

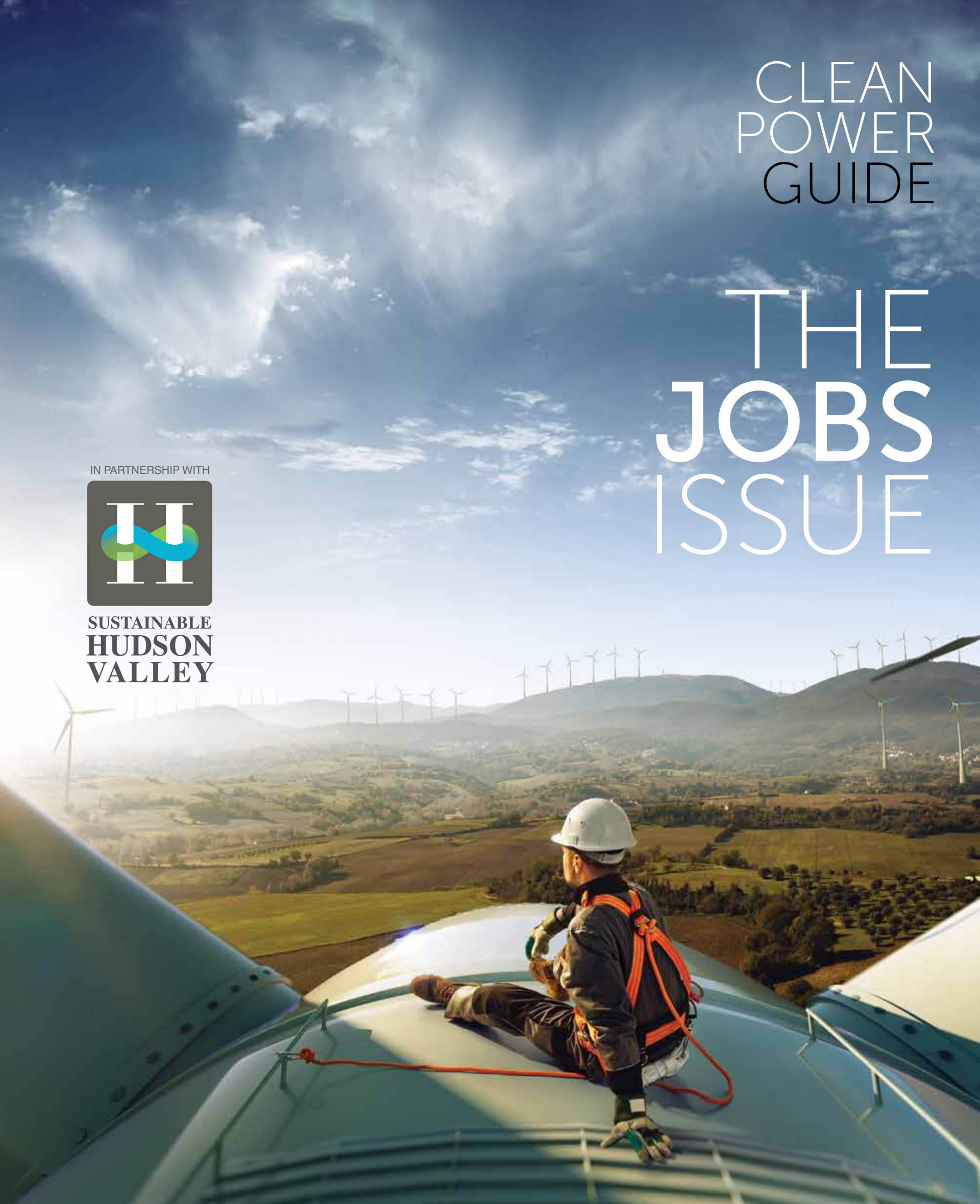
CLEAN POWER GUIDE

THE JOBS ISSUE

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IT'S GO TIME

BY MELISSA EVERETT, PH.D. EXECUTIVE DIRECTOR,
SUSTAINABLE HUDSON VALLEY

Are you obsessed with kicking the fossil fuel habit? Impressed by the sophistication of renewable technologies entering the mainstream, like high-efficiency solar panels and cold climate heat pumps? Or obsessed with saving money and controlling your energy budget? Whichever applies, now is a fine time to translate interest into action by adopting energy-efficient, renewable energy systems for your home or business. It is also a great time to look at the potential for working in these growing fields as you build your career back better.

Welcome to the fourth annual Clean Power Guide, a collaboration between Sustainable Hudson Valley and Chronogram Media. We publish this as a special section in *Upstate House*, online, and in 10,000 freestanding copies for readers throughout the region, throughout the year. We amplify the impact with special events where you can come into direct contact with experts who are ready to help you take the steps you are ready for and understand your options.

The green economy is quite broad. It encompasses energy efficiency and renewable energy, clean transportation, natural resource management, low-impact buildings and infrastructure (and the materials that go into them), recycling-based industries, and more. In these fields there are expanding opportunities in management, marketing, information technology, training, HR and other professional fields, as well as technical career paths. At the end of 2020, there were 153,000 clean energy jobs in New York—putting the state third in the

nation in total clean energy employment behind California and Texas—and the Mid-Hudson is one of the top five regions for concentration of clean energy workers.

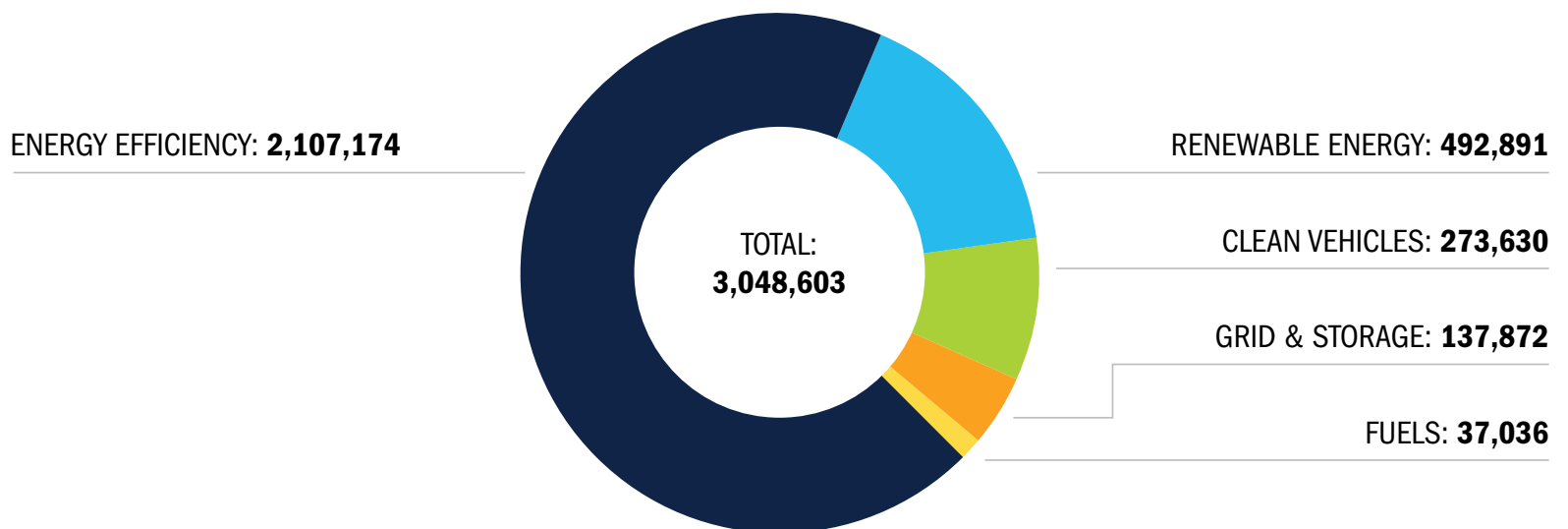
New York is ambitious and generous in its funding of these opportunities. NYSERDA funds eligible employers for the first three to four months of a new hire's salary and cost-shares 90 percent for clean energy internships at nonprofits as well as private companies.

This year, the focus of the Clean Power Guide is on the jobs available now—and the many more that are expected in the next few years—as the state and federal government scale up climate action programs. We're highlighting key growth sectors such as solar, wind, and geothermal that are a major focus for implementing New York's Climate Leadership and Community Protection Act. We look at specific jobs, career pathways, training resources, and funding programs. And we ask a hard question: How good are those jobs?

For the consumer, we've got a special treat too. Tom Konrad is one of the most knowledgeable people in our region on small-scale renewable energy technologies for home and business, and the marketplace trends you need to understand. Tom has built his knowledge as a writer for AltEnergyStocks, and shares it generously—both as a volunteer energy coach with New Yorkers for Clean Power and as chair of the Marbletown Environmental Conservation Commission, which is working with Sustainable Hudson Valley to implement the town's 100 percent Renewables Action Plan.

Read, enjoy, strategize.

US CLEAN ENERGY EMPLOYMENT by sector 2020



This graphic is from *Clean Jobs America 2021*, a report issued by E2 (Environmental Entrepreneurs). More analysis can be found at [E2.org](https://www.e2.org).

Q&A

What's New in Clean Power?

AN INTERVIEW WITH TOM KONRAD



The electr-hybrid Ford 2022 F-150 Lightning

One of the most knowledgeable people in our region on small-scale renewable energy technologies and the marketplace trends, Tom Konrad is a financial analyst, portfolio manager, and writer. He has a PhD in mathematics from Purdue. His study of chaos theory led to his conviction that knowing the limits of our ability to predict is much more important than predictions themselves, a lesson he applies to climate science. He's a volunteer energy coach with New Yorkers for Clean Power and chair of the Marbletown Environmental Conservation Commission.

As an energy coach, what are the most exciting developments in clean energy and efficiency technology that you have seen in the last year?

I'm excited about the new range of electric and plug-in hybrid electric vehicles, like the Ford F150 Lightning and the Toyota RAV4 Prime. They are now allowing people who would never consider buying a compact car to experience the incredible responsiveness of driving electric. We're on the cusp of having electric vehicles that meet every driver's needs. They are not just as good as gas powered vehicles; they are better.

The same is true for electrics replacing small gas motors like lawn mowers and leaf blowers. A year ago, I cleared a foot and a half of fairly heavy snow from my driveway with my new electric two-stage snowblower. It was even able to handle the piles of compacted snow left by the snowplows better than my old gas blower.

What are the most persistent questions that households and business owners have about switching to renewables?

People come at this from all sorts of angles. Often, it's a narrow question, like "Should I use geothermal or air source heat pumps?" Or, "What is the best electric vehicle?" The answers to these questions depend on their needs and how much they can pay, so they usually end up in a much broader conversation than they probably expected.

What I really like is when someone comes to me asking about solar or an electric vehicle, and I'm able to get them interested in heat pumps or induction cooking while also answering their original question.

Heat pumps have come into the mainstream quickly. What

is most important for people to understand as they consider these technologies? When are air source heat pumps the best choice and when should people consider geothermal?

Most people will find that air source heat pumps are the most economical choice. While they are slightly less efficient than geothermal, the upfront cost is much lower. But people should know that the air filters need to be cleaned regularly (I've had multiple people complain to me that their heat pumps just are not working properly only to find the problem was fixed when they clean the filter.)

It's also very important to make sure that your home is well insulated and air sealed before relying on air source heat pumps...they can have problems keeping up in older, poorly insulated, or drafty buildings.

The outdoor units need to have protection from snow piling up around them. The normal way to do this is to attach them to the wall of the building, but if it is a stud wall, you may get noisy vibration when the heat pump is working hard in the winter (this is seldom an issue in the summer in air conditioning mode.) If at all possible, the outdoor unit should be attached to a masonry wall rather than a stud

wall. If that's not possible, consider ground mounting, especially if there is an overhang or a deck to offer snow protection.

Geothermal is the best choice for people who can afford the up-front cost, or are in hard-to-insulate houses that have a high heating load and already have air ducts.

Solar is a commodity now and the prices have fallen. What are the biggest issues around quality, and the consumer choices that people should keep in mind?

Because of falling panel prices, more than half the cost of a home solar installation is actually labor and other soft costs like marketing and overhead. For that reason, there is not a lot of incentive for established installers to offer substandard equipment. Find a local installer with a good reputation, like the ones Sustainable Hudson Valley vets for our Green Group Purchase program and you are unlikely to go wrong.

What are your go-to sources of information to keep on top of electric car choices?

For electric cars, I like the Plugstar Shopping Assistant [Plugstar.com].

Solar is sexy. Efficiency is earnest. People can be daunted when it comes to doing the foundational work of making their buildings more efficient before they invest in renewables. What's your advice?

Upgrading your home's insulation and air sealing is a lot less sexy and trickier than most of the other upgrades we are talking about, so I totally understand. Part of the problem is that every building is different, so there is no one-size-fits-all recommendation. But if you don't address a leaky building before upgrading your heating and cooling, you will pay more for the system and it won't work as well.

For many people, the best strategy is to hit the most critical spots. In many buildings this means spray foam around the above ground portions of the basement walls (the rim joists) and a lot of blow-in cellulose insulation in the attic. The walls are less critical, and can be addressed when there are opportunities during other remodeling projects. If you are adding or replacing siding, that is a great opportunity to add a layer of continuous insulation on the outside of the walls. If you need a new roof, you may be able to insulate the ceiling from above in buildings that don't have an attic. If you open up the drywall in any wall, make sure you don't miss the opportunity to cut down on air leaks and add insulation.

The Climate Act: Tackling the Hard Parts

January 20, 4:30-5:30pm on Zoom

New York's Climate Leadership and Protection Act (CLCPA), passed in 2019, is one of the most ambitious climate laws in the world. It requires New York to reduce greenhouse gas emissions 40 percent by 2030 and no less than 85 percent by 2050. To get there, epochal shifts will need to happen across industries. On a practical level: What is it going to take actually to weatherize all those buildings? How are we going to get all that solar built? How can we ensure that underserved communities participate in the scoping of the CLCPA and benefit from its climate justice provisions?

Join us for a virtual event celebrating the launch of the latest issue of the Clean Power Guide and a look at the practical implications of implementing the CLCPA. Moderated by Brian K. Mahoney, Chronogram Media editorial director; with Melissa Everett of Sustainable Hudson Valley; and special guests from the worlds of industry and policy innovation.

Find more information and resources at Sustainhv.org and Upstatehouse.com.



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The World of Wind

Opportunity Profile: Wind Power

BY DAVE CONOVER, PROGRAM DEVELOPER FOR SUSTAINABLE HUDSON VALLEY



Wind technicians are on the front lines of the growing renewable energy sector as they repair and service wind turbines and troubleshoot problems on site. Working in the field, sometimes traveling from site to site, these highly skilled tradespeople get to use both head and hand capabilities. People interested in this position must be comfortable outdoors and with heights, be physically fit, and be versatile with computers and tools.

These jobs are already in high demand, and the sector is growing. The Bureau of Labor Statistics predicts that wind technician jobs will increase by 68 percent this decade. About 1,400 new job openings are anticipated annually. The median wind tech salary range is around \$56,000, and some companies offer sign-on bonuses.

Beyond a high school diploma, some specialized training is required. Companies like General Electric, Vestas, and Orsted—those that employ large numbers of wind technicians—have well developed training programs. Wind technician training is also available at some community colleges, and may be part of a two-year associate's degree program. Programs vary considerably. Some private institutes offer certificates after a

six-month intensive training while others offer a combination of online coursework followed up with an intensive boot camp of hands-on practice.

A typical curriculum features units on:

- **wind energy basics and terminology**
- **safety procedures, OSHA 30 and first aid/CPR**
- **mechanical skills including tool use and troubleshooting problems**
- **basic electrical and hydraulic theory along with practice on the use of meters and other equipment**
- **climbing and rigging**
- **radio communications**

As New York expands its commitment to offshore wind, training center initiatives are being funded by NYSEERDA. These include the New York Offshore Wind Training Institute program through SUNY's Farmingdale State College and Stony Brook University, and a training program at Schenectady Community College. These institutions are developing a plan to disburse up to \$3 million in funds to support skills development in disadvantaged communities. A new National Offshore Wind Training Center, located at Suffolk Community College, recently received \$10 million

from the developers of New York's Sunrise Wind project. The Center of Excellence for Offshore Energy at SUNY Maritime College in The Bronx is developing training courses as well.

In New York State, many jobs are based in high wind potential areas such as Long Island and western New York. Offshore Long Island is a hotbed of wind energy activity with several new projects planned to come online that will help New York meet its ambitious renewable energy goals.

UP AND AROUND THE INDUSTRY

The world of wind also employs meteorological technicians, who chart weather patterns and help choose the best sites for wind turbines. There is also work in construction and site preparation, where tasks range from brush clearing and pouring of foundations to creating access roads. Of course, there is more highly specialized work involved with design and manufacturing wind power components, as well as research into future technology. As the industry grows, so will jobs in administration and management, finance, IT, sales and marketing, customer support, and maintenance of systems.

For information on wind energy training programs, go to Windexchange.energy.gov/training-programs.

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BREAKING INTO THE CLEAN ENERGY FIELD

I graduated from Wells College about a year ago. I studied sustainability—such a broad field—for the first few years, I really did not know what I wanted to do. But as I looked at the economy and the immense use of fossil fuels, I began to think that the economic disparities around us can be brought back to fossil fuel use and environmental degradation, which are the basis for so much economic activity and capital inequality. So I focused my last three semesters on delving into the fossil fuel industry and how to replace it with efficiency and renewables. Coming into my senior year, I was talking with my advisor, who brought up the idea of working with a HeatSmart program. These are feisty, state-funded campaigns to get home and business owners excited about shifting to efficient electric heat pumps to get off fossil fuels. I decided to apply for an internship with HeatSmart Tompkins—a creative program in Tompkins County working to eliminate fossil fuel use in the home—and worked with them for about a year. That was game changing. I learned a lot about how building infrastructure is generally designed to depend on fossil fuels. I wanted to find a way to retrofit existing buildings to be more comfortable and affordable while eliminating fossil fuel use. That set in motion the next steps as I met a lot of wonderful people who talked me through the facets of the industry. I considered taking classes to become a heat pump technician, but then I learned that ICF International was taking over the management of NYSERDA's statewide Clean Heat program, and hiring. I was able to apply and get an entry-level analyst position that offers a lot of exposure to Clean Heat campaigns. My work is tracking progress of campaigns and contractors, which lets me see how all the elements work together. Aiming high for an internship with an innovative, well connected organization was the key.

—Dana Grover

WHERE THE WIND BLOWS

I've always enjoyed hard work, but I'm always surprised at how tired but rewarded I feel at the end of the day. I'm a resource wind technician for Vestas Americas. This year I have been in Montana, Missouri, California, Oregon, Texas, New York, Pennsylvania, Oklahoma, and more, so I live in hotels. We replace big parts of the turbines when they go down and rebuild the turbines. I work six days a week, usually 10 to 12 hour days. You do that for two months and then you get some time off.

I reinvented myself at the age of 40. I was a bartender for 20 years, worked in big cities in upscale dining. I went back to school for six months, to Kalamazoo Wind Technician Academy. It was an immersion experience, using the tools and working on turbines. I graduated in mid-June and was working by July. There is a lot of learning through the work as well, especially in the bigger jobs. The majority of the people I work with are younger; some came out of the military or wandered around for a bit, but some of my co-workers are in their 50s and the most knowledgeable people I've ever met. There's a lot of mentoring in our company and a process you can learn through.

—Brian Rhoades





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Geothermal

FROM THE GROUND UP OPPORTUNITY PROFILE: GEOTHERMAL

BY JOHN CIOVACCO, PRESIDENT OF AZTECH GEOTHERMAL

The geothermal field offers a variety of occupations and roles in the installation, design, and maintenance of geothermal systems. Let's start with installation.

There are two main components to a geothermal heat pump installation: the inside work and the outside work. The inside work involves the installation of the heat pump itself, done by mechanical, electrical, and plumbing engineers, project managers, and technicians. The outside work makes a thermal connection to the ground, done by drillers and excavators with piping support from HVAC (heating, ventilation, and air conditioning) technicians.

The inside work is very similar in design and installation to an air conditioning system, so it is not difficult to train designers (often engineers) and installers (technicians) that are presently involved in HVAC to design and install the inside components of a geothermal heat pump system. The outside work requires specialized design and installation procedures that are less common, so it requires a bit more training and experience to get both the design and installation right. Some HVAC designers and/or contractors learn this new "ground coupling" skill and can put both pieces together for projects.

Several specific trainings are offered by the International Ground Source Heat Pump Association (IGSHPA). The most common is a three-day course with a written test to become an IGSHPA-accredited installer. For design professionals, IGSHPA and the Association of Energy Engineers (AEE) offer a 40-hour course with a more rigorous test and required design experience to become an

IGSHPA/AEE-certified geothermal designer. A relatively new certification to help encourage good installation practices is a 20-hour course with a test and required field experience to become an IGSHPA-certified geothermal inspector. Aside from these industry-specific courses, college engineering courses and trade school coursework in HVAC are the foundation for much of what needs to be learned to design and install geothermal systems.

Building electrification is a well-defined trend, which will drive increases in all types of heat pump installations, including geothermal heat pump systems. New York State's energy and environmental policy, supported by 2019 passage of the Climate Leadership and Community Protection Act, anticipates that heat pumps will make up over 90 percent of the HVAC equipment sales in the state by 2050. This is further supported by increasing utility rebate levels and the continuation of federal tax credits for geothermal heat pump systems. While we have a good stable of design professionals and HVAC contractors to do the inside work, the workforce supporting the outside systems will need to increase significantly to support the demand for the most efficient heat pumps systems available today. Specifically, drilling capacity today to install vertical heat exchangers will need to grow by an order of magnitude to keep pace with demand projections for new construction and existing building conversions.

Traditionally, geothermal heat pump systems have been installed in suburban areas by small companies, many with fewer than 10 employees. These companies often struggle to maintain

staffing, especially with today's tight job market, and don't often have diversity, equity, or inclusion policies beyond legal requirements. As we see more large geothermal projects taking place, larger HVAC contractors are engaged and have more sophisticated hiring practices, often with emphasis on diversity, in order to meet bidding requirements sometimes found on larger projects.

Compensation is quite good for even entry level jobs involved in the design and installation of geothermal heat pump systems. Entry level HVAC technicians commonly start above \$15 per hour, and experienced senior level technicians can easily make over \$30/hour. Skilled drillers and excavators are also well paid. Many large geothermal projects may use union labor or have a prevailing wage requirement, which commands a higher wage for workers.

Installing geothermal systems is just plain old hard work at times! Heat pumps are heavy and need to be moved and installed in all sorts of places in buildings. Heat pumps are high-pressure refrigeration systems powered by electricity and require training and appropriate safety equipment to work on safely. There are inherent risks when working with heavy equipment, like drilling and excavation, which also are covered by OSHA safety standards and related training. If the hands-on aspects make you weak in the knees, there is also growth in jobs related to design, inspection, sales and marketing, finance, and management. As geothermal systems become more popular, there will also be an increase in landscaping to bring the grounds back to their original condition.



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NYSERDA



SURVIVING A PANDEMIC IN THE SOLAR INDUSTRY

BY MELISSA EVERETT

At the beginning of 2020, the solar industry was poised for growth. Then it was hit by the same work-busting but necessary shutdowns that decimated restaurants, cultural venues, and other businesses whose work is specific to a place. Workforce numbers fell 6.7 percent from 2019, down to 231,474, according to the 2021 annual Solar Jobs Census. While it's possible to put solar panels on a roof without customer contact, it is not so easy to sell those panels, nor to get the attention of distracted people. Those reductions impacted every occupation in just about every state, and companies are still recovering.

Still, the industry installed record amounts of solar, thanks to increased productivity—a result of larger systems being built, on average, and an easier sales process as the technology is mainstreamed.

“We did have significant layoffs for a few months, then we started ramping back up with site visits as soon as that was possible,” says Jason Iahn, vice president of Lighthouse Solar in New Paltz. “Soon, we were booking consistent business and now we are pretty much nonstop. There are other challenges now, like shortages of components, but there’s a lot of upside with the infrastructure bill. We are optimistic.”

Anthony Sicari, president of Modena-based New York State Solar Farm, found an opportunity to pivot powerfully during the shutdown. “Everything went digital for the first time, and it made solar the way it should always be: easy to access,” he says. The company made constant use of Zoom, drones, and customer photographs of their spaces to do touchless assessments and system designs. “Even our sales and operations meetings went remote,” Sicari says. “For us, it brought everyone together.”

At Rhinebeck-based SunCommon, the shutdown forced adaptation and brought efficiencies through online marketing campaigns. “More efficiency means more time to innovate,” says Madeline Brydges, senior manager of digital marketing. “We were able to spend more time building our business acumen and training our teams on new products like the Tesla Solar Roof, even running a pilot to become the first certified installer of this new technology.”

For customers, too, the change opened eyes to renewables and resilience, building enthusiasm for battery storage as well as solar panels. “For the first time ever, people’s homes became their offices so their electricity usage went through the roof. They were looking at their utility bills and wondering how they could save. Commitment to following

through was much higher. And it was much more interactive; people saw the people behind the company,” says Sicari.

This boost in efficiency and innovative thinking can only help as the solar industry goes into growth mode. To reach the 100 percent clean electricity goal set by the Biden administration, the solar industry expects to need over 900,000 workers by 2035. To prepare for this rapid expansion (and keep its existing workforce), the industry has been paying greater attention to diversity, inclusion, and wages. The Solar Jobs Census notes that 10.3 percent of workers in the industry are unionized, a level similar to other construction trades. While wages are not always competitive with those of fossil fuel and nuclear power workers—many employed by larger companies—solar wages are on par with similar trades such as electrical work.

In particular, the industry is actively courting veterans. A key certifying agency for solar installers, the North American Board of Certified Energy Practitioners, has just released a new, streamlined eligibility criteria for veterans wanting to take the professional exam as a certified installer, who can now count relevant military experience as on-the-job training.

Jobs

Can Green Jobs Be Good Jobs?

BY ELIOT CRESSWELL, DIRECTOR OF RESEARCH, WORKFORCE DEVELOPMENT INSTITUTE



Can green jobs be good jobs? There's no guarantee. But with thoughtful and deliberate action, we can ensure that those securing our future against the climate crisis can also secure their family's future with good wages, safety standards, opportunity for advancement, health care and retirements benefits, access to quality child care, and all the things workers should be able to take for granted in the 21st century.

Green jobs cover a wide range. There are solar installers, wind technicians, geothermal system designers, and others who work on renewable energy systems all the time. The green economy also depends on electricians and line workers who might work on renewable energy projects or electrical grid upgrades for part of the year, then transition to various other building and construction projects. And bringing energy efficiency and renewable power to the entire economy creates green job opportunities across industries, from agriculture to cryptocurrency.

What makes a job a good one? At least three factors:

- **Benefits:** What does the job provide for the worker?
- **Results:** What does the job produce for the market and the world?
- **Access:** Who can obtain, retain, and succeed in the job?

According to the 6th annual Clean Jobs Report by E2, the median hourly wage for clean energy jobs in 2019 was \$23.89, compared to \$19.14 for the economy overall. While average clean energy wages are lower than the averages in the fossil fuel industry, clean energy jobs are three times more plentiful.

When it comes to the things we most commonly associate with good jobs—family-sustaining wages, benefits, safety standards, regular schedules, representation for workers, and opportunities for advancement—the American labor movement has led the way for generations. In alignment with the labor movement and to elevate existing pro-worker policies, Climate Jobs NY and the Center for American Progress have identified five job-quality recommendations specifically for green jobs.

- **Labor peace agreements, binding contracts between unions and major employers which**

limit both strikes and employer intimidation of the union

- **Prevailing wage requirements requiring that government-funded projects provide wages and benefits at least comparable to others in the industry and/or region**
- **Worker boards to monitor and upgrade wages and working conditions**
- **Expanded access to apprenticeship and pre-apprenticeship programs.**
- **Enforcing workplace health and safety laws.**

For all these strategies to be widely accepted, “we must expand the understanding, use and applications of renewable energy,” urges Mary Jane Bertram, Workforce Development Institute’s Hudson Valley Regional Director. “In doing so, we must also expand access to the technology, training, and opportunities.”

So, can green jobs be good jobs? If we prioritize worker empowerment, equity, and inclusion as called for in the CLCPA, they can. If we do not, we it will be harder to attract and retain the quantity and quality of worker necessary to achieve our energy and climate goals.



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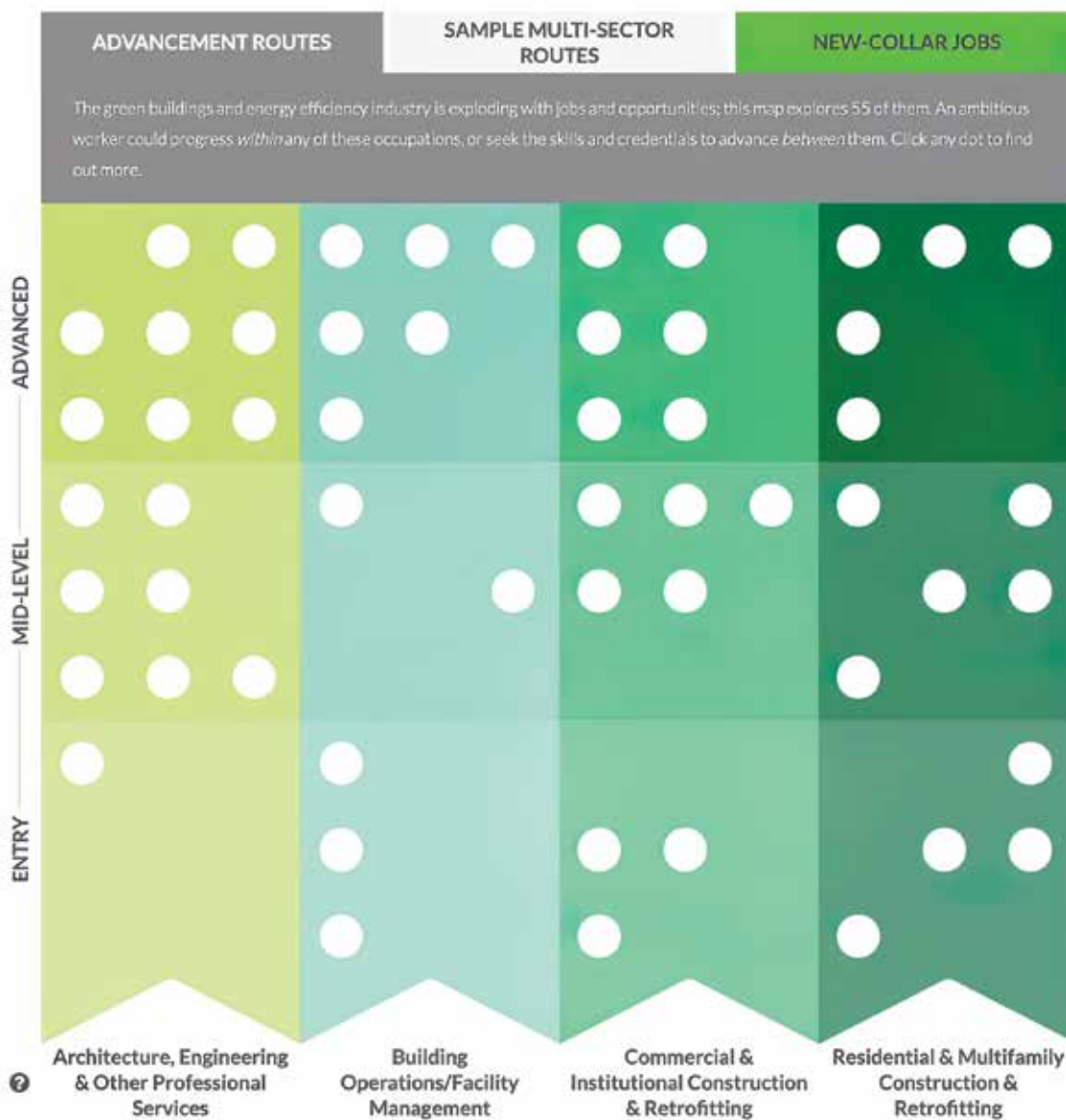
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Understand the Paths Forward

Delve Into Department of Energy Career Maps



These information packed graphics identify types of jobs in the very fluid fields of green building, solar and wind energy, and show points of entry and pathways of advancement. The fields are not always structured as formally as old-fashioned industry, but these maps give you a starting point for investigating the opportunities.

Green Buildings Career Map
greenbuildingscareermap.org

Solar Career Map
irecsolarcareermap.org

Wind Career Map
energy.gov/eere/wind/wind-career-map

The Department of Energy's interactive Green Building Career map.

Opening it Up!

It isn't enough to have good jobs for some. To make sure that green economy opportunities more widely available, there is a good, growing and generous support system for job seekers.

YouthBuild trains out-of-school young people (16-24) in construction trades and leadership skills, working with community organizations such as Nubian Directions in Poughkeepsie.
Nubiandirections.org

Citizens for Local Power's Kingston-based **Green Jobs Internship** pays a diverse group of interns for 24 hours of work spread over several hands-on and classroom learning experiences to provide a strong overview of green jobs from the inside and a personalized network.
Citizensforlocalpower.org

SUNY Ulster and **SUNY Sullivan** offer a suite of courses in solar installation, building performance, green construction, and more. SUNY Ulster has even secured funding from NYSERDA to make the basic Building Science Principles Certificate of Knowledge prep course (taking around 18 hours) free as an online training that

prepares you to work in building energy efficiency.

Sunyulster.edu/continuing_education/industrial-tech/green-careers.php

Sunysullivan.edu/green-building-maintenance-and-management/

NYSERDA has committed over \$32 million for clean energy training through educational institutions and companies. They offer special programs supporting clean energy internships with 90 percent cost-share for eligible workplaces, and on-the-job training to cover new employee's first months at work. Email winfo@nyserderda.ny.gov for more information.

NYSERDA has just announced an ambitious Climate Justice Fellows hiring program that will support 150 workplaces in hiring and mentoring professionals whose job is to bring clean energy benefits to disadvantaged communities.

Nyserderda.ny.gov