New York Solar Energy Society

Monthly Digest for March 2022

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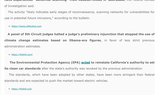
NATIONAL AND INTERNATIONAL

The Russian invasion of Ukraine threatens the complete or partial destruction of half of the remaining natural gas reserves in the country (pictured). Ukraine's Ministry of Energy



Ukraine has achieved significant results in developing renewable energy, including large wind farms and solar power plants, which have a total capacity of more than 62 GWs. To develop energy infrastructure is one of the war tactics of the Russian Federation, the occupation and the Russian forces have already destroyed hundreds of energy plants, fired at and exposed thermal plants to air strikes, and destroyed electric transmission lines, gas pipelines, power plants, and other energy infrastructure.

- https://www.pv-magazine.com/

The Russian aggressions are reacting to PV to have gas substitutions causing despite the destruction of the electricity grid by Russian forces. Meanwhile, PV power sensors are beginning to detect the electromagnetic pulses from the explosions or damaged equipment in the Ukraine.

- https://www.h-concordance.com/

Russian natural gas is crucial for gas dominance over European energy supplies as a **weapon to fend off interference in the war** appear in danger of weakening. Europe is embarking on a plan to reduce its Russian fossil fuels imports by two-thirds within the next two months, while the UK will end its energy security dilution that will emphasize renewable power.

- https://www.h-concordance.com/

War in oil-rich Eastern Europe is complicating the global effort to reduce carbon emissions. Russia's attack on a peer for control of oil and gas production will be necessary to stabilize the energy market and bridge the gap to a more carbon-free future.

- https://www.bloomberg.com/

Republicans and the fossil fuel industry have sent the (Ukraine) crisis demonstrates the need for further fossil fuel exploitation (pictured) and Democrats and environmental groups warn the economic pitch underscores the need to make the U.S. more energy independent, and to invest in renewable energy to reduce the nation's reliance on fossil fuels. Yet, the idea that the U.S. can reduce its exposure to a volatile commodity is to increase your use of a volatile commodity," said one Democrat lawmaker.

Alexandria Ocasio-Cortez Rashida Tlaib White House Council on Environmental Quality Brenda Mallory Defense Production Act (DPA), which directs private companies to prioritize domestic energy materials crucial to national defense.

(Both parties supported the last-in-majority of Russian oil.)

- https://www.cnn.com/

At least from U.S. energy companies and US others spending critical infrastructure sectors Ukraine's cyber-security agency has warned of Russian cyber attacks against the U.S. in the wake of investigation said.

The article, Nitzu indicates what appears to be unprecedented, warning referents for cyberattacks for use in potential future intensively," according to the bulletin.

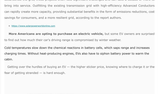
- https://www.cnn.com/

A power of Ten Circuit judges halted a judge's preliminary injunction that stopped the use of Illinois Energy solutions based on Obama-era figures. In favor of 10th circuit power administration witnesses.

- https://www.cnn.com/

The Environmental Protection Agency (EPA) acted to rescinds California's authority to set tailpipe emissions standards for the state's automobiles was restored by the appeals court.

The standards, which have been adopted by other states, have been more stringent than federal standards and required sales of zero-emission vehicles.



- https://www.bloomberg.com/

CLIMATE-ECONOMY-ECO

CLIMATE EMERGENCY/ENVIRONMENT

Transportation in Massachusetts reached record levels, MIT, CTRP's above normal in places.

Transportation in Massachusetts, the state's largest source of climate pollution, has been the highest in the nation for the past three years, according to data from climate advocacy group Ceres.

At this time of year, the Atlantic should be rapidly cooling after its summer, and the Bilbo very warm, but it is now rapidly warming.

Startling heatwave at both of Earth's poles are causing alarm among climate scientists, who have warned the "unprecedented" events could upset the world's climate patterns.

- https://www.bloomberg.com/

Bavaria environmental groups urged the European Union to pass aggressive legislation banning all imports linked to deforestation, criticizing "gaps" in a draft bill. "Deforestation and forest degradation are the second-biggest source of global CO2 emissions, after the burning of fossil fuels, and the importing of these products is a major cause of deforestation in the tropics," said Sandra Schwab, the Climate Observatory, and the Nature Conservancy.

- https://www.bloomberg.com/

Fortune 500 companies have pledged to cut their emissions. They reported that. It excludes the majority of recent key acquisitions in Brazil, including the Petrobrás website, the Cemada successor, and the Tempo acquisition.

- https://www.bloomberg.com/

Extreme Cold, Polar Vortex

Pollen season is getting longer and more intense with climate change.

A study in 2021 found that the overall pollen season was already about 20 days longer in North America than it was 25 years ago, and pollen concentrations were up about 21%.

The U.S. will face up to a 200% increase in total pollen this century if the world continues on its current path of greenhouse gas emissions, climate, power, and other sources at high risk. Pollen season is already set to go 16 days earlier in the spring and last up to 23 days longer in the fall, according to the study.

Allergy sufferers across the U.S. in the future will have a much longer ragweed season, and pollen and heatwaves. Seasonal allergies affect about 30% of the population, and these economic impacts, from health care costs to lost productivity, are significant.

- https://www.nytimes.com/

Heatwave in Ukraine, 24, report from the United Nations' Intergovernmental Panel on Climate Change (IPCC) details how the impacts of climate change are playing out today in different parts of the world and how people are responding to the challenge of climate change.

Many countries underestimate the need for climate adaptation. And modern solutions, such as the use of data and technology, are underused. Adaptation is not just about "hard" infrastructure, such as dams and flood walls, it is also about "soft" measures, such as early warning systems and insurance. As a result, about 3.3 billion to 5.6 billion people live in climate hotspots, areas such as coastal regions, arid lands, low-lying land, and food and water shortages.

- https://www.washingtonpost.com/

RENEWABLE ENERGY

In 2019, President Jimmy Carter outlined a six-point plan to shield us from gasoline price hikes by boosting domestic energy production, and reduce imported oil. Now, over four decades later, with President Biden announcing an embargo on Russian oil and gas products, we're in a similar situation. It's time for us to start ignoring the warning signs around us, this time around, America can use a crisis to create an economy that's more resilient and better for the planet. Our current energy infrastructure is fragile and Congress have a chance to address the unprecedented recommendations President Carter made decades ago instead of just the one, or two, or three, that suit our current political preferences.

- https://www.nytimes.com/

Hypothesizers and redundancy existing transmission pathways using Advanced Conductors can make sense for consumers and the electric system, particularly when the power grid accounting is the report, Advanced Conductors on Existing Transmission Corridors to Accelerate Low Carbon Electricity Generation, released by the Brookings Institution. An estimated 97% of transmission and distribution lines are well into the second half of their 50-year useful lifetime, and most of the remaining transmission lines are over 100 years old. While new transmission construction is needed to interconnect large amounts of renewable energy and accommodate new loads, it is also important to upgrade existing transmission and take a deeper or more long-term view. Outfitting the existing transmission grid with high-efficiency Advanced Conductors can increase capacity and improve reliability and resilience, while the cost of Advanced Conductors, when factoring in the consumer benefit, accounting to the report authors.

- https://www.h-concordance.com/

More Americans are opting to purchase an electric vehicle, but some EV owners are surprised to learn that it costs more to charge their vehicle during commonly used hours.

Cold temperatures slow down the chemical reactions in battery cells, which says range and increase charging time. Wholesale electricity costs, which also have to pass through the utility, are higher during those hours.

Getting over the tumbling of energy on EV — the higher sticker price, knowing where to charge it or the fear of getting stranded — is small enough.

- https://www.pbs.org/

Solar

The enforcement and compliance arm of the U.S. Department of Commerce intends to investigate whether imported solar cells and modules violate trade laws. The Department, and Commerce is considering imposing **antidumping and countervailing duty orders** on crystalline silicon photovoltaic cells from China.

A revised long-term renewable resources procurement plan, by the Illinois Power Agency, aims to facilitate solar and wind projects under the **Illinois Climate and Equitable Jobs Act.** Illinois last September. Environmental advocates generally praised the plan for supporting an accelerated transition away from fossil fuels and toward clean energy.

Illinois's last plan, a 20-year-long plan, was approved in 2019 and was the state's first since 2007 with by 2040. It also increased funding for state renewable energy initiatives and called for the development of 3 megawatts of renewable energy, including solar and wind. The Illinois Power Agency Commission seeking renewable energy credits will be required to meet minimum criteria for equity and diversity, and Illinois's Adjustable Block program and Illinois's National Labs and Universities will adjustments during the bidding process.

The plan also includes the creation of the law is the revamping of the Illinois Solar for All program which has succeeded in meeting its goals connecting community solar installations and solar projects in underserved communities, and providing workforce training and job opportunities.

The other plan aims to expand the state's solar and wind energy production, including new supplier classes for retrofits, allowing facilities to address issues such as outdated electrical panels, and allowing for community solar projects in underserved communities.

- https://www.utilitydive.com/

Developers from New England to California say problems connecting to the grid is an often-overlooked issue that is stressing new utility and community solar projects.

Solar power generation in the United States increased 43% last year, to 15.1 GWs, the first quarter of 2021 compared with the previous quarter, due in part to interconnection issues, the Solar Energy Industries Association report said.

In the years to come, interconnection difficulties could "represent a major challenge" for community solar developers and other distributed generation, the Solar Energy Industries Association said.

- https://www.h-concordance.com/

Although 30% of a PV installation is, the current economics of end-of-life (EOL) handling are unfavorable to recycling. The cost to recycle PV modules is significantly higher than the value of the recovered materials, according to a report from the National Renewable Energy Laboratory (NREL).

The U.S. Department of Energy released an **action plan** to tackle the growing challenge of end-of-life PV modules.

- https://www.h-concordance.com/

Solar power is more greenhouse gases than the gasoline it is supposed to replace. 37 to 52 million stores of zero are planned in the US each year, 40 million.

Solar panels are made from silicon, which is made from quartz.

Recent research from the Lawrence Berkeley National Laboratory **Solar Energy** suggests that solar power power is the lowest carbon source of energy, **Solar Energy** between 200 and 427 MWh per acre per year. It one modules according to the article suggestions that it is 200 MWh per acre per year.

Early million acres of altered flat-term could be used to generate up to 24 petawatt hours* (1,000 TWh) of electricity, which is the current U.S. electricity consumption if deployed in downward, higher-efficiency installation techniques.

- The author of the article is only 200 MWh per acre per year.
- https://www.h-concordance.com/

The good news and bad news is that we're ending **the carbon footprint of solar panels** and that it takes **the average American generated on** amounts **5.5 years** to offset the carbon dioxide they. Electricity of coal-fired power plants, modern seals breaks down this methane more or less the same, and the rate of methane leakage is the combination of the carbon dioxide and methane that takes place in the use of modeling pathways has been shown to be the same, and the carbon footprint of solar panels.

Agrivoltaics The International Renewable Energy Agency (**IRENA**) has stressed the tremendous efficiency of bringing in policies worldwide to drive the **green hydrogen** revolution by creating out there is only one movement curve for **heavy industrial sectors** before mid-century.

- https://www.h-concordance.com/

The U.S. Department of Energy's Office of Fossil Energy and Carbon Management is investing $8.5 million in three projects to develop technologies that will reduce greenhouse gas emissions from the oil and gas industry and beyond the electricity decarbonization transition. They are,

- A high-temperature thermal energy storage system that uses molten salt (juxtaposed with quartz or silica) as the storage medium.
- Hydrogen Storage for Load Following and Clean Power: Dual-Firing of Hydrogen to Improve the Capacity Factor of NGCC.
- Hydrogen Storage Hub Demonstrate to Long Duration Hydrogen Energy Storage Solutions for Fossil Power Generation.

- https://www.utilitydive.com/

Global pipelines for projects and electricity production facilities have seen four-figures growth capacity, and the growth of electricity production in pipelines increased nearly 50% in the past 18 months. In just a few years electricity production capacity has fallen to 30,400 MWs from 55,000 MWs in 2016, the Global Energy Monitor's Global Coal Plant Tracker reported.

Type of hydrogen production	Method
Black hydrogen	Hydrogen produced with coal or lignite and without carbon capture and storage (CCS)
Brown hydrogen	Hydrogen produced from lignite with CCS
Grey hydrogen	Hydrogen produced from natural gas without carbon capture and storage (CCS)
Blue hydrogen	Hydrogen produced from natural gas with carbon capture and storage (CCS)
Turquoise hydrogen	Hydrogen produced from methane pyrolysis
Green hydrogen	Hydrogen produced from renewable energy with CO2 emissions from the production process being zero
Yellow hydrogen	Hydrogen produced from electricity with a mix of renewable energy and other sources
Purple hydrogen	Hydrogen produced from electricity with nuclear power
Pink hydrogen	Hydrogen produced from electricity with nuclear power
White hydrogen	Hydrogen produced as a by-product of industrial processes

- https://www.h-concordance.com/

Wind Farm

Westinger-based Consumer Energy threatened to abandon plans to develop the coal-fired power plant, from fact 2020 of the Michigan Public Service Commission (PSC) approves a recommended decision the utility says would consist coal gets parts of its transportation.

Consumer Energy indicated on March 1 to the Michigan Public Service Commission, the company it would be able to recover the costs of retiring its coal-fired power plants early or leaving the power supplies to replace them, the CMS Energy subsidiary said in a filing and the PSC on March.

- https://www.utilitydive.com/

The nation's largest federally owned utility plans to invest more than $15 billion in new transmission and other infrastructure to connect more renewable energy to the grid.

The Tennessee Valley Authority is an independent organization governed by a board of directors made of independent appointees. The board is formally recommended to the board the Tennessee Prosecutor Federal scheme and was on the board.

- https://www.utilitydive.com/

NORTH-EAST

New York, New Jersey, Massachusetts, and Connecticut agreed to work with about 40 clean power companies, utilities, and renewables to create plans for a regional hydrogen hub in the coming months of the program.

- https://www.bloomberg.com/

200 New Jersey public power agency authorized gas-fired power plants on either advances in their capacity and operating reserve markets by failing to account for the possibility they may be needed to provide power during periods of high demand, according to a complaint filed in Federal Energy Regulatory Commission.

ISO-NE's "broad preference" for natural gas-fired generators without firm fuel supplies leaves New England's power system vulnerable to disruptions in natural gas pipelines and natural gas and energy storage facilities, the American Clean Power Association (ACP) and NDRAP Northeast said in a joint complaint to FERC on Thursday.

- https://www.utilitydive.com/

New Jersey

Twenty-eight municipalities and school districts across Jefferson County, New Jersey, have joined a lawsuit to force the state to shift its electricity costs and breaking the state's clean energy portfolio with solar, wind, and geothermal. The lawsuit, filed in Jefferson County Superior Court last month, is the first such challenge of a state's clean energy portfolio.

Light Energy, a New York-based distributed solar developer, have completed an 11.5-MW solar project in Jefferson County, New Jersey. The remaining 20 megawatts of the construction are expected to open in the coming months, Light said.

New York has become the top community solar market in the United States with more than 1 million subscribers and 1,000 megawatts of capacity, according to a new report from Wood Mackenzie. It made New York the top community solar market in the nation with enough community solar capacity to serve an additional 60,000 homes.

- https://www.utilitydive.com/

The City of Cohoes proposed municipally owned and operated 2.5 MW was awarded $3 million in grants from the New York State Energy Research and Development Authority (NYSERDA) to fund the project, the grant, which will be used to fund the project, the grant, which will be used to fund the project, the grant, which will be used

wind capacity is expected to come online in 2022 and 5 GW in 2023.

- Utility-scale solar capacity rose by 13 GW in 2021. Our forecast for added utility-scale solar capacity is 22 GW for 2022 and 24 GW for 2023.
- Solar additions are estimated to account for nearly half of new electric generating capacity in 2022. In addition, in 2021, small-scale solar capacity (systems less than 1 megawatt) increased by 5.4 GW to 33 GW. Small-scale solar capacity is projected to grow by 4.0 GW in 2022 and 4.3 GW in 2023.

U.S. coal consumption is projected to decrease by 7 MMst in 2022 and by 15 MMst in 2023. In both forecast years, declining consumption from the electric power sector is somewhat offset by rising consumption at coke plants.

- U.S. energy-related carbon dioxide (CO2) emissions increased by nearly 7% in 2021 and is expected to increase by 2% in 2022.

Wind and solar generated 10% of global electricity for the first time in 2021, a new analysis shows. Fifty countries gave more than a tenth of their power from wind and solar sources, according to research from Ember, a climate and energy think tank.

- https://www.bbc.com

Driven by higher fossil prices, S&P Global Market Intelligence projects a substantial increase of 102 GW of wind capacity by 2035, mainly in MISO and WECC. Similarly, solar capacity is projected to increase 78 GW by 2035, with the increase evenly distributed across US markets.

The battery storage outlook is modestly lower (6 GW). The modest increase of higher fossil prices reduces offtake peak arbitrage in some markets where renewables have not penetrated substantially, undercutting a small portion of new battery storage build.

- pages.marketintelligence.spglobal.com

2021 Highlights from the 10th annual Sustainable Energy in America 2022 Factbook:

- THE US. primary energy consumption grew 4.4% but was 3.19% below 2019 (pre-pandemic) levels.
- Energy productivity improved by 1.3%. The ratio of GDP growth to energy consumption grew again, suggesting that the long-term trend of the U.S. using energy more efficiently continued through two anomalous years.
- A record-breaking $105 billion in new capital went into new U.S. clean energy assets, an 11% year-over-year; jumps the figure bars grown 70% in the last five years.
- Developers built a record 23 GW of wind and solar power generating capacity. Solar enjoyed its biggest year ever with 24.2 GW added while the wind had its third-biggest year, at 13 GW.
- A total of 351 companies pledged to procure 100% clean energy. Companies signed contracts for 17 GW of clean energy.
- Renewables made another record contribution to the power grid, with production rising 4.1% year on year. Renewable sources accounted for just over one-fifth of U.S. power generation.
- Nearly 4.2 GW of battery storage capacity was added. 81% of storage is provided by pumped hydropower projects, but batteries accounted for 89% of new storage capacity over the past decade.
- The offshore wind sector saw 8.5 GW of new capacity awarded, stemming from contracts in New York, New Jersey, Massachusetts, and Maryland.
- U.S. electric vehicle (EV) sales fell 65,000 units, a doubling from the 325,000 cars sold in 2020.
- The administration adopted a 2050 economy-wide net-zero emissions goal for the U.S. as Congress approved $80 billion for energy transition research and development. Congress earmarked $21 billion with over $300 billion in climate and clean energy policies pending in a tightly divided House and Senate.
- https://irps.aee.net/

Within the solar sector alone, the report, **U.S. Solar Market Insight: 2021 Year-in-Review**, by the Solar Energy Industries Association (SEIA) and Wood Mackenzie highlights:

- in 2021, U.S. solar prices increased as much as 18% due to unprecedented supply chain challenges, trade actions, and legislative uncertainty.
- As a result of these issues, a record-low 4.6 GW of utility-scale solar capacity scheduled for completion in the last quarter of 2021 was delayed by at least a quarter, and 13% of capacity slated for completion in 2022 has either been delayed by a year or more or canceled outright.
- Solar accounted for 3.9% of total U.S. electricity generation in 2021.
- Residential solar installations totaled 4.2 GW in 2021, a 30% year-over-year growth.
- Community solar volumes reached 957 MW, representing 7% year-over-year growth, while commercial solar volumes in 2021 were relatively flat and equal to 2020 at 1,435 MW. Project delays from interconnection challenges and supply chain constraints limited growth in both sectors.
- 17 GW of utility-scale capacity were installed in 2021, about 3 GW less than expected due to supply chain constraints, logistics challenges, and trade headwinds. In Q4 alone, more than a third of all capacity expected to come online was delayed to 2022 or later.
- Year-over-year price increases for utility-scale solar reached 18% for fixed-tilt projects and 14.2% for single-axis tracking projects in Q4.
- https://www.seiapowerworld

OF INTEREST

A team of researchers from The University of Queensland (UQ) has designed an atomic-thin cathode material that reduces corrosion in lithium-ion batteries and has demonstrated improved high-voltage cycling stability with capacity retention of about 80% after 1,000 cycles.

The new technology involves the application of an epitaxial[1] engineered wetting layer on a lithium nickel manganese oxide (LNMO) cathode material. The research team said the atomic-thin wetting layer offers long-term suppression of the transition metal dissolution from the cathode without impacting its dynamics.

[1]Epitaxy refers to a type of crystal growth or material deposition in which new crystalline layers are formed with one or more well-ordered orientations with respect to the crystalline seed layer. The deposited crystalline film is called an epitaxial film or epitaxial layer.

- https://www.pv-magazine.com

By using electrostatic repulsion to remove dust from solar panels instead of water, the industry could save 10 billion gallons of water each year, according to researchers from the Massachusetts Institute of Technology.

The research team developed a lab-scale prototype for the dust removal process and demonstrated up to 95% recovery of lost power output.

Lab tests showed that the weight of energy output from the panels happens steeply at the very beginning of the process of dust accumulation and can reach a 30% reduction after one month without cleaning. Even a 1% reduction in power for a 150 MW solar installation could result in a $200,000 loss in annual revenue. The researchers said that globally, a 3-4% drop in power output from solar plants would amount to a loss of between $3.3 billion and $5.5 billion.

- https://www.newscientist.com

Next-generation nuclear plants could be safer and more efficient, but first, the US has to figure out how to fuel them up—without relying on Russia.

Advanced reactor designs are only proposals right now, but they promise to be safer and swifter than the massive plants of today. The hope is that they might reinvigorate nuclear energy in the United States and in Europe, where old reactors are shuttered or about to shut down. The new ones are being built. In the US, only two plants are under construction, and they have experienced massive delays and cost overruns. In theory, advanced reactors could be cheaper to build, offering a complement to renewable energy sources like wind and solar.

But they would require up to 20% U-235, which is the cutoff for "highly enriched" uranium (HALEU) not the 5% enriched uranium used in today's nuclear power plants. Right now, the only place that can enrich uranium to that sweet spot is Russia. In particular, it's nearly all by a state company.

A few decades ago, the military had an unexpected problem: too much weapons-grade uranium. Non-proliferation treaties resulted in turning the excess into fuel for standard reactors— 5 percent enrichment, or below HALEU stuff.

Right now the U.S. does not have a sufficient capacity to produce the highly enriched uranium and sufficient interest in investing in its production as the new generation of nuclear plants is theoretical, at least, for now.

- https://www.wired.com

While the energy used to power air conditioners has clear implications for greenhouse gas emissions, the impact of removing moisture from the air has received in-depth study until now. The researchers showed that controlling humidity is responsible for roughly half of the energy-related emissions, with the other half due to controlling temperature.

While the energy used to power air conditioners has clear implications for greenhouse gas emissions, the impact of removing moisture from the air has escaped in-depth study until now. The researchers showed that controlling humidity is responsible for roughly half of the energy-related emissions, with the other half due to controlling temperature.

The increasing need to cool the air is both a cause and an effect of climate change.

Even a small amount of moisture in the air can cause people to feel uncomfortable and even damage buildings in the form of mold and mildew. Furthermore, controlling indoor humidity through commercially available air conditioning technologies impacts the environment in three ways: 1) They consume a considerable amount of electricity, which results from burning a hydrogen-binding energy, and poor durability due to rapid passivation from metal oxide formation.

The new hydrogen fuel cell has an anode (where hydrogen is oxidized) catalyst consisting of a solid nickel core surrounded by the outside layer of atoms paired with a cobalt-manganese cathode (where oxygen is reduced), the resulting completely precious metal-free hydrogen fuel cell outputs more than 200 milliwatts per square centimeter.

- https://phys.org

Methanotrophic bacteria consume 30 million metric tons of methane per year and have captivated researchers for their natural ability to convert the potent greenhouse gas into usable fuel.

By studying the enzyme the bacteria use to catalyze the reaction, a team at Northwestern University now has discovered key structures that control the reaction. The scientists, called particulate methane monooxygenase (pMMO), is a particularly difficult protein to study because it's embedded in the cell membrane of the bacteria. Typically, researchers use a harsh process in which the proteins are ripped out of the cell membranes using a detergent solution. The process kills all enzyme activity and limits how much information researchers can gather.

In this study, researchers used lipids from the bacteria to form a membrane within a protective particle called a nanodisc and then embedded the enzyme into that membrane.

Their new approach, combined with recent advances in cryo-electron microscopy (cryo-EM)* provides a new starting point to answer the questions such as: How does methane travel to the enzyme active site? Or does methanol travel out of the enzyme? How does the copper in the active site do the chemical reaction?

If continued research is successful, researchers will be able to see exactly how the enzyme is arranged in the cell membrane, determine how it operates in its truly native environment, and learn whether other proteins around the enzyme interact with it.

**Cryogenic electron microscopy (cryo-EM) is a cryomicroscopy technique applied on samples cooled to cryogenic (very low—below -180C (93 K, -292°) temperatures and embedded in an environment of vitreous water.*

- https://phys.org

Solid-state batteries, currently used in small electronic devices, like smartwatches, have the potential to be safer and more powerful than lithium-ion batteries for things such as electric cars and storing energy from solar panels for home use.

A Sandia National Laboratories research team found that in many cases solid-state batteries with a little liquid electrolyte were safer than their lithium-ion counterparts, contravening the long-held assumption that adding liquid electrolyte would make them less safe.

Solid-state batteries are somewhat like lithium-ion batteries. In both, lithium ions move from one side of the battery to the other, while electrons flow through a circuit to power the device. One big difference is that throughout a lithium-ion battery, there is a substance that helps the lithium ions move quickly: the liquid electrolyte.

The researchers found that the solid-state battery with a little liquid electrolyte in it produced about one-fifth of the heat of a comparable lithium-ion battery—depending on how much liquid electrolyte it had. The solid-state battery without liquid electrolyte didn't produce any heat under this scenario.

- https://techxplore.com

Researchers from South Korea-based solar manufacturer Hanwha Q Cells and German research institute Helmholtz-Zentrum Berlin (HZB) have announced they have achieved a power conversion efficiency of 28.7% for a two-terminal perovskite-silicon tandem solar cell.

The device is based on a silicon bottom cell relying on Hanwha Q Cells' monocrystalline quantum half cell technology and a perovskite-based top cell. This latest record efficiency result, of 28.7%, is an improvement of almost one percentage point compared with the 2020 record value of 27.8%," the module maker said in a statement.

- https://www.pv-magazine.com

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 analyzes legislation and state programs and visits with the staff of legislators in New York City, New York State, and in Washington, DC. NYSES. **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.

For more information, please contact:

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Join and Support NYSES — http://nyses.org/Main/Join

By renewing your membership and/or making one-time or periodic donations, you can help to sustain and expand the efforts and activities of the New York Solar Energy Society.

Basic Membership	Advance notice of events and legislative policy updates	**$86.00/ year**
Professional Membership	Above benefits plus discount on event registrations	**$100.00/year**
Business Membership	Above benefits plus sponsorship of conversions	**$500.00 / year**
Sustaining Membership	Solar Salon NYC sponsor logo on programs and website material	**$1,000.00/year**

Contribute online via **NYSES** website www.nyses.org.
or mail check to the address above
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 each odd numbered month via teleconference. Please contact us **if you wish to attend.**

Monthly Update is compiled & edited by Yuri Rahne

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