren Hildebrand

Here’s to Our Buildings, and Our Health!

The evidence in support of more healthful buildings is overwhelming. Children living in green housing have significantly lower incidences of asthma. In the workplace, we see greater employee productivity, with staff that are more engaged, creative and innovative, and less likely to leave for a competitor. And, the same concepts can be applied to tenants in apartment buildings and condos as well.

In Part I of this article, published in the January 2019 issue of Green Energy Times (http://bit.ly/IndoorEnvironment_GET_Jan2019), we outlined our top five (of 10) tips for more healthful buildings, which discussed strategies for better indoor air quality as well as mitigation of harmful household chemicals. We now conclude with our remaining top tips for a healthier indoor environment:

6. PESTS, LEAVE MY KIDS STRESS

More than 20 million people suffer from chronic asthma, including eight million children. There is a correlation between the prevalence of asthma among children and adults and the presence of pests, allergens, and pesticides. To help manage and avoid pests, use our PEST strategy: Prevent, eliminate, manage, and intercept. We now extend our PEST strategy to residential pest control for a PEST strategy that follows natural circadian rhythm. Artificial (electrical) light throws off our natural rhythms and can lead to sleep disorders, increased risk for accidents, metabolic disorders, cardiovascular disease, and certain types of cancer. Visually induced health impacts include visual strain, eye irritation, and blurred vision. Access to natural light is always the best option, but for spaces where that is not possible, a lighting strategy that follows natural circadian rhythms through balanced lighting and that 80% of people feel relaxed after spending time in a garden. Tip #8 touches upon the benefits of natural light, and we can also incorporate elements such as benches and roof-top gardens that provide a communal space to gather and promote more time outdoors. Perceived connection to the outdoors from within buildings through daylighting, views and natural design elements (biophilia) have been linked to improved sleep, mood and productivity. Lowes’ melatonin, which reduces fatigue.

7. REDUCE NOISE, REDUCE STRESS

Studies have shown a correlation to depression, stress, and heart disease when occupants are exposed to high levels of sound, such as road traffic and construction. According to Harvard’s 9 Foundations of Health, each year roughly 30 million Americans are occupationally exposed to hazardous noise levels, and another 26 million Americans ages 20 to 69 have hearing loss that may have been induced by noise exposure in the workplace or leisure activities. To control for sound, we recommend specifying sealing and sound attenuation to separate dwelling units, choosing fans based on sound ratings, installing remote-mount fans, studying ‘free area’ for grilles and louvres to avoid whistling, and testing for background sound.

8. BRIGHTER WORK DAYS, DIMMER NIGHTS

Lighting affects our alertness, productivity, decision making abilities, and circadian rhythm. Artificial (electrical) light throws off our natural rhythms and can lead to sleep disorders, increased risk for accidents, metabolic disorders, cardiovascular disease, and certain types of cancer. Visually induced health impacts include visual strain, eye irritation, and blurred vision. Access to natural light is always the best option, but for spaces where that is not possible, a lighting strategy that follows natural circadian rhythms through balanced lighting levels, intensities, and colors should be employed.

9. BRING THE OUTDOORS IN

In a 2018 report published by the World Green Building Council, studies found that people are seven times more engaged if they have a friend at work and that 80% of people feel relaxed after spending time in a garden. Tip #8 touches upon the benefits of natural light, and we can also incorporate elements such as benches and roof-top gardens that provide a communal space to gather and promote more time outdoors. Perceived connection to the outdoors from within buildings through daylighting, views and natural design elements (biophilia) have been linked to improved sleep, mood and productivity. Lowes’ melatonin, which reduces fatigue.
How Safe Is YOUR Indoor Air?

Barbara and Greg Whitchurch

Indoor Air Quality (IAQ) refers to the quality of the air within buildings, especially as it relates to the health and comfort of the occupants. A home that’s healthful for the occupants has the proper moisture level, is pest-free, contaminant-free, and well-ventilated with filtered outside air.

IAQ is affected by building design, construction practices, materials, and by the furnishings and finishes; also by having a tight building envelope that keeps undesirable outside pollutants out of the building, such as mold, pollen, and smoke. All this is consistent with what we now know about energy efficient building practices: a tight, well-insulated building is consistent with what we now know about energy efficient building practices.

One common problem is formaldehyde (bit.do/hhs-formaldehyde), a chemical that is used in pressed wood products, plywood, paneling, foam insulation, carpets, drapery, glues, and gas ranges – even paper towels, dryer sheets, and baby wipes. To cut down on formaldehyde in your home, avoid the products that contain it. But what if they’re part of the building itself? Certain plants (e.g. bit.ly/SD-plant-cleaning-air ) and materials (e.g. bit.ly/CT-air-renew-drywall) can assist in scrubbing specific pollutants out of indoor air. But once the toxin is in that air, the simplest answer is ventilation.

The simplest ventilation technique is to open your windows. Obviously, this is hardly any better than depending upon air leakage from the construction materials and methods of older buildings. In most homes, the leaky places where air comes in are where bugs and vermin travel, hide food, die, and deposit their wastes and dander.

Addressing leaky houses, Allison Bailes III, PhD, of Energy Vanguard says, “Prob-ably the most common type of whole-house mechanical ventilation system in homes is an exhaust-only system. The problem is, this type of system sucks. Literally. And if your house is sucking from an attached garage, a moldy crawl space, or dirty attic, you could be making things worse. The way to avoid having a house that sucks is to do balanced ventilation (bit.do/ev-vent4).

Balanced ventilation with a heat or energy recovery ventilator (HRV or ERV) These devices push stale air outside and bring fresh filtered air inside while saving most of the thermal energy (heat or coolness) already invested. The HRV just saves temperature; the ERV also saves the moisture difference. If you wish to go beyond the ERV by including a small heat pump for heating and cooling, consider the Conditioning ERV (CERV bit.do/be-cerv) or the Minotair (bit.do/mino-tair) – both devices can...

Cont’d on p.30
Catalyzing Clean Energy in Northern New England

A study released on February 13, 2019 by The Nature Conservancy (TNC) and Coastal Enterprises Inc. (CEI) identified strategies to transition New Hampshire, Vermont, and Maine to a clean energy economy. Innovative public-private partnerships and new investments can spark a clean energy future that has the potential to catalyze the creation of new jobs, expand access to renewable energy and energy efficiency, and lower greenhouse gas emissions. According to the report, it will require $100 billion of investment across the three Northern New England states to transition to a clean energy future. Northern New England spends $8.2 billion every year on imported fossil fuels that could be redirected toward local clean energy solutions to eventually meet 80% of the region’s energy needs with renewable heating and electricity, energy efficiency, and electric vehicle transportation.

The transition to cleaner and more efficient energy will rely largely on private investment and leadership from businesses, governments, and non-governmental organizations (NGOs). Investments in clean energy have proven economic benefits. Energy efficiency and distributed clean energy can reduce energy costs, hedge against volatile energy prices, and support local jobs. The report shows that improved policy approaches like expanded opportunities for community solar energy projects and innovative financing mechanisms can help overcome upfront cost barriers and allow businesses, consumers, and municipalities to realize cost savings from day one.

TNC & CEI are striving to create a vision for a clean energy future that is rooted in affordability, accessibility, and availability. This report helps identify tools to increase investment and finance to support the region’s transition to clean, reliable, affordable energy for ratepayers of all types and scales.


The Nature Conservancy website is nature.org. Contacts: Jim O’Brien, Director of External Affairs New Hampshire at 1.603.856.5378, jim_obrien@tnc.org or Eve Frankel, Director of Strategic Communications Vermont at 802.229.4425, eve.frankel@tnc.org.

The VEIC website is veic.org. Contact: Alayna Howard at VEIC at (802) 658-6060 x7656, ahoward@veic.org.

How Safe Is YOUR Indoor Air?
Cont’d from p.29

also control other heat pumps throughout the home.

The CERV shows a continual readout of parts per million (ppm) of CO2 and ppm VOCs throughout the day - the tolerance levels for those pollutants can be adjusted by the homeowner. It is used in Efficiency Vermont-related projects (bit.do/evt). We have a CERV in our own award-winning Passive House (bit.do/vbgnphc).

The U.S. EPA (bit.do/epa-iaq) and Efficiency VT (bit.do/evt-iaq) provide information and links to research regarding IAQ effects on cognitive function, quality of sleep, and frequency of employment sick leave.

Superior indoor air quality is one of the many benefits of a high performance home. But even if you have an older home, you can still improve your IAQ, perhaps while you improve its energy efficiency; for help, contact Efficiency VT bit.do/evt-hea.

Broecker’s Final Warning • Cont’d from p. 1

recently discovered “ocean conveyor belt,” a system of circulating currents that includes the Gulf Stream. He worked on the issues of how the ocean currents and temperatures are related to climate change. His work covered the current situation, but he also looked at the whole question from a historic perspective, using scientific evidence and dating techniques.

In his final talk, Broecker urged scientists to be ready for geo-engineering. Again, that is not to say that he was urging actual geo-engineering. He regarded it as a last resort, but one we should study so we can be ready if we need it. The issue of geo-engineering is best illustrated by an event in 1991. Mount Pinatubo, a volcano on the Philippine island of Luzon, suddenly started to erupt. While the quick buildup of the eruptions was interesting in itself, and the emergency evacuation of thousands of people was widely talked about, climate scientists are interested in another aspect of the event.

Along with about 10 billion tons of magma, the eruption of Pinatubo put 20 million tons of sulfur dioxide (SO₂) into the atmosphere. In terms of the material it ejected, it was the largest eruption since Krakatoa’s, in 1883. The effect of it was a global cooling of 0.5° C (0.9° F) that lasted for well over a year. It happens to be the case that SO₂ and related sulfur compounds are precursors for sulfuric acid (H₂SO₄). H₂SO₄ reflects quite a lot of sunlight back into space, dimming the surface of the Earth, a reflection that is all we need to do to reverse the global warming that has happened so far is to dump about 20 million tons of SO₂ into the atmosphere every year or two. Of course, as we emit more carbon dioxide (CO₂), we would have to increase the amount of SO₂.

I know there are probably many readers who want to shout at this point, “That’s crazy!” I do not blame them one bit. It is crazy! And that is why Broecker wanted us to study it as a potential last resort. He hoped we would never have to use it, but if we need to use it, we should use it as intelligently and carefully as we can.

Coal-fired power plants have been emitting SO₂ for over a century, and this has been returning to Earth as acid rain containing H₂SO₄, along with some sulfuric acid (H₂SO₄). It melts marble, kills fish, kills birds, inhibits growth of vegetables, destroys paint on cars and buildings, and eats iron, not to mention what it does to our health. That is why the Environmental Protection Agency requires that power plants take care not to emit it above certain levels.

Putting SO₂ in to the atmosphere is actually a type of chemotherapy, intended to keep the Earth alive. No one would choose chemotherapy, unless there is no other option. No sane person would choose to push 20 million tons of SO₂ into the air we breathe without a really good reason. The problem is that if we do not act faster to reduce CO₂ emissions, SO₂ emissions may come to be our only hope. Please notice that our best hope is stated in the conditional clause: Act faster to reduce CO₂ emissions. If we do that, we are doing our best to avoid the worst.

WHERE’S WINTER? • Cont’d from p. 21

now part of Vermont. Many years ago, her bones were found in a farmer’s field, and they are now the official state fossil. Like Where’s Winter?, Charlotte’s Bones is a book with an environmental message. Erin Rounds is a dedicated fourth grade teacher who is passionate about the environment. Her books are successful because she uses her interactions with children to impact her writing in a way children can relate to. Those who wish to meet her might take note of the Waterbury LEAP (Local Energy Action Partnership) Energy Fair, which will take place in Duxbury, Vermont, on April 6, at the Crossett Brook Middle School, from 9 am until 3:00 pm. She will be there, sharing a table with Green Energy Times (see ad on page 3). Tammie Stevens and Jason Lewis cofounded BillyFish Books to champion stories that educate, uplift and inspire. Their books are sold worldwide Where’s Winter? is strongly recommended and makes a wonderful gift for a child. ☺

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Sustainability at Dartmouth College Continues

George Harvey

Dartmouth College shows up regularly in news and articles at Green Energy Times (G.E.T.). Most of this is at the G.E.T. website, as announcements of programs, lectures, and achievements come out. Attention the college was giving to housing was the subject of a June 2016 G.E.T. print article, “High Performance Faculty Housing for Dartmouth.” A lot has been going on.

This is not new. Sustainability efforts at Dartmouth go back decades. For example, the Dartmouth Organic Farm was started by students in the early 1990s, and its first harvest was gathered in 1996. Students also started Dartmouth Bikes, a program supporting the use of bicycles at the campus. In 2006, students started work on the Sustainable Moving Sale, which offered goods of all sorts that were unwanted but could be reused, with refurbishing if necessary. The sale is hosted by the Sustainability Office and is run during the orientation period each year, giving it special value to incoming students.

Despite the efforts, Dartmouth College did not really have the sustainable leadership position it would have liked, and the administration wanted to do better. In April, 2016, President Philip J. Hanlon founded the Sustainability Task Force to pursue the issue. That body issued its report, “Our Green Future: The Sustainability Roadmap for Dartmouth,” a year later, on April 15, 2017 (http://bit.ly/dartmouth-roadmap).

Though it does not get into the specifics of how its goals are to be achieved, the roadmap sets out what those goals are. In its Executive Summary, it says, “The best available science indicates that, in order to limit temperature rise to two degrees centigrade, greenhouse gas emissions must be decreased by at least 80% by 2050. Our report recommends principles, standards, and commitments in the areas of energy, waste, and materials, water, food, transportation, and landscape and ecology.”

Energy is the largest contributor to Dartmouth’s greenhouse gas emissions and is also the area where prior analysis best positions us to take action. We believe that providing 50% of campus energy from renewable sources by 2025 and 100% by 2050 is feasible.

According to the roadmap, in 2016 Dartmouth consumed 3.5 million gallons of number 6 fuel oil and 50,000 megawatt-hours of grid electricity each year. Use of energy from oil and the grid accounted for about 75% of Dartmouth’s greenhouse gas emissions. Those two items were clearly the ones that needed the greatest effort.

The roadmap is the creation of just one of the Sustainability Office initiatives. There are four others, two of which might be of special interest to G.E.T. readers. The Food Working Group and the Tiny House Project could both be subjects of articles of its own. There are also ten programs in addition to the organic farm, bike project, and moving project mentioned earlier. The others range from internships to sustainable maple syrup practices.

Once the is-
COW POWER IN NEW YORK AND VERMONT

Evans Lawrence

In Vermont, a program that pays farmers to generate electricity from cow manure provides enough power for 3,200 homes. In New York, farmers are discouraged by low power prices that make it difficult for the expensive manure-powered systems to break even. Fourteen of Vermont’s roughly 800 dairy farms are in Green Mountain Power’s (GMP) renewable energy program, but in New York, with about 4,600 dairy farms, only a few dozen farms statewide are believed to be generating electricity with anaerobic waste digesters.

“One of the big factors is an agreement with the power company,” said Aaron Gabriel, crops and soils educator at Cornell Cooperative Extension in Washington County, N.Y. Gabriel said he knew of only two farms with digesters in his region. Anaerobic waste digesters heat manure and other organic material in an oxygen-free tank, where naturally occurring bacteria break it down. The bacteria release methane which can be collected and burned for heat or to run a generator. Because methane is a potent greenhouse gas than carbon dioxide, the digester greatly reduces the farm’s impact on the atmosphere.

In three to four weeks, the remaining sludge is separated into liquid and fibrous solids. The liquid can be sprayed on fields as fertilizer. The sanitary, odor-free solids can be returned to the barn as fluffy bedding or sold as nutrient-rich compost.

Green Mountain Power, the utility that delivers most of Vermont’s electricity, estimates that a digester-generator system costs around $1,400 per cow. Farmers may need loans, grants, and a 20-year state incentive that the utility was not eager to deal with the system, he said. The biggest benefit has been the bedding solids, which the cows like.

When the Wagners installed their digester, New York’s energy policy was based on standards that encouraged renewable energy development. However, that policy is under review. The state’s goal is to obtain 50% of its electricity and reduce greenhouse gases by 40% by 2030, but new policies may or may not favor the economics of digesters.

NY Assemblywoman Carrie Woerner has many dairy farms in her upstate district. She supports legislation that would require utilities to pay a fair market price for electricity from anaerobic digesters. “Power from digesters is different from other forms of green energy,” Woerner said. Unlike solar and wind, which are intermittent and depend on weather and season, “you know how many cows you have, how much they eat, and how much they poop. You can predict very accurately how much power they’ll produce and put on the grid. They are a base producer. Utilities know how much they need to meet peak demand. If they know how much digesters are producing, they know how much less power they’ll have to buy on the open market.”

Digesters also “take methane out of greenhouse gases and produces power. I think that’s something we should be encouraging, but we’re not able to recognize the opportunity of this technology,” the Public Service Commission doesn’t require distributors to pay a fair market price,” Woerner said.

Evans Lawrence is a free-lance writer in Cambridge, NY. This article appeared in a longer form in the December 2017-2018 issue of Hill Country Observer.

Twenty-one NY Universities Form Renewable Energy Purchasing Consortium

Steve Hanley

Twenty-one public and private universities in the state of New York have banded together to create the New York Higher Education LSRE Project, which seeks to lower financial barriers to renewable energy procurement through combined purchases. The consortium plans to consider large scale solar photovoltaic, wind, hydroelectric and energy storage projects for development in New York State, according to the Sustainable Campus initiative at Cornell University.

The new group says its mission is to “create positive change in our regional renewable energy market, advance partnerships between New York State higher education campuses, and help us advance our academic missions by powering our campuses in a manner that is financially viable, environmentally conscious and socially just.” That translates into obtaining all the electricity needed to operate all twenty-one campuses from net zero carbon resources.

The group includes all sixteen campuses in the State University of New York (SUNY) system together with Cornell University’s
Elmore Roots’ Permaculture Know-How

There’s Something about a Leaf

David Fried

The way it sits there.
The way they all work together as one.
Fluttering
and relaxing to produce energy from the sun.
How does a leaf open? I don’t really know.
I want someone to assure me that it is magic.

What is a Low-carbon Diet?

Is it Good for Losing Weight or Is It Only About Saving the Planet?

EarthTalk® From the Editors of E - The Environmental Magazine

Not to be confused with a “low-carb” diet, which involves avoiding carbohydrates to lose weight, a low-carbon diet – whereby you limit foods that generate a lot of carbon emissions in their production and distribution – is about reducing your carbon footprint. That said, proponents of a low-carbon diet say that eating with reduced greenhouse gas emissions in mind is more healthful for us than the typical American diet wherein carbon-intensive meat, dairy and processed foods occupy too large a share of our overall food intake.

A recent study from the University of Michigan Center for Sustainable Systems backs up these assertions. Researchers correlated data from the National Health and Nutrition Examination Survey – a snapshot of what 16,000 Americans consumed over one 24-hour period – with information on the nutritional value and greenhouse gas impacts of different food items, concluding that the better a diet is for the planet, the better it is for our health. Furthermore, the 20 percent of Americans who eat what researchers consider a “high-carbon” diet (rich in red meat, dairy and exotic and processed foods) are responsible for almost half of the nation’s food-related carbon dioxide (CO₂) emissions. The upshot is that changing the behavior and food choices of this small segment of the population could pay big dividends for reducing our overall carbon footprint and for public health.

The concept of a low-carbon diet was first popularized in the U.S. by Bon Appétit Management Company, which runs more than 1,000 cafés in 33 states for corporations, universities and venues. Back in 2007, the company partnered with the non-profit Ecotrust to compile and conduct Life Cycle Assessments (LCAs) – measuring the amount of CO₂ emitted during a given food product’s entire life cycle – for thousands of different foods. These LCAs became the basis for the “Food Scores” section of its EatLowCarbon.org website, which provides information to help people reduce their carbon footprints through food choices.

Besides launching EatLowCarbon.org, Bon Appétit’s managers also embarked on a five-year internal campaign to ratchet down the emissions generated by the company’s own operations and offerings by 25 percent. The company stopped buying air-freighted seafood, reduced its use of tropical fruit by half, shrank beef purchases by 33 percent and cheese by 10 percent while cutting food waste by one-third. Overall these moves shaved some five million pounds of carbon emissions per month off Bon Appétit’s contribution to global warming.

The fact that food and the systems to produce and distribute it are responsible for about a third of all greenhouse gas emissions means that everyone has a lot of potential for fighting climate change through sourcing locally produced and in-season foods to minimize emissions-intensive ‘food miles,’ buying only as much as we can eat to reduce waste, and minimizing consumption of red meat, dairy and processed foods. In the case of climate change, if we don’t watch what we eat, it could really come back to haunt us.

Contacts: National Health and Nutrition Examination Survey, cdc.gov/nchs/nhanes/;
Bon Appétit Management Company, banco.com; Ecotrust, ectrust.org; Eat Low Carbon, EatLowCarbon.org.

EarthTalk® is produced by Roddy Scheer and Doug Moss. Visit www.earthtalk.org or question@earthtalk.org.
Grass-Fed Dairy Initiative

Jessie Haas

When UVM agroecologist Heather Darby initiated a study of twenty grass-fed dairy farms three years ago, there were 130 of them nationwide. This year she is heading a study of all grass-fed dairies, and there are now 500. The effort is funded by a $1 million grant from USDA.

Well-managed grazing can rapidly increase soil organic matter (SOM) creates soil that acts like a sponge, absorbing water during heavy rains, and retaining it during dry spells. This in turn helps keep waterways cleaner and prevents flooding. Other environmental services include a local cooling effect, due to soil being continuously covered with growing plants, and a measurable increase in rainfall.

Grass farmers provide these environmental services as part of their business model, and grass milk currently receives a premium price in the market. But Darby worries that even so, it’s not enough to make a decent living. “We need to bring farmers and the environmental community closer together,” she said. “We need food, and we need the environment. These aren’t just things we want.”

The money from USDA’s Organic Research and Extension Initiative will fund a look at where grass-fed dairy works, and how it can work better. The grass-trend is consumer-driven, and that’s one of the things Darby’s team will study. Why exactly do consumers want grass milk? Taste? Personal health? The environment? That part of the study includes pulling grass milk from grocery store shelves all over the country and sampling.

But the bulk of the study focuses on the farmer. A survey has just gone out to grass milk farmers nationwide asking about what has worked for them, what has not, and what issues they’ve had during the transition. The responses will form a database that participating farmers can consult. It will also deploy a benchmarking program to help farmers track production and costs, so they can compare within the grass milk community.

Another part of the research focuses on nutrient flow, a major difference between grass-fed and conventional dairy. Conventional farmers can feed grain to make up for a poor forage crop; grass milk farmers don’t have that option. That can strongly impact productivity. Soil depletion is also a concern. After all, nutrients are leaving the farm in the form of milk or beef. These need to be replaced, or the soil will deteriorate.

Darby sees this as a relatively minor problem that can be solved in a short timeframe, a year or two, as compared to the much longer time it can take to transition to a different breed of cow. One of the most important strategies is to incorporate legumes like clover and alfalfa into the pasture mix. These plants fix nitrogen from the air and can supply it to the grasses that grow with them, eliminating the need for chemical fertilizer—a major source of greenhouse gases. Legumes also provide nutritious fodder and contribute to biodiversity. (Red clover, a classic pasture legume, is the Vermont state flower.)

Darby has seen an increased environmental awareness on the part of farmers over the past ten years, and farmers are responding to consumer demand. But grass milk often requires more acreage which may create pressure to clear land. And farm profits, or lack thereof, is still a big problem.

“When will we bear the true cost of having food and the environment?” Darby asked. “How will we pay for it?” Or as farming consultant, Ray Archuleta, has often said, “To go green, you have to be in the black.”

Darby is not just an academic. With her husband she owns and operates Darby Farm, a seventh generation vegetable and fruit farm in Orwell, VT. Darby is also a hops expert and is currently experimenting with milkweed as a commercial crop. Her study of the reality of grass-fed farming nationwide is one ray of hope for the struggling dairy industry in the Northeast and for the environment.

Sources:
- http://www.uvm.edu/faculty-darby.php
- www.darbyfarm.com

IT'S A GREEN LIFE - AFTER ALL … FARM AND GARDENS

voila! You have just made yourself several drops of peppermint oil, shake lightly and what's a conscious consumer to do? Almost act like a rope…choking sanitary sewer pumps and causing huge backups. “I tested Izorama extensively as a toilet freshener and for everything else I could think of and was duly impressed overall. It worked great on my hands without drying them out. The ingredients are simple (non-GMO alcohol, essential oils and water), and I liked the handy six ounce clear spray bottle. Give it a try if you are not into experimenting and making your own wiping, cleansing, people, and toilet freshening spray juice.

Make a disposable applicator by wrapping your favorite unscented toilet paper three times around your fingers. After dry wiping (yes, we can be talking butts here), spray your alcohol and essential oil blend onto the topper twice quickly and wipe once to finish. Dispose of in the usual fashion. This home-made system is great as a cleansing wipe for yourself. Some people even claim that alcohol and essential oils helps to shrink hemorrhoids. I like to use it on my reading glasses as it cuts through greezy film easily. Here is a terrific recipe for an all-purpose spray cleaner or wipe:

Fill an eight-ounce spray bottle with the following:

Seven ounces of distilled water (put this into the bottle first)
1/2 tsp Vermont Soaps’s Liquid Castile (your favorite scent!)
Optional: Add a couple of drops of essential oils to the blend
Shake it up, and your nontoxic cleaner is ready to use. Great for all washable surfaces including glass, tile, and finished woodwork. Ball up newspaper and use it with the spray to make your windows shine! You can upcycle an old flannel sheet or towel and cut it up into small squares. Keep a basket handy with the clean scraps and a pail in your laundry room for used wipes. When they are dirty, simply wash them out with Liquid Sunshine or Castle Liquid Soap and return them to the basket.

Larry Plesent

Larry Plesent is a writer, blogger and natural products formulator who lives off-grid in a hand built solar-powered cabin in the Vermont mountains. He is also the founder of Vermont Soap, a pioneering personal care products company dedicated to replacingucky stuff with yumsuny stuff. Learn more at vermontsoap.com. Please Note: Green Energy Times advocates exercise of caution in the use of potable alcohol as a disinfectant. While it can be very effective and can be used safely by anyone who could safely ingest it, some people can be negatively affected by it.

Eat - Lancet with a Grain of Salt

Jessie Haas

The Lancet commission’s report, “Food in the Anthropocene,” which recommends a near-vegan diet for the health of people and the planet, has been widely discussed and the main ideas are widely shared. EAT (Experience Anthropocene) is a movement that promotes a shift towards a diet that is more sustainable and healthier for both people and the planet. This movement is based on the premise that modern agriculture is not sustainable and that a shift towards a more plant-based diet is necessary to address the environmental and health challenges we face.

The report argues that the current system of agriculture is not sustainable and that a shift towards a more plant-based diet is necessary to address the environmental and health challenges we face. The report highlights the need for a transition to a more sustainable food system that is based on the principles of regenerative agriculture. This system would focus on regenerating soil health, reducing greenhouse gas emissions, and preserving biodiversity.

One of the key recommendations of the report is to reduce the consumption of meat and dairy products. The report argues that the current system of meat production is not sustainable and that a shift towards a more plant-based diet is necessary to address the environmental and health challenges we face.

The report also highlights the need for a shift towards a more sustainable and healthy food system. This system would focus on reducing food waste, promoting healthy diets, and ensuring that everyone can access affordable, nutritious food.

The report suggests that a shift towards a more sustainable and healthy food system would have a number of benefits. This system would help to reduce greenhouse gas emissions, reduce the risk of chronic diseases, and promote economic development.

The report recommends that governments, NGOs, and civil society organizations should work together to implement the recommendations of the report. This would require a shift in policy and in public perceptions of food and the environment.

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https://regen-intl.org/why-regen-ag/
https://liveloavefruit.com/glyphosate-food/


Larry Plesent

Flushable wipes cause sewer clogs. Image: www.foxmetro.org


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One of the key recommendations of the report is to reduce the consumption of meat and dairy products. The report argues that the current system of meat production is not sustainable and that a shift towards a more plant-based diet is necessary to address the environmental and health challenges we face.

The report also highlights the need for a shift towards a more sustainable and healthy food system. This system would focus on reducing food waste, promoting healthy diets, and ensuring that everyone can access affordable, nutritious food.

The report suggests that a shift towards a more sustainable and healthy food system would have a number of benefits. This system would help to reduce greenhouse gas emissions, reduce the risk of chronic diseases, and promote economic development.

The report recommends that governments, NGOs, and civil society organizations should work together to implement the recommendations of the report. This would require a shift in policy and in public perceptions of food and the environment.

Sources:
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Are You Drinking Roundup?
Popular Weed Killer Found in Top Beer and Wine Brands

A new report shows that numerous beers and wines, including organic, inadvertently contain toxic glyphosate from Roundup.

Many beers and wines sold in the U.S. contain the weed killer glyphosate, the main ingredient in Roundup, according to a new report by U.S. Public Interest Research Group (PIRG) Education Fund. U.S. PIRG tested twenty beers, wines and hard cider, including several organic brands, for glyphosate and found that all but one contained the harmful chemical.

This revelation came on the same day a San Francisco court began hearing arguments in the first federal civil case over whether Monsanto’s Roundup weed killer causes cancer.

“When you’re having a beer or a glass of wine, the last thing you want to think about is that it includes a potentially dangerous pesticide,” said U.S. PIRG Education Fund’s Kara Cook-Schultz, who authored the study. “No matter the efforts of brewers and vintners, we found that it is incredibly difficult to avoid the troubling reality that consumers will likely drink glyphosate at every happy hour and backyard barbecue around the country.”

U.S. PIRG tested five wines, fourteen beers and one hard cider for the study. The wine brands were Barefoot, Beringer, Frey (organic), Inkari Estates (organic), and Sutter Home. The beers examined were from Budweiser, Coors, Corona, Guinness, Heineken, Miller, Peak (organic), Sam Adams, Samuel Smith (organic), Sierra Nevada, Stella Artois, Tsingtao and New Belgium. Ace Perry Hard Cider was also tested. The study results confirm past results of several other groups, including Moms Across America.

Of particular note, the study found that, despite weed killer products like Roundup being prohibited in the making of organic beers and wines, glyphosate was discovered in three of the four organic alcoholic beverages tested.

The Brewers Association, which represents more than 4,900 small and independent craft brewers, said in a statement, “Brewers do not want glyphosate used on barley or any raw brewing material, and the barley growers organizations have also come out strongly against glyphosate.”

“The amount of glyphosate discovered in the samples ranged as high as 51 parts per billion (ppb) in Sutter Home wine and more than 25 ppb in non-organic beers from Budweiser, Coors, Corona, Miller and Tsingtao. The organic drinks were found to have totals as high as 5.2 ppb. While these numbers are below the EPA’s risk tolerances for beverages, at least one previous scientific study found that as little as one part per trillion of glyphosate can stimulate the growth of breast cancer cells and disrupt the endocrine system.

“Craft brewers pride ourselves on producing the highest quality products for our patrons, and that necessitates the use of the highest quality, safest ingredients,” said Elan Walsky, who is co-owner of Coalition Brewing in Portland, Oregon. “Maintaining this high standard of excellence is not only important for our beer and our health, but also for the local community from the farmers who grow our hops and barley, all the way down to the people enjoying our beer.”

With the findings indicating glyphosate contamination is common in over-the-counter beers and wine, the report recommends that, unless it can be proved otherwise, the pesticide should be banned in the U.S. due to its many potential health risks and ubiquitous presence in food, water and alcohol.

“With a federal court looking at the connection between Roundup and cancer, we believe this is the perfect time to shine a spotlight on glyphosate,” Cook-Schultz said. “This chemical could prove a true risk to so many Americans’ health, and they should know that it is everywhere — including in many of their favorite drinks.”

U.S. PIRG Education Fund is an independent, non-partisan group that works for consumers and the public interest through research, public education and outreach, serving as a counterweight to the influence of powerful special interests that threaten our health, safety or well-being. Learn more at uspirg.org.


Links are available on our website at http:// www.greenenergytimes.org/2019/02/25/ are-you-drinking-roundup/.
Another Ban on Single-Use Plastics

George Harvey

Single-use plastics include such things as bags we get in stores, plastic table wear, and drinking straws. They include the plastic-based wipes Larry Plesent objects to in his "Ingredient of the Month" article in this issue of Green Energy Times (G.E.T.). In cases like plastic bags, they need not be thrown out but are anyway. In such cases as the wipes, they really should be thrown out but need not be made of plastic. But they are always a problem.

The issue is not whether they can be recycled. Jenna Evans, Ben & Jerry's Global Sustainability Manager, made this clear. She said, "We're not going to recycle our way out of this problem. We, and the rest of the world, need to get out of single-use plastic."

Plastics get into the environment and making their way in winds and river waters to the ocean, where they accumulate in slowly swirling systems called gyres. Some of the areas where plastics accumulate are hundreds of miles across. For more about this, see the article, "Garbage Patches in our Ocean," which was in the August, 2015 issue of G.E.T. (http://bit.ly/G.E.T-gyres).

Single-use plastics kill all manner of life in the oceans, from the smallest to the largest. They often kill by clogging digestive systems. Last June, when the UN World Environment Day had the theme, "Beat Plastic Pollution," G.E.T. ran an article of the same name; it mentioned a whale that was killed by plastic bags (http://bit.ly/beat-plastic).

The move to stop plastic pollution has been gaining momentum over the last few years. Some Vermont towns have banned single-use plastic bags. Last year, Brattleboro was first to ban the bags outright, while Manchester called on the state to implement a state-wide ban. This year, Manchester, Middlebury, and Burlington residents voted overwhelmingly in favor of bans on plastic bags.

Vermont is not the only state moving on the bans. New Hampshire, Maine, Massachusetts, and others have efforts under way for state-wide bans on single use bags, with bills coming before the legislatures. As voters understand the issue better, support for the bans is growing, and we are increasingly likely to see bills passed into law.

Some businesses have taken leadership roles in reducing single-use plastic use. A notable example is Ben & Jerry's, which started reducing use of plastics in 2009, with a switch away from plastic containers for their ice cream. Now the company is eliminating use of plastic spoons and straws. The changeover to wood and paper for these items is set to be complete by the end of 2020.

Ben & Jerry's is not alone. Businesses large and small are working on eliminating single-use plastic. One example is the Common Man, which runs fifteen restaurants and a movie theater in New Hampshire. The Common Man is actually going a little beyond a simple switch to paper straws by making sure that all straws are made from Forest Stewardship Council certified paper. The switch is costing the chain $24,000, which does not seem excessive, considering there are sixteen sites involved.

For the time being, paper and wood cost a little more than plastic, but pressure can be brought on hesitant businesses to take steps to protect the environment. Trader Joe's has announced it will eliminate use of a million pounds of single-use plastic from its stores in 2019. It will replace all single-use plastic bags, offering biodegradable and compostable bags instead. It will eliminate the polystyrene foam used for packaging, and it will sell more produce loose, instead of wrapped in plastic. Nevertheless, according to Greenpeace, Trader Joe's could do much better, and customers should hold it to a higher standard.

The plan Trader Joe's announced did not address well over a million pounds of plastic it will still be using.

This is an issue that we should all keep in mind as we shop. And if we see stores continue to offer single-use plastic to its customers, we might ask the management to stop. One alternative is to shop instead at a store that does better on plastic.
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