CLEAN POWER GUIDE

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EMPOWER YOURSELF!

By Melissa Everett, Ph.D.

A transformation is beginning. In 2019, New York passed a visionary law, the Climate Leadership and Community Protection Act, committing the state to shift to 100-percent renewable sources for our electricity in just 10 years. Much of this power will come from large-scale solar, offshore wind, and existing hydroelectric sources like Niagara Falls. But the legislation's goals will only be met if people get involved. Now is a time when you can save dollars, as well as the planet, through savvy investment in clean energy technologies both at home and at work.

The price of solar power keeps falling. Thanks to improvements being made in energy storage technologies, solar power can be stored and made available when the sun doesn't shine. You can find an electric vehicle (EV) to suit every taste, range need, and price point. And far more efficient options are available to replace your oil, gas, or propane burner with electric heating and cooling that can be powered by—you guessed it—solar panels.

There is a lot to learn about, and the choices to be made are not simple. As the market for clean power technologies grows and grows, there is a need for neutral expertise that is accessible to consumers. Sustainable Hudson Valley and Chronogram Media are pleased to bring you the second annual *Clean Power Guide* for this purpose.

Get to know about

Clean Energy Technology

Want to climb the clean-power learning curve with healthy speed and limited pain? Here are some frequently asked questions to get you going when it comes to electric vehicles (EVs), heat pumps, and solar power.

FAQ ELECTRIC VEHICLES

FOR ELECTRIC VEHICLES, WHAT KIND OF RANGE IS POSSIBLE NOW?

Current plug-in hybrids, which have a gas engine as backup, range from 14 miles to around 53 miles of electric range, after which the car shifts to gas powered and you can keep driving as far as you need to. The range for 100-percent electric vehicles is typically from 80 miles to up to 400 miles.

WHAT HAPPENS IF I RUN OUT OF CHARGE?

The onboard computer systems will alert you well before you run out, and, on most models, help you find the nearest charging spot. If, for some reason, you do run out of power, the vehicle will stop operating—just like when you run out of gas. The need to plan and pay attention with an EV is the same as with a conventional gas-powered car.

ARE THERE TIPS AND TRICKS FOR GETTING THE BEST RANGE OUT OF MY EV?

Yes. Become familiar with the vehicle's "eco modes" for using the power efficiently, and with the regenerative braking systems that can transform the mechanical energy of braking into electricity that feeds your battery.

HOW DO EVS REALLY COMPARE TO CONVENTIONAL CARS ECONOMICALLY?

From the Nissan Leaf at $29,990 to the Volkswagen e-Golf at $31,895 and the Chevy Bolt at $36,620, there are moderately priced EVs out there. Dealerships vary in their structures for down payments, installments, and discounts, and may be open to matching a competitor's price. Maintenance costs for EVs are far below conventional cars, since there are no fuel costs, oil changes, tune-ups, or air filters to be replaced. What's more, there are very few moving parts to break or that will need replacement.

Charging costs depend on the local electric rate, the charging station price structure, and the battery size in the car. For example, if the electric rate is $0.14 per kWh and the battery size is 24kWh, then $0.14 x 24 kwh = $3.36 cost to fully charge the battery. According to Plugin America, charging costs average the equivalent of $1 per gallon. Some EV dealerships, workplaces, and municipalities have low-cost or free public charging.
Some charger-finding apps will tell you how much energy is being put into the vehicle, the distance equivalent in miles, and the cost per charge. Fast chargers on the New York State Thruway cost $8 per charge.

WHAT ABOUT THE DRIVING EXPERIENCE—SPEED AND HANDLING?

EVs get up to speed faster than conventional cars because they offer full torque available from standstill. The suspension and handling are as good as with any conventional car. In fact, due to the battery's low center of gravity, many drivers feel an EV handles better than a gas-powered vehicle. EVs with all-wheel drive are beginning to appear on the market from companies including Subaru, Mini, Volvo, Audi, and BMW.

WHAT KIND OF MAINTENANCE DO ELECTRIC CARS REQUIRE?

A plug-in hybrid needs the same kinds of maintenance as any hybrid car. For a 100 percent EV, you mainly need to add washer fluid and rotate the tires. The regenerative braking system may occasionally need a repair, and the transmission may eventually need to be replaced. In New York State, all EV makers have to provide a battery warranty for at least the first 150,000 miles.

WHAT ARE THE BENEFITS OF BUYING VS LEASING?

It depends on your financial comfort, the incentives available, and your desire to keep a vehicle for a short or long period. If you prefer not to make the upfront investment, or you know you only want to keep the vehicle for two or three years, a lease will meet your needs. The federal tax credit of $3,750 only applies to purchases, but New York's Drive Clean Rebate applies to both purchases and leases, with amounts that depend on the range of the car:

Over 120 miles: $2,000
40 to 119 miles: $1,700
20 to 39 miles: $1,100
Under 20 miles (or over $60,000 price): $500

ARE THERE ANY DOWNSIDES TO OWNING AND DRIVING AN EV?

Besides the need to stay on top of trip planning, the lack of noise sometimes takes getting used to. You need to be more vigilant of pedestrians because they may not hear you coming.

WHAT ABOUT OTHER KINDS OF EVS, LIKE LIGHT TRUCKS, BIKES, AND BUSES?

Many bicycles with electric assist are available, with prices starting at under $500 and rising to the sky. E-trucks are entering the marketplace with a Tesla splash that has led other companies to make big commitments; according to Reuters, "Tesla CEO Elon Musk and his spacy Cybertruck have ignited a frenzy over electric pickups, and at least seven other US automakers expect to build new battery-powered trucks by 2021." Electric transit and school buses are already in use by some municipalities and school districts, while being tested by others.

WHAT ABOUT THE SAFETY OF EVS COMPARED WITH GAS CARS?

Cars are generally getting safer. All-electric cars do not have the flammable gas tank of a conventional vehicle, an advantage in accidents. Lithium ion batteries can (rarely) overheat, so EV makers put in sensors to detect temperature increases quickly. Several EVs (Chevy Bolt, Tesla Model S and Audi E-Tron) have achieved the "Top Safety Pick" status from the International Institute of Highway Safety (iihs.org). Just research the safety features you care about most, in the cars that interest you.

I'VE HEARD THAT YOU CAN GET GREAT DEALS ON USED EVS. WHAT SHOULD A SHOPPER KEEP IN MIND?

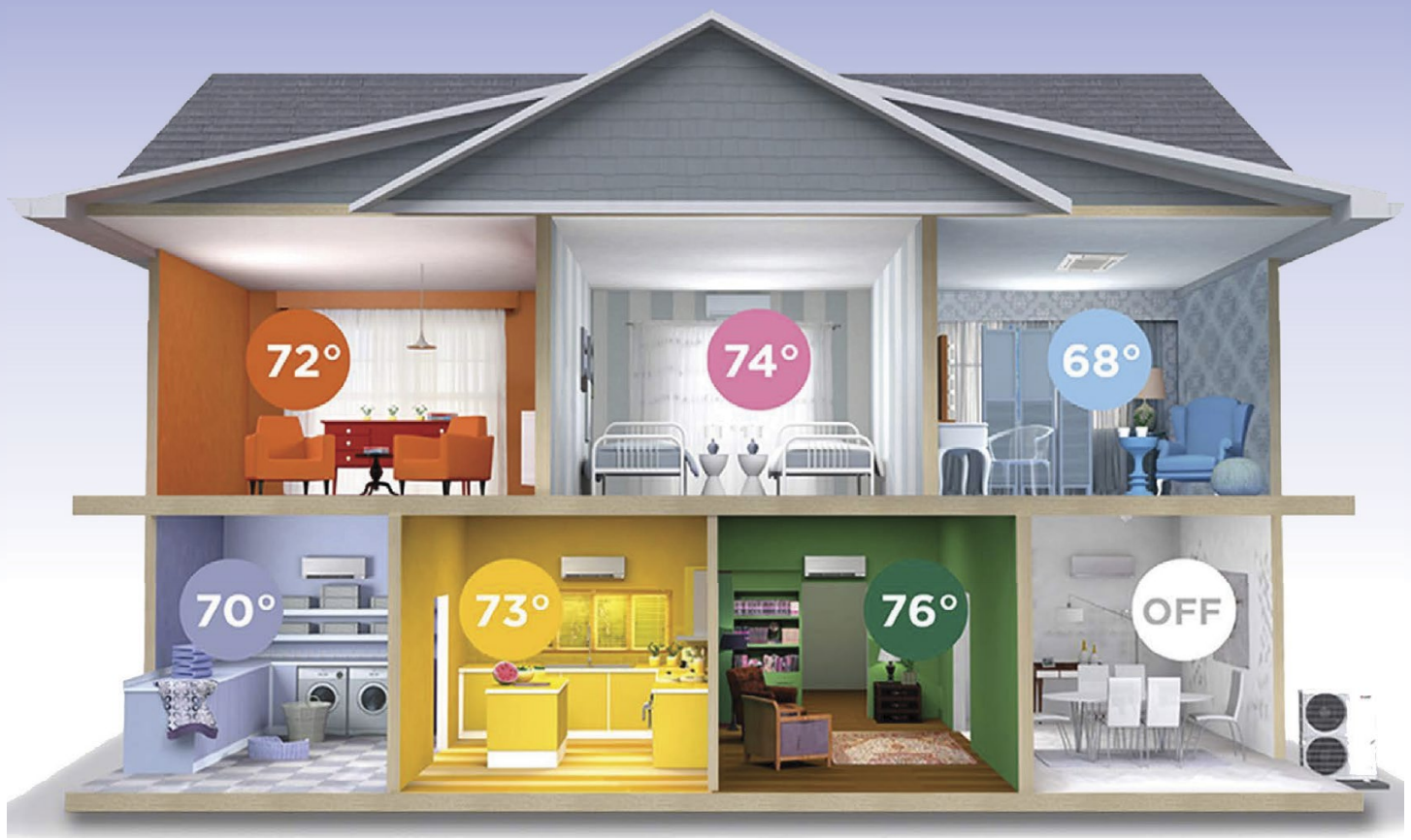
Yes, even gently used electric vehicles can be steeply discounted in price because the technology is developing so rapidly. But these older EVs are likely to have less range than current models, so make sure that fits the uses you are planning.

HOW CAN I TELL WHETHER A CAR DEALERSHIP IS REALLY COMMITTED TO SELLING EVS AND CAN GIVE ME GOOD GUIDANCE?

Look at what is in their lot. If they have inventory, they h ave made some preparations to be approved to sell those cars. Ask if they are authorized to give the New York State Drive Clean Rebate of up to $2000 for electric vehicles. If they don't know what that is, try someplace else. If they do, ask if they have an in-house EV specialist and what EVs they have onsite. If they find you an enthusiastic, knowledgeable person, you are in the right place.

COOLER ❄ CHEAPER $ CLEANER

Mitsubishi Electric Heat Pumps are 40% more efficient than central air conditioning!



STOP BURNING FOSSIL FUEL

Recycle Your Heat with Heat Pumps

Say goodbye to hot and cold rooms and outrageous utility bills. Say hello to year-round comfort made personal.

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- Lower heat bills and carbon footprint
- Financing available with credit approval

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FAQ
HEAT PUMPS

WHY ARE ELECTRIC HEAT PUMPS CONSIDERED A CLEAN, GREEN CHOICE?

Efficiency is the key to the renewable energy revolution. Because heat pumps transfer heat rather than burning fuel like a conventional boiler, they are significantly more efficient and also quieter and safer to operate. Like anything electric, they can be powered by solar or other renewable energy.

WHAT ARE THE PRIMARY HEAT PUMP TECHNOLOGIES FOR A HOME OR BUSINESS?

Ground-source heat pumps (aka geothermal) transfer warmth from the ground or groundwater; air-source heat pumps exchange heat with the outside air through a condenser; and heat pump water heaters heat water by drawing heat from the air. All these technologies can make good sense in a new building, but for retrofits there are additional variations depending on what kind of heating system is there now (ducted or ductless, air or water transfer).

WHAT KINDS OF BUILDINGS ARE BEST SUITED FOR AIR-SOURCE HEAT PUMPS AND GEOTHERMAL?

A well-insulated and air-sealed building will make the most of any heating and cooling technology. Air-source heat pumps work best where there is a relatively open floor plan without a lot of nooks and crannies. Ground-source heat pumps are easiest to install where there are already ducts in place.

WHAT ARE SOME FACTORS TO CONSIDER IN CHOOSING A CONTRACTOR TO INSTALL HEAT PUMPS?

First, make sure a contractor is experienced in installing and servicing the type of system you want. The major manufacturers like Mitsubishi and Waterfurnace provide specific training and certification, and so do third parties like North American Technical Excellence (NATE) and International Ground Source Heat Pump Association. Those certifying organizations may also be a source of extended warranties through your contractor. Finally, look for someone who understands more than the equipment, who is willing to talk with you about building efficiency and the dynamics of heating and cooling, to make sure your system is designed and sized for optimal performance.

HOW EFFECTIVE ARE HEAT PUMPS IN A COLD CLIMATE LIKE OURS?

Very effective, if you buy a unit that is classified as "cold climate."

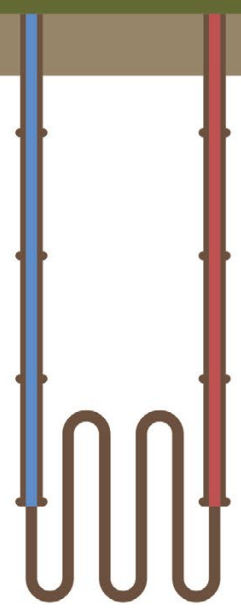
WHAT KINDS OF MAINTENANCE WILL MY HEAT PUMP SYSTEMS NEED?

Air source heat pumps mainly need to have their filters cleaned once or twice a month (a very easy process). Ground source heat pumps are also low maintenance but need periodic checks for antifreeze levels, dirt and debris, and any obstructions in the ductwork.

WHAT IF MY BUILDING IS DRAFTY OR POORLY INSULATED?

It is so worthwhile to have an energy assessment before installing these technologies—and to follow the recommendations for sealing air leaks and adding insulation. Otherwise, you run the risk of buying an oversized heat pump system to provide you with enough energy to waste!

NYSERDA provides abundant information on approaches to energy audits and ratings for your building. You can also find local contractors who are trained and competent to help you with air sealing, insulation, and other measures.



TIPS FOR EFFICIENT ELECTRIC USE FROM ORANGE & ROCKLAND UTILITIES, INC.

Consider cold washes.

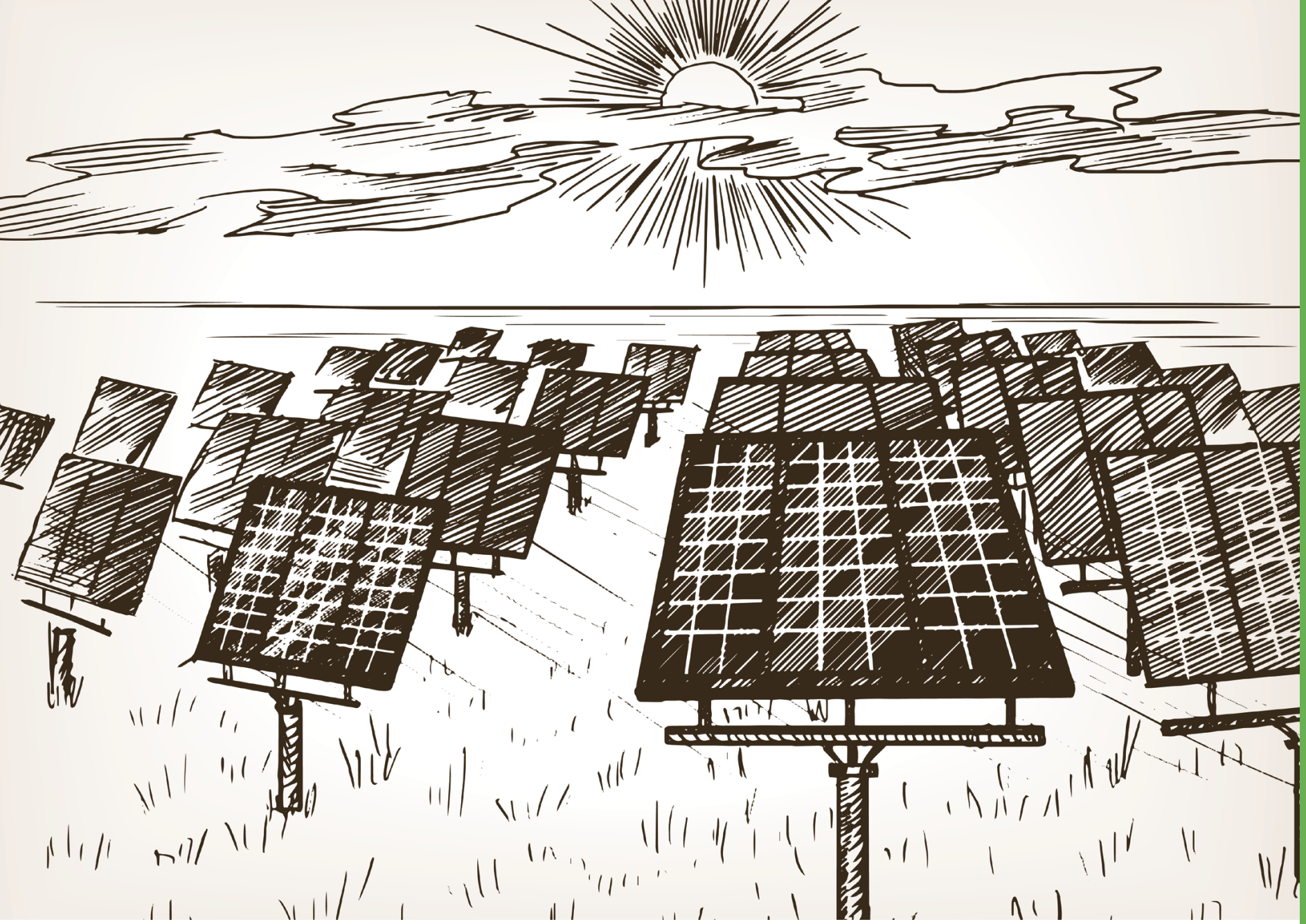
Open shades on a sunny day.

Keep ducts and vents clean.

Take showers instead of baths.

Avoid "vampire" voltage by unplugging electronics when not in use.

Lower the thermostat.



FAQ
SOLAR POWER

WHAT PRIMARY CHOICES WILL I FACE IF I WANT TO PUT SOLAR PANELS ON MY PROPERTY?

Solar panels have become a commodity, a product that has many minor variations but is pretty much the same and is sold in volume. The major exception is high-efficiency panels like those made by SunPower, which are engineered to provide significantly more electricity per square foot. These cost more, but can be worth it if you are space-constrained or trying to max out your solar resources.

The other big choice in terms of your system design is in the inverter, the hardware that converts direct current from the panels into the alternating current that is needed in your building. You can put in one inverter for dozens of panels (cheaper) or have more inverters—one per panel or group of panels (more reliable in the unlikely event of a panel problem). This multiple approach means that if some of your panels stop functioning for any reason and shut down the inverter that is associated with them, then the rest of your array can still function.

I'VE BEEN HEARING ABOUT SOLAR SUBSCRIPTION APPROACHES LIKE COMMUNITY SHARED SOLAR AND COMMUNITY CHOICE AGGREGATION. WHAT ARE THESE OPTIONS?

These are the two major ways that you can go solar by taking advantage of a large-scale installation rather than installing panels on your roof. Community Shared Solar allows customers to chip in on power from a solar farm, either sharing credits or outright owning some of the panels. Community Choice Aggregation actually lets whole cities, towns, and villages subscribe to an energy alternative on behalf of their residents (who can opt out). Both are growing fast.

WHAT IF I LIVE IN AN APARTMENT OR CONDO?

You need to get your landlord or association excited about renewable energy.

WHAT IF I LIVE IN A HISTORIC DISTRICT?

Historic district homeowners have to conform to local guidelines, which likely come from some thoughtful source like the National Trust for Historic Preservation. Typically, they allow panels in locations that are not visible from the street.

CAN I GET COMPLETELY OFF THE GRID WITH SOLAR POWER?

Special, newer inverters can decouple your system from the grid if you are willing to invest in the battery backup to cover your power needs when the sun isn't shining. An ordinary rooftop solar installation will turn off automatically when the grid goes down. That's because there will probably be technicians working on the grid; bursts of electricity from your solar array could seriously injure someone.

CAN I USE A SOLAR ELECTRIC SYSTEM (PV) TO CHARGE MY EV?

Of course, and the EV can essentially serve as a storage system for your excess solar electricity. More and more solar installers are providing energy storage, EV plugs, and other equipment for the all-electric and off-grid life.

WHAT KIND OF A WARRANTY SHOULD BE AVAILABLE FOR THE PURCHASE OF SOLAR PANELS?

It should guarantee the engineering of the system, and its performance, for a reasonable period—at least 10 years, preferably 20, since your panels will produce efficiently for at least that long.

ARE THERE ANY REASONS TO WAIT AND GO SOLAR LATER?

You can expect the price to go down over time, but in the meantime, you will miss out on savings compared to your current electric bill. Don't overthink it!

CLEAN POWER GUIDE COLLABORATORS

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SUSTAINABLE HUDSON VALLEY's mission is to speed up, scale up, and jazz up the region's efforts to fight climate change. In the marketplace and in communities, we are all about creative partnerships for impact. SustainHV.org

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+ **CATSKILL MOUNTAINKEEPER**
  CATSKILLMOUNTAINKEEPER.ORG

Clean Power Breakthroughs: What Can a Region Do?

A Chronogram Conversation

Wednesday, March 11, 6-8pm, Clarkson University's Beacon Institute for Rivers & Estuaries - Dennings Point campus

$10 in advance/$15 at the door

New York has passed the Climate Leadership and Community Protection Act, a commitment to rapid scale-up of renewable energy and a carbon-neutral economy by mid-century. But changes this big require input at every level, from state to neighborhood. How can the Mid-Hudson region mobilize its networks of experts and enthusiasts to build momentum for clean power and bring together landowners, developers, utilities, advocates, and others?

Clean Power Expo Exhibition & Networking

Free Events with Hudson Valley Green Drinks

Thursday, April 23, 5-8pm
Keegan Ales, 20 St. James Street, Kingston

Thursday, September 24, 5-8pm
Benmarl Winery, 156 Highland Avenue, Marlboro

Take control of your energy

All New York residents—whether homeowners or renters—have more opportunities than ever before to make their homes more efficient, comfortable, and affordable.

Solar

New Yorkers statewide are switching to solar. Going solar will help you save money through reduced electricity bills and contribute to a cleaner and healthier community by reducing your carbon footprint. Whether you own or rent, there is a solar option for you, including home installation and community solar. The Solar for All program helps qualified New Yorkers receive a subscription to a community solar project at no cost. **Learn more about which solar option is right for you and find available incentives and financing.**

nyserda.ny.gov/solar

Clean Heating and Cooling

There are cleaner, more efficient ways to regulate the temperature in your home. Air source and ground source heat pumps heat and cool a home two to four times as efficiently as conventional heating and cooling systems. They are also a safer and healthier choice for homes with no combustion of fossil fuels, fuel storage, or carbon monoxide emissions. **Pair with solar and on-site energy storage options to save even more.**

nyserda.ny.gov/heat-pumps

Electric Vehicles

It's a great time to get an electric car or truck in New York State. Electric vehicles are cleaner, offer a cutting-edge driving experience, save you money on fuel, and need less maintenance than gas or diesel cars. New York offers a rebate to individuals who purchase electric vehicles—up to $2,000 for new car purchases or leases, which for eligible vehicles, can be combined with a federal tax credit of up to $7,500. **Learn more about electric vehicle options and available rebates.**

nyserda.ny.gov/charge-ny

For more information on these and other opportunities to save with clean energy, visit **nyserda.ny.gov**

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

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How to Shift to Clean Power Without Sticker Shock

By Tom Konrad, chairperson, Marbletown Environmental Conservation Commission

As Marbletown finalizes its plan to help the whole community shift to 100-percent renewable energy, we are focused on how to inspire and involve people—realistically and without pressure. We've come up with a pledge campaign, combined with customized assistance for participants. Instead of asking people to change (and pay for) everything right away, we're encouraging folks to plan now how they will choose renewables when they need to replace a boiler, appliance, or vehicle. Some actions save money from day one, and we encourage people to start with those immediately. So we offer the pledge as 10 cost-effective steps:

Choose green electricity.

If your town has joined a Community Choice Aggregation (CCA) program to buy 100 percent green electricity, usually at reduced cost, just participate. If your town is not in a 100 percent renewable CCA, encourage your town board to join.

Opt for solar or community solar power.

By signing up for community solar, you can get up to 10 percent savings on your electricity bill with no upfront cost and no termination fee. Anyone who pays an electric bill who does not have solar on their roof is eligible. If you have a suitable roof and you can benefit from the tax credits, home solar is a great investment.

Take control with energy efficiency.

Conduct a DIY home energy audit. Free guidance is available at energy.gov/energysaver/home-energy-audits/do-it-yourself-home-energy-audits.

Choose efficient electrics.

Use only efficient LEDs in high-use lighting areas. When buying appliances, look for Energy Star appliances, and compare annual usage between models.

Improve comfort with insulation and air sealing.

• Wherever accessible, insulate and air-seal critical areas like the rim joist around your basement or crawl space and your attic.

• When you replace your roof, add insulation and air sealing under the new (preferably nonfossil-based) roofing material if you cannot add insulation to your attic.

• When you replace or add siding, install continuous insulation under the siding.

• Whenever any work is done on an exterior wall of your building, take the opportunity to reduce air leakage and add insulation if possible.

Choose green transportation.

• Be EV ready. The next time you have electrical work done, ask the electrician to also install an electric vehicle (EV) charger or electric vehicle charger-ready circuit (50A 240V) with a NEMA 14-50 outlet near your parking space(s).

• Plan that the next vehicle you purchase will be an all-electric or plug-in hybrid electric vehicle (PHEV). If there is not currently a model that meets your needs or budget (i.e., you need a pickup truck), use your old vehicle as long as possible. Or purchase only used vehicles that are as fuel-efficient as possible (e.g. hybrid cars and trucks). If new EVs or PHEVs are too expensive, look into a used one.

Make your next home heating and cooling systems 100 percent renewable.

• If you install or replace an air-conditioning unit, do so with a cold climate-rated, air-source heat pump or geothermal heat pump.

• If you install or replace a boiler or furnace, choose a cold climate-rated air-source heat pump, geothermal heat pump, or EPA-rated wood or wood pellet furnace or heater.

• Replace your water heater with a heat pump, hybrid water heater because wood is renewable, but not so clean unless your stove is quite new.

• Even though wood is renewable, all but the newest woodstoves pollute significantly.

• If you use a gas fireplace, wood-burning fireplace, or woodstove that's more than 10 years old, replace it with an EPA 2020-qualified woodstove or wood pellet stove, or another renewable choice.

• If you use wood for heat, store your wood with protection from rain and snow, and obtain wood well in advance so that it has time to dry fully.

Cook, wash, and dry renewably.

Use efficient electric appliances, and use the eco settings (and/or hang a clothesline for drying).

Practice green yard care and handywork.

Choose electric for small tools and power equipment such as lawn mowers, snow blowers, generators, chainsaws, and more. They come corded or battery powered.

Consider alternative water heaters.

Replace your water heater with a heat pump, hybrid water heater, electric on-demand water heater, solar water heater, electric tank water heater, or auxiliary heater run off a high-efficiency wood or wood pellet furnace.

By shifting to renewable energy as you make replacements, you can reduce costs, frontload savings, plan for financial outlays, and factor in paybacks. Any business selling an EV, solar array, heat pump, or home storage system should offer finance plans. And there are state and utilies incentives and rebates. So get educated about the technologies and economics!

Learn more, and help others learn.

Start learning about these options so that you're ready when it's time to make your first purchases or replacements. Share what you're learning freely with your neighbors and friends.

Clean Power SAVINGS

NO UPFRONT COST
INSTANT SAVINGS

- COMMUNITY SOLAR

COSTS NO MORE THAN FOSSIL OPTION
INSTANT SAVINGS

- USED EV
- HEAT PUMP WATER HEATER (SOME SITUATIONS)
- AIR-SOURCE HEAT PUMP (BEST CASE)
- COMMUNITY CHOICE AGGREGATION
- ELECTRIC LAWN MOWER, SNOWBLOWER, OTHER YARD TOOLS
- MANY EFFICIENT APPLIANCES

LOW COST
QUICK SAVINGS

- BUILDING AIR SEALING AND INSULATION (SOMETIMES)
- HEAT PUMP WATER HEATER (SOME SITUATIONS)
- LED LIGHT BULBS
- BUY FIREWOOD EARLY
- KEEP FIREWOOD COVERED
- MANY EFFICIENT APPLIANCES
- SMART THERMOSTAT

LARGER INVESTMENT
QUICK PAYBACK

- BUILDING AIR SEALING AND INSULATION (SOMETIMES)
- AIR SOURCE HEAT PUMP (SOMETIMES)
- EV, IF YOU DRIVE A LOT
- WOOD PELLET STOVE OR EPA-CERTIFIED WOOD STOVE (SOME SITUATIONS)
- LED LIGHT BULBS

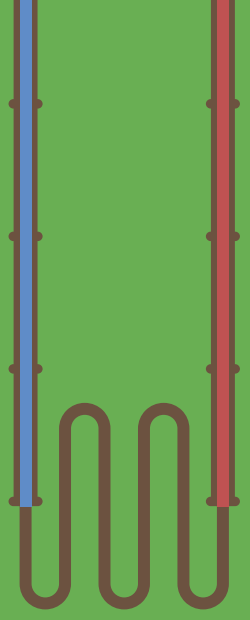
LARGER INVESTMENT
BETTER THAN STOCK MARKET RETURNS

- HOME SOLAR
- SOLAR HOT WATER (HIGH, CONSISTENT WATER USE)
- BUILDING AIR SEALING AND INSULATION (SOMETIMES)
- AIR-SOURCE HEAT PUMP (SOMETIMES)
- GEOTHERMAL/GROUND SOURCE HEAT PUMP
- WOOD PELLET STOVE OR EPA-CERTIFIED WOOD STOVE (SOME SITUATIONS)
- WOOD PELLET BOILER
- SOME ELECTRIC VEHICLE

NOT GREAT INVESTMENT
BUT OTHER BENEFITS

- BUILDING AIR SEALING AND INSULATION (SOMETIMES)
- INDUCTION STOVE OR HOT PLATE
- SOLAR HOT WATER
- SOME ELECTRIC VEHICLES
- INSTALL ELECTRIC VEHICLE CHARGING
- HOME BATTERY BACKUP (BEST WITH HOME SOLAR)

—Tom Konrad



Should You Be Pumped?

How to Decide If Air Source Heat Pumps Are Right for You

By Derek Koundakjian, project manager, Northeast Energy Efficiency Partnership

Air-source heat pump technology has been improving rapidly and, not surprisingly, these systems are growing in popularity. But they don't make sense in every situation. So, how do you determine whether air-source heat pumps are a good investment for your home? In researching our 2020 Air Source Heat Pump Buying Guide (available from Northeast Energy Efficiency Partnership at NEEP.org), we've come up with three important questions to consider:

Is your existing heating system older? You might think about supplementing or replacing it with one or more heat pumps before it fails completely.

Are you considering installing a central air-conditioning system, or replacing an existing one? A heat pump may cost only a little more and will provide heating and dehumidification as well as cooling.

Do you heat with oil, propane, or electric resistance? In comparison to these fuel types, a heat pump can save significantly on heating costs.

NEEP's Air Source Heat Pump Buying Guide and the 2020 Clean Power Guide's FAQ both suggest questions to ask in selecting a contractor with a high-quality offering of product and warranty. But don't hand off responsibility to a contractor without paying attention to the reasoning behind his or her recommendations. In sizing and designing systems, there are a few not-so-obvious factors to consider. For example:

Ductless indoor units should be installed in an open-plan building with large, open doorways. Units in rooms with frequently closed doors may run cool in the winter.

The indoor units are usually mounted high on a wall, but they can also be placed lower or attached to the ceiling.

There are judgments to be made about how to define zones in the building and install the heat pump appropriately within each zone for optimal heat transfer.

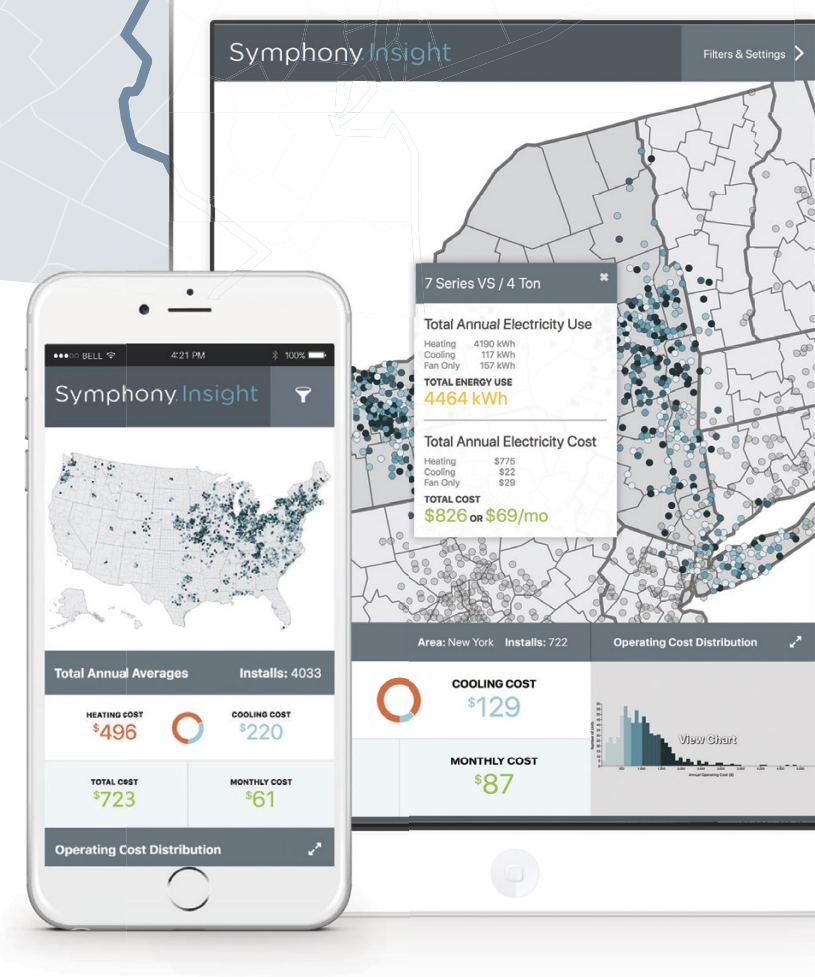
With thousands of makes and models of air-source heat pumps available today, we want you to be pumped—and to shop wisely. For system-by-system considerations, including centrally ducted heat pumps as well as dual-fuel, ductless, compact-ducted, and multizone systems, refer to NEEP's guide.

WATERFURNACE GEOTHERMAL UNITS QUALIFY FOR A 26% FEDERAL TAX CREDIT[1] AND LOCAL INCENTIVES

Symphony Insight

Symphony Insight provides you with actual energy usage & operating costs data from WaterFurnace homeowners across the country.

It's simply the most accurate, compelling way to communicate the financial benefits that geothermal provides and features an easy-to-use interface so you can filter by model, tonnage, geography, and more. Symphony Insight can transform your selling story and is only available to WaterFurnace dealers. To learn more about Insight or becoming a WaterFurnace dealer, visit *waterfurnace.com/insight.*



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1. 26% through 2020 and 22% through 2021

CHARGING UP

By Hugo Jule

WHAT CHARGING ACCESS DOES YOUR EV NEED? THAT DEPENDS ON YOUR PATTERNS OF USE.

The gold standard is the extensive Tesla charger network, and there are adapters on the market today that allow other types of EVs to use these chargers. For the rest of us, DC fast chargers are becoming more common, especially on highways. These chargers can provide up to 100 miles of range in under an hour, but they are too high-powered for home use.

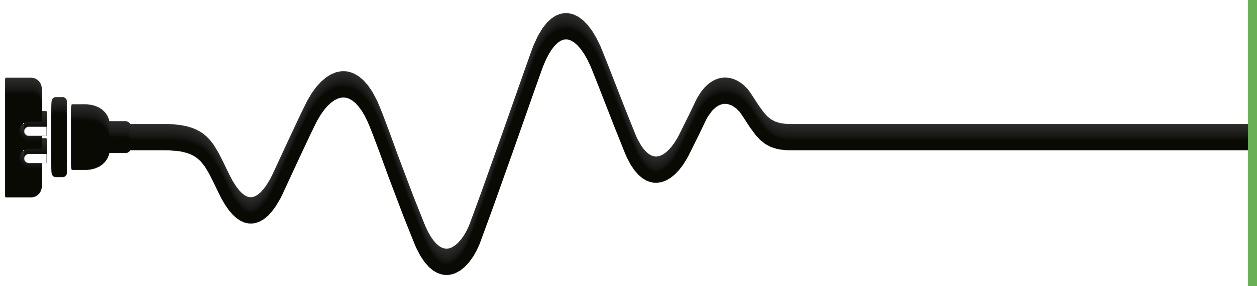
FOR HOME CHARGING, THE MOST BASIC IS THE LEVEL 1 CHARGER.

Level 1 (L1) chargers, which come standard with most electric vehicles, are the slowest, restoring about five miles of travel range per hour. On the plus side, these can be plugged into a regular 120-volt wall outlet.

More convenient is a Level 2 (L2) charger, which works on a 240-volt circuit (like a clothes dryer outlet), and can easily add 20 to 25 miles of range per hour. Many L2 models can be purchased and installed for under $1,200.

Keep in mind that some wiring upgrades may be needed for a home charger, for example, if the electrical panel is full of breakers or there isn't enough amperage of capacity. Talk with an electrician to be clear about what you need to install an EV charger.

IT'S EASY TO FIND A CHARGER ON YOUR DRIVING ROUTE FOR ADVANCE PLANNING. Refer to Plugshare.com and many other apps for the latest information.



HOW TO TEST DRIVE AN ELECTRIC VEHICLE

Don't just drive around the block and say, "Wow."

By Seth Leitman aka Green Living Guy

I have test driven many cars—both conventional and electric. If you have your eye on an EV and are ready to test drive one, here are some important things to look for when determining whether an EV will work well for you.

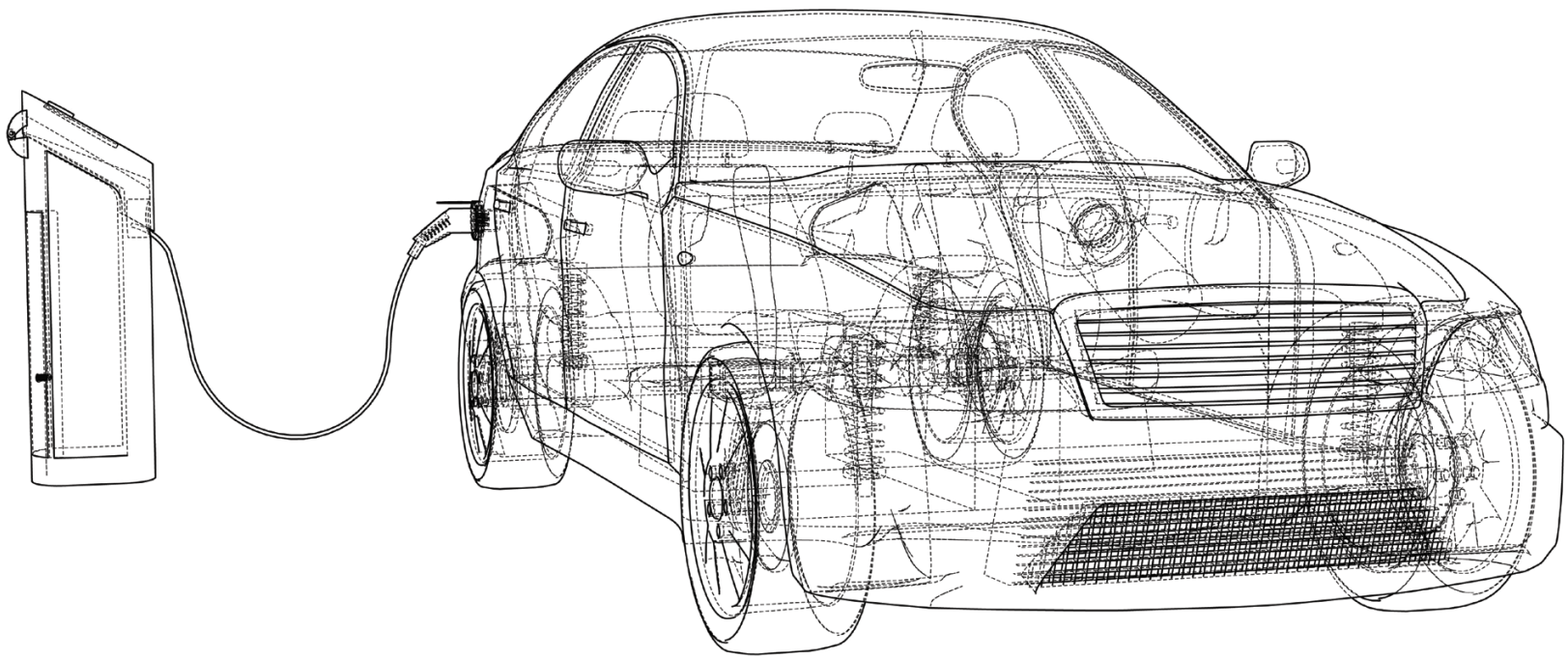
First, ask the dealer to show you how the regenerative braking works to help restore battery charge, and practice driving to maximize its benefits. Sometimes regenerative braking will perform better than the formal rating indicates. For example, the Kia Optima is conservatively listed with a range of 29 miles all electric, but at times I was able to get 35 miles, and once even up to 40 miles. Truth! This was in stop-and-go traffic, which electric cars love.

Second, after you get a good idea of the EV's fuel economy and how it operates in eco-mode, let it rip—carefully, of course. If the speed limit is 65 mph, see how well the car goes from zero to 60mph. Acceleration is important. But don't be a lead foot, as it'll only drain your miles per gallon.

Take time to read the car's manual and note any special features. Try the ones that interest you and that might make your drive smoother.

If you like the initial performance and want to give the EV a serious test, ask the dealership about a loan for a few days. Definitely charge the car every night, while you have it, for the best fuel economy. Then you can really check out the performance and any special features—which are probably numerous.

Have fun!



Elizabeth "Betta" Broad and her partner Andrew Bunch clean their home's heat pumps with ease.

What Surprised You About Switching to Clean Power Technology?

One of the best ways to learn about clean power technologies is to talk with people who already use them. We asked our network of users to share their personal experiences and to alert us to any surprises—most of which turned out to be pleasant!

Elizabeth "Betta" Broad (Kingston) has installed heat pumps in her home and recently bought a Chevy Bolt—and says she would install solar panels "in a heartbeat" if not for nearby trees blocking the sun. "Last year, we put Mitsubishi heat pumps into the retrofitted 1850s commercial building where we live," she says. "They work great, so the house stays nice and warm. We were using natural gas for heating, which we stopped having to pay for, but at the same time our electric bill went up, so we are glad to have community solar as an option to help reduce the bill. I like the way the heat pumps serve different zones in the building so you can use just what you need. I love the air conditioning too. I'm a little surprised about how easy it is to get spoiled with that."

Paul Curran (Lagrangeville) has installed solar panels on his roof and recently bought his second Chevy Volt, after driving his first one for nine years and 230,000 miles. "I drive a lot for work and did not realize how low maintenance an electric vehicle (EV) would be," he says. "And the rooftop solar is totally maintenance free. To be honest, except when I look at the power bill, I forget that the panels are up there, but they do save money and help with the cost of charging an EV."

Polly Howells (Woodstock) recently bought a Hyundai Kona EV. "I like the smoothness," she says. "I like the bells and whistles, like being able to hook up my iPod. I like the way the lights dim automatically when a car comes toward us. I like never having to go to a gas station. What I don't like is that I bought a black car and it shows the dirt horribly!"

Olga Anderson (Highland Falls) is very happy with the Chevy Bolt premier she bought last August. "I love driving past gas stations and not using fossil fuels and setting an example," she says. "The extra cost of installing and maintaining a home EV-charging system was a surprise, but over time, I am sure I will come out ahead."

Michael Helme (Warwick) bought Mitsubishi air-source heat pumps in 2018 and notes that while "there weren't real surprises," he "learned a lot" from the switch. "There is an adjustment process when you shift from baseboard heat to the separate units," he says. "We got a rebate from NYSERDA, but did not qualify for the utility rebate from Orange and Rockland counties because the air-conditioning capacity of these units was low by their standards. I had all our electric use covered by solar panels (with a $20 per month bill). I got a second set of panels installed to power the heat pumps, so that's nice. The basement tends to be cool, and we didn't put a heat pump down there, so occasionally the propane furnace will turn on to heat the basement."

Tom Konrad (Marbletown) drives a 2012 Toyota RAV4 EV and says he's had only "one pleasant surprise" with his EV: "The New York State annual safety inspection is just $10—no emissions test!"

Photo: Courtesy New Yorkers for Clean Power

Step toward a sustainable future

HEAT PUMPS

Choose an air-source heat pump or a geothermal system to efficiently heat and cool your home, or an electric heat pump water heater. Heat pump technology is efficient, cost-effective and produces fewer emissions. Central Hudson offers incentives to help offset costs and federal tax credits are also available.

APPLIANCE RECYCLING

Central Hudson will pay you $100 to recycle your old refrigerator or freezer. We'll even pick it up, free of charge, and properly recycle it to prevent the release of harmful substances into the environment. Recycle, save and get paid! Visit *RecycleMyAppliance.com* to learn more.

DRIVE CLEAN

33 percent of all greenhouse gas emissions come from transportation. An e-gallon costs nearly $1 less than the average cost of a gallon of gasoline and is significantly cleaner. Plus, electric vehicle owners can sign up for Central Hudson's Electric Vehicle Time of Use Rate. Learn more at *CentralHudson.com/EV.*

RENEWABLE ENERGY SUPPLY

Consider joining a community solar program or other green energy supplier. The electricity you purchase directly from these providers, generated by renewable fuels (wind, hydro, biomass, solar), becomes part of the overall energy mix distributed by Central Hudson. The choice is yours!

CONSERVATION

Reducing the amount of energy utilized in your home or business can save you money while significantly offsetting annual greenhouse gas emissions. Make simple changes to how you utilize energy and install energy efficient products and appliances. Shop with instant rebates at participating local retailers or on *CenHubStore.com*.

ENERGY STAR®

If every household in the U.S. installed an ENERGY STAR certified smart thermostat, we could offset 13 billion pounds of greenhouse gas emissions and save $740 million in energy costs per year.

WATERSENSE

We could save more than 260 billion gallons of water and $2.5 billion in energy costs per year if every home in the U.S. used WaterSense labeled showerheads.

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Consumer Guide Endorsed by the Solar Energy Industries Association
seia.org/initiatives/consumer-protection

Air Source Heat Pump Buying Guide
neep.org/sites/default/files/resources/ASHP_buyingguide_5.pdf

Building Performance Institute Homeowner Portal
bpihomeowner.org

Choose a Light Guide from EnergyStar
energystar.gov/sites/default/files/asset/document/purchasing_checklist_revised.pdf

Choosing and Installing Geothermal Heat Pumps from US Department of Energy
energy.gov/energysaver/choosing-and-installing-geothermal-heat-pumps

Drive Change, Drive Electric
One-stop info shop on EVs from the auto industry.
driveelectricus.com

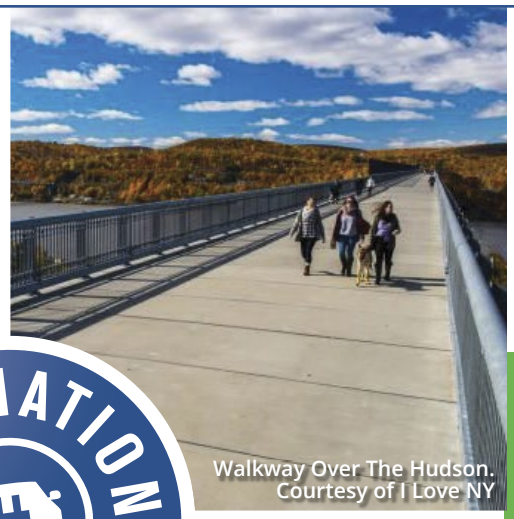
Energy Sage
energysage.com

Find a Contractor (NYSERDA)
nyserda.ny.gov/Contractors/Find-a-Contractor

Green Car Reports
greencarreports.com

New York Geothermal Energy Organization
ny-geo.org

Residential Customer Guide to Solar Energy (Solar Energy Industries Association)
seia.org/research-resources/residential-consumer-guide-solar-power



Walkway Over The Hudson. Courtesy of I Love NY

DESTINATION ELECTRIC

Mount Beacon. Courtesy of Mike Todd of Hike the Hudson Valley

Emerson Resort & Spa

Explore the Northeast in an Electric Car

"The Hudson Valley is a great EV destination because of the many walkable communities that have charging areas — as well as diverse ways to have fun."

– Mary Kay Vrba, President, Dutchess Tourism Inc.

A weekend full of exploring new places is ahead of you and an electric car can get you there! Visit Destination Electric small businesses around the Hudson Valley.

www.driveelectricus.com/destination-electric

Be Proud of Your Electric Bill

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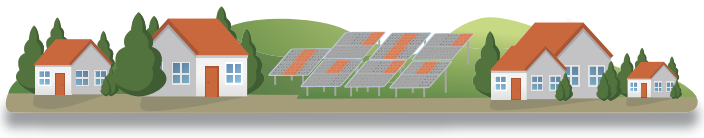

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SO YOU WANT A JOB IN RENEWABLE ENERGY? YOU HAVE OPTIONS!

By Melissa Everett, Ph.D.

You can target the technical specialties of solar, wind, heat pump installation, and energy efficiency retrofits to buildings, and you will find rewarding but challenging work in each one.

As Paul Hawken, the mastermind behind Project Drawdown, observes in the new film Ice on Fire, "We are approaching an inflection point in the dynamics of climate action; there is just about as much money to be made in climate solutions as there is in perpetuating the problem."

- As an industry, solar is already bigger than steel or coal. Solar power is only 1.4 percent of New York's power generation and needs to grow at least 7 percent per year to achieve our climate goals. As policies become less solar friendly at the federal level and in some states, New York is an attractive marketplace for new solar companies to embrace. You can install solar panels as a well-paid union electrician or part of a company dedicated to solar.

- Wind technician is one of the fastest growing trades in the country. New York's existing offshore commitments are expected to create 1,600 jobs.

- Heat pumps, energy-efficient building systems, and advanced transportation are all areas of large-scale opportunity for technicians, managers, marketers, finance people, and more. Heat pumps are the primary scalable strategy for getting buildings off fossil fuels, so those industries have to grow. Even before the new climate law, New York's goal was 233,000 new air-source heat pump installations per year.

- Building energy improvement is also an established field and virtuous work, but it can be a hard sell, and the job can be physically demanding.

While these "new" fields have been getting a lot of attention, they are really a subset of larger, mature industries such as power generation, architecture, construction and engineering. In addition to the technical specialties, they have a growing need for management, marketing, finance, information technology, human resources, and—oh, yes—food service. So whatever your strength, there is a way to be part of this sector.

And whatever your ultimate goal, there are high-quality training opportunities in the Hudson Valley, including well-established programs at SUNY Sullivan and a new Green Careers Academy at SUNY Ulster. Through these programs, you can access state-of-the-art labs including simulators for HVAC, mechanicals, and solar technology; train for the installation and maintenance trades, or integrate your knowledge in a technical associate's degree program that can lead to a job, business or higher degree. And you can study in facilities that model sustainable energy principles. People are already coming to the Hudson Valley to take advantage of these resources. As the state's commitment and this movement grow, more will follow.