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New York Solar Energy Society

Monthly Digest for January 2024

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Upcoming Events

You Are Invited!

Renewable Energy Seminar, CUNY City College Campus and Online

Thursday, February 08, 2024
12:30 pm to 1:20 pm (New York Time/EDT)
Free, in-person and online, registration-optional (below)

Civil Engineering Department conference room, Steinman Hall Room 105
Dr. Richard Perez*, Sr. Researcher, Atmospheric Sciences Research Center, University at Albany, will present his latest on renewable energy at CUNY in Manhattan.

Dr. Richard Perez directs applied research and teaches in solar radiation, solar energy applications, and daylighting.

To register, click here ***(an online link will be provided to registered attendees)***

LINK TO*:

- NATIONAL AND INTERNATIONAL
- CLIMATE-EMERGENCY/ENVIRONMENT
- CARBON-FREE ENERGY
- ENERGY STORAGE
- FOSSIL & OTHER FUELS
- NORTHEAST
-
- DATA
- OF INTEREST - Research and Development
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NATIONAL & INTERNATIONAL

Selected Headlines

+ **UK fossil fuel plants contributed about a third of electricity supplies in 2023** and renewables a record 42%. The use of gas and coal for electricity in the country was at its lowest since 1957. *theguardian.com/*
+ **Germany's greenhouse emissions hit a 70-year low in 2023**. Germany had resorted to coal following the Russian invasion of Ukraine, when Moscow cut off gas supplies. But since then, Germany has significantly reduced its use of fossil fuels. The year-over-year GHG emissions decline was just under 10%. *theguardian.com/*
+ **The Environmental Protection Agency has proposed a new rule to charge certain oil and gas producers for methane emissions above emissions levels** set by Congress. The proposal is facing pushback from the American Petroleum Institute, which is calling on Congress to repeal it. *.upi.com/*
+ **The European Parliament [MEPs] voted to outlaw the use of terms** such as "environmentally friendly," "natural," "biodegradable," "climate neutral" or "eco" without evidence. It also introduced a total ban on using carbon offsetting schemes to substantiate those claims. *theguardian.com/*

Ukraine expects to start construction work on four new nuclear power reactors this summer or autumn as the country seeks to compensate for lost energy capacity due to the war with Russia. Two of the units - which include reactors and related equipment - will be based on Russian-made equipment that Ukraine wants to import from Bulgaria, while the other two will use Western technology from power equipment maker Westinghouse. *reuters.com/*

For the second consecutive winter, Russia has increased military attacks on Ukraine's energy system, significantly undermining the security of the country's power supply, according to the International Energy Agency (IEA). *hydroreview.com/*

Russia's drone attack against Ukraine overnight on Jan. 30 damaged an electrical substation in Dnipropetrovsk Administrative District and caused a blackout in a Chernihiv Administrative District, Ukrainian authorities reported.
Russia launched 35 Shahed-type drones at Ukraine at night, 15 of which were downed over multiple oblasts, according to the Air Force. A part of Russian drones reportedly targeted energy infrastructure as well as civilian and military facilities near the front line and the Russian border. *news.yahoo.com/*

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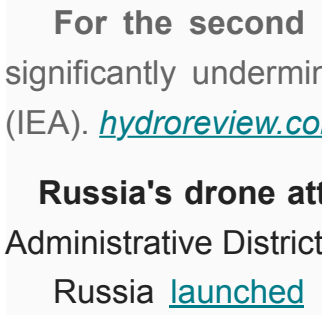


CLIMATE EMERGENCY / ENVIRONMENT

Experts say that recently discovered documents show that the fossil industry was aware of the fossil fuels potential to affect the Earth's climate at least as early as 1954. "The industry was not just on notice but deeply aware of the potential climate implications of its products for going on 70 years," according to the head of the Center for International Environmental Law. *theguardian.com/*

The American Oil Institute launched an eight-figure media campaign in early January promoting the idea that fossil fuels are "vital" to global energy security;, alarming climate experts. The Lights on Energy campaign will work to "dismantle policy threats" to the sector, the American Petroleum Institute (API) CEO said in an interview. He also stated that clean energy can currently only play a limited role. In reaction to the campaign, two experts pointed out that the API claims deny the ability for a large-scale transformation and ignore copious evidence that the world can begin to phase out fossil fuels, and must do so, (theguardian.com/

Climate change and antibiotic resistance are both major threats to human health, and the risks multiply when they intersect. *nature.com/*

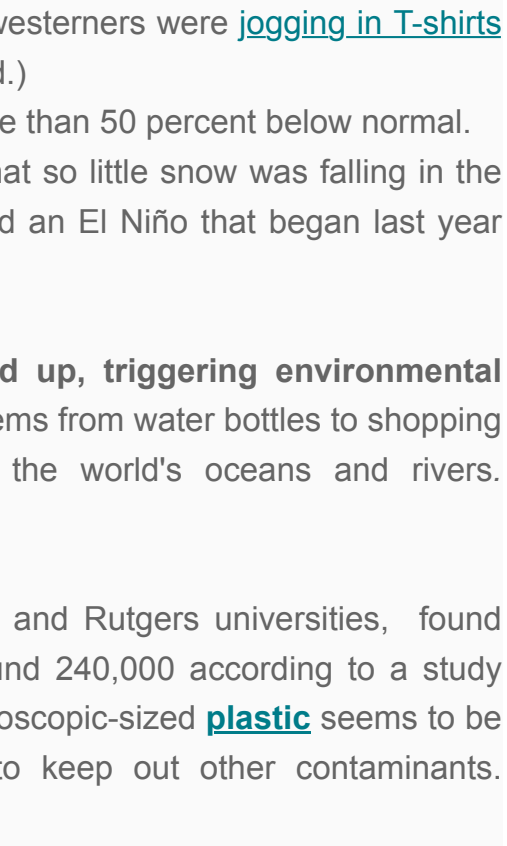
The Great Lakes had the smallest amount of ice cover this New Year's Day in at least the past 50 years and are on track to see less than the seasonal average this winter, according to government data. The decline comes during a five-decade drop in ice cover that experts say is due in part to human-caused climate change. *washingtonpost.com/*

Almost no one in the United States experienced a white Christmas. Ski areas in the West were closed. The Great Lakes began the year with the lowest amount of ice in at least 50 years. Midwesterners were jogging in T-shirts in the dead of winter. (until the bitter cold hit the center of America in mid-January, e.d.)
Real-time showed that, across vast parts of the Western U.S., the snowpack is more than 50 percent below normal.
Weather is complicated, and there is no single factor that can explain why it is that so little snow was falling in the U.S But the combination of record heat driven in part by man-made emissions and an El Niño that began last year were major factors. *nytimes.com/*

In Spain's northwestern Galicia region millions of plastic pellets washed up, triggering environmental concerns and a political blame game. The pellets are used to produce everyday items from water bottles to shopping bags and are known to add to the problem of plastic making its way into the world's oceans and rivers. *newslink.reuters.com/*

Using samples from three common water brands, researchers at Columbia and Rutgers universities, found plastic particle levels ranging from 110,000 to 400,000 per liter, averaging at around 240,000 according to a study released in the Proceedings of the National Academy of Sciences. Much of the microscopic-sized plastic seems to be coming from the bottle itself and the reverse osmosis membrane filter used to keep out other contaminants. *euronews.com/*

The fastest growing type of offset on the global carbon market subsidizes the distribution of efficient cookstoves in developing countries to reduce greenhouse gas emissions. But a new study finds that the credits overestimate the stoves' carbon savings by a factor of ten.
The overestimation undermines efforts to counteract carbon emissions to slow climate change since companies use these offsets to meet climate targets and to sell products labeled as "carbon neutral" instead of making real reductions in greenhouse gas emissions. It also undermines trust in the carbon market, and therefore the market's ability to support the long-term financing of efficient stoves.
Researchers at U.C. Berkeley who studied the issue specifically advise buyers to prioritize projects that distribute stoves that meet the World Health Organization's health standards; most stoves on the market do not, they found. *scitechdaily.com/*



A poster from 1970 by *Milton Glaser via Poster House*

We Tried to Warn You! Environmental Crisis Posters, 1970–2020 (Through February 25 at Poster House). Every poster in this exhibition is a failure—not in the sense that they failed in their graphic intent or intent of communicating a message, but rather that they failed to successfully modify behavior. Almost all of the environmental issues showcased in these posters remain or have worsened. *posterhouse.org/ via nytimes.com/*

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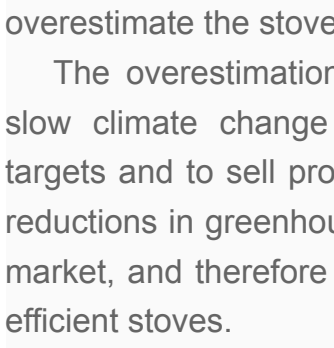
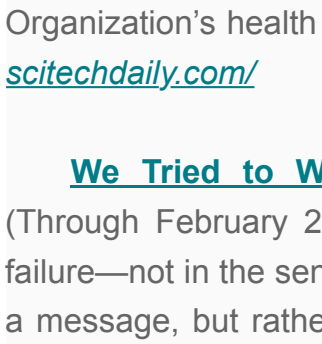
CARBON-FREE ENERGY



Solar

California's net energy metering, NEM 3.0, net billing tariff for distributed solar interconnection applications went into effect in 2023. The tariff is intended to encourage customers to pair battery storage with their solar systems, allowing them to store energy and export it back to the grid during times when it is valued more highly. NEM 3.0 caused an uncertain future for the California solar industry and led to a reduction of 17,000 jobs, 22% of the total, so far.
On the national level, the distributed solar industry is facing a 12% contraction in 2024 due to challenging economic headwinds, like high interest rates.
Consultants following the renewable energy sector, however, are optimistic about long-term solar growth. *utilitydive.com/*



Heat Pumps

An analysis from the National Renewable Energy Laboratory (NREL) and Oak Ridge National Laboratory (ORNL) has found that installing geothermal heat pumps in about 70% of buildings in the United States could save up to 593 terawatt hours (TWh) of electricity each year and seven gigatons of carbon emissions by 2050, among other benefits. The technology is already in use across the U.S., and the analysis explains that they may be either installed in newly constructed buildings or added to existing ones. 593TWh approximately 15% of annual electricity usage today. *[1TWh = 1,000,000 MWh]* *environmentenergyleader.com/*

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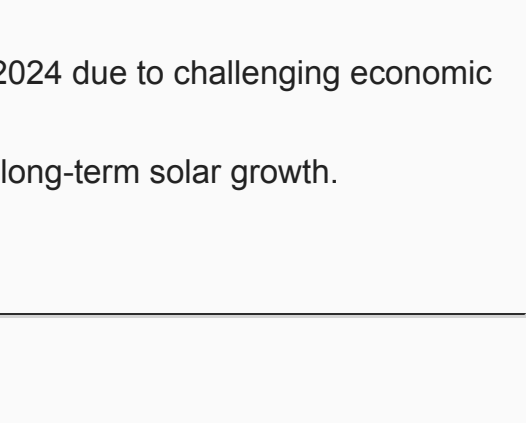
Nuclear

The British government has set out plans for what it claims will be Britain's biggest nuclear power expansion in 70 years. The plans call for the construction of a fleet of nuclear reactors by 2050 capable of meeting 25% of the UK's electricity demand by 2050.
Britain's nuclear power output fell to its lowest level in more than 40 years in 2023, to less than 50 terawatt hours (TWh) from the high of 65 TWh in 2016. (1TWh = 1,000,000 MWh)
"The challenge is the industry has a record of running over budget and behind schedule, so this does little to increase the UK's energy security any time soon," said an analyst for Energy and Climate Intelligence Unit (ECIU).
A scientist for Greenpeace UK retorted, "(t)he energy industry knows that the economic case for slow, expensive nuclear just doesn't add up, and the future is renewable." *theguardian.com/*


Torness gas-cooled nuclear reactor on the Scottish east coast. *Photograph: Murdo MacLeod/The Guardian*

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Energy Storage

Inverters convert energy generated by renewables into alternating current that flows through the transmission system. "As long as variable renewables' inverters synchronize their generation with that 60-Hertz heartbeat, they can deliver power into the system without concern about system faults," said NERC Chief Engineer.
Coal, natural gas, nuclear and hydropower plants are designed to drive spinning turbines that generate electricity at the (heartbeat) rate of 60 hertz, according to a National Renewable Energy Laboratory. This is not the case with renewable energy sources, and inverters convert DC to AC before sending them to the grid.
Fluctuations in the power system's heartbeat that threaten reliability have been stabilized by traditional power plants, but they are retiring, engineers said.
The U.S. does not have unified comprehensive standards requiring grid-following inverters, which took 20 years to develop in Europe. Inverters with "grid-forming" (GFM) capabilities are needed to stabilize the power flow. To drive GFM deployment, pilots are needed to assess GFM performance, engineers agree. Standards defining GFM requirements based on the pilot results must then be set by NERC and system operators. *utilitydive.com/* == *ecmag.com/*

A new 185 MW/565 MWh energy storage facility, now operational in Hawaii, is projected to reduce Hawaiian Electric Company renewable energy curtailment by 69% and integrate 10% more utility-scale renewables into its system in the first five years that it is online. *utilitydive.com/*

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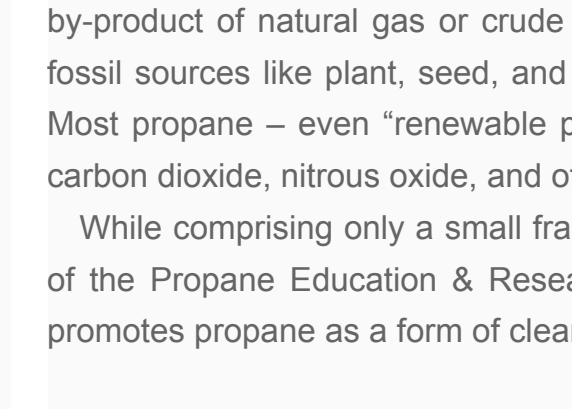
FOSSIL & OTHER FUELS

—

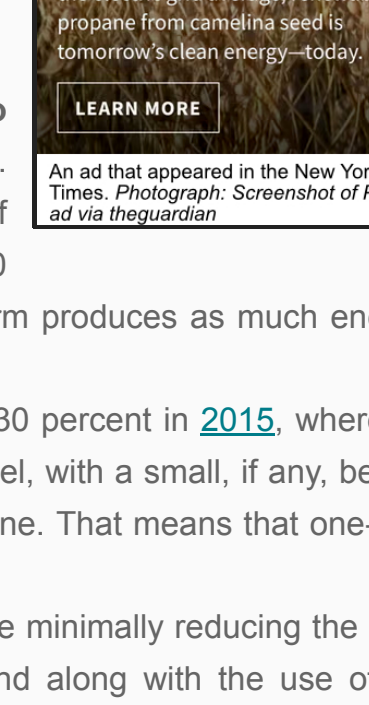
Canada's tar sands hold a vast amount of oil, making the country the third largest holder of oil reserves after Saudi Arabia and Venezuela. Extracting this oil is a process that is both energy and water-intensive, and it generates more GHG than conventional oil extraction.



A team of scientists measured all carbon-based molecules over the oil sand in the province of Alberta, Canada. They report in the January 25th issue of *Science* that these pollution-causing gases from the oil sands are 20 to 64 times what has been detailed in industry reports based on standard monitoring techniques. *nature.com/*

PROPANE

Propane gas, commonly liquified, is used in heating and cooking. Typically, a by-product of natural gas or crude oil refining, propane can also be made from non-fossil sources like plant, seed, and animal oils – though currently only 0.04% of it is. Most propane – even "renewable propane" made from plants or cooking oil – emits carbon dioxide, nitrogen oxide, and other environmentally harmful fossil fumes
While comprising only a small fraction of fuels burned in the country, the advertising of the Propane Education & Research Council (PERC), a US lobbying group, often promotes propane as a form of clean and renewable energy. *theguardian.com/*


ENERGY FOR EVERYONE
propane
A Huge Step Forward in The Path to Zero Carbon Emissions
With lower carbon intensity than diesel or the electric grid average, renewable propane from camelina seed is tomorrow's clean energy—today.
LEARN MORE
An ad that appeared in the New York Times. *Photograph: Screenshot of Perc ad via theguardian*

CORN

For all they disagree on, presidential candidates of either party find no arguments against using corn-derived ethanol as an additive to gasoline. However, an expert says, corn-based ethanol is a woefully inefficient use of resources. According to the 2023 Iowa Climate Statement, signed by more than 200 science faculty at 31 colleges and universities across the state, a "one-acre solar farm produces as much energy as 100 acres of corn-based ethanol" over a year.
The portion of the U.S. corn crop devoted to fuel rose from 11 percent in 2004 to 30 percent in 2015, where it has held steady. Ethanol now makes up about 10 percent of every gallon of automobile fuel, with a small, if any, beneficial impact. On a per-gallon basis, ethanol produces about two-thirds of the energy of gasoline. That means that one-third of the vast corn crop offsets less than 7 percent of gas use.
Growing corn for ethanol does not do much to mitigate climate change. In fact, while minimally reducing the price of fuel for combustion engine-powered cars, it may have encouraged more driving and along with the use of GHG-emitting fertilizers, increased water consumption for irrigation, it may have achieved the opposite.
Using all those corn fields for energy generation continues to be a viable option. And the (more productive) agricultural use of the land can continue along with solar panels built in the same fields. newrepublic.com/

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NORTH-EAST

More than 90 environmental organizations call on the governors of Connecticut, Massachusetts, New York and Rhode Island to oppose the expansion of a major natural gas pipeline through the states. *wbur.org/ via Northeast Energy News*

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Green Energy Times
Be Energy Independent!

New York

The New York Power Authority issued a request for information on the development of renewables and battery storage necessary to help meet the state's climate goals.
New York law requires the state to get 70% of its electricity from renewable energy sources by 2030 and achieve a zero-emission power sector by 2040. *utilitydive.com/*

The developers of the Empire 2 offshore wind power array have canceled their contract for the 1200-megawatt facility to be built off the south coast of Long Island. The project cancelation will affect the Port of Albany where the tower facilities were assembled.
The termination of the project did not come as a surprise to those in and around the wind industry, given the recent disruptions stemming from rising construction costs. *timesunion.com/ via Northeast Energy News.*

The New York City Council approved the "City of Yes for Carbon Neutrality" which removes zoning impediments to rooftop solar, solar parking canopies, onshore wind, and energy storage systems. Policies included in the initiative will open up over 8,500 acres of parking lots across the city for the potential installation of solar panels, ease wall height and thickness restrictions that hinder building electrification and retrofit efforts, and more than double commercially zoned land where EV charging facilities can be located, according to the proposal document and release. *utilitydive.com/*

Long Island electric vehicle owners deal with inaccurate or inconsistent charger functionality, availability, and pricing across service providers — problems that limit interest in using the vehicles on longer trips. *newsday.com/ via Northeast Energy News.*

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Connecticut

Under the updated Energy Storage Solutions **program, expanded residential customer incentives f**or the installation of battery storage, now provide up to $16,000 in upfront incentives, an increase from the previous maximum of $7,500. *solarpowerworldonline.com/*

Massachusetts

Four new fast electric vehicle chargers come online at Massachusetts Turnpike rest stops. *Telegram & Gazette via Northeast Energy News*

Rhode Island

Rhode Island's first anaerobic digester in Johnston— one of the largest renewable energy facilities in the state — faces criticism from its neighbors over how bad it smells*. ecori.org/ via Northeast Energy News*

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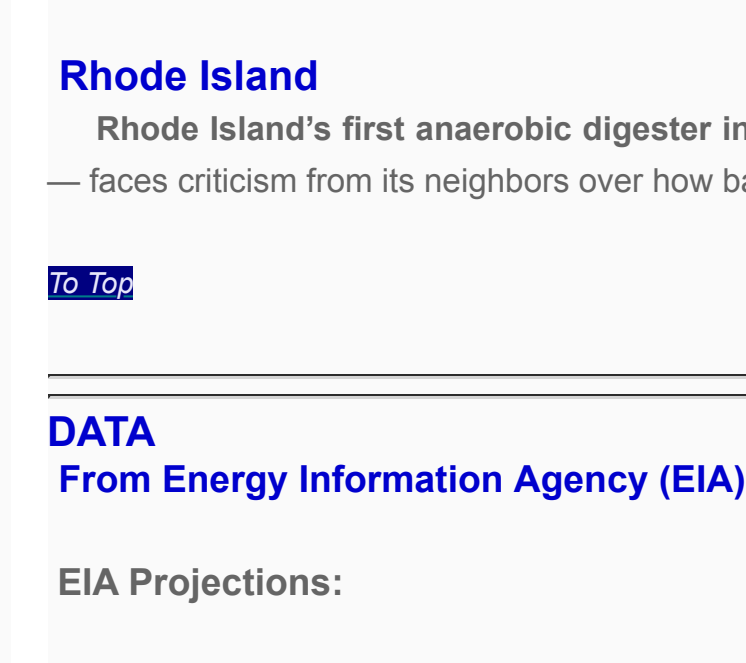
DATA

From Energy Information Agency (EIA):

EIA Projections:


Annual U.S. cumulative installed battery capacity (as of November 2023)

Data source: U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory*, based on Form EIA-860M

U.S. battery storage capacity has been growing since 2021 and could increase by 89% by the end of 2024 if developers bring all of the energy storage systems they have planned online by their intended commercial operation dates. Developers currently plan to expand U.S. battery capacity to more than 30,000 megawatts (MW) by the end of 2024, a capacity that would exceed those of petroleum liquids, geothermal, wood and wood waste, or landfill gas.

EIA forecasts that U.S. solar power generation will be the leading source of growth in electricity generation, growing by 75% from 163 million megawatt hours (MWh) in 2023 to 286 million MWh in 2025. Wind power generation will grow 11% from 430 million MWh in 2023 to 476 million MWh in 2025.

Crude oil production in the United States is projected to reach 13.2 million barrels per day (b/d) in 2024 and more than 13.4 million b/d in 2025, both of which would be new records.
U.S. production of dry natural gas is forecast to grow between 1% and 2%, or about 1.5 billion cubic feet per day (Bcf/d) in 2024 and 1.3 Bcf/d in 2025, down from growth of 4.0 Bcf/d in 2023.

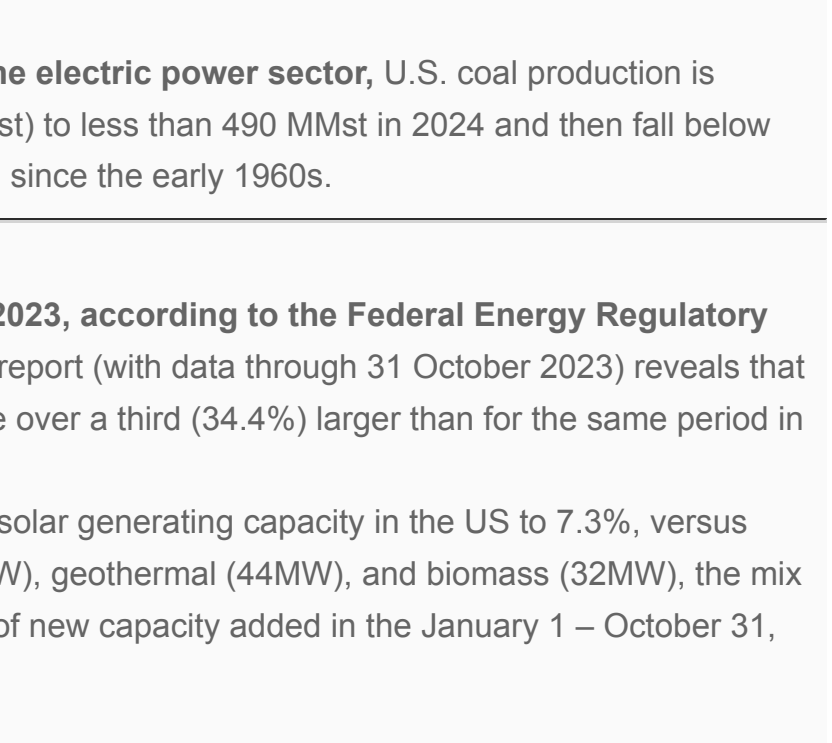
Faced with continuing declines in coal consumption in the electric power sector, U.S. coal production is expected to decline by more than ninety million short tons (MMst) to less than 490 MMst in 2024 and then fall below 430 MMst in 2025, the least coal produced in the United States since the early 1960s.

The US installed 11GW of solar in the first 10 months of 2023, according to the Federal Energy Regulatory Commission (FERC). FERC's "Energy Infrastructure Update" report (with data through 31 October 2023) reveals that solar capacity additions during the first 10 months of 2023 were over a third (34.4%) larger than for the same period in 2022.
The additions brought utility-scale (>1MW) share of installed solar generating capacity in the US to 7.3%, versus 6.2% in the same period in 2022. Including hydropower (228MW), geothermal (44MW), and biomass (32MW), the mix of renewable energy sources has accounted for most (57.7%) of new capacity added in the January 1 – October 31, 2023 period. *renews.biz/*

From Copernicus, **European Union's Climate Change Service**

- 2023 is confirmed as the warmest calendar year in global temperature data records going back to 1850
- 2023 had a global average temperature of 14.9C, 0.17°C higher than the previous highest annual value in 2016

- 2023 was 0.60°C warmer than the 1991-2020 average and 1.48°C warmer than the 1850-1900 pre-industrial level
- It is likely that a 12-month period ending in January or February 2024 will exceed 1.5°C above the pre-industrial level.
- 2023 marks the first time on record that every day within a year has exceeded 1°C above the 1850-1900 pre-industrial level. Close to 50% of days were more than 1.5°C warmer than the 1850-1900 level, and two days in November were, for the first time, more than 1° C warmer.
- Each month from June to December in 2023 was warmer than the corresponding month in any previous year.
- In 2023 Antarctic ice reached record low levels.
- The atmospheric concentrations of carbon dioxide and methane continued to increase and reached record levels in 2023, reaching 419 ppm and 1902 ppb, respectively. Carbon dioxide concentrations in 2023 were 2.4 ppm higher than in 2022 and methane concentrations increased by 11 ppb.


SURFACE AIR TEMPERATURE ANOMALY • 2023
Reference period: 1991-2020 • Data: ERA5 • Credit: C3S/ECMWF
Temperature anomaly (°C)
Copernicus
ECMWF

climate.copernicus.eu/

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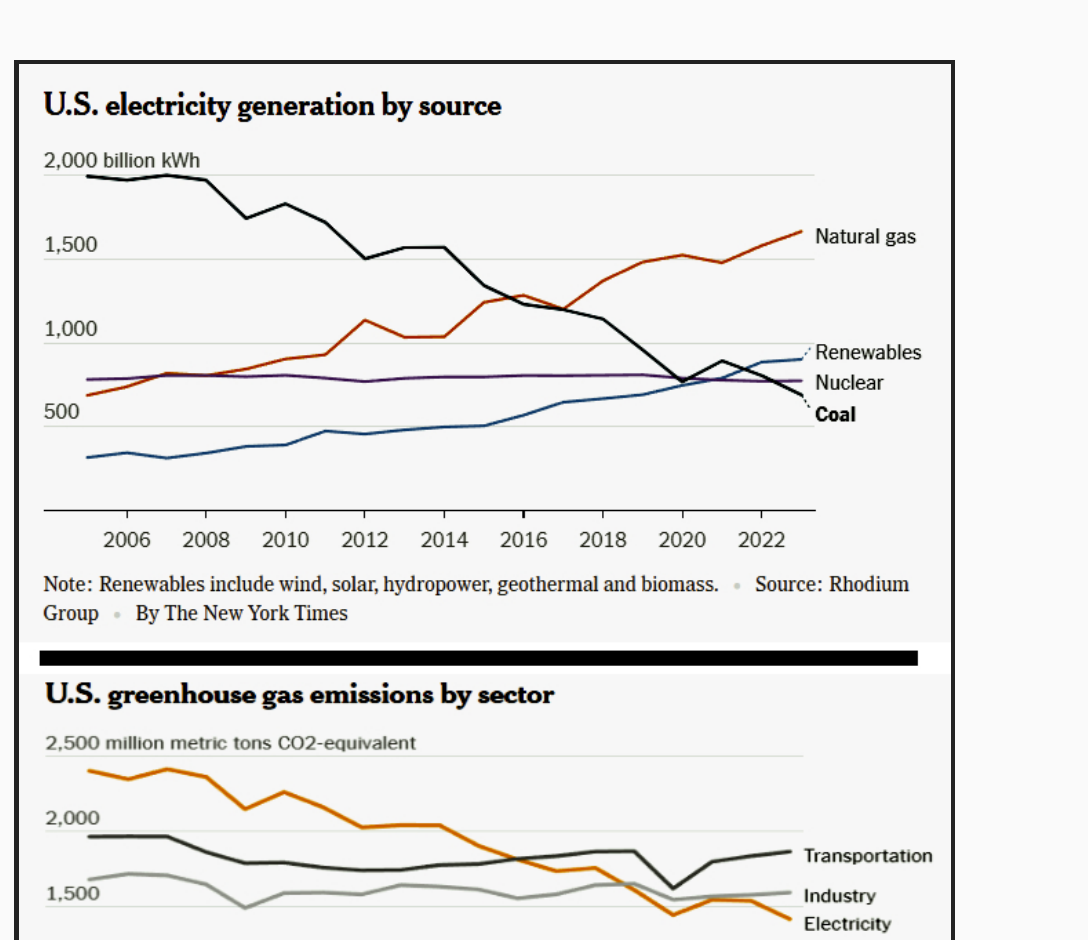
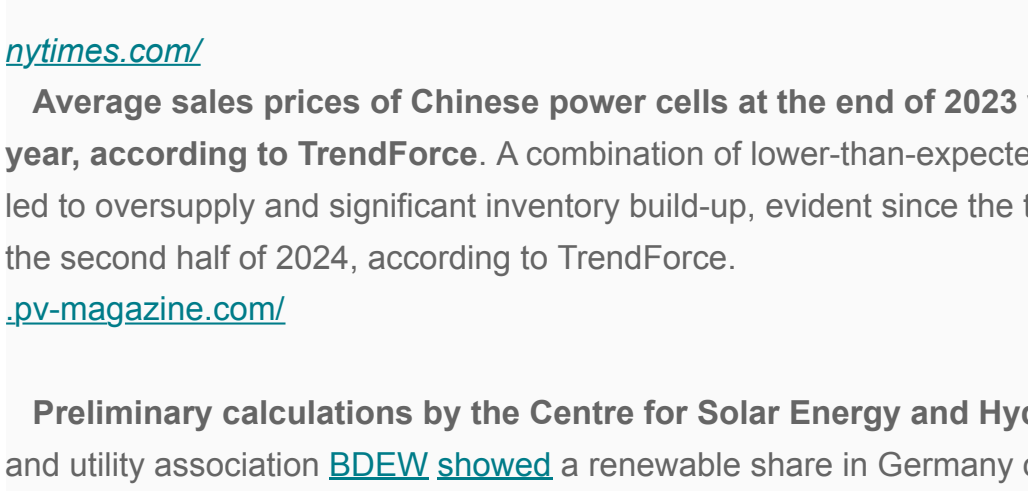
Taipei-headquartered solar and energy storage analysis firm EnergyTrend anticipates huge growth in commercial and industrial (C&I) storage system uptake in 2024.


An estimated 507GW of renewable electricity capacity was added globally in 2023
Capacity added in gigawatts

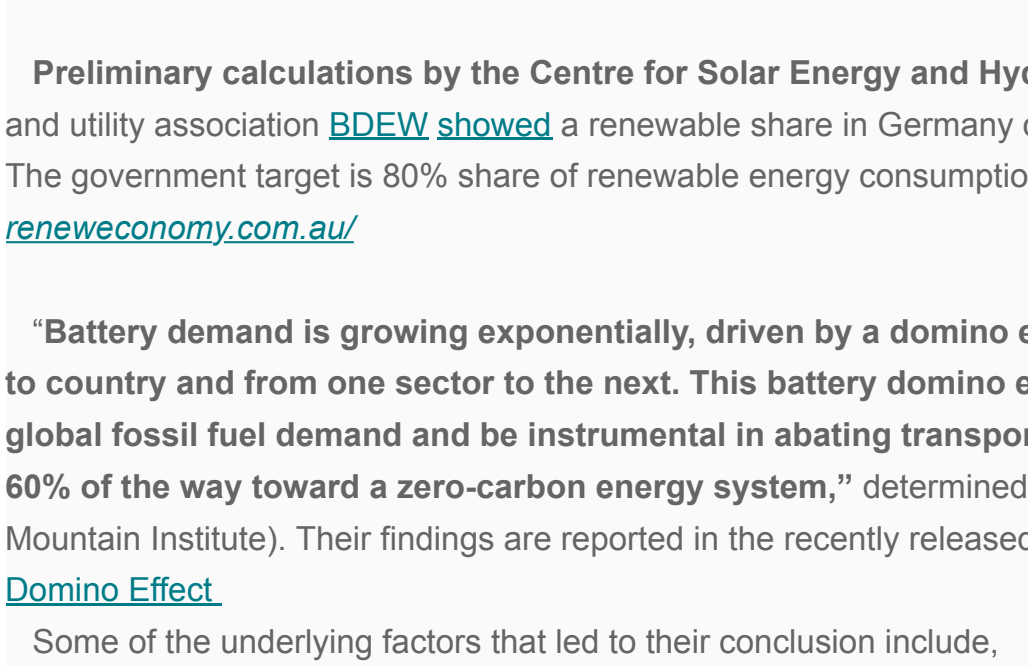
Guardian graphic. Source: IEA. *2023 capacity estimated. Note: IEA main case projection shown assuming growth trajectory under existing policies and market conditions

theguardian.com/

America's greenhouse gas emissions fell 1.9 %in 2023, a total decline of 17.2% since 2005. But emissions will need to fall three times as fast for the rest of the decade if the country wants to meet its climate goals.


U.S. electricity generation by source

Note: Renewables include wind, solar, hydropower, geothermal and biomass. • Source: Rhodium Group • By The New York Times


U.S. greenhouse gas emissions by sector

Source: Rhodium Group • By The New York Times

nytimes.com/

Average sales prices of Chinese power cells at the end of 2023 were half of what they were at the start of the year, according to TrendForce. A combination of lower-than-expected market demand and rapid capacity expansion led to oversupply and significant inventory build-up, evident since the third quarter of 2023. Prices should stabilize in the second half of 2024, according to TrendForce.
.pv-magazine.com/

Preliminary calculations by the Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) and utility association BDEW showed a renewable share in Germany of around 52 percent of consumption in 2023. The government target is 80% share of renewable energy consumption by 2030.
reneweconomy.com.au/

"**Battery demand is growing exponentially, driven by a domino effect of adoption that cascades from country to country and from one sector to the next. This battery domino effect is set to enable the phaseout of half of global fossil fuel demand and be instrumental in abating transport and power emissions, propelling us over 60% of the way toward a zero-carbon energy system,"** determined the researchers at RMI (formerly Rocky Mountain Institute). Their findings are reported in the recently released report X-Change: Batteries — The Battery Domino Effect
Some of the underlying factors that led to their conclusion include,

- Battery sales have been doubling every two to three years, and we are on track for a six to eight-times increase by 2030, with sales of 5.5 - 8 TWh (1Tera Wh = 1 million Wh) per year.
- As one sector scales up demand, the cost and quality feedback loops enable batteries to start uptake in the next sector - e.g., from consumer electronics to EVs, to stationary electricity storage.
- Once new battery technology is successful, it jumps geographies.
- In 2022 we spent more on building battery factories ($45 billion) than on solar and wind factories combined; and by the end of the decade, the battery market will be larger than both solar panels and wind turbines.
- Over half of fossil fuel demand is at risk. Batteries will enable renewable technologies to replace 175 exajoules (EJ) of fossil fuel demand in the electricity sector and 86 EJ of demand in the road transport sector and put at risk the remaining 23 EJ of transport demand from shipping and aviation.
- Although supply chains are stressed, thanks to constant innovation and investment, we have enough raw materials that can be sourced — equitably and sustainably — and can act fast enough to build the charging infrastructure required for the future battery-dominated energy system. *rmi.org/*

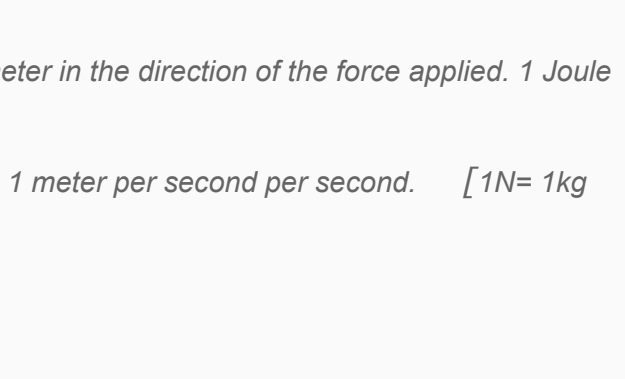


Figure 3: Lithium-ion battery prices, $/kWh (left), $/kWh log scale (right)

1 EJ = 10^{18} Joules = 277,778,000 KWh
1 joule is the amount of work done when a force of one Newton displaces a body one meter in the direction of the force applied. 1 Joule = 1 Newton × 1 Meter [1 kg·m^2·s^{-2}]
1 newton of force is the force required to accelerate an object with a mass of 1 kilogram 1 meter per second per second. [1N= 1kg m/$s^2$1]

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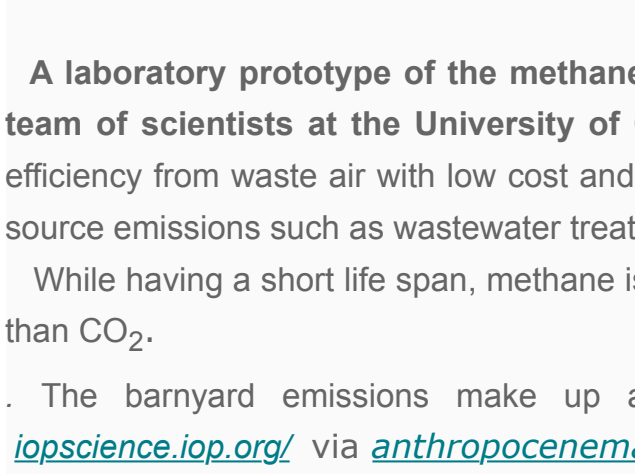
OF INTEREST

Energy: Research/Development


Capex on fossil fuels and clean energy supply, long term (billion $)

In a recently released report, RMI, a non-profit clean energy research entity, argues that the buildout of renewable energy supply net capital expenditures related to renewable energy expansion are much less than generally presented. Multiple analyses include the growth in end-use capex for renewables but not the off-setting decline in end-use capex for fossil technologies.
rmi.org/ == insideclimatenews.org/

A vehicle-to-grid (V2G) pilot in New York City that became operational in the late summer of 2022 demonstrated that EV drivers can earn income under New York's Value of Distributed Energy Resources (VDER) program. Hosted at a Brooklyn garage belonging to Revel, an all-electric ride-hailing service provider, the hardware and software technology was provided by bidirectional charging equipment specialist Fermata. *energy-storage.news/* == microgridknowledge.com/

A laboratory prototype of the methane eradication photochemical system (MEPS) has been developed by a team of scientists at the University of Copenhagen, Denmark. The technology achieves 58% methane removal efficiency from waste air with low cost and energy per unit volume, especially at the low concentrations found in point source emissions such as wastewater treatment, livestock production, biogas production and mine ventilation.
While having a short life span, methane is a potent greenhouse gas that traps 28 times more heat in the atmosphere than CO_2.
. The barnyard emissions make up a substantial portion of methane emitted by the agricultural sector. *iopscience.iop.org/* via *anthropocenemagazine.org/*

ENERGY STORAGE

A new lithium-ion battery includes a cathode based on organic materials, instead of cobalt or nickel (metals used in lithium-ion batteries), has been designed by researchers at MIT.
Cobalt is widely used in cathodes of lithium-ion batteries for its high stability and energy density. However, it is a scarce metal, its price can fluctuate dramatically and its extraction poses environmental and health hazards. In addition, cobalt ore is available and mined in mainly politically unstable countries.
Tests show, that the new batteries that use organic TAQ (bis-tetraaminobenzoquinone) material have conductivity and storage capacity that is comparable to that of traditional cobalt-containing batteries. Also, batteries with a TAQ cathode can be charged and discharged faster than existing batteries, which could speed up the charging rate for electric vehicles. *sciencedaily.com/*

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EV

A fully electric passenger jet seating up to 90 passengers could be launched within the next 10 years. The E9X concept, designed by the Dutch company Elysian, is a battery-powered plane that can fly up to 500 miles on a single charge based on a theoretical battery pack of 360 watt-hours per kilogram — the standard measure of battery density. By contrast, a Tesla battery has a density of between 272 and 296 Wh/kg according to Inside EVs. With future improvements, the startup hopes to boost the plane's range up to 620 miles (1,000 km). *livescience.com/*.

In an AI-based exploration of 160 billion organic molecules, Argonne National Laboratory's scientists identified 41 liquid hydrogen carriers that could one-day fuel cars, trucks, buses, trains, and ships and generate energy for consumers.
Hydrogen in its pure form exists as a gas under normal conditions. For use as a fuel, one of the challenges is shipping this gas safely to refueling stations and storing it.
Hydrogen carrier compounds in liquid form have a much better safety profile because they are not as prone to leaking and explosion. They also have a much higher energy content per unit volume, making storage and transportation far easier.
The calculations necessitated access to supercomputers available at a few places in the world. One of them is Argonne.
Even with the powerful computational resources available, one millisecond of compute time per molecule would translate into five years of computer time for the 160 billion molecules. Argonne scientists developed an AI-based screening method that sped up the computations to three million molecules per second, or about 14 hours for the 160 billion. In the next steps, experimentalists will further evaluate the 41 suitable hydrogen carriers.
The research findings appeared in Digital Discovery. anl.gov/

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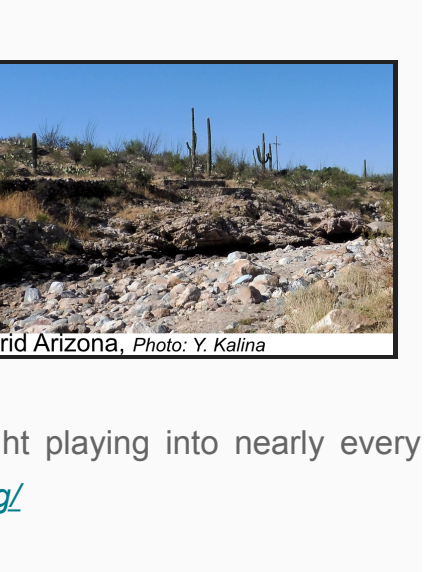
THE READS


And Arizona. Photo: Y. Kalina

Critical minerals for the clean energy transition are abundant in the Southwest, but the dozens of mines proposed to access them will require vast sums of water, something in short supply in the desert. Mine claims for the elements critical to the clean energy transition are piling up from Arizona to Nevada to Utah. Lithium is needed for the batteries to store wind and solar energy and power electric vehicles. Copper provides the wiring to send electricity where it will be needed to satisfy exploding demand. But water stands in the way of the transition, with drought playing into every proposed renewable energy development, from solar to hydropower. *insideclimatenews.org/*

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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 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.

For more information, please contact:

New York Solar Energy Society
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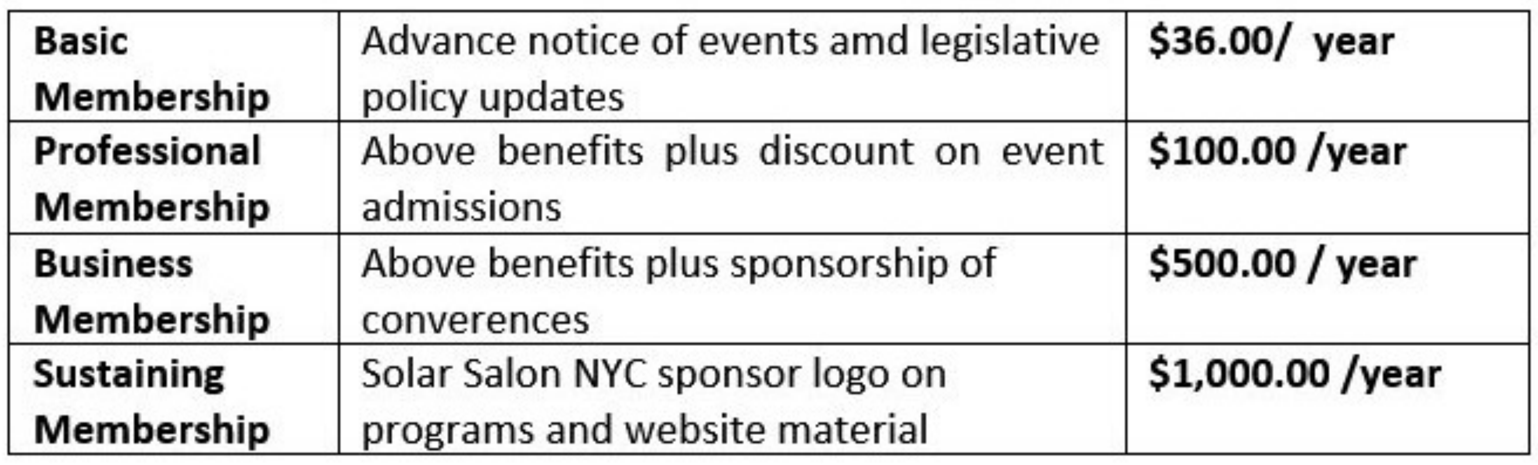
917 974 4606

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.



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Professional Membership	Above benefits plus discount on event admissions	**$100.00 /year**
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Contribute online via the 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 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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