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FINDING AND FINANCING *Efficient Maine homes*

BY STEPHANIE CHENEY

SAVING MONEY AND using less energy are terrific goals for a homeowner, but where do you start? Whether you own your own home or are looking to purchase one, Maine has plenty of resources to get you on the energy-saving track.

Show me the money

EFFICIENCY MAINE IS A FIRST STEP

Efficiency Maine is an independent administrator of energy-efficiency programs that acts as a clearinghouse to help homeowners and businesses upgrade their energy efficiency and heating/cooling systems. Efficiency Maine offers financing programs as well as rebates for a variety of appliances, heating and cooling systems, and weatherization upgrades. According to Dana Fischer, residential program manager for Efficiency Maine, the agency offers homeowners an unbiased resource for information about saving energy and money.

The Efficiency Maine website also identifies contractors that provide services for weatherization and insulation; renewable energy sources, like solar, geothermal or wood pellet systems; and high efficiency oil, propane or natural gas furnaces. The website walks homeowners step-by-step through the entire process, and offers plenty of help along the way. If you are interested in qualifying for rebates, it is important to work with an Efficiency Maine certified contractor or vendor to ensure that the improvements will qualify for financing and any applicable rebates from the organization.

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Efficiency Maine residential rebates, financing & tax credits*

Improvement type	Program name	Benefit cap
Air Sealing, Home Insulation, and Heating System Projects	Home Energy Savings Program	$1,500
Home Energy Upgrade Financing (1-4 unit buildings)	Energy Loans	$25,000
Heat Pump Water Heaters	Water Heater Rebate Program	$100
ENERGY STAR® Appliances	Appliance Rebate Program	$25 – $50
ENERGY STAR® CFL and LED Lights	Retail Lighting Program	Reduced price at retailers
Electricity Monitor Loaner from Local Libraries	Electricity Monitor Loaner Program	Free

Other incentives

Improvement type	Program name	Benefit cap
Air Sealing; Energy Audits; Natural Gas Boilers, Furnaces, and Water Heaters	Summit Natural Gas of Maine	$300 – $2,060
Natural Gas Heating Systems	Maine Natural Gas	$400
Solar/Wind/Geothermal Systems	Federal tax credit (EXPIRES 12/31/16)	No cap

*Note: rebates and tax credits are subject to change. Visit EfficiencyMaine.org for current rebate offerings and criteria for high-efficiency heating systems and building performance upgrades.

CONTINUED FROM PAGE 17

Efficiency Maine's financing programs for energy-saving improvements are an excellent way to upgrade your home's energy efficiency. Loans are offered for amounts ranging from $1,000 to $25,000. Fischer explained that the most common use of the loans is to improve air sealing, attic insulation, basement insulation and boilers. Most of the loans fall in the $5,000 – $12,000 range, with no upfront costs. "For example, a 15-year PACE loan for $10,000 will result in an $80 per month payment," he explained. And more often than not, the energy savings of the improvements often cover the monthly loan payment, Fischer noted.
www.efficiencymaine.org

MAINE STATE HOUSING AUTHORITY

For low-and moderate-income homeowners who qualify, the Maine State Housing Authority (MSHA) offers grants and financing to weatherize homes, replace central heating systems such as furnaces or boilers, as well as home loans to first-time home buyers who meet certain income guidelines.
www.mainehousing.org

UNSECURED ENERGY LOANS

Some private lenders offer financing for energy improvements and even fuel for heat. Jen Baickle at cPort Credit Union in Portland, explained that their organization offers Energy Loans at favorable rates—about 3% lower than traditional interest rates—depending on the length of the loan term, credit score and other credit factors. The loan is an unsecured loan and is capped at $25,000. "Customers need to provide an estimate or invoice for the energy-related expense for review," said Baikle. "At closing, the check is cut payable directly to the vendor or contractor."

Casco Federal Credit Union offers a similar program. "We have closed on more and more of these types of energy loans every year," explained Nicki Frazier, V.P. of Lending at Casco Federal Credit Union. Financing for energy improvements can be as low as 2.99% APR and can be used for appliances, efficient furnaces or pellet stoves. A home equity loan, which is tied to the borrowers' home equity stake would probably be a better fit for larger expenses, she explained.

At Maine Savings Federal Credit Union in Hampden, their Energy / Green Energy loan program offers unsecured financing for new solar, wind, heat pumps, geothermal, and natural gas or propane heating systems. According to Rick Morris, V.P. of Lending, "This program was expanded from financing a pellet stove upgrade to just about anything that might replace fuel oil heat. Many of these loans are going toward heat pumps," he added. The loans are based on an annual percentage rate 3% lower that other loans at the credit union. The monthly payment based on the present rate of 5.99% would be $14.62 per $1,000 financed. There are no application fees, but the borrower must provide an estimate for the improvement. Like other programs, the check is cut payable to the contractor or installer.

www.cportcu.org
www.cascofcu.com
www.mainesavings.com

SECURED ENERGY IMPROVEMENT LOANS

Most traditional banks offer loan products that can apply to energy improvements or upgrades in two ways. The first, a home improvement loan, is tied to home equity. The second, an unsecured line of credit, acts as a revolving account, much like a credit card, but with lower interest rates. Recent mortgage and financing regulations have restricted many banks from offering more nuanced loans specifically targeting "green" improvements, but it's worth sitting down with your bank representative to see what options might be available for your goals.

Another option used by Mainers to finance energy-efficiency improvements is the FHA Title One home improvement loans offered by Home Loan Bank, based in Rhode Island. According to Oscar Almanzar, business development officer, Home Loan Bank offers federally-insured loans of up to $25,000 toward home energy or efficiency improvements, or as much as $12,000 per unit in 2-5 unit multifamily homes. The unique option for Maine homeowners is that the company allows the homeowner to reduce the payment by applying any Efficiency Maine rebate (or other incentives such as the federal tax credit) to the principal. This feature is a one-time pay down that will recalculate the monthly payment, and must be completed within the first year of the loan term.

"Applicants can apply for this loan for solar, geothermal, wind, pellet boilers or any improvement to heating or cooling," Almanzar said. The loan APR is based on the term of the loan (36 months to 20 years), the borrowers credit score, and creditworthiness. Closing costs include an origination and accounting fee, which is rolled into the loan. No down payment or equity is required, but the borrower must provide an estimate for the improvement at closing.
www.homeloanbank.com

VENDOR FINANCING IS ANOTHER OPTION

Revision Energy, a solar installer with offices in Portland and Liberty, offers their "Own Your Power" (OYP) solar loan program. The OYP is structured as a pair of loans: the first is a one-year, no interest, same as cash loan in the amount of anticipated energy incentives. The second loan is structured as a 12-year, 2.99% fixed-rate loan on the remaining balance of the installation. According to Jen Hatch, Revision's marketing manager, "It's the best loan we've found to date. It allows our customers to swap their electric bill payment for an installment toward owning their own solar array," she explained.
www.revisionenergy.com

Finding home sweet home

If your present home is not well-suited for the type of energy and efficiency improvements you have in mind, or you're considering a new home, there are plenty of options and resources to help you find an energy-efficient and environmentally healthy home.

GREEN REALTORS OFFER VALUABLE TRAINING

Real estate brokers now provide many more services beyond the purchase or sale of a property. The GREEN Realtor designation provides training and certification in the specialty of identifying and quantifying an existing "green"

CONTINUED ON PAGE 20

Community, and the opportunity to know and interact with neighbors, is a core element of the Belfast CoHousing Community.

PHOTO: STEVE CHIASSON

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home or one that has potential for transformation into a more energy-efficient dwelling.

Jennifer Defilipp of Townsend Real Estate in Cape Elizabeth is a certified GREEN Realtor, and has completed specific training to help her buyers understand energy efficiency aspects of a potential purchase. "I want my customers to have energy efficiency in mind when reviewing properties," she explained.

She encourages buyers to get an energy audit done on their new home to provide a baseline of the home's performance and then work to improve from there. She helps to identify existing efficiencies and suggests a plan to improve on existing features. "I want them to be able to prioritize improvements to get the biggest bang for their buck," Defilipp said.

Her experience has paid off. In the historic district of Portland, she has found it is possible to restore a historic house and secure approvals to add solar photovoltaic panels adding to the home's value. She also has compiled a list of experienced contractors who can recommend renewable energy upgrades.
www.greenresourcecouncil.org

COMING SOON ... GREEN APPRAISALS

The Appraisal Institute, a national organization that certifies real estate appraisers has begun to offer green appraisal certification along with an addendum that covers green aspects associated with homes. This is good news, but it may be early for the full benefit to be realized by Mainers. While appraisals for bank-financed mortgages may be conducted by a green-certified appraiser, there is not yet an effective mechanism in place to match green-certified appraisers with applicable homes, and most communities in Maine lack the quantity of green properties needed to make their value relevant for appraisal comparison purposes.
www.appraisalinstitute.org

ENERGY SMART DEVELOPMENTS

Another way to go is to invest in a home that is designed to be highly efficient and utilizes renewable energy technology. Since 2009, Russell DeConti, of Keller Williams Real Estate, has been working on a development in Freeport with an unusually strong environmental ethic. Kelsey Brook features 15 one- to two-acre lots that are situated on a 60-acre parcel on Wolf's Neck. About 40 acres are reserved as open land, with the lots and roads occupying the remaining 20 acres. Conservation land surrounding the property offers fields, forests and public walking trails.

The unique feature of this development lies in the direction of the types of homes to be built. The restrictive covenants require that proposed homes be built to meet a high-efficiency, sustainable profile, using one of an array of recognized green designations as a measure, including LEED, Passive House, Net Zero Energy, ENERGY STAR®, or National Association of Home Builders' Green Building Standard.

Certifications and standards

LEED (stands for Leadership in Energy & Environmental Design) certification looks at the design, totality of the structure, the construction and all aspects of a home's efficiency, longevity and use of environmentally responsible materials. Homes are rated on a point system that assigns value to location, site, water use, energy use, materials, and indoor air quality. LEED has four levels of certification: LEED Certified, Silver, Gold or Platinum.

Passivhaus or Passive House is a home designed and oriented to minimize its energy needs and to maintain a comfortable living environment while keeping to an extremely low carbon footprint. This is achieved with an airtight, super-insulated exterior envelope that minimizes heating and cooling loads, a ventilation system that consistently provides fresh air, and renewable energy systems.

National Association of Home Builders' Green Building Standard is a set of guidelines for designing and building high-performance homes that utilize sustainable construction methods.

ENERGY STAR® Homes are designed to save 30 percent more energy when compared to typical new homes. The designation follows guidelines developed by the Environmental Protection Agency.

Net Zero Energy Homes a house that produces as much energy as it uses, including the use of renewable technologies.

"It is a niche custom construction market, but we've sold five lots so far," DeConti explains. Three homes have been completed and construction will begin on two more this year. Of the three completed homes, the first home was a LEED Silver designated home, the second an ENERGY STAR® home and the third is a Net Zero energy home.

CO-HOUSING COMMUNITY INSPIRED BY PASSIVHAUS DESIGN

The long-term benefits of designing a highly efficient home lie in the savings realized from the initial investment in insulation, highly efficient doors and windows and tapping into renewable energy to power the homes.

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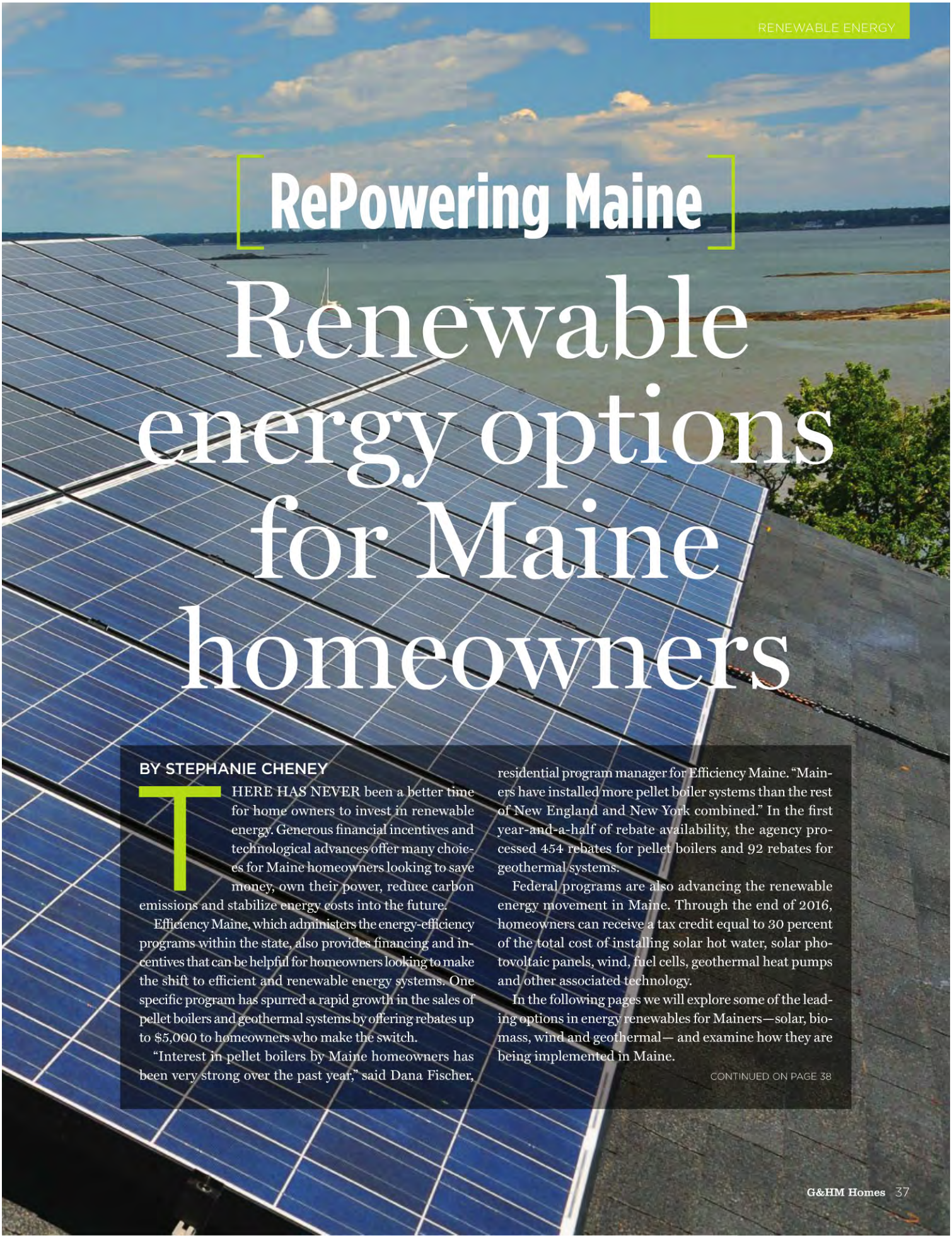
PHOTO COURTESY OF: REVISION ENERGY



RePowering Maine

Renewable energy options for Maine homeowners

BY STEPHANIE CHENEY

THERE HAS NEVER been a better time for home owners to invest in renewable energy. Generous financial incentives and technological advances offer many choices for Maine homeowners looking to save money, own their power, reduce carbon emissions and stabilize energy costs into the future.

Efficiency Maine, which administers the energy-efficiency programs within the state, also provides financing and incentives that can be helpful for homeowners looking to make the shift to efficient and renewable energy systems. One specific program has spurred a rapid growth in the sales of pellet boilers and geothermal systems by offering rebates up to $5,000 to homeowners who make the switch.

"Interest in pellet boilers by Maine homeowners has been very strong over the past year," said Dana Fischer, residential program manager for Efficiency Maine. "Mainers have installed more pellet boiler systems than the rest of New England and New York combined." In the first year-and-a-half of rebate availability, the agency processed 454 rebates for pellet boilers and 92 rebates for geothermal systems.

Federal programs are also advancing the renewable energy movement in Maine. Through the end of 2016, homeowners can receive a tax credit equal to 30 percent of the total cost of installing solar hot water, solar photovoltaic panels, wind, fuel cells, geothermal heat pumps and other associated technology.

In the following pages we will explore some of the leading options in energy renewables for Mainers—solar, biomass, wind and geothermal— and examine how they are being implemented in Maine.

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RENEWABLE ENERGY SOURCE

BIOMASS

BIOMASS IS OUR most local form of energy—fuel from wood and wood by-products has been heating homes in Northern New England for centuries. While many Mainers have a working relationship with wood in some form, new technologies are making heating with biomass resources more convenient, cost effective and cleaner.

Benefits:
- Renewable, plentiful, Maine-grown energy source
- Improves the local economy and creates local jobs
- Multiple incentives to reduce investment cost
- Clean burning pellets reduce emissions
- Pellet boilers can replace existing boilers, using existing piping/duct work and pumps
- Pellet delivery to automatic boiler households as convenient as oil/propane deliveries.

Considerations:
- Requires on-site storage (stacked wood, pellet bags or pellet hoppers)
- While pellet boilers are often automated, wood and pellet stoves require manual loading of cordwood or pellet hopper and most pellet stove hoppers need replenishing every 24 hours.

AUTOMATIC PELLET BOILERS

Several years ago, it was the advances in automatic pellet boilers that inspired Hans Brandes to replace his oil boiler and two oil tanks with what he calls "a modern, efficient pellet boiler that does what it is supposed to do." Prior to that time, he'd been using 1,000-1,200 gallons of oil each year to heat his home and hot water. Tired of fluctuating oil prices, he was looking for a stable energy option.

Automated pellet boilers were relatively new in Maine at that time and Brandt did a lot of research before deciding on his MESys AutoPellet PES20 68,300 BTU boiler and a five-ton pellet storage bin. No extensive retrofit was needed for the pellet boiler installation, and he was able to keep all the original heating pumps and thermostats. But the best part was the cost savings. With a pellet cost equivalent of about $2/gallon, Brandes estimates that the new system cut his heating bill in half.

Sam Flick of North Yarmouth was drawn to the quiet operation of the Kedel wood pellet boiler. He estimates it has reduced his fuel consumption costs by about 50%.

PHOTO: REVISION HEAT

"It's nice to be out of the game of oil price fluctuations," says Brandes. Because pellet production is local, prices tend to be flat and stable. And he feels good about feeding the local economy. "It's a Maine employment pipeline from trees, to trucks, to pellet mill, to my house." Brandes said the switchover is easy for a homeowner, with trucks delivering pellets direct to the system's hoppers in the basement. Brandes likes the clean efficiency of his pellet boiler. "Burning wood smells nicer, there's no sulphur or oil smell in my basement," he explained. "And, it's nice to be out of the oil business."

MESys has grown a steady business in automatic pellet boilers, assisted by Efficiency Maine's up-to-$5,000 rebates offered. According to MESys' Matt Hiebert, "the incentives are helping customers see the value of this technology, and as a result, it is becoming more commonplace." MESys has expanded its pellet storage capabilities and added a fourth delivery truck to keep up with demand. Because each installation is unique, Hiebert said, costs for a MESys pellet boiler can vary. MESys pellet boilers cost about 50% more than a similar sized oil furnace, not including any rebates or incentives, he explained. On average, Hiebert says his cash customers can expect a five-year payback. A homeowner who finances a MESys Pellet Boiler at 4.5% APR over 15

years would experience an immediate return, as the loan plus pellet cost would be less than the oil payment. "For example, a home that consumed 1,200 gallons of fuel oil would save $911 in the first year," Hiebert explained. "When you do the math, it really makes sense."

This growing demand is what led Ryan Hamilton of Portland-based Interphase Energy to begin importing Kedel pellet boilers from Denmark. Ryan had experience with the the high-end pellet boilers that cost upwards of $20,000 to install, as well as inexpensive pellet boilers that required lots of attention. He wanted to offer a more affordable pellet boiler in Maine that was as easy to operate as a traditional oil-fired system. After some research, he found NBE/Kedel, a leading manufacturer in Denmark, whose pellet boilers have been installed in 60,000 homes throughout Europe, and began importing them in 2012.

With an average installation cost of $14,000, the Kedel boilers also qualify for up to $5,000 in rebates from Efficiency Maine bringing the after-rebate cost close to that of a high-efficiency gas/oil boiler with a more stable, economical fuel. Hamilton is excited about the pellet industry spurring economic development in Maine by creating jobs and investing in a locally sourced fuel. "What we have here in Maine is totally unique within the U.S.," Hamilton said. "The combination of pellet manufacturing, pellet delivery and pellet boiler technology—it's a whole new energy industry that's starting right here in Maine."

Both the Kedel, and the MESys systems offer the ability to track performance via the web, so homeowners can view their boiler's performance on a desktop computer, tablet or smart phone and even get an email if anything in the system fails.

"Kedel Boilers are efficient and easy to clean, requiring little beyond simple annual maintenance," explains Hamilton. "Plus, they are amazingly quiet to run."

It is that quiet operation that sold Sam Flick from North Branch Farm in North Yarmouth on his Kedel Boiler. When his oil boiler cracked and he needed a replacement to heat his 3,500 sq.ft. home, he looked first to high-efficiency heat pumps. He was already using a solar array to generate electricity and the heat pump/solar combination (as described later in this article) seemed like a likely alternative at first. But because of the size and configuration of his home, he learned that heat pumps were not the most efficient solution for his situation.

Flick then took a look at replacements for the existing boiler, and considered adding a pellet stove insert for his fireplace combined with a new oil boiler offered at a discount from his oil company. The other option, at about the same price, was a fully automated Kedel pellet boiler. On paper the Kedel seemed like a nice alternative in cost savings, efficiency and clean operation. But it wasn't until Flick visited

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the showroom and heard a Kedel in action that he was sold. He noticed immediately how quiet the Kedel boiler was when compared to his roaring oil furnace. Like Brandes, his investment in the Kedel pellet boiler has reduced his fuel consumption costs by 50% or about $1,500 per year.

WOOD AND PELLET STOVES

While automatic pellet boilers are relatively new entries into the biomass renewable energy market, the venerable wood stove has been a mainstay in many Maine homes for generations. Wood stoves and their modern cousins, pellet stoves, provide a reliable supply of heat that can be both primary or supplemental.

Many Maine woodstove enthusiasts enjoy the physicality of heating with cordwood: cutting, splitting, stacking and loading up the stove each day during the colder months. For others, pellet stoves offer a cleaner and easier way to heat with wood. The pellets are clean, easily stored in bags, delivered on pallets and are simpler to handle than cord wood. A larger version of the compressed wood pellet called BioBricks has even supplanted cordwood for many homeowners with conventional wood stoves. It is worth noting that pellet stoves should not be confused with pellet boilers, which take the place of oil or gas-fired whole house boiler heating systems. Pellet boilers are automatically fed with pellets stored in a hopper and the pellets are replenished via truck delivery.

Both wood stoves and pellet stoves require monitoring and continuous feeding. However, many pellet stoves have an optional hopper that can be sized to fill just once a day. Although some pellet shortages occurred in the past, today—thanks in part to the growth of the pellet boiler industry—Maine's pellet supply is robust and stable and has been a boost to Maine's local economy, particularly in areas hit hardest by paper mill shutdowns. Logging companies are turning waste by-product into value-added

pellets with their own pellet operations. A former toothpick-turned-pellet factory, Geneva Wood Fuels, is constructing the nation's largest pellet production upgrade. And family-owned Maine Wood Pellets is expanding their operation with a new biomass electric generation plant that will be the largest in the world.

In its natural state, hardwood produces smoke, gasses and high amounts of particulate matter that can adversely affect people with respiratory illnesses and conditions like asthma or COPD. However, new standards from the Environmental Protection Agency (EPA) are seeking to improve emissions by requiring cleaner and more efficient burning woodstoves. Recent revisions to wood stove labeling were designed to help consumers understand how efficient and clean a particular stove is and how it compares to others on the market. The EPA white rating sticker contains three pieces of information: smoke or grams per hour output; efficiency on a sliding scale between 50% and 100%; and output given in a range of BTUS per hour. Catalytic stoves burn cleaner and are held to more stringent smoke standards of less than 4 grams of smoke per hour (g/s). Non-catalytic stoves are easier to maintain,. but allowed a higher smoke emission level of 7.5 g/s through EPA guidelines.

Wood and pellet stoves that meet the requirements for efficiency and low particulate emissions may qualify for a $500 rebate from Efficiency Maine. To qualify, stoves must be installed by a certified installer. Check out the Efficiency Maine website for guidelines and a list of qualifying stoves.

An old oil tank heads for recycling at the home of Joe Bauman and Megan Keeler of South Portland.

PHOTO COURTESY OF: REVISION HEAT

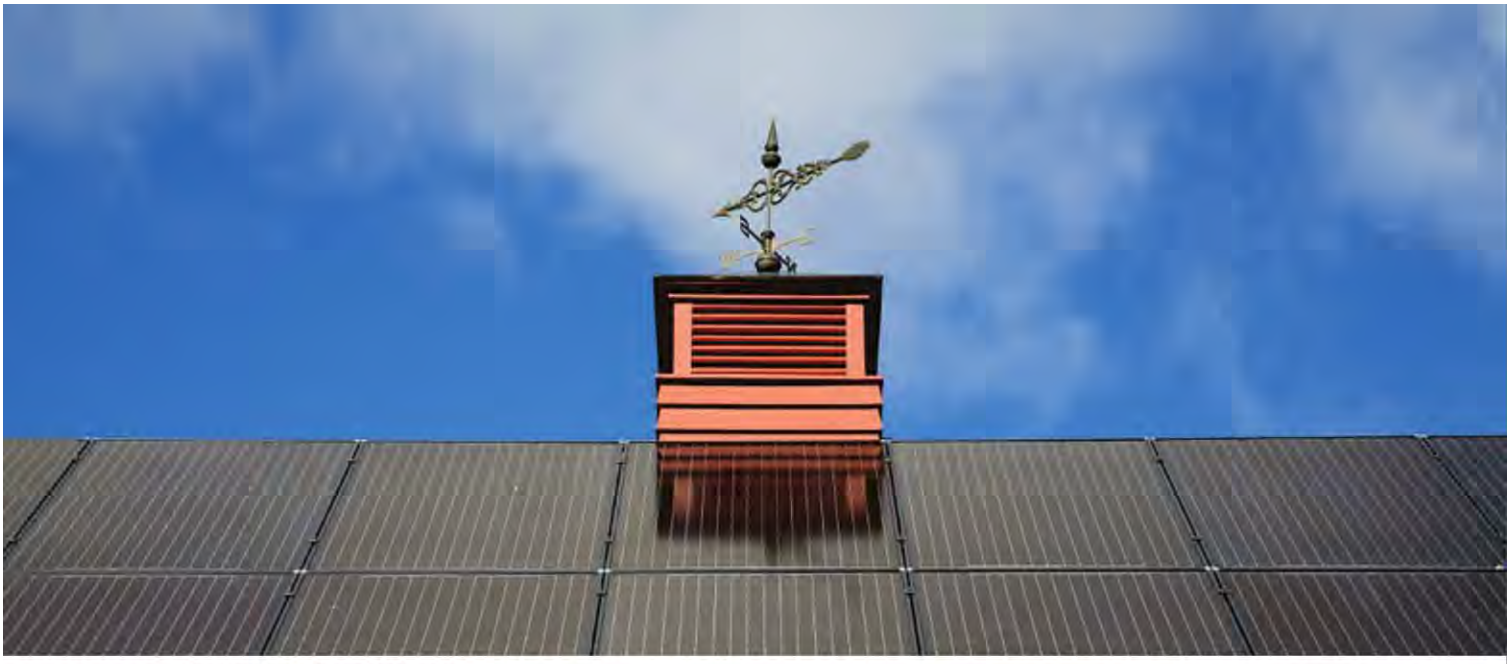

PHOTO COURTESY : MAINE SOLAR SOLUTIONS

RENEWABLE ENERGY SOURCE

SOLAR

THE SUN IS arguably the most abundant renewable energy source available, even in a northern state like Maine. And there's good reason that solar installations have quadrupled nationally in the past four years, spurred by price reductions and technological advances that have increased the efficiency of output. The innovations aren't limited to the technology itself. In Maine and across the country, people are finding new ways to access solar power benefits through financing, group purchasing and community solar projects (see sidebar).

Benefits:
- Infinitely renewable and plentiful in Maine
- Own your power source
- Net metering allows access to solar power credit through the year
- Federal tax credit for 30% of installation cost
- Pairs well with other high efficiency electric appliances, such as heat pumps

Considerations:
- Requires plentiful sunshine onsite, plus a southerly facing roof or southerly, un-shaded ground exposure

PRIVATE RESIDENTIAL INSTALLATIONS

When faced with a failing oil furnace last year, Jan Strout of Gray considered adding solar panels to her 1800-era farmhouse. "Solar was very attractive to me, but I didn't think I could afford it," said Strout. However, facing the prospect of spending $5000 or more for a new oil boiler and then still having to pay unpredictable oil prices, she decided to learn more. An energy audit helped her prioritize areas where she could reduce heat loss, and rebates from Efficiency Maine enabled her to seal the leaks in her home and add attic insulation.

Strout then met with Solaris Energy Systems and learned that her farmhouse was ideally situated to support solar panels on her roof. When financed over 10 years, the numbers were very compelling. She chose to replace the oil furnace with an electric heat pump powered by solar panels, and supplemented by her existing woodstove. The total project cost after rebates and tax incentives was about $13,000. She opted for financing from Efficiency Maine at 4.99% that resulted in a monthly payment of $160, significantly less than her previous $216 monthly budget for heating oil.

Advances in technology over the past 10 years have resulted in a nearly 50% price drop for solar photovoltaic (PV) panels, making solar an attractive option for Maine homeowners. Graced with an abundant supply of average sun hours, Maine homeowners stand to benefit from this renewable source.

PV solar arrays are commonly sized to provide nearly all the electricity a home needs when connected into the electrical utility grid or "grid-tied." And since Maine is one of 42 states that allow some form of net metering, you can

even receive credit for power you generate in excess of your needs on any given day. Net metering is a system that enables your local electric company to act as a sort of energy storage bank where you can receive credit for power you generate but do not use immediately. These credits can then be applied to your bill when you draw power from the grid in the evening or less sunny days.

The key to understanding the benefits of solar, said Susan Elichaa of Solaris, is replacing the electric bill with a short-term payment that eventual stops, unlike your electric bill. When solar is financed, the electricity is paid for at a fixed rate for 15-20 years. For example, she said, a 12-panel solar PV array can practically eliminate the average electric bill of $75. Ultimately, she said, there are two options that cost roughly the same: finance a solar array over 15 years or pay a monthly CMP bill. At the end of the first option, your energy costs move to near zero.

Sam Zuckerman of Maine Solar Solutions in Portland, finds that his customers are attracted to the stability of the expense and being able to plan for that expense being set in the future. Many of his customers are at a stage in life where other large financial obligations like college tuitions are complete and they are anticipating a retirement where less income will be the norm. "One customer explained that he had just bought his electricity for the next 30 years in one lump sum amount," said Zuckerman. As for the return on investment for solar panels, Zuckerman estimates that even if electrical costs remain stable into the future (which is unlikely), the homeowner will still average a 6% return on investment.

Jan Strout of Gray, chose to replace her oil furnace with an electric heat pump powered by solar panels and supplemented by her existing wood stove.

PHOTO: JAN STROUT

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HEAT PUMPS AND SOLAR: A MATCH MADE IN RENEWABLE ENERGY HEAVEN

One of the benefits of solar energy is that it can power electrical appliances less expensively than traditional power. Pair a solar array with an already highly efficient heat pump and it can be a viable combination to heat a Maine home.

Because of their technological improvements and super efficient operation, many Mainers are switching to energy efficient heat pumps as an alternative to oil or propane heat. In fact, Efficiency Maine has provided cash incentives for more than 10,000 mini split heat pumps for Maine homes and businesses since 2012. And incentive applications for this year are expected to more than double. When powered by solar panels, heat pumps can make an amazing difference in the cost of heating and cooling a home.

In 2013, Roland Cloutier added 20 solar panels to his Standish, Maine, home to lower his energy consumption and power his new electric car. When heating oil spiked, he called Royal River Heat Pumps in Freeport, who installed two heat pumps powered by the solar panels on the back of his modified ranch home. The units were stacked so that one indoor unit heated the lower level great room, and the second heated the upstairs main living area. That season, Cloutier saw his electric bill drop by 30%, and his oil bill by more than half. He is extremely pleased with the combination of solar and heat pumps in his home.

Benefits:

- Heating and cooling that taps the energy produced by solar panels
- New technology allows operation in cold Maine temperatures
- Qualifies for Efficiency Maine $500 rebate
- Improved indoor air quality
- Provide air conditioning and heat

Considerations:

- Visible inside and outside units
- May require a second or third installation depending on home configuration

"Heat pumps are a different kind of heat, with no temperature swings and constant circulation in the house," Cloutier said.

The mini-split heat pump consists of the outdoor compressor unit and an indoor unit that can be installed high on a wall or on the lower half to resemble a radiator. Other duct/vent systems are available to heat from the ceiling and can be sized to heat and cool large, and small homes alike. A single unit may be specified for a large open living area while a second unit might be placed in the second floor master bedroom or on the opposite side of the home.

New technology allows operation even in the most extreme Maine winters. "Industry standards for heating in Maine's coastal region requires a design for minus 3

degrees," said Scott Libby of Royal River Heat pumps. "Modern heat pumps are designed for 100% heating capacity at 5 degrees, with 85% heating at minus five degrees."

A great benefit from heat pump systems is improved indoor air quality. Heat pumps feature multiple air and HEPA filters, and also remove excess humidity during the summer cooling months.

Libby chuckles when he noted that adding a heat pump requires a bit of a "lifestyle adjustment" for most Mainers, since the units operate most efficiently when set at 70-72 degrees. "It's no longer necessary to lower the thermostat to save on fuel, and the savings when compared to oil consumption are a dramatic difference." One customer reported a $300 a month savings in energy consumption from his heat pump, when comparing December 2014 to the previous year.

CONTINUED ON PAGE 46

Community solar offers a collective approach

For many Mainers, solar panels installed directly on their homes is not an option because they live in apartments or condominiums, or their rooflines are not suitable for solar. Community solar projects have addressed these two barriers in unique ways.

SOLARIZE FREEPORT

Solarize Freeport is a new program developed by the town of Freeport to assist residents in selecting a reliable solar PV company and using collective buying power to lower the prices that all participants pay.

The Solarize model began in Portland, Oregon in 2009 and the concept has since spread to dozens of communities across the country. Freeport is modeling their approach after a similar program in New Hampshire that has completed 300 installations in the past two years. Solarize projects use the collective buying power of a community to purchase solar panels at a discounted price. Freeport's tiered pricing model offers thresholds that drop the cost to participants as more people sign up.

This past winter, Solarize Freeport sought proposals and selected a consortium of two solar companies—Insource Renewables of Pittston and Assured Solar of North Yarmouth to provide energy assessments and ultimately contract with homeowners. The companies see their role with the project as educators as well as providing thoughtful design and installation.

Benefits:
- Vendor is researched and vetted by the town or organizing group
- Can be financed, and can add value to property
- Participants can participate in tiered pricing to reduce individual investment
- Eligible for 30 percent Federal tax credit

Considerations:
- Home may not be a suitable location for solar installation

"Our job is to show that energy costs can be stabilized through this program," said Vaughan Woodruff, owner of Insource Renewables. He explains that the cost of energy is

PHOTO COURTESY OF: REVISION ENERGY

like another mortgage, but more variable and never ending. "The tiered approach was developed to benefit homeowners who are early adopters by offering solar installations at a reduced price," says Rob Taisey owner of Assured Solar. "Our hope is that once people see their neighbors signing up they'll want to join in as well." So far hundreds of households have expressed interest in the project and panel installation is expected to take place between May and October this year.

COMMUNITY SOLAR FARM

Benefits:
- Allows participation in solar energy remotely, without onsite installation
- Portable within the utility's service area in Maine
- Can be financed and sold
- Eligible for 30 percent Federal tax credit

Considerations:
- Group needs a minimum half-acre of open land leased for 40 years
- Typically needs investment by nine total individuals to ensure financial viability

Community solar farms are another innovative way for Maine homeowners to enjoy the benefits of solar power. Russ Florenz, a farmer in South Paris, wanted to add solar photovoltaic panels to his farmhouse, but didn't have enough space on his roof for the panels. He worked with ReVision Energy, a solar installation company with offices in Portland and Liberty, who ultimately suggested that the barns on the property would be a good location for an even larger project.

At about the same time 50 miles south, Jim Atwell of Falmouth was interested in adding solar panels to his condominium. He'd also worked with ReVision Energy to design the solar array and then much to his disappointment, his condominium association denied his request to install them.

Last year, both Florenz and Atwell, along with seven other homeowners, joined together to create Maine's first-ever community solar farm. The model allows up to 10 meters (households) to draw from an oversized solar array, located within the area serviced by a common electric utility (so for Central Maine Power customers that means anywhere in the CMP service area).

Nine members purchase shares in the solar "farm" and form a mutual benefit association, with the tenth meter assigned to the array itself. Each of the members draw electricity credits through their account based on the percentage of their share, and then the utility distributes the credits from the farm to the shareholders on a percentage allocation. The members pay a small annual fee to cover ongoing maintenance of the array and any lease payments due to the landowner, much like a condominium association charges a monthly association fee. Because the members need only be living within the service area of the utility, the membership is fully portable within the service area limits.

"It was a bit of a leap of faith," said Atwell, "and some of my friends thought it sounded too good to be true." He decided to give it a try and invested in a 12% share. His investment of $14,000 is estimated to generate 8500 kW per year, just enough to offset about 80-85% of his electricity cost. Florenz, on the other hand, only needed an 8% share to eliminate his electric bill, and he receives a lease payment for the use of his barns.

According to Jen Hatch of Revision Energy, the average size of a community solar farm is about 200 panels for maximum cost benefit. The South Paris community solar farm was completed in the fall of 2014, and another project in Damariscotta will break ground this year. "Share members on the system are eligible for the 30 percent federal tax credit for their investment, and they can finance the share just like an array on their home," said Hatch. Land for a solar farm may be private or municipal-owned and is typically leased for a 40-year term.

For Atwell, the solar farm is an innovative way to generate solar and re-purpose his unused chicken barns. And he says, "I'm looking forward to checking my solar power app on sunny days!"

RENEWABLE ENERGY SOURCE

WIND

WITH THE GROWTH of industrial wind projects in Maine, some homeowners are looking at wind as a potential source of energy in their homes. Wind can be a viable option in Maine with the right location and equipment, according to Sue Jones of Community Energy Services. Wind energy overall is projected to create 4,200 jobs in Maine, primarily through large commercial operations. Jones believes that smaller community wind projects may be the way to tap into this renewable resource in Maine, much like the community solar projects now being implemented.

Proper location is the most essential part of a successful and productive wind energy systems. A wind turbine installer will first consult Maine's 30-meter wind map on the Department of Energy's WINDExchange website to determine if the sustained winds are strong enough to justify a residential scale installation. According to the site, an average wind speed of greater than 4 meters per second is the minimum threshold for a small turbine set at between 14 and 40 meters high.

Benefits:
- Taps into relatively plentiful Maine resource
- Can benefit from 30% federal tax credit if properly certified
- Can generate as much as 10 kW under favorable wind conditions

Considerations:
- Requires unobstructed, open terrain
- Needs 5-7 acres of land to buffer from neighbors and allow space for tower
- Costs can vary widely $15,000 – $70,000 depending on type of turbine, size of tower, infrastructure to bring power to home.

Bergey is one of the wind turbines certified for use in a residential scale installations.

PHOTO: COURTESY BERGEY WINDPOWER CO.

Rick Therieaux, owner of Maine Guide Wind Power, recommends that the location for a turbine have at least 5-7 acres of field to make the Bergey turbines he installs work properly. The turbines can generate 12,000 watts in a gale, and 10,000 watts in a strong 28 mph breeze. "Wind turbines are a significant investment," Theriault said, "But they can be a significant resource for power with the right property."

John Myatt at Moosehead Solar finds that coastal or island properties have some of the best wind access. "You've got to have a unique installation location to make it work," he said. Most of his clients are supplementing a solar array and if the installation is an off-grid application, wind can supplement low solar production in the winter, when winds are stronger.

Wind energy systems that utilize certified equipment qualify for a 30% federal tax credit. For a list of certified equipment, visit the Interstate Renewable Energy Council website.

RENEWABLE ENERGY SOURCE

GEOTHERMAL

GEOTHERMAL SYSTEMS HARVEST energy from the ground using the earth's warmth to heat water that circulates through an air-to-air or air-to-water ductless heat pump.

Jim Godbout of Godbout Plumbing in Kennebunk has installed dozens of both commercial and residential geothermal systems in Maine. He says that geothermal can be done inexpensively, but it is important to specify a closed loop system to limit any maintenance issues down the road. Open loop systems can be troublesome to maintain, and often have problems with disposing excess water.

Geothermal systems use boreholes—similar to those drilled for wells—to tap into the earth's heat. A geothermal system will pump water down into several boreholes to be heated, then cycled back up into the home's heat pumps for converting into the home's heating or cooling source.

Benefits:

- Tap into readily available energy source from the earth
- Can provide heating, cooling, radiant heat and domestic hot water
- Can integrate with existing boiler or heat pump configurations
- Qualifies for Federal 30% tax credits and Efficiency Maine rebates up to $5,000

Considerations:

- Can be a high initial investment depending on the system design

Godbout said he rarely recommends a 100% geothermal system, but rather a hybrid that combines geothermal and a boiler system. "Done well, a geothermal system can heat, cool, provide radiant heat and domestic hot water," he explained. G&HM