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New York Solar Energy Society

Monthly Digest for June 2023

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144 Steinberg Rd
Brandon, VT 05733

Directions
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Transforming the Energy Landscape for All
August 8-11, 2023
University of Colorado, Boulder
AMERICAN SOLAR ENERGY SOCIETY

Join us at the America Solar Energy Society's 52nd ANNUAL NATIONAL SOLAR CONFERENCE on August 8-11, 2023, in Boulder, Colorado!
SOLAR 2023 is designed to serve and advance the solar energy industry by bringing together national labs, installers, government officials, and enthusiasts in the solar and renewable energy industries to explore solutions, new technologies, policy initiatives, and other key factors.
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National & International

Selected Headlines

- Sweden's parliament has dumped its 100% renewable target amid ongoing concerns about short-term energy security as it looks to join several European nations to build new nuclear plants.
  The EU remains split on the role of nuclear energy, which critics say is too expensive, takes too long to build and is unsafe, when it comes to the transition to a net-zero economy. smh.com.au
- In a referendum earlier this month, voters in Switzerland passed a new law to cut carbon emissions to net zero by 2050.
  Glaciers in the Swiss Alps have lost a third of their ice volume in the last two decades. The Climate Law, which will cut dependence on imported oil and gas and move the country to renewable sources passed with 59.1% of the vote. upi.com/
- Concerned by the growing presence of oil and gas lobbyists at climate talks, the UN will require anyone registering for the November COP28 e summit in the United Arab Emirates to declare their affiliation. theguardian.com/
- Beginning July 1, new buildings in Colorado must integrate energy-efficient appliances and include pre-wiring for on-site solar and EV charging. Implemented on a rolling basis, the law requires compliance by new single-family and multi-family homes, as well as commercial buildings. pv-magazine-usa.com/
- The U.S. Treasury Department and the Internal Revenue Service offered guidance to non-profits, state and local governments, as well as tribal entities, on how best to tap into the clean energy tax credit under the IRA. upi.com/

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CLIMATE EMERGENCY / ENVIRONMENT

Ice and snow in the world's highest mountains are disappearing as a result of rising temperatures and at a faster pace than previously thought. A report from the International Centre for Integrated Mountain Development in Kathmandu finds that glaciers in the Hindu Kush and Himalaya mountain range region in Nepal melted 65 percent faster from 2010 through 2019 than in the previous decade

Nearly two billion people who live within the mountain region or in the river valleys downstream depend on melting ice and snow for their water supply. Melting glaciers are destabilizing the landscape and raising the risks of hazards like floods and landslides. These rapid changes are squeezing much of the region's unique wildlife into smaller, more precarious habitats. For some unlucky species, it's already too late.

A second report, the State of the Climate in Europe 2022, by the World Meteorological Organization and the European Union's Copernicus Climate Change Service registered in 2022 a record amount of single-year ice mass loss among the glaciers in the Alps.

- nytimes.com/

***June 23:* Temperatures of waters surrounding the UK and much of Europe are running as high as 5 degrees Celsius (9 degrees Fahrenheit) above normal, the warmest in more than 170 years,** and are more typical of August and September. The event has registered as a Category 4 on the National Oceanic and Atmospheric Administration's marine heatwave scale with localized areas reaching Category 5, the two highest categories on the scale.

The causes of the extreme ocean warmth are not clear. Factors that may have affected it include,

- A reduction in sulfur emissions from ships due to recent fuel regulations. Sulfur reflects sunlight back to space, thus having a cooling effect.
- Natural variations in weather and ocean patterns. A weaker-than-normal area of high pressure in the North Atlantic, weaker winds carrying less sun-blocking Saharan dust into the Atlantic and a developing El Nino, which tends to warm ocean waters in certain areas.
- Human-caused climate change. It has increased the chances of heat waves both on land and in the oceans. The underlying trend of ever-increasing variability between warmer and cooler events is caused by fossil fuel greenhouse gas emissions, according to a professor of environmental geography at the London School of Economics.
- washingtonpost.com/

***June 24:* A record-breaking heat wave is entering its third week in Texas,** as temperatures reach triple digits in the broader US south. More than 40 million people in the US are under a heat alert. Texas cities have reached an unprecedented heat index – which combines temperature and humidity. Corpus Christi has hit 125F (51C), while Rio Grande Village notched 118F (47C) and Del Rio marked 115F (46C).

- theguardian.com/

Amid a dangerous heatwave that has brought blistering temperatures across Texas, the state's governor signed a law eliminating local rules requiring water breaks for workers The measure, which will take effect later this year, will nullify ordinances enacted by Austin and Dallas that mandate 10-minute breaks for construction workers every four hours. It also prevents any other local governments from passing similar worker protections.

The heat follows a weekend of destructive storms that left hundreds of thousands of people without power. The heat dome, as it is known, has settled above Mexico and parts of the US south-west and is caused by hot ocean air that has become trapped in the atmosphere.

- .theguardian.com/

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A groundbreaking climate trial came to an early close as lawyers on each side presented a very different picture of who can be held responsible for the climate crisis. The Held v Montana lawsuit is the United States' first constitutional trial relating to the climate crisis. The plaintiffs, aged five to 22, in partnership with the non-profit law firm Our Children's Trust, are arguing that the state's support for the fossil fuel industry undermines the constitution's guarantee that the "state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations".

- theguardian.com/ == theguardian,com/

El Niño conditions are now present and will "gradually strengthen" into early next year according to the National Oceanic and Atmospheric Administration (NOAA)' A climate scientist at the University of Pennsylvania, said human-caused warming will be exacerbated by an event that typically adds between 0.1C to 0.2C (0.18F to 0.36F) to the overall global temperature.;
A remarkable burst of warmth is occurring in the seas. Excess heat in the oceans, which cover 70% of the globe's surface, influences overall global temperatures, as well as warp fish populations, bleach coral reefs and drives coastal sea level rise.

- theguardian.com/

Parts of southern and eastern China experienced prolonged periods of torrential rainfall on June 8-9, as the summer rains known as "dragon boat water" got off to a remarkable start. The city of Yulin in the Guangxi region experienced 35 hours of non-stop rain and the nearby city of Beihai was flooded after a record 614.7mm (24 inches) of rainfall over 24 hours in the same period.

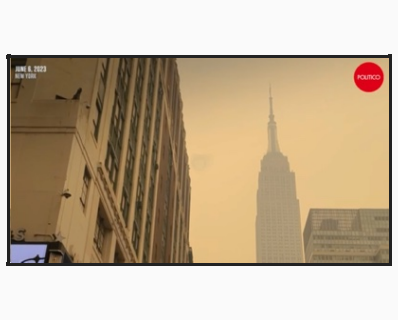
Parts of eastern China were hit by severe thunderstorms. Simultaneously, much of northern China experienced high temperatures.

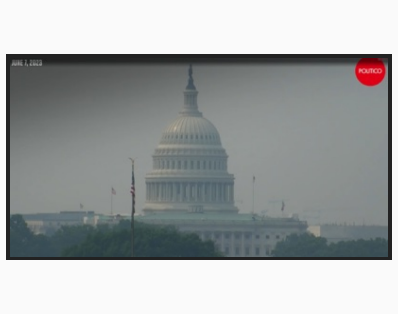
- *theguardian.com/*

***June 7:* "I'm guessing people in most Western states would laugh at this being called poor air quality,"** House Natural Resources Chair Bruce Westerman (R-Ark.) said during an interview outside the Capitol under a haze-obscured sun.

- *politico.com/*

AP
CHICAGO AIR QUALITY IMPACTED BY CANADIAN WILDFIRES





***June 14:* Reminiscent of** historic smoke incursion from fires in Canada into the Northeast **in early June,** the evening air quality in Minneapolis plummeted to its worst level on record. It reached the Code Purple range, meaning very unhealthy air for the entire population. As smoke lingered Thursday, air-quality alerts covered Wisconsin; Minneapolis and southern Minnesota; eastern Iowa; Green Bay and Madison, Wis.; and Cedar Rapids, Iowa.

- *washingtonpost.com/*

***June 27:* In Minnesota, a record 23rd air quality alert was issued** across much of the state, as smoky skies obscure the skylines of Minneapolis and St. Paul.

Fires in northern Quebec and low pressure over the eastern Great Lakes are sending smoke through northern Michigan, and across southern Wisconsin and Chicago, said the National Weather Service.

- *apnews.com/*

Green parties made major gains across Western and Northern Europe in last month's elections, picking up seats in some of the bloc's biggest countries - including France, the UK and Germany - as well as in smaller countries like Ireland, Finland and Luxembourg. The Greens now look to be the European parliament's fourth-largest bloc, and voters in many countries ranked climate change as one of their top issues.

- *cleanenergywire.org/*

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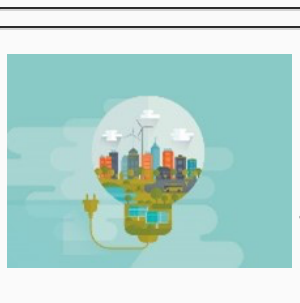

CARBON-FREE ENERGY

For much of the month, Texas has been blanketed by an oppressive heat dome, and federal forecasters say there is "no end in sight". The sweltering temperatures have forced people to stay in their homes with their air conditioners cranked, causing energy demand to soar to record levels. An atypically large number of the state's aging, run-down coal and gas-fired power plants have failed amid the spikes.

Even amid three-digit temperatures, Texas has still managed to avoid rolling blackouts this month. A key reason, energy analysts say, is the state's supply of solar power, which has doubled since early 2022, accounting now for over 15% of the state's power supply. Other factors helped as well. They included voluntary reductions of energy consumption by the users. Battery storage also helped by providing immediately available backup power when a nuclear plant and later a major coal-fired power plant went offline.

Texas is second only to California in battery capacity.

- *theguardian.com/*

Building thousands of wind turbines across the Great Plains and solar arrays in the South would be one of the least expensive ways to reduce dangerous emissions and bring low-cost energy to consumers. But many spots with the best sun and wind are far from cities and the existing grid.

The electric system in use today was cobbled together over a century by thousands of independent utilities building smaller-scale grids to carry power from large coal, nuclear or gas plants to nearby customers.

To cut across the fractured grid systems, thousands of miles of new high-voltage transmission lines across multiple regional electric grids would need to be built. There are enormous challenges to accomplish this, including convoluted permitting processes and potential opposition from local communities. But the problems start with planning — or rather, a lack of planning.

- nytimes.com/

Sabin Center for Climate Change Law at Columbia Law School recently published a report documenting severe local and state restrictions on renewable energy projects.

Since March 2022, at least 228 local entities across 35 states as well as nine state-level entities have enacted such restrictions. In addition, 293 renewable energy projects have encountered significant opposition in 45 states.

Specific instances of such restrictions include,
* In Ohio, 11 counties prohibit large renewable energy projects in all of their unincorporated territories or very large swathes of those territories(bringing the total to 13 since 2021).
* Buffalo County, NE, a wind ordinance requires that turbines be set back 3 miles from the nearest property lines and 5 miles from any village or city.
* Pittsylvania County, VA, prohibits the construction of any solar farm within 5 miles of any other solar farm and limits utility-scale solar projects to 2% of the total acreage of any zoning district.
* In Michigan two townships (LaSalle and Milan) have adopted ordinances limiting utility-scale solar energy projects to industrial districts and prohibiting such projects on land zoned for agricultural use.
* In Wisconsin, four towns in Dane County (Deerfield, Dunn, Springfield, and Westport), now have policies to restrict solar from agricultural land.

In many instances opponents seek to block a specific project using means other than local legislation, including lawsuits and environmental impact challenges.

- scholarship.law.columbia.edu/ *(via ASES Online Community)*

A recent working paper **from Dartmouth College and Princeton University analyzed the impact of the IRA on technology costs, material demand and labor.** Among others, the authors of the report concluded,
* The production and investment tax credits (PTC and ITC) enacted in the legislation substantially reduce the levelized cost of utility-scale solar and wind projects deployed in the United States (U.S.), making renewable energy projects economically viable across much wider extents of the country.
* Additional project costs associated with meeting labor requirements to qualify for the PTC and ITCbonus rates are potentially more than compensated by the increased tax credit rates.
* With the 45X Advanced Manufacturing Production Tax Credit, components manufactured in the U.S. are now likely to be less expensive than imports across the entire solar supply chain (i.e., polysilicon ingots, wafers, cells, and module assembly as well as inverters).

- *bluegreenalliance.org/*

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Solar

The Environmental Protection Agency on Wednesday launched a $7 billion competitive grant program that aims to give low-income communities access to residential solar panels. The agency will provide up to 60 awards to community groups around the country representing specific states, Native Americans and Alaska Natives and multi-state programs.

- reuters.com/

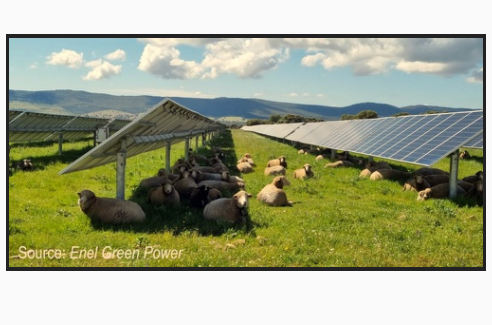
A Radian solar project, in Brown County, Texas, recently reached commercial operation. Part of Intersect Power, an Oregon-based developer of clean energy resources, Radian generates 415 MW, enough to power more than 114,000 homes.

- *solarindustrymag.com/*

Fourteen downtown merchants in Adjundas**, Puerto Rico,** a small mountainside municipality, formed and invested in a non-profit independent utility, the Community Solar Energy Association of Adjuntas (ACESA). Their new community-owned solar microgrid, the first such system on the island, will become operational this summer. The microgrid prioritizes power delivery to the homes of the most vulnerable residents.

- *power-grid.com/*

Owners of the Canyonville, Oregon, 3.2 MW community solar project will be testing several agrivoltaics methods to share solar energy generation with agricultural uses of the land**:**
* Solar panels will be positioned in a manner that accommodates agricultural production.
* Local goats, and other animals, will be allowed to graze the overgrown grass.
* Beehive boxes will be maintained on the property.
* Special fences will enable small animals. (e.g., rabbits and turtles) access to the location while preventing entry to larger animals.
* Native plants and pollinator-friendly vegetation will be accommodated on the site.



- *pv-magazine-usa.com/*

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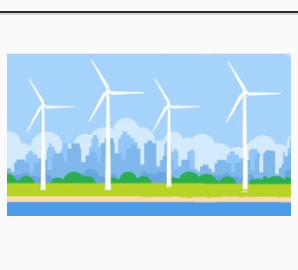


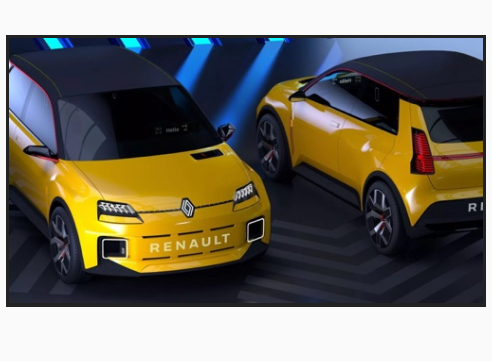
Wind

A power-to-heat plant running on powered by wind energy became operational in the German port city of Hamburg. The plant can supply about 27,000 households with low-carbon district heating. Water is converted to steam heated to 140 degrees Celsius (284 F) before its release to the district heating grid.

- *leanenergywire.org/*

Energy Storage

A vehicle-to-grid (V2G) service for the new Renault 5 EV will be launched next year in France by The Mobility House, a German company. In addition to the bi-directional V2G technology, the company's smart charging software, ChargePilot, will enable users to charge their vehicles with low-carbon energy and to minimize their charging costs by selecting off-peak times at which to draw power from the grid.



- *energy-storage.news/*

Starting in early 2024, GM EV drivers will be able to recharge at 12,000 Tesla Superchargers in North America using an adapter. The agreement is similar to the one Ford announced in late May.

- *axios.com/*

A new generation of modular home batteries has been introduced by Panasonic Corporation of America. The new EverVolt batteries support both DC and AC coupling. This flexibility makes them a good fit for both new and existing solar installations. Each battery is modular in increments of 4.6 kWh of usable energy, offering up to 18.4 kWh per battery.

- *pv-magazine-usa.com/*

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FOSSIL & OTHER FUELS

The energy giant Shell is focused on shareholder returns and the energy transition, according to its new CEO. Fossil fuels have a long future on the global market in his view.

Even as the company has abandoned its plan to cut oil production by 1-2% each year through the end of the decade, the CEO reiterated the goal of Shell becoming a net-zero emissions energy business by 2050. A recent lawsuit, however, charged the Shell board with violating their own laws by failing to follow through on an energy strategy that would meet the benchmarks outlined in the Paris climate

Shell joined the growing list of energy majors reporting bloated profits over the first three months of 2023.

- *apnews.com/ == theguardian.com/ == upi.com/*

France and Germany strongly disagree on the role of nuclear in Europe's energy supply. France's 56 aging reactors normally provide some 70% of France's electricity needs. "Nuclear power is an absolute red line for France, and France will not relinquish any of the competitive advantages linked to nuclear energy", Finance Minister Bruno Le Maire insisted as he closed the annual conference of the French Electricity Union.

- *euractiv.com/*

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NORTH-EAST

The cost of connecting to the grid by new power generators in ISO-NE **have nearly doubled since 2018 compared to 2010-2017,** reports Lawrence Berkeley National Laboratory in an interconnection cost analysis. Interconnection costs are highest for onshore wind ($909/kW), followed by solar ($450/kW) and storage ($230/kW). The study included generator and storage interconnection cost data from 194 projects in ISO-NE between 2010 and 2021,

- *emp.lbl.gov/ == power-grid.com/*

The influx of solar power cleared a path for closing the Mystic Generating Station in Massachusetts, one of New England's dirtiest power plants. The New England's grid operator says the power plant is no longer needed to prevent blackouts, in part because of rooftop solar installations.

Rooftop solar is also easing the need for carbon-intensive oil which in New England serves as backup fuel for widely used natural gas.

- politico.com/

New York

Ahead of the 2024 legislative session, Governor Hochul's administration will be developing regulations for the "cap and invest" program, which imposes a fee on carbon that is designed to reduce consumer utility costs and fund action on climate. However, the program has the potential to create environmental hotspots that hurt environmental justice communities that need relief the most. To prevent this, the rules need to include climate justice guardrails. (can-nyc.org)

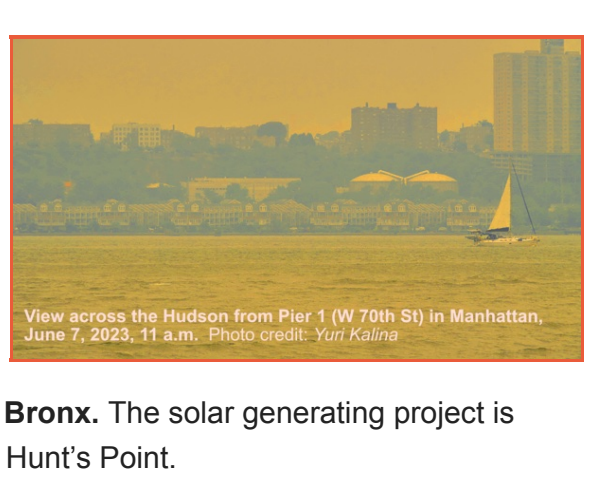
New York City's Local Law 97 requires energy efficiency improvements in many of New York City's residential buildings over 25,000 square feet. Over 70% of New York City's carbon emissions come from buildings, generated primarily from boilers/furnaces in the buildings and electricity for the buildings. Local law 97 sets initial caps on each source of pollution and then lowers the cap every five years. The first cap starts next year and runs until 2029. While some 80% of buildings meet the cap requirements through 2029, most buildings will need to increase their energy efficiency to meet the cap that goes into effect in 2029 or face substantial fines.

The NYC Department of Buildings is issuing draft rules to guide the implementation of Local Law 97. Of specific concern in developing the rules is providing reasonable limits on escape clauses
(1) landlord buy-outs of upgrading buildings by purchasing "Renewable Energy Credits (RECS)."
(2) exceptions for good faith effort by landlords.

- *jcan-nyc.org/*

The developer using the former Ravenswood natural gas-fired plant in New York City as an interconnection point for a potential offshore wind project plans to retrain the 100 union workers at that facility. *(Reuters via Northeast Energy News)*

In New York City, the Air Quality Index (AQI), a measure of air pollution and health safety risk, peaked **at 484 (on a 1 - 500 scale) Wednesday, June 7, evening, the highest ever recorded in the city.** Philadelphia also surpassed 400. The East Coast was blanketed in smoke from wildfires in Canada for much of the week. A *Washington Post* analysis found nearly 200 air quality monitoring stations recorded all-time high air pollution from wildfires by June 7. More than 100 million people were impacted by unhealthy levels of air pollution this week.


View across the Hudson from Pier 1 (W 70th St) in Manhattan, June 7, 2023, 11 a.m. Photo credit: Yuri Kalina

- *thebulletin.org/*

1.62 MW of power from a 2.68 MW warehouse rooftop solar facility is available to 300 low- and moderate-income residents in the Bronx. The solar generating project is located at the warehouse of the grocery chain operator Krasdale Foods at Hunt's Point.

Under Con Edison's export-only framework, at least 60% of the community solar's power output must be made available to the local community, while 40% of the power capacity would be used by the anchor tenant.

Maine

Residents in Maine **are about to be bombarded with a multimillion-dollar public relations campaign** aimed at saving the state's two dominant electric utilities from being voted out of existence in November. If Mainers vote yes, they will make history - endorsing a first-of-its-kind plan - to buy out the assets of Central Maine Power (CMP) and Versant Power which distribute 97% of the state's electricity and to create a state-level, public power company through a hostile takeover.

Investor-owned utilities are being challenged to decarbonize while state officials adopt more aggressive climate agendas amid customer frustration at high rates and outages. The ballot initiative has already been outspent 17 to one by the parent companies of the two utilities, Avangrid and Enmax.

Maine has strong campaign finance laws, and its utilities must disclose their political spending – a rarity in the US. Adding to the complexity, though, is that neither of Maine's top two power companies generates electricity; they only distribute it.

- *theguardian.com/*

New Jersey

A New Jersey offshore wind component manufacturing facility may be over a year delayed because the state has not approved federal tax credits for wind farm developers. *(NJ.com via Northeast Energy News)*

Rutgers University will install 16 solar carports that total 14.5 megawatts (MW) in parking lots across its five campuses. Rutgers University has set a goal of achieving net zero by 2040. (*electrek.co/ via Northeast Energy News)*

Rhode Island

The University of Rhode Island and the National Oceanic and Atmospheric Administration formed a five-year partnership to study how offshore wind development impacts marine ecosystems and humans who rely on the ocean. *(News release Northeast Energy News)*

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DATA

From Energy Information Agency (EIA):

U.S. electricity generation from natural gas reached a record-high 619 billion kilowatt-hours (BkWh) during the most recent winter heating season (November 1–March 31), averaging more than 120 BkWh per month and accounting for 38% of the country's electricity generation mix.

EIA Projections:

- Solar has been the leading source of new generating capacity in the United States so far this year, and the new capacity contributes to the EIA's forecast that U.S. solar generation this summer (June, July, and August) will be 24% higher than in summer 2022.
- Wholesale electricity prices in the eastern half of the country are projected to average about 50% lower in 2023 vs. 2022 as a result of lower natural gas prices. The Northwest, Southwest, and California regions could experience temporary spikes in wholesale power prices this summer, due to a likelihood of limited power supply during peak demand hours.

An audit of more than 600 commercial rooftop solar systems around the world found that nearly all, 97%, had "major" safety concerns. The audit conducted by the consultancy Clean Energy Associates noted the leading safety concerns that included grounding issues (49%), damaged modules (47%), cross-mated connectors (41%), and poor terminations (40%).

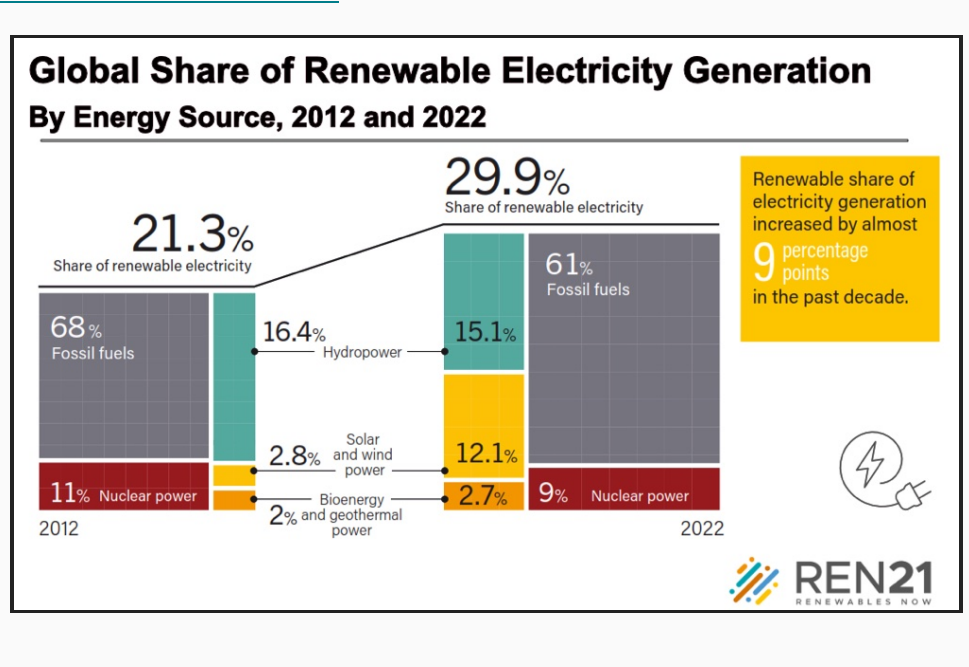
- power-grid.com/

According to the U.S. Solar Market Insight Q2 2023 report by the Solar Energy Industries Association (SEIA) and Wood Mackenzie, the U.S. solar industry just experienced its best first quarter ever, with 6.1 GW of solar capacity installed.

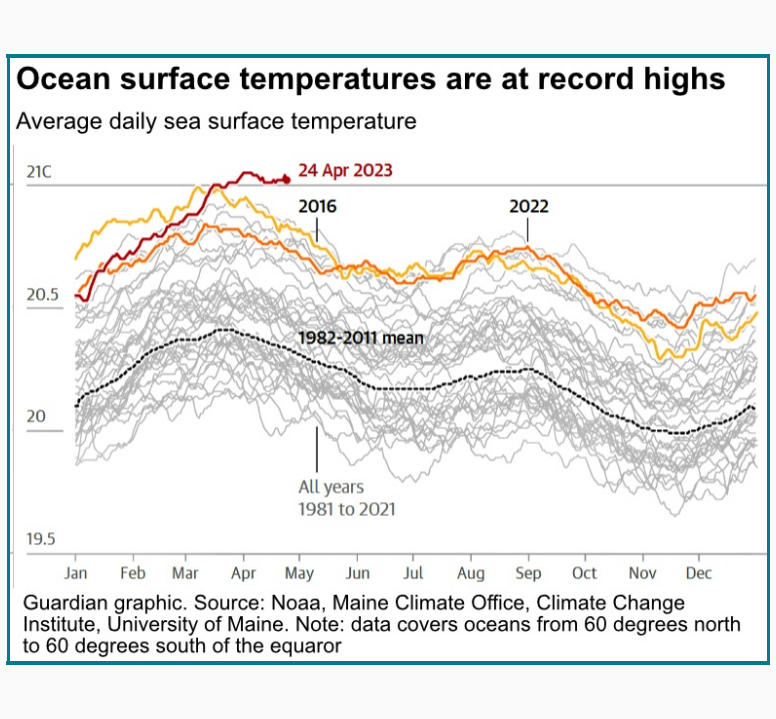
Due in part to the strong first quarter numbers and a surge in demand resulting from the Inflation Reduction Act (IRA), Wood Mackenzie expects the solar market to triple in size over the next five years, bringing total installed solar capacity to 378 GW by 2028.

- *solarindustrymag.com/*

The share of renewable energy in global power generation hit 30% last year after record growth in solar, but little progress has been made when it comes to decarbonizing the heat and fuel sectors, according to a research report published by the Paris-based REN21 think tank



- *reuters.com/ == ren21.net/*



Guardian graphic. Source: Noaa, Maine Climate Office, Climate Change Institute, University of Maine. Note: data covers oceans from 60 degrees north to 60 degrees south of the equaror

- *theguardian.com/*

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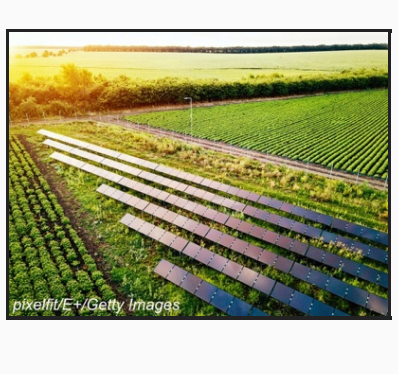
OF INTEREST

Energy: Research/Development

AGROVOLTAICS

A major issue facing solar energy development in sun-rich southern Alberta and Saskatchewan is criticism about overtaking some of the world's most fertile agricultural land out of production.


pixelfit/E+/Getty Images

An analytical modeling study at the University of Western Ontario, Canada, used data collected from studies in the United States and Europe, as well as solar irradiance levels in the southern part of the provinces to determine the potential for using solar arrays inter-spaced between rows of wheat. The study confirmed earlier findings of an overall increase in agricultural yields. Vegetable crops appeared to have the largest potential for increased yields if grown under solar panels — particularly cherry tomatoes, lettuce and peppers.

- *vancouverisawesome.com/*

ENERGY STORAGE

Railcar batteries can't replace needed infrastructure like new transmission lines, but they can reduce the cost of building that infrastructure by ensuring that power grids have enough backup electricity. If electric batteries become more common on the nation's freight rail lines, they could provide ways to deal with spikes in energy demand, including responding to extreme weather conditions. A recent study published in the journal Nature Energy by researchers at Berkeley Labs focused on the potential of the country's freight rail lines to increase grid reliability

- *nature.com/ == utilitydive.com/*

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Environment/Climate

Using a single gas-stove burner can raise indoor concentrations of benzene, which is linked to cancer risk, to above what's found n secondhand tobacco smoke and even to levels that have prompted local investigations when detected outdoors. According to a study from Earth System Science Department, Stanford University, gas stoves emit harmful pollutants like nitrogen dioxide, carbon monoxide and formaldehyde and can also leak methane, a potent greenhouse gas, even when they are turned off. A recent population-level analysis concluded that approximately 12% of childhood asthma in the U.S. is attributable to gas stoves. More than 1/3 of U.S. households (47 million households) cook with gas, and millions more do so worldwide.

2.8 – 6.5 µg Benzene min⁻¹
Source: Environmental Science & Technology

- *nytimes.com/ == pubs.acs.org/*

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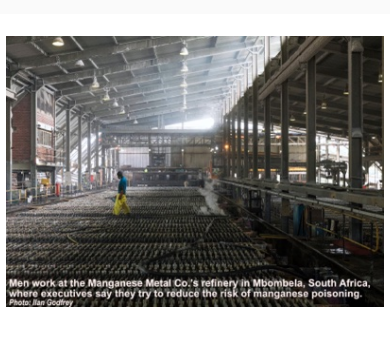
The Reads



In a Scramble for EV Metals, Health Threat to Workers Often Goes Unaddressed

As demand for electric vehicles has soared in recent years, automakers have rapidly turned to manganese, a common and relatively inexpensive mineral that is already used in about half of rechargeable batteries and is seen as key to making supply chains more reliable and cars more affordable. For years, however, manganese has taken a toll on the health of those who mine and process it, according to scientific research that shows that high-level exposure can be toxic, causing a spectrum of neurological harm.

It is unclear how seriously the wider industry is taking the danger. Analysts at four research and consulting firms that follow the EV and minerals sectors said that risk to manganese workers is rarely a topic of discussion among automakers, suppliers and investors.

The shift to EVs already figures prominently in the global battle against climate change, and that transition is stoking demand for a wide range of minerals used in manufacturing them, such as manganese, cobalt, lithium and nickel. To run, EVs typically require six times the mineral input of conventional vehicles, as measured by weight, excluding steel and aluminum. But there is little recognition of the harm that the extraction and processing of such minerals could have on workers and surrounding communities.

- *washingtonpost.com/*

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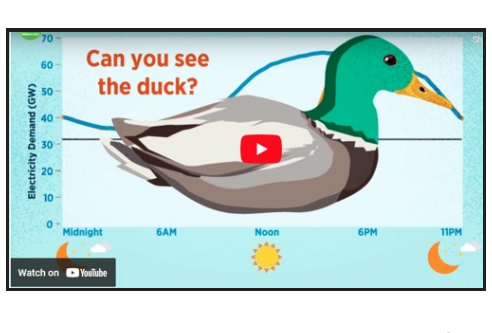
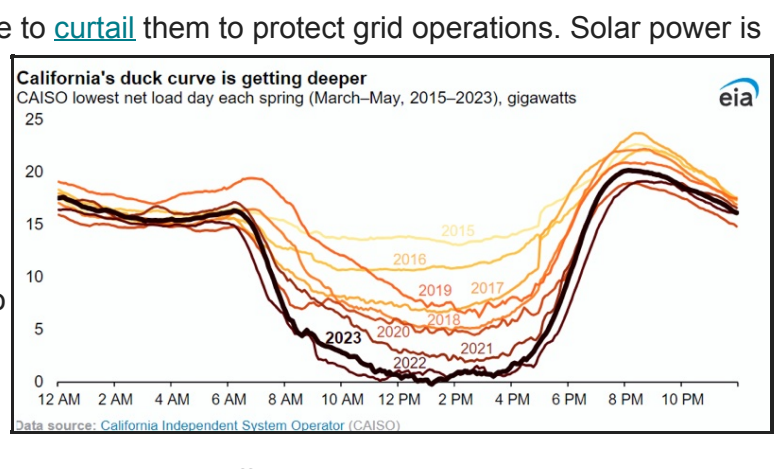
ICYMI / FYI

As more solar capacity has come online in California, grid operators at the California Independent System Operator (CAISO) have observed a drop in net load (or the demand remaining after subtracting variable renewable generation) in the middle of the day when solar generation tends to be highest. Graphed for a typical day, the pattern created by the midday dip in the net load curve, followed by a steep rise in the evenings when solar generation drops off, looks like the outline of a duck, so this pattern is often called a *duck curve*. As solar capacity in California continues to grow, the midday dip in net load is getting lower, presenting challenges for grid operators.



While electricity demand does not vary much during the day, solar power generation tends to be the highest at midday. Unlike conventional power plants, solar and wind resources can't be fully dispatched at will to help meet demand, and utilities may have to curtail them to protect grid operations. Solar power is only generated during daylight hours, peaking at midday when the sun is strongest and dropping off at sunset. As more solar capacity comes online, conventional power plants are used less often in the middle of the day, and the duck curve deepens.



Data source: California Independent System Operator (CAISO)

The duck curve presents two challenges related to increasing solar energy adoption:
1..Grid Stress - The extreme swing in demand for electricity from conventional power plants from midday low to late evenings, when energy demand is still high but solar generation has dropped off, means that conventional power plants (such as natural gas-fired plants) must quickly ramp up electricity production to meet consumer demand.
2. Economic Challenge - The dynamics of the duck curve can challenge the traditional economics of dispatchable

power plants because the factors contributing to the curve reduce the amount of time a conventional power plant operates, which results in reduced energy revenues. If the reduced revenues make the plants uneconomical to maintain, the plants may retire without a dispatchable replacement. Less dispatchable electricity makes it harder for grid managers to balance electricity supply and demand in a system with wide swings in net demand.

The duck curve, however, has created opportunities for energy storage. The large-scale deployment of energy storage systems, such as batteries, allows some solar energy generated during the day to be stored and saved for later, after the sun sets. Storing some midday solar generation flattens the duck's curve and dispatching the stored solar generation in the evening shortens the duck's neck.

The duck curve is increasingly occurring in other parts of the country and around the world in places where the share of solar generation is increasing compared with generation from conventional sources.

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The New York Solar Energy Society (NYSES)

a Chapter of the American Solar Energy Society (ASES)

prepares consumer knowledge handouts about energy conservation and renewable energy, and distributes Green Energy Times, a resource publication, to the public throughout eastern New York State. NYSES analyses legislation and state programs and visits with the staff of legislators in New York City, New York State, and Washington, DC. NYSES is a volunteer, grassroots, membership organization serving the children, families, engineers, architects, and teachers of New York State since 2007.

Our Mission:
To encourage the understanding and use of solar energy technologies through public outreach, to be a source of sound technical knowledge, and to provide a forum to address critical regional and state issues relating to solar energy solutions. We address the energy usage of all segments of society by increasing awareness of the benefits of renewables: solar, wind, biomass, geothermal ground source, tidal/wave energy, and energy efficiency.

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Thank you!

Please send your comments/suggestions via Contact-Us

The Board of Directors of the New York Solar Energy Society meets on the fourth Tuesday of odd-numbered months via teleconference. Please contact us **if you wish to attend.**

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Monthly Update is compiled & edited by Yuri Kalina

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