

Special | September 2021

# pv magazine special

*Solar and clean energy  
leaders chart a course  
for rapid growth*

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"How Next Generation Solar Technologies Drive Lower LCOE's"

Industry Trends Theater on the Show Floor

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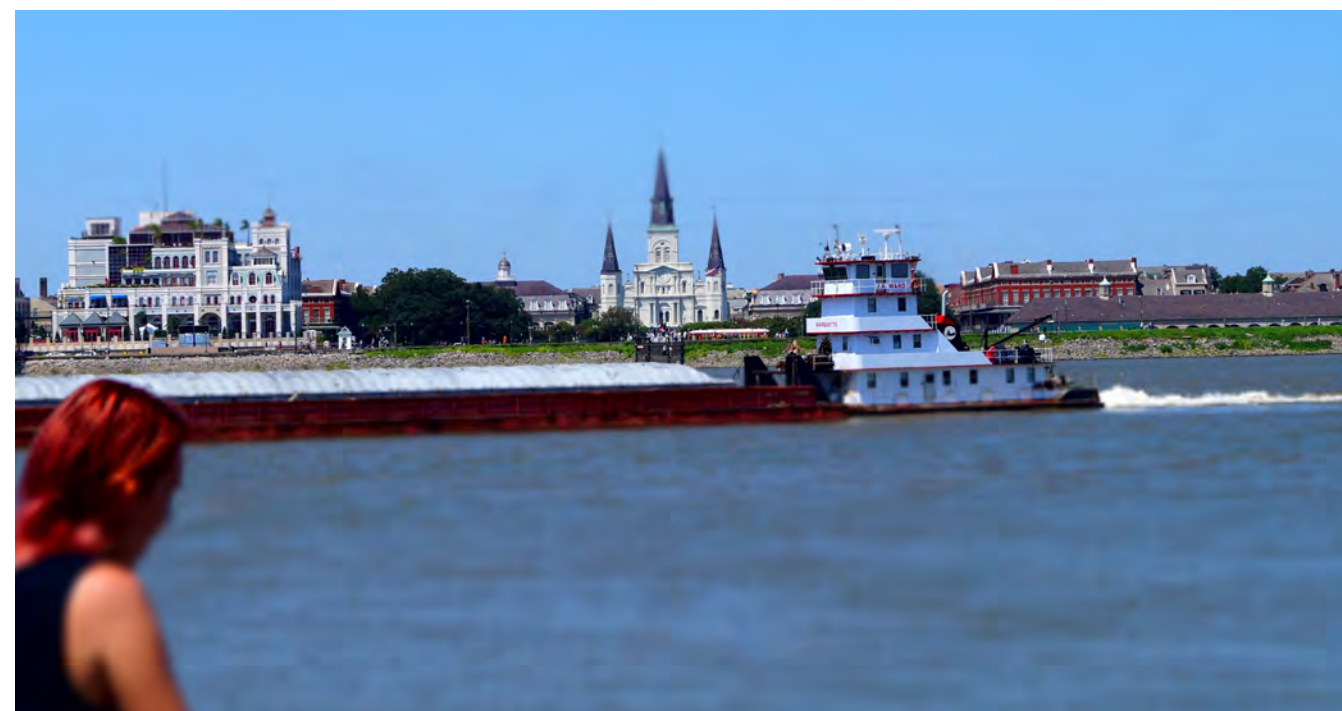


Image: David Wagman

## pv magazine group

### Special publication

A special publication produced by pv trade media LLC in partnership with Solar Energy Trade Shows LLC (SETS)

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ISSN 1865-3138



# Capture solar's moment

David Wagman, Senior Editor,  
pv magazine USA



“The supply chain is out of balance and the sector is vulnerable to disruptions.”

this summer with smoke plumes from fires burning in the West. Drought has led to the first-ever water emergency declaration for the Colorado River, which not only is used to irrigate cropland in the West but also to generate electricity. And rising sea levels are impacting coastal areas of Florida while more frequent and severe tropical storms result in massive and widespread destruction.

The essential and economy-wide shift away from fossil fuels is imperative to our nation's continued resilience and survival.

But by another measure we have a little over a year for Congress to enact long-term policies and spending priorities. We all know that the Senate has a 50-50 split and the Democrat's majority in the House is razor thin. Loss of either chamber in the 2022 elections could slow or even halt the vital work that has only just restarted after four years of rudderless drift.

Forward progress is also not assured at the state or local levels, either. Efforts to blunt or roll back solar incentives are in play in statehouses across the country. In some parts of the country, anti-solar NIMBY sentiment is growing as solar arrays are proposed for agricultural areas. The industry needs to remain sensitive to these local concerns and consider, where feasible, maximizing the use of rooftops, parking areas, brownfield sites, and other parts of the built environment. On the other hand, innovative solutions such as agriPV and floating PV have significant potential, but they will require solar developers to engage with local communities to convince them of their value.

Given the strategic nature of our shift to clean energy resources, it's vital for the solar industry to diversify and shorten our supply chains, and work tirelessly to reduce the round-trip environmental impact of solar energy. The supply chain is out of balance and the sector is vulnerable to disruptions. We've seen rising ocean freight rates this year as well as rising tensions related to the alleged use of forced labor in solar supply chains.

These are difficult challenges, but they must be met if we are to decarbonize our economies and claw our way back from the precipice of climate change. This is solar's moment.

*We are delighted to partner with Solar Energy Trade Shows (SETS) to produce this special publication for this year's Smart Energy Week, Solar Power International (SPI), and Energy Storage International (ESI), all leading platforms with the goal of accelerating the clean energy transition. We hope you find this SEW/SPI/ESI guide a valuable resource as you seek to make the most out of this event.*

*David Wagman is Senior Editor of pv magazine USA. Be sure to subscribe to our free daily pv magazine USA newsletter, visit our pv magazine USA website [www.pv-magazine-usa.com](http://www.pv-magazine-usa.com), and stay up to date on the global solar industry through our multiple country-focused sites, as well as our monthly magazine (just use the QR code on this page to access our shop and secure a 10% discount off our subscription rate).*

## Powering the clean energy transition

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# SPI, ESI & Smart Energy Week 2021

Welcome to SPI, ESI, and Smart Energy Week, the most comprehensive event for the renewable energy industry. This year is shaping up to be a very exciting year with a compelling digital program and hundreds of online exhibitors.

While we cannot meet in New Orleans this year, we encourage you to help the Gulf Coast recover and rebuild by hope joining SEIA, SEPA, and Smart Energy Week community in supporting these local organizations: [www.solar-powerinternational.com/ways-to-help/](http://www.solar-powerinternational.com/ways-to-help/)

## Digital Program Hours

Tuesday,  
September 28, 2021  
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Wednesday,  
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9:00 AM - 5:00 PM ET

### About Smart Energy Week

SPI, ESI & Smart Energy Week, powered by the Solar Energy Industries Association (SEIA) and the Smart Electric Power Alliance (SEPA), is the most comprehensive event in North America for the renewable energy industry. Anchored by the flagship event, SPI, Smart Energy Week brings together an extensive alliance of renewable energy leaders for multiple days of networking, education, and innovation that moves the industry forward. Smart Energy Week has become the center of integration for the wider energy industry - with Energy Storage International (the largest energy storage event in North America), Smart Energy Marketplace + Microgrid, Hydrogen + Fuel Cells International, EV International, and Wind Energy International.

### About SEIA

The Solar Energy Industries Association® (SEIA) is leading the transformation to a clean energy economy, creating the framework for solar to achieve 20% of U.S. electricity generation by 2030. SEIA works with its 1,000 member companies and other strategic partners to fight for policies that create jobs in every community and shape fair market rules that promote competition and the growth of reliable, low-cost solar power. Founded in 1974, SEIA is the national trade association for the solar and solar + storage industries, building a comprehensive vision for the Solar+ Decade through research, education and advocacy.

### About SEPA

The Smart Electric Power Alliance (SEPA) is dedicated to helping electric power stakeholders address the most pressing issues they encounter as they pursue the transition to a clean and modern electric future and a carbon-free energy system by 2050. We are a trusted partner providing education, research, standards, and collaboration to help utilities, electric customers, and other industry players across three pathways: Electrification, Grid Integration, Regulatory and Business Innovation. Through educational activities, working groups, peer-to-peer engagements and advisory services, SEPA convenes interested parties to facilitate information exchange and knowledge transfer to offer the highest value for our members and partner organizations.



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# Making up for lost time

Tim Sylvia, Associate Editor,  
pv magazine USA

President Joe Biden and his team have been in office for more than eight months, and they've been busy addressing renewable energy and climate initiatives. Here are highlights on this fast-moving front.



The U.S. Capitol. Image: Architect of the Capitol

## January

[On Inauguration Day](#) President Joe Biden signed executive orders for the U.S. to rejoin the Paris climate agreement and also to block construction of the Keystone XL pipeline.

A week later, Biden [issued executive actions](#) directing federal agencies to procure carbon-free electricity and zero-emission vehicles made in America; eliminate fossil fuel subsidies and identify ways to make federal operations more resilient to climate-related impacts; and establish a moratorium on new oil and gas leases on federal lands.

The actions created new entities, including the White House Office of Domestic Climate

Policy, the National Climate Task Force, and the Special Presidential Envoy for Climate.

## February

[On February 5](#), lawmakers on the U.S. House Ways and Means Subcommittee on Select Revenue [reintroduced](#) the Growing Renewable Energy and Efficiency Now (GREEN) Act.

[On February 8](#), bills to create a Clean Energy and Sustainability Accelerator that would leverage \$100 billion of public funds to finance up to \$463 billion in total investment over the next four years were introduced in the [House](#) and the Senate.

## March

[On March 1](#), Senators Joe Manchin (D-WV) and Debbie Stabenow (D-MI) unveiled the [American Jobs in Energy Manufacturing Act of 2021](#). The bill would update Section 48C of the Internal Revenue Code to provide tax credits for manufacturers and other industrial users. Credits would be used for investments in advanced electric grid, energy storage, renewable energy and energy efficiency equipment, among other categories.

[That same week](#), the U.S. House Committee on Energy and Commerce introduced the Climate Leadership and Environmental Action for our Nation's (CLEAN) Future Act.

[On March 9](#), lawmakers introduced the Energy Storage Tax Incentive and Deployment Act, [legislation](#) which would create a standalone ITC for energy storage technologies for utilities, businesses, and homes.

On March 26, the Department of Energy (DOE) [announced a goal](#) to cut the cost of solar energy by 60% within the next 10 years.

## June

On June 15, DOE [announced \\$200 million](#) to support new vehicle development, both in EVs and connected vehicles, as well as the battery supply chain.

On June 30, the Internal Revenue Service released a notice extending safe harbor for solar projects under the Section 48 Investment Tax Credit. [Notice 2021-41](#) extended the safe harbor rules from four years to five years for projects that started construction during 2020.

## August

By a vote of 69-30, the U.S. Senate on August 10 passed a \$1 trillion infrastructure bill, a landmark piece of legislation that had unusual bipartisan support. The measure moved on the House for consideration.



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# Utility transformation accelerates opportunities for all clean energy resources

Julia Hamm, President and CEO,  
Smart Electric Power Alliance



“We don’t have the luxury of time on carbon reduction.”

In response, electric utilities are taking action. Utilities are reassessing longtime operational practices, shuffling their generation portfolios, increasing supply diversity, and strengthening resilience measures. As of this writing, 74 utilities across the U.S. have [publicly stated carbon or emission reduction goals](#), and 51 have announced commitments to 100% carbon-free or net-zero emissions by 2050.

The trajectory is clear: Falling clean energy costs, climate change concerns, extreme weather events, mounting pressure from investors, public policy, technology advancements, broader electrification, and evolving customer preferences are driving an industry-wide transformation to a more modern and carbon-free energy system.

The Smart Electric Power Alliance (SEPA) recently completed a comprehensive, honest assessment of electric utilities’ progress on the path to a modern, carbon-free energy system. We call this project [The Utility Transformation Challenge](#). SEPA conducted surveys of over 130 U.S. electric utilities to identify and analyze key differentiators between the leaders and all other participating utilities, as well as areas where significant improvement is needed.

What did SEPA learn? The journey to a clean and modern grid is challenging,

complex and, in most cases, not fully charted.

The industry is moving beyond a focus on single technologies and solutions to large-scale integrations of clean energy solutions such as solar, wind, storage, demand flexibility, and more. Utilities are integrating distributed energy resources (DER) into their resource and infrastructure planning, and expanding traditional transmission and distribution system planning by considering or incorporating non-wires alternatives.

Utilities are also rethinking and streamlining processes to process rising volumes of DER interconnection requests, and to accommodate newer and more complex DER systems. With the expected growth of electric vehicles, nearly all utility survey respondents have developed or are developing a strategic plan for transportation electrification.

Utilities cannot achieve a carbon-free system alone. To achieve our aggressive climate goals in the timeframe needed, it will take all hands on deck, and use of all available clean energy resources.

We don’t have the luxury of time on carbon reduction.

For more than a century, electric utilities in the U.S. have kept the lights on, powered our economy and created an engineering marvel in the U.S. electric grid.

Now, the electric utility industry is changing at a pace never seen before.

Today, large-scale solar and wind are the lowest-cost resources in many states. Energy storage is a viable option in many applications, and technology advancements are allowing customers to take control of their electricity supply and demand. The overall U.S. electricity generation portfolio is significantly cleaner, with coal usage dropping precipitously and carbon-free energy increasing to 40%.

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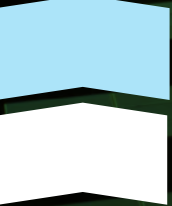
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# Solar Futures Study: A roadmap to decarbonize the grid

David Wagman, Senior Editor,  
pv magazine USA



Image credit: NREL/Dennis Schroeder

The U.S. Department of Energy released a study in early September that examines solar's role in decarbonizing the nation's electric power grid.

The Solar Futures Study, led by the National Renewable Energy Laboratory, puts numbers behind the expected massive amount of solar necessary to decarbonize the grid.

The report examines what the U.S. needs to reach clean energy goals and how such a large amount of solar energy impacts the grid, the economy, the solar industry, the environment, and how solar might interact with other technologies such as storage, electric vehicles, buildings, industry.

The report said that by 2035 the U.S. would need to quadruple its yearly solar capacity additions and provide 40% of the electricity on the grid, on the order of 1,000 GW. By 2050, solar energy could provide 1,600 GW on a zero-carbon grid, the study said.

Decarbonizing the entire energy system could result in as much as 3,000 GW of solar by 2050 as result of increased

electrification in the transportation, buildings, and industrial sectors.

The report said that a 60% reduction in PV energy costs by 2030 could be achieved through improvements in photovoltaic efficiency, lifetime energy yield, and cost. It said that higher-temperature, higher-efficiency concentrating solar power technologies could deliver cost and performance improvements.

The report said that further advances also are needed in areas including energy storage, load flexibility, generation flexibility, and inverter-based resource capabilities for grid services. It said that solar technologies "may proliferate in novel configurations" associated with agriculture, water bodies, buildings, and other parts of the built environment.

The study said that electrification of fuel-based end uses could enable solar electricity to power about 30% of all building end uses and 14% of transportation end uses by 2050.

For buildings, rooftop solar were forecast to increase the value of batteries and investments in load automation systems. For transportation, rooftop solar could increase the value of electric vehicle adoption to consumers through a combination of low-marginal-cost electricity and managed charging.

It cautioned that the long-term role of solar electricity in industry is less certain. Even so, it said that industrial process heat from concentrating solar thermal plants can help decarbonize the sector.

The study said a clean grid requires "massive, equitable deployment" of diverse, sustainable energy sources. It said the U.S. must install an average of 30 GW of solar capacity each year between now and 2025 and 60 GW each year from 2025-2030. The

study's modeling showed that the remainder of a carbon-free grid largely supplied by wind (36%), nuclear (11%-13%), hydroelectric (5%-6%), and biopower/geothermal (1%).

The study said that solar will employ 500,000 to 1.5 million people across the country by 2035. And overall, the clean energy transition will generate around 3 million jobs across technologies.

It said that new tools that increase grid flexibility, like storage and advanced inverters, as well as transmission expansion, will help to move solar energy to all parts of the country. The report said that solar and wind combined are expected to provide 75% of electricity by 2035 and 90% by 2050.

The deployment of storage would enable more flexibility and resilience, growing from 30 GW to nearly 400 GW in 2035 and 1,700 GW in 2050. Tools like grid-forming inverters, forecasting, and microgrids also are expected to play a role in maintaining the reliability and performance a renewable-dominant grid, the report said.

Reduced carbon emissions and improved air quality were expected to result in savings of \$1.1 trillion to \$1.7 trillion, outweighing the additional costs incurred from transitioning to clean energy. The projected price of electricity for consumers was not expected to rise by 2035 as the costs are expected to be fully offset by savings from technological improvements.

The report said that without some combination of limits on carbon emissions and mechanisms to incentivize clean energy, the U.S. "cannot fully decarbonize the grid." Its modeling showed that grid emissions could be expected to fall around 60% without policy.



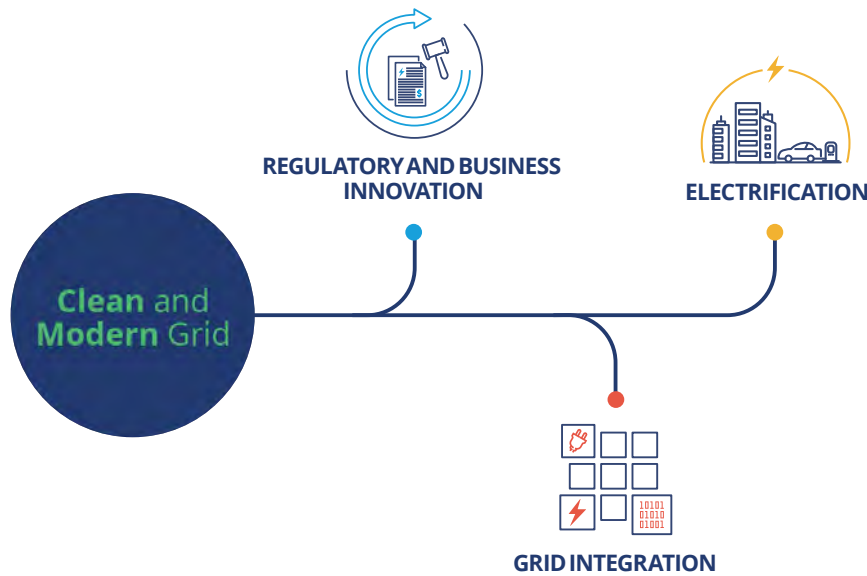
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# States offer victories but also some setbacks for solar

**Tim Sylvia, Associate Editor, pv magazine USA**

While much of the attention on energy policy has focused on initiatives by players on the federal level, action on the state level has been just as critical.

Here are some of the most impactful actions taken at the state level so far this year.

## Trio from New Jersey

A year ago, California became the first state to require solar panels on roofs of most new homes. Now New Jersey, the country's most densely populated state, is following suit on the commercial side of things.

The state legislature [passed A3352](#) requiring all new warehouses to be solar-ready. The bill defines a warehouse as any building that is 10,000 square feet or more in size and that is primarily used to store goods for resale. New warehouses built on or after July 1, 2022 will need to be optimized for solar.

One offshoot proposal is for some of the warehouse solar capacity to be targeted for community solar installations, providing

access to clean energy to low- and middle-income New Jersey ratepayers.

Two other New Jersey bills, [S2605](#) and [S3484](#), also deserve attention. [S2605](#) looks to establish a successor program to the state's solar renewable energy certificate (SREC) program under the Board of Public Utilities (BPU). It would provide incentives for development of at least 3,750 MW of behind-the-meter solar facilities and 750 MW of community solar by 2026. The bill also revises the state's competitive solicitation process for new solar projects, with the hope of spurring development of at least 1,500 MW of large-scale solar power facilities by 2026.

Next, [S3484](#) looks to establish a dual-use solar project pilot program for farmland. The bill directs the BPU to establish a "Dual-Use Solar Energy Pilot Program," which authorizes up to 200 MW of solar projects on what is referred to as "unpreserved farmland." The pilot would allow for continued agricultural production beneath and around the solar panels. It authorizes and encourages dual-use solar projects up to 10 MW each and plants the seeds for a permanent dual-use solar energy program.

## Veto power in Ohio

One of the most impactful state-level actions comes from Ohio, where Senate Bill 52 opens the door for local communities to reject large-scale solar proposals by bringing them to a vote.

The move is largely unprecedented and has renewable energy advocates worried as Ohio regulators have begun to consider and approve a series of 100 MW+ solar projects.

The bill would require renewable energy project developers to share their application with township trustees 30 days before applying for a certificate from the Ohio Power Siting Board.

Township trustees, after reviewing the application, could call for a referendum petition. If that petition receives signatures representing at least 8% of the votes cast in the last gubernatorial election, then the project would be voted on at the next election before moving forward.

The state is on track to exponentially increase its installed solar capacity in the coming years. However, the potential for communities to hold up the permitting and approval process presents an unnerving reality.

## Legalized solar leases

At the start of the year, few would have expected one of the country's least solar-committed states to take meaningful policy action to advance the resource, but here we are.

In April, the West Virginia Senate passed a bill to exempt solar power purchase agreements from state regulatory jurisdiction. The move means that leasing a solar system is now an option.

When leasing a residential system, a solar developer arranges designing, permitting, financing, and installation, and the customer buys the system's electric output for a set period at a fixed rate, usually lower than the local utility's retail rate. In return, the solar services provider gains tax credits and income from the electricity sales.

## California ponders automated permitting

A policy measure that has been pushed hard at the national level is in on the table in California with S.B.617, [the Solar Access Act](#), which would allow for remote inspections and approval of residential solar and solar-plus-storage systems.

To institute automated solar permitting, the bill would lean on the National Renewable Energy Laboratory's [SolarAPP+](#) web-based portal that streamlines and automates permit reviews.

If passed, the bill is expected to cut permitting costs for local governments and homeowners, and help California meet its greenhouse gas emission reduction goals through an easier solar review and approval process.

Solar advocates have long pointed to automated permitting as a system which would increase access and adoption by eliminating the lengthy and potentially expensive traditional permitting process.

## Community solar finds a home

In April, New Mexico became the 21<sup>st</sup> state to enable community solar following Gov.

Michelle Lujan Grisham's signature on Senate Bill 84.

[SB 84](#) calls on state regulators to evaluate existing community solar programs and develop rules for a state program to be adopted by April 2022. The bill sets a number of guidelines for regulators to follow as they form the program:

- Projects are capped at 5 MW capacity
- Program is initially capped at 200 MW across the state's three investor-owned utilities for the first three years
- Each project may have an "anchor tenant" that subscribes to no more than 40% of a project's capacity
- Each project needs at least 10 subscribers before construction may begin
- The program must include a mandatory 30% capacity carve-out for low-income people and related service organizations.

The law's twin provisions for minimum subscriber counts and an anchor tenant are intended to offer greater certainty of a financial return to project developers.

## Easier storage additions

[House Bill 2148](#) would extend Virginia's permit by rule (PBR) program to include energy storage projects as well as hybrid renewable + storage projects. PBR allows renewable generation projects less than 150 MW in size to bypass the often-lengthy approval process overseen by the State Corporation Commission.

And while projects still would have a number of hurdles to clear that could slow or even stop them, PBR has already proven to be an effective policy for Virginia. More than 70 project developers filed notices of intent to apply for the program in 2020.

Also introduced was [House Bill 2006](#), which would either cause tax exemptions for energy storage projects to decrease over time, or allow local governments to opt for a revenue-sharing system through which a \$1,400/MW fee could be imposed on the project. While this may sound less than ideal for project developers and financiers, the program has succeeded in getting local communities to sign off on large-scale solar projects.





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For Panasonic panels bundled with Enphase microinverters and Unirac or IronRidge racking systems<sup>3,4</sup>

Our comprehensive AllGuard warranty covers labor to replace and repair all major components in your EverVolt Series or HIT solar panel system. This includes Panasonic solar modules, Enphase microinverters, and Unirac or IronRidge racking systems for 25 years, and monitoring hardware for five years.<sup>3,4</sup>



For standalone Panasonic panels<sup>3</sup>

TripleGuard warranty covers your HIT® and EverVolt™ Series standalone panels for performance output, parts, labor, and shipping for 25 years. Whether in year three or year 25, enjoy the peace of mind that your Panasonic warranty coverage will be there when you need it.



<sup>3</sup>When purchased from and installed by a Panasonic Authorized, Premium or Elite installer.  
<sup>4</sup>Must be ordered by installer as a Panasonic/Enphase bundle



# Session Highlights

(as of 9/9/2021)

## Show Me the Money: Policy and Pricing in Wholesale Markets

Wholesale market revenue opportunities will be a key development driver for renewables and clean Distributed Energy Resources (DER) going forward. What will dispatchability requirements look like, how will Virtual Power Plants be treated, and how should ISO/RTO market structures adopt? This panel will look at the evolution of wholesale constructs and ask where can solar and clean technologies sell their services? We will focus on the state perspectives, transmission constraints, and FERC Order 1000, as well as DER opportunities under FERC Order 2222.

**Moderator:** Michael Borgatti, Vice President, RTO Services & Regulatory Affairs, Gabel Associates Inc.

**Panelists:** Cisco DeVries, CEO, OhmConnect; Suzanne Leta, Head, Policy and Strategy, SunPower; Bonnie Lind, Director, Grid Services Business Development, Sunrun; Jill Powers, Infrastructure and Regulatory Policy Manager, CAISO

## The Carbon-Free Moonshot

Join us on the transition to a carbon-free future. Panelists will explore challenging questions that must be addressed as we decarbonize the U.S. energy system, including: Are utilities on track for their announced targets? Are utility and corporate goals aligned with State targets? Who is doing well and why? What more can be done?

**Moderator:** Peter Kelly-Detwiler, *Principal*, Northbridge Energy Partners

**Panelists:** David Carroll, *Chief Renewables Officer*, ENGIE; Jack Ihle, *Director*, Regulatory & Strategic Analysis, Xcel Energy; Marlene Motyka, *Principal*, Deloitte; Pat O'Connell, *Senior Clean Energy Policy Analyst*, Western Resource Advocates

## How Do We Get There? Aligning Clean Energy Goals with Effective Transmission, Distribution & Interconnection Planning

How do we deliver the power we make? There is a common disconnect between efforts to increase clean energy generation and the transmission and distribution planning required to support the electric grid of the future. Long interconnection queues and assumptions based on the status quo for regional and inter-regional transmission are adding unnecessary costs to clean energy generators at all scales. To face these challenges, we need thoughtful approaches to grid planning that account for increased renewable energy penetration, especially an influx of small- to medium-sized front-of-the-meter projects. This session will provide a variety of perspectives from industry and regulators about the future of transmission, distribution and interconnection planning to help accelerate the clean energy transition.

**Moderator:** Ric O'Connell, *Executive Director*, GridLab

**Panelists:** Maggie Clark, *Director*, Government Affairs, Pine Gate Renewables; Emma Nicholson, *Economist*, Federal Energy Regulatory Commission; Brandon Presley, *Commissioner*, Mississippi Public Service Commission

## Game Show Break- Rate Design Final: 2021 Edition

Back by popular demand, Rate Design Final, the game where contestants navigate the hazards of utility regulation.

**Hosted by:** Janet Gail Besser, *Managing Director*, SEPA

**Contestants:** Sachu Constantine, *Managing Director*, Regulatory, Vote Solar; Lon Huber, *Vice President*, Rate Design and Strategic Solutions, Duke Energy Corporation; Barbara Lockwood, *Senior Vice President*, Public Policy, Arizona Public Service; Karl Rabago, *Principal*, Rábago Energy LLC

## Corporations Leading the Charge: How Tech Giants are Meeting 100% and 24/7 Clean Goals

A growing number of corporations have made commitments to 100% clean energy targets, with Google, for example, seeking to pursue 24/7 clean energy goals by 2030. These targets are pushing the envelope in the clean energy transition, but will require innovation and collaboration to achieve success. In this session, learn how tech giants are partnering and working across the globe to satisfy customer demand and accelerate their clean energy goals.

**Moderator:** Laura Vendetta, *Manager*, Policy Innovations, Renewable Energy Buyers Alliance

**Panelists:** Will Conkling, *Global Infrastructure & Energy Strategy*, Google; Rob Parker, *Vice President*, Strategy, Regulatory and Policy, The AES Corporation; Dana Clare Redden, *Founder & Chief Executive Officer*, Solar Stewards

## Market Structures and Policy Implications for DER Aggregation

Aggregated Distributed Energy Resources are rapidly emerging as a potent solution to deep decarbonization scenarios. Questions remain, such as where control should rest, how far price signals and tariffs can go, and where the financing will come from. Learn how policies and programs such as FERC Order 2222, "Bring Your Own Battery" approaches, and other avenues to aggregated DERs are leading the way.

**Moderator:** Kevin Lucas, *Senior Director*, Utility Regulation & Policy, SEIA

**Panelists:** Kristen Ardani, *Researcher and Group Manager*, Markets and Policy, National Renewable Energy Laboratory; Richard Dovere, *Chief Investment Officer*, EDP Renewables; Chris Rauscher, *Director*, Policy & Storage Market Strategy, Sunrun; Graham Turk, *Innovation Strategist*, Green Mountain Power

## The Great Solar Debate: Distributed vs. Centralized— How Do We Create the 100% Clean Grid of the Future?

With the recent climate disasters and dire warnings from climate scientists, it's crucial that U.S. transition to 100% renewable energy as soon as possible. But how do we do it and transform the old grid into a renewable grid? Join four solar and utility industry thought leaders for a discussion on the best and fastest way to get to 100% renewable energy.

**Moderator:** Tor Valenza a.k.a. "Solar Fred", *Founder*, UnThink Solar Marketing & Communications

**Panelists:** Barry Cinnamon, *CEO*, Cinnamon Energy Systems (CES); Barbara Lockwood, *Senior Vice President*, Public Policy, ArizonaPublicService; Meredith McClintock, *Director of Business Development*, Aurora Solar; Emilie Wangerman, *Senior Vice President*, Head of Business Development and M&A, Lightsource bp

## Meeting the Moment: Federal Policies to Achieve Ambitious Clean Energy Goals

In this first year of a new administration and Congress, federal policies are poised to have a meaningful impact on the clean energy industry. This panel will discuss the legislation and Executive Branch programs, both in progress and coming down the pike, that will affect deployment and growth in the Solar+ Decade. Speakers will cover the current policy landscape, including ongoing infrastructure negotiation, and discuss outstanding issues that should be addressed in future legislation. This session will address topics like transmission, workforce development, tax policy and direct pay, carbon pricing, clean electricity standards, and the industry's path forward. Speakers will also highlight how industry stakeholders can get involved to ensure that federal policies work for your company.

**Moderator:** Erin Duncan, *Vice President*, Congressional Affairs, SEIA

**Panelists:** Jaime Carlson, *Strategy & Investments*, SB Energy; Alyssa Edwards, *Vice President*, Environmental Affairs and Government Relations, Lightsource BP

## Raising the Bar for Responsible Land Use and Justice-Centered Siting Decisions: How We Respond to "Solar Saturation"

Land use and community impact concerns are growing as utility-scale and community solar penetration increases in many states and jurisdictions. Project developers with experiences across a variety of geographic areas will share insights on the best ways to achieve buy-in from local stakeholders on building out the next generation of solar projects. Considerations for equitable siting decisions, such as environmental justice, local employment and responsible environmental review will be addressed.

**Moderator:** Wahleah Johns, *Director*, U.S. Office of Indian Energy Programs and Policy

**Panelists:** Chris Carr, *Partner*, Real Estate Development, Paul Hastings, LLP; Tyler Kanczuzewski, *Vice President*, Marketing and Sustainability, Inovateus Solar; Colette Pichon Battle, *Executive Director*, Gulf Coast Center for Law & Policy; Jessica Robertson, *Director of Policy and Business Development*, New England, Borrego Solar

## Domestic Clean Energy Manufacturing for a Circular Economy

Building a circular economy can benefit businesses, society, and the environment. Rethinking manufacturing and the lifecycle of products used in solar projects can broaden the positive environmental impact and the economic potential of our industry. In addition to exploring how a circular economy strategy can benefit the industry, this session will cover manufacturing trends, including the prospect for new domestic facilities, sustainability, supply chain management, availability of source materials, trade issues, and more.

**Moderator:** John Smirnow, *General Counsel & Vice President of Market Strategy*, SEIA

**Panelists:** Brooke Beebe, *Vice President*, External Affairs, Hemlock Semiconductor; Jade Jones, *Market Strategy Manager*, LONGi; Costa Nicolaou, *Chief Executive Officer*, PanelClaw; Philip Schwarz, *Cofounder*, PVpallet

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# GAF Energy looks to innovation to ignite a solar roof revolution

David Wagman, Senior Editor,  
pv magazine USA

“Choosing an integrated solar roof should “be a no-brainer””

Around 5.5 million American homeowners are likely to replace their roof this year. Maybe 300,000 of those will opt for a solar roof as a replacement option.

GAF Energy aims to expand that fraction by focusing on the curb appeal of integrated solar roofs, by speeding up installation times, and by advocating for policies that favorably impact solar roof prices.

Choosing an integrated solar roof should “be a no-brainer,” said Martin DeBono, president of GAF Energy in an interview with **pv magazine**. And innovation is the key to easing buyer hesitancy when it comes to making the solar roof decision, he said.



Martin DeBono

For starters, the company is moving its manufacturing out of Asia and into a 112,000-square-foot facility in San Jose, California. Both R&D and production will be housed under one roof. No more frequent flyer miles for company engineers

who once squeezed themselves into economy seats on long-haul jets as they traveled to check on production issues and supply chain details.

In its new building, GAF Energy’s R&D teams will be a short stroll away from the production line. And while California and Silicon Valley are not known for their low costs, the company chose San Jose for its proximity to a talent pool that is used to innovating for the likes of Apple, Google, and others.

The facility will employ about 400 people in manufacturing, engineering, and R&D and be capable of producing about 50 MW of solar panels a year. The company’s next-generation product remained under wraps when this article was written, but is expected to be introduced this fall.

GAF Energy launched in 2019 and is a unit of Standard Industries, a privately held global industrial company. To date, GAF Energy has installed its product on roughly 2,000 U.S. rooftops.

## Street Smarts

DeBono said that one part of the company’s strategy is to focus on the street-side look of its solar roofs. After all, the roof is one of most obvious features on a home. And, almost by definition, adding solar to a roof means drilling a lot of holes into the primary barrier that protects what’s inside a home from what’s outside. Aesthetics and

roof integrity are two sides of the same coin for DeBono.

A second focus aims to trim the amount of time it takes to install a solar roof. DeBono said installers typically need around two days from start to finish, and GAF Energy aims to reduce the time still further.

Reducing installation times is a goal that GAF Energy shares with one of its main competitors, Tesla Solar Roof. The company said in July that it is working to improve its Solar Roof installation capabilities by hiring and training a “large number” of installers and reducing the installation time “dramatically.” Tesla said that it will have to hire additional personnel, “particularly skilled electricians,” to support the ramp of its Solar Roof product.

A third focus for GAF Energy is cost. DeBono said that on a per-Watt basis, solar roofs cost around \$0.14-\$0.15 with transportation costs and other “soft costs” adding almost as much to the total. DeBono said that automated permitting tools that are becoming widely available will likely have only a small impact on his segment of the solar market. After all, a roof replacement typically does not require a building permit.

A larger factor that affects a solar roof’s overall cost in a positive way is the Investment Tax Credit (ITC), which DeBono credited with expanding residential solar demand by “more than 1,000 times” since its inception.

In August, a bill was introduced in the U.S. House of Representatives to expand the ITC to include integrated solar roofs. Backers said the Revamping Appropriate Incentives for Solar Energy (RAISE) the Roof Act would maximize the positive climate and economic impacts of the next generation of solar energy technology.

DeBono praised the bill and said in a statement that it positions U.S. manufacturing resources “to contribute meaningfully to a resilient path forward in our energy infrastructure.”

Underlying the broader goals is the realization that consumer education is a critical factor. Potential customers need to understand that a solar roof will help protect their home, enhance their energy security, and add to the push to reduce reliance on fossil fuels. In turn, solar roof manufacturers need to deliver on reliability, durability, and attractiveness.

So, although solar roofing today represents a small part of the overall solar market, DeBono said, “it needs to be” a larger piece of the pie. “We’re going to make it so.”



A technician installs an integrated solar roof. Aesthetics and speed of installation are key issues for GAF Energy.

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# Solar puts \$30,000 a year on the scoreboard for D.C. United's Audi Field

## Contributed by SolarEdge

A growing number of stadiums around the world are turning to solar to power their massive banks of floodlights, sound systems, and flashing video screens.

According to a report from the Solar Energy Industries Association, in the U.S. alone, solar has supplied sports facilities with 46 MW of power.

One of the latest to join this trend is Washington D.C.'s Audi Field, home to Major League Soccer club D.C. United.

As the club moved from its historic RFK Stadium to a new home, it became D.C. United's mission to build an environmentally friendly venue, one that could combat high-energy consumption and rising utility costs.

In keeping with Washington's rating as a Leadership in Energy and Environmental Design city, Audi Field's design and construction included a solar energy system. The District guaranteed D.C. United a \$25 million PACE (property assessed clean energy) loan from EagleBank.

After a competitive bidding process, D.C. United chose a local installer, New Columbia Solar, to design, build, own, and operate a 627.8 kW canopy and rooftop PV system, which was supplied by SolarEdge. The array is projected to improve both stadium sustainability and public health in nearby communities.

The solution includes three-phase inverters and P800 Optimizers and was chosen for its safety, design flexibility, and ability to maximize energy yield.

New Columbia Solar will sell all of the energy generated to D.C. United at a fixed price for 25 years. This lets the club buy renewable energy from New Columbia Solar at a lower price than from the local utility, and without any up-front capital costs.

The PV system is expected to reduce the stadium's grid dependency by around 30% annually, while helping to save \$30,000 a year on utility bills.

As the second-largest solar installation at a soccer-specific Major League Soccer stadium in the U.S., the Audi Field array will generate more than 787,000 kWh of renewable energy on-site per year, and nearly 20 million kWh over its expected 25 years of operation.

## Bottom Line

Sporting events and organizations around the world, including the IOC and FIFA, recognize the importance of sustainability to their fans and partners as solar becomes a star player at stadiums, raceways and arenas.

With this PV install and its other green initiatives, Audi Field is leading the way toward an environmentally friendly future. Their efforts can be a model to other sports venues and stadiums across the world hoping to lessen their environmental impact.

## Installer Insight

With the task of installing a canopy system more than 100 feet off the ground, New Columbia Solar turned to SolarEdge solutions for its engineering and design flexibility. The capacity for longer strings and strings of different lengths allowed engineers to optimize roof space, reduce cables and combiner boxes, and achieve lower balance-of-system costs.

With MPPT technology embedded in module-level power optimizers, the system can eliminate mismatch losses by up to 3% in year one. Power optimizers also allow maximum energy generation from every module on the same string, even when located on different roof facets.

MPPT technology also facilitates remote monitoring and problem-solving, making it easy to pinpoint any under-performing modules and reduce onsite maintenance visits and costs.



MPPT technology can eliminate mismatch losses by up to 3% in year one – a benefit unattainable with traditional string inverters

The system's built-in SafeDC feature is designed to automatically reduce DC voltage to touch-safe levels during grid failures, providing maximum protection for the installation crew and maintenance personnel.



The rooftop and canopy PV system at Audi Field will generate over 787,000 kilowatt hours of renewable energy and cut CO2 emissions by 556 metric tons each year



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# 25 largest solar PV projects

All projects must be listed on EIA 860 Monthly, and have at least achieved regulatory approval.

NA = Not available  
T = Regulatory approvals received. Not under construction  
TS = Construction complete, not yet in commercial operation  
U = Under construction, less than or equal to 50% complete  
V = Under construction, more than 50% complete

Ryan Kennedy, Associate Editor, pv magazine USA

Plant Name	Owner	Developer	Plant State	Nameplate Capacity (MW)	Planned Operation Year	Status (see notes)		County	ISO	Storage (MW)	Mount	Module	Offtaker
Gemini Solar	Gemini Solar	Arevia Power	NV	690.0	2023	U		Clark	NEVP	380	single-axis	Maxeon Bifacial	NV Energy
Desert Quartzite	First Solar	First Solar	CA	480.0	2023	T		Riverside	CISO	Likely, TBD	single-axis and fixed	CdTe	NA
Old 300 Solar Center, LLC	Orseted	Orsted	TX	430.0	2022	U		Fort Bend	ERCO		single-axis	Bifacial, Longi and JA	CenterPoint Energy
2W Permian Solar Project Hybrid	Orsted	Orsted	TX	420.0	2021	TS		Andrews	ERCO	40	single-axis NEXTracker	Bifacial, JinkoSolar and JA	ExonMobile
Fighting Jays Solar Project	AP Solar 2, LLC - Copenhagen Infra-structure Partners	Avondale Solar, Plus Renewable Technologies	TX	350.0	2022	U		Fort Bend	ERCO		NA	NA	Shell Power
Notch Peak Solar LLC	BayWa r.e.	BayWa r.e.	UT	324.0	2025	T		Millard	LDWP		NA	NA	LADWP
Delilah Solar Energy II LLC	Invenergy Services LLC	Invenergy	TX	31-0.0	2023	U		Red River	ERCO		NA	NA	NA
Eagle Shadow Mountain Solar Farm	8minute Energy	NA	NV	300.0	2021	U		Clark	NEVP	None	single-axis	Bifacial crystalline silicon	NA
Delilah Solar Energy LLC	Invenergy Services LLC	NA	TX	300.0	2022	U		Red River	ERCO		NA	NA	NA
Hecate Energy Highland LLC	Highland Solar Farm	New Market Solar	OH	300.0	2022	T		Highland	PJM		single-axis	Tier 1 silicon crystalline	City of Cincinnati
Titan Solar Project	SoftBank Energy	Intersect Power	TX	260.0	2021	V		Culberson	ERCO		NEXTracker single-axis	First Solar	Undisclosed PPA
Prospero Solar II	Longroad Energy Services LLC	Swinerton Renewable Energy	TX	250.0	2021	V		Andrews	ERCO		NEXTracker single-axis	First Solar Series 6	DaVita and Zimmer Biomet Holdings
Aquamarine	CIM Group	Swinerton Renewable Energy	CA	250.0	2021	U		Kings	CISO		NEXTracker single-axis	WAAREE	Valley of Clean Energy Alliance, Santa Clara, Anaheim
Galloway 1 Solar Farm	Ardian	Skyline Renewables	TX	250.0	2021	U		Concho	ERCO	None	single-axis	Bifacial crystalline silicon	NA
Samson Solar Energy	Invenergy Services LLC	NA	TX	250.0	2021	U		Franklin	ERCO		single-axis	NA	Honda, AT&T, Google, and others
Samson Solar Energy III LLC	Invenergy Services LLC	NA	TX	250.0	2022	U		Lamar	ERCO		single-axis	NA	Honda, AT&T, Google, and others
Athos Solar Project	SoftBank Energy	Intersect Power	CA	250.0	2022	U		Riverside	CISO		NEXTracker single-axis	First Solar	Direct Energy Business
Sparta Solar	Orsted	Orsted	TX	250.0	2022	T		Bee	ERCO		single-axis	Mono-crystalline bifacial	Bee County
Solar Blue	Westlands Solar Blue, LLC	Swinerton Renewable Energy	CA	250.0	2022	T		Kings	CISO		NEXTracker single-axis	WAAREE	Valley of Clean Energy Alliance, Santa Clara, Anaheim
Pleinmont Solar 2	AES	sPower	VA	240.0	2021	V		Spotsylvania	PJM		DuraTrack Single-axis	Jinko Solar	Microsoft, Apple
Bighorn Solar 1	Lightsource bp	Lightsource bp	CO	240.0	2021	U		Pueblo	PSCO		single-axis	Bifacial	Xcel Energy, EVRAZ North America
Muscle Shoals	Longroad Energy	Swinerton Renewable Energy	AL	227.0	2021	V		Colbert	TVA		NEXTracker single-axis	First Solar Series 6	Tennessee Valley Authority
Azure Sky Solar	Enel Green Power	Enel Green Power	TX	225.0	2021	U		Haskell	ERCO	81	single-axis	Trina Bifacial	Home Depot, others
RE Maplewood	Canadian Solar	Recurrent Energy	TX	220.0	2021	V		Pecos	ERCO		NA	Canadian Solar Bifacial	Anheuser-Busch, Energy Transfer Partners
Cool Springs Solar	Nextra Energy	NA	GA	213.0	2021	V		Decatur	SOCO				Georgia Power



# Cleared for landing: Solar notches on-time arrival at U.S. airports

David Wagman, Senior Editor,  
pv magazine USA



A solar array near Denver International Airport with the Rocky Mountains as a backdrop. Image: Denver International Airport

Pittsburgh International Airport flipped the switch on its new microgrid in mid-July. The airport now can supply its own energy using natural gas and solar.

Plans are already being discussed to double the size of the solar array and make the energy available to the broader regional grid.

Airports across the country have been looking to increase power resilience and reliability after several high-profile power outages led to thousands of cancelled flights and passenger travel disruptions.

The issue gained international attention a week before Christmas in 2017 when a fire in an underground electrical system knocked

out power for 11 hours at Atlanta's Hartsfield-Jackson International airport, one of the world's busiest. Air traffic was disrupted across the United States and more than 1,000 flights into and out of Atlanta were canceled.

"That was an eye-opener," said Tom Woodrow, VP of Engineering at Allegheny County Airport Authority, which runs the Pittsburgh airport.

Plans for a Pittsburgh microgrid already were underway when the Atlanta outage occurred. Officials in Pittsburgh were keen on finding a way to make use of two natural gas wells on airport property. A short-list of proposals was put together, and each

included solar. Woodard said that was due in part to the airport offering a nearly ideal location: 20 acres of south-facing, sloping land close to the airfield.

Utility Peoples Natural Gas won the bid to develop the microgrid, which includes 20 MW of gas-fired capacity and 3 MW of solar. The nearly 10,000 solar panels were supplied by VSUN Solar, inverters by Sungrow Power, switchgear by General Electric, and racking system by RBI Solar.

Power generated at PIT is the primary supply for the entire airport, including terminals, airfield, and an on-site hotel and gas station. The total load is around 14 MW, and the airport

will remain connected to the electrical grid for emergency or backup power, if needed.

"The redundancy part is what we like," Woodrow said.

Load demand could grow after a new \$1.39 billion terminal opens in 2025. Growth also could come from the expected development of an industrial campus known as Neighborhood 91, whose focus would be on advanced manufacturing and 3D printing.

The airport expects to trim its electricity bill by \$30 million over the 20-year term of the microgrid deal with Peoples, with rates locked in for the first five years.

Federal aviation regulators early on worried that siting solar energy systems at U.S. airports could produce a potentially dangerous glint and glare effect on pilots on final approach. The FAA has since concluded that, in most cases, the glint and glare is not much different than what pilots routinely deal with from lakes and streams, glass-faced buildings, parking lots, and similar features.

Pittsburgh is not the only U.S. airport to deploy solar arrays to help power operations. Currently, four PV solar arrays are operating

on Denver International Airport property with a combined capacity of 10 MW.

And the solar farm at Chattanooga Metropolitan Airport in Tennessee underpins the airport's green initiative. The multiple-phase project launched in 2011, expanded in 2013, and was completed in the spring of 2019. Each phase added nearly 1 MW of power, for a total of 2.73 MW. The combined capacity produces virtually all of the energy consumed by the airport.

Solar array making up part of the Pittsburgh International Airport microgrid. Image: Allegheny County Airport Authority



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# Capping off Hot Solar Summer with a Big Advocacy Push

**Abigail Ross Hopper, President and CEO of the Solar Energy Industries Association (SEIA)**

The COVID-19 pandemic has been incredibly hard on our industry and our country at large, and in many ways, it is not fully behind us. Nonetheless, as we look to the future, I am thrilled that the solar industry is gathering once again to show off the progress we have made in the face of that adversity.

Our industry has shown great resilience during the pandemic, keeping 231,000 Americans on payroll and generating \$25 billion in private sector investment. Across the country, there are now 3 million solar installations and by 2030, one in eight American homes will have solar.

Even with this progress, America is at a crossroads, and the decisions we make today about our energy future will have a lasting impact on the fate of our planet, our economy and our families. The solar industry is ready to make major progress and we will be talking a lot this week about the policy action needed to spur growth at the scale required to tackle our dual climate and economic challenges.

Our industry is poised for record growth over the next few years, but frankly, we are not growing fast enough. To reach President Biden's 2035 climate goals, solar deployment needs to quadruple over current forecasts and our workforce will need to grow to over 900,000 Americans.

This calls for major investments that require policy certainty, which is why SEIA is leading a nationwide advocacy campaign for transformative clean energy policies and long-term commitments that will sustain the industry over the next decade.

This past summer, alongside our members and partners, we engaged lawmakers across

the country on what the solar industry needs to accelerate our clean energy transformation. This includes a comprehensive set of policies that encourage solar deployment and domestic manufacturing, modernize and invest in the U.S. electrical grid, and train the next generation of diverse solar workers, bringing clean, affordable power to communities across the country.

Accomplishing these priorities will help decarbonize our electricity system

and generate hundreds of thousands of quality jobs in every zip code. It is an ambitious vision, and SEIA will be releasing a new Roadmap this week outlining the path to achieving our long-term goals for the Solar+ Decade.

We have an historic opportunity here, and I know that the thousands of leaders in the solar industry are up to the task.

Now is the time to keep the pressure on lawmakers to act.



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