

# ENERGY MATTERS

Soundbite summaries of the energy news you need to know

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AN OFFICIAL PUBLICATION OF



AMERICAN ENERGY SOCIETY

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March 20, 2023

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## - The Power Read -

- **Oil:** Producer vs. refiners - the underdogs have seized a temporary advantage.
- **Low-/no-carbon:** Higher prices for critical minerals eventually leads to substitutions.
- **Policy:** 40% of US corn is used to offset 10% of gas consumed.
- **Policy II:** Europe has successfully transitioned away from Russian sources of energy.
- **Climate:** US efforts to reduce energy-related CO2 emission is working.
- **Electricity:** The belly of the duck is getting fatter.
- **Quotes:** On the fall of SVB and its impact on climate tech.

## - News from the Society -

- Others may be concerned about economic recession, but the energy sector is hiring! There are 100,000s of unfilled jobs. [Contact us](#) if you're curious about new professional opportunities.

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## - Fossil Fuels -

### - Oil -

- *Special report:* There has always been competition between oil producers and processors (aka "refiners," or the companies that buy output and turn it into consumer goods). Historically, producers have the advantage in this relationship because they can capitalize on "optimizer models" that project how the short-run demand curve for crude oil in specific locations responds to changes in spot prices. By looking carefully at each refinery customer, producers can stay just below the price at which that customer will substitute imported crude oil. However, Putin's invasion of Ukraine **has caused shortages and higher prices, which has allowed processors to seize the advantage from producers, [at least in the short run.](#)**

## - Natural gas -

- Natural gas consumption in **the US set nine monthly records and an [annual record](#)** (88.5 billion cubic feet per day) in 2022. Also, natural gas consumption increased 5% year-over-year, the second-fastest y/y growth since 2013.

## - Coal and mining -

- **Asia's electricity generation, by source:**



## - Carbon capture -



- [Agroforestry](#) — an ancient land management method that integrates the growth of trees with crops or livestock — is **gaining support among investors and in Congress** (note: see *Energy Today* on [Conservation](#) and especially the article, "Buffalo for the Broken Heart"). *Insert*: map of US regions practicing agroforestry; a darker shade of blue represents more intense agroforestry.

A few of the many benefits of agroforestry include:

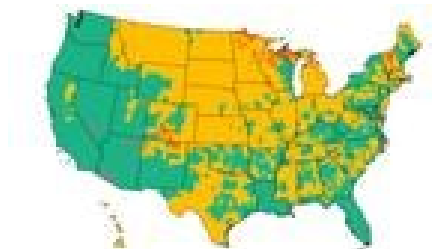
- Buffers against extreme weather
- Boosts soil health
- Increases crop yields
- Reduces air and water pollution
- Assists crop diversity
- Sequesters carbon

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## - No- / Low-Carbon and Renewable Energy -

- "Critical minerals" required by clean energy are in extremely high demand, which has introduced premium pricing. Historically, however, **high prices for critical minerals eventually leads to substitutions**. For instance, cobalt markets are in decline because prices went to \$100,000 per metric ton, which led to declining demand and a shift to other commodities like vanadium and zinc. (From SME and AES Member [Ken Hoffman](#).)

- From 2010 to 2019, the [unit costs](#) of solar energy fell 85 percent, while wind power dropped 55 percent.



- About 90% of US households that own a vehicle could **reduce the percentage of income spent on fuel** if they switched to electric vehicles. *Insert:* map of percentage change in transportation energy burden with a shift from an ICE vehicle stock to an EV vehicle (**green** = significant savings; **yellow** = moderate savings).

- Related, on the one hand, **battery-electric vehicles are responsible for 25 fires per 100,000 cars, as compared to 1,530 fires per 100,000 internal-combustion vehicles.** On the other hand, fires from EVs are more difficult to extinguish due to the high burning temperature of lithium-ion batteries.

- Silicon Valley Bank's customers were not distributed evenly across all industries. According to SVB publications, about half of all venture deals in 2022 banked with SVB. American Energy Society has determined that about 1,500 climate and sustainability companies (aka "**climate tech**") banked there, and **the subsector with the greatest percentage of was community solar. (About 60% of all community solar ventures banked at SVB.)**

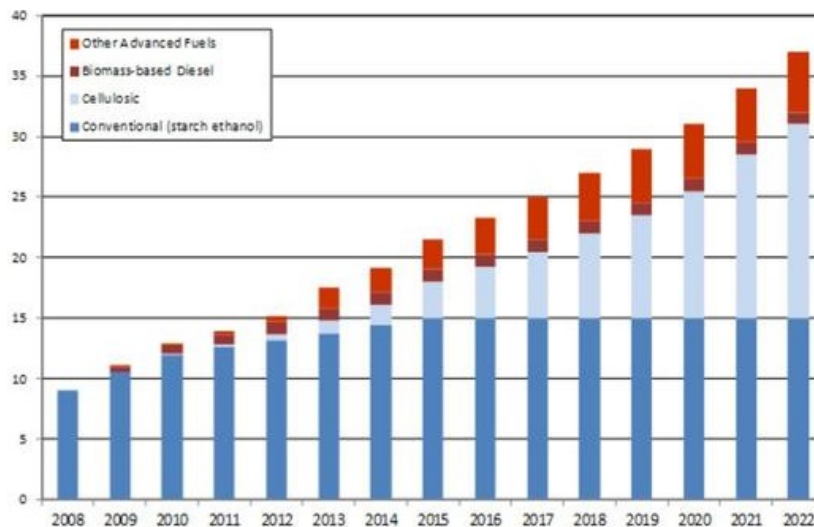
-**"Initial criticality"** (adv.) def: when a nuclear plant has **safely started** a self-sustaining nuclear fission reaction inside its reactor (i.e. atoms are being split, and the heat from that reaction can be harnessed to produce steam, power a turbine, and generate electricity). Vogtle 3, one of a pair of 1,100-megawatt nuclear reactors constructed by Georgia Power, has reached "initial criticality." *Note:* construction started on the Vogtle 3 reactors in 2009, with plans to get them online by 2017, but the project is six years overdue and has cost utility customers about \$30 billion, more than double the original price tag.

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## - Energy Policy & Geopolitics - - Beltway Buzz -

- **President Biden approved the Willow oil project, which allows for drilling on federal land in Alaska.** The decision contradicts Biden's campaign pledge of "No more drilling on federal lands, period."

- **40% of US corn is used to offset 10% of US motor gas demand.** Corn is used to make ethanol, which is considered a "renewable fuel." The Renewable Fuel Standard (RFS) is a federal program that requires transportation fuel sold in the US to contain a minimum volume of renewable fuels. In 2022, about 36 billion gallons of renewable fuel was blended into four types of transportation fuels (conventional and advanced biofuels, biomass-based diesel, and cellulosic biofuels). *Insert:* renewable fuel standard volumes, by year, in billion gallons.



- The IRA provides significant federal funding for a very wide range of clean energy projects and programs. However, **award funding is slow** because the **Treasury Department needs to clarify IRA terms** like "prevailing wages," "qualifying apprenticeships," "energy communities," "domestic content," and "direct pay tax credits."

- *Special report:* The US Department of Education expanded its interpretation of rules for college/vendor relations. More specifically, there is **increased oversight on universities that collaborate with vendors on tech-2-market projects**. For instance, there are limits on what colleges can accept from vendors (online project management programs and services, tracking systems, devices, etc.). *Note:* a study on the new rules has a [firewall](#).

- *Late edition for Members only:* California governor Gavin Newsom is proposing to [penalize](#) refiners who excessively profit from in-state gasoline production, aiming to combat what his office views as price gouging by oil companies. Newsom's proposal would create an independent watchdog to monitor gasoline markets and impose, through the California attorney general, penalties on excessive profit margins. **What constitutes an excessive profit margin is not clear**, and California industry groups say the policy could actually raise pump prices.

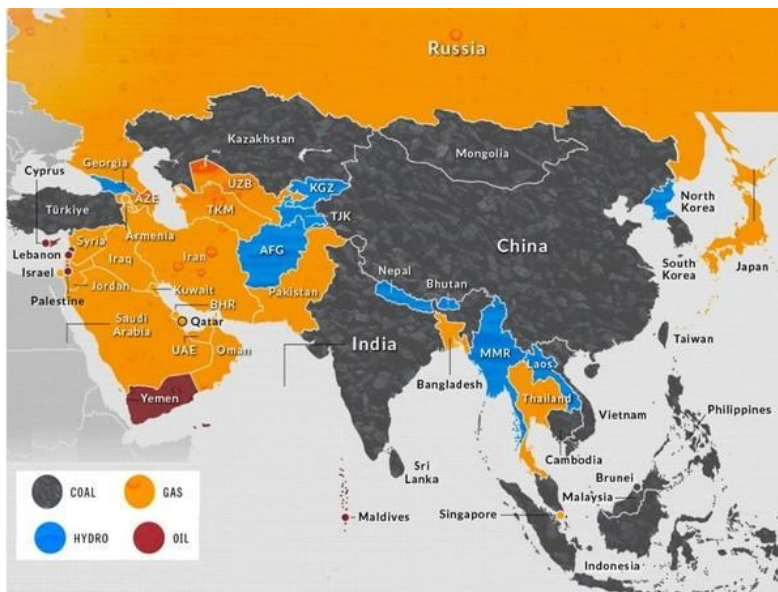
### - Global Spotlights -

**Europe:** As winter fades into spring in the northern hemisphere, it's clear that Europe has been able to successfully transition away from Russian sources of energy. Wind power provided a big boost (onshore and offshore wind farms met 17% of EU and UK power demand in 2022), while solar generation increased 24 percent. But the most important factor was [reduced consumption](#). In general, Europeans turned down thermostats, switched off nonessential lighting, took shorter showers, and wore heavier clothes.

**Africa:** Perhaps the sector and region most affected by the collapse of Silicon Valley Bank might be [startups in Africa](#), which keep the bulk of their money in US banks to prevent the effects of local currency devaluation and regulatory uncertainty at home while staying close to global sources of capital.

**L/S America:** Costa Rica, followed by Honduras, El Salvador, Nicaragua, and Uruguay, relies almost entirely on renewable energy for electricity. The former generates 99% of its electricity from renewable sources, while the latter uses offshore oil platforms to generate wind energy for producing green hydrogen.

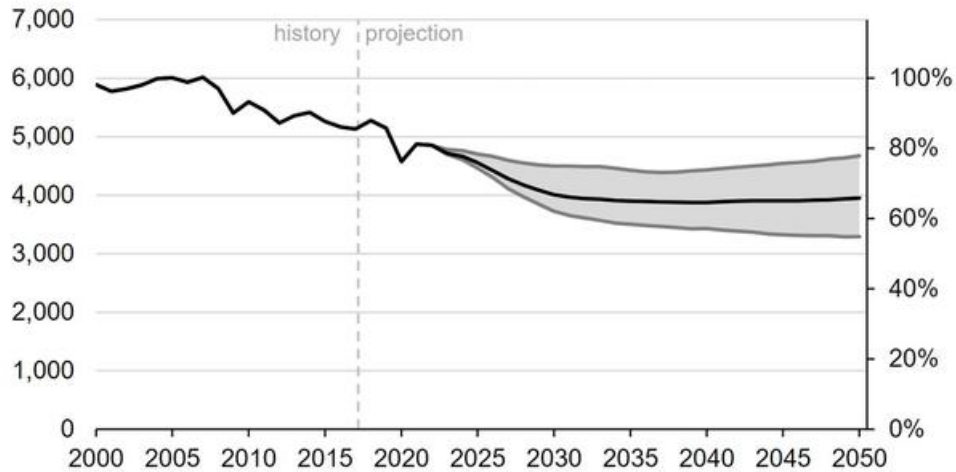
**Asia:** *Insert* - primary sources of energy, by country.



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## - Climate and Sustainability -

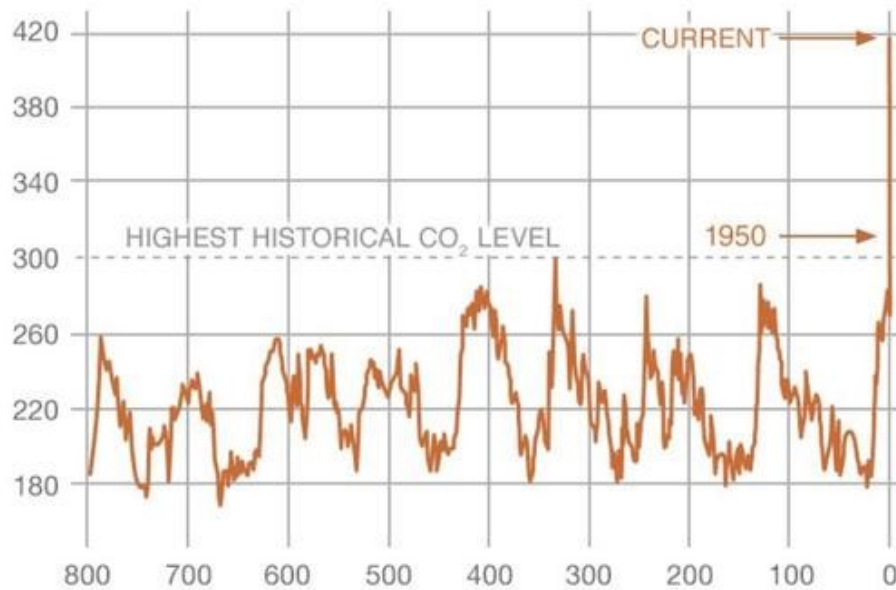
- **US efforts to reduce energy-related CO2 emissions is [working](#).** There is certainly more to do, but it's important to note what has been accomplished. *Insert:* total US energy-related CO2 emissions, a comparison of case studies, in million metric tons.



- **Methane is responsible for around 30% of the rise in global temperatures** since the Industrial Revolution. The [energy sector](#) – especially oil, natural gas, coal, and bioenergy – accounts for nearly 40% of methane emissions from human activity.

- **Deforestation in the Brazilian Amazon is at an [all-time high](#).**

- *Insert:* **CO2 emissions in the last 800 years** (x-axis: years before today; y-axis: CO2 parts/million).



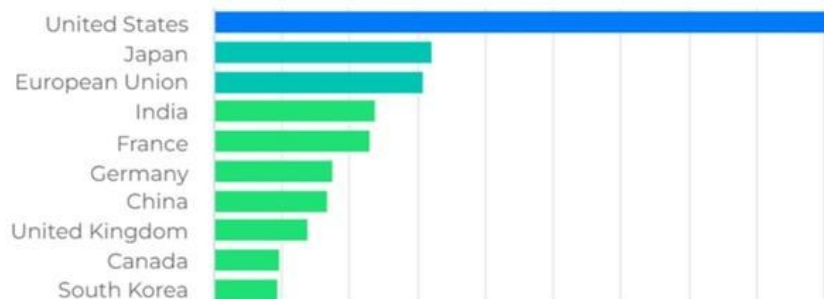
- **"Eco-anxiety"** (noun) *def:* Distress relating to climate and ecological crises. While not a diagnosable disease, it appears to be on the [rise](#), especially among young people.

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## - Research and Markets -

- In 2020, the top five Western oil and gas supermajors — ExxonMobil, BP, Shell, Chevron and Total — saw combined losses of \$76 billion; in 2022, **these same five companies generated \$200 billion in profits.**

- *Insert below: public energy RD&D expenditures, by country (from the Fletcher School).*



- **A few interesting energy-related research projects:**

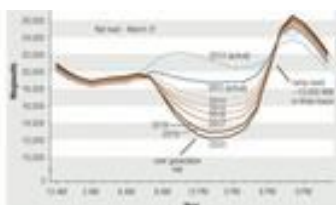
- Funded by NASA, researchers at **Boston University** (and at **Virginia Tech** and **Tuskegee University**) will work with Joby Aviation to [study](#) rotor performance and wind sound for electric aerial vehicles.
- A typical EV lithium-ion battery stores about 200 watt-hours per kilogram (Wh/kg). Researchers at Argonne NL (and at the Illinois Institute of Technology, or IIT) [reached](#) 675 Wh/kg with a lithium-air variant and believe they can reach 1,200 Wh/kg.
- Professor Goswami at the University of South Florida has developed the "[Goswami Cycle](#)," a method of turning waste heat back into electricity.

- **A few interesting technologies on the market in 2023:**

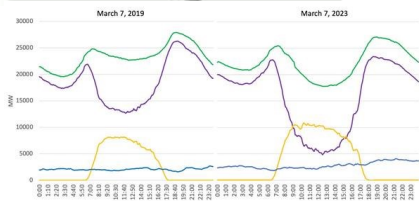
- [Honeywell](#) manufactures **EV battery safety sensors** that are integrated into EV battery packs, which enables early detection of fires.
- Consider that "**battery health**" might be the new odometer for electric vehicles. AES is watching [Recurrent](#), which offers a rating system for EV batteries.
- [Impossible Metals](#) has developed a **robotic seabed harvesting system** that carefully collects rare earth elements off the ocean floor.

- The US DoE is offering 90 \$100,000 prizes for individuals and organizations that develop partnership plans or innovative financing strategies to help rural or remote communities improve their energy systems and advance clean energy. **The [deadline](#) to apply for the American-Made Energizing Rural Communities prize is May 24, 2023.**

## - Electricity & Power -

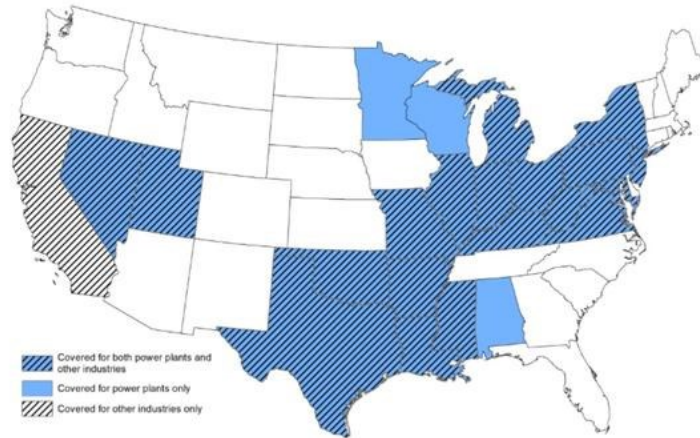


- About ten years ago, analysts at CAISO and NREL saw that a graph of daily electricity demand and net production of wind and solar generation (aka "[net load](#)") was shaped like a duck (*insert upper left*). It turns out that **the belly of the duck has gotten fatter** (*insert below: a comparison of duck curve "net loads" on the same date in two different years, March 7, 2019 and 2023*).





- The EPA finalized "[Good Neighbor](#)" rules for 22 states that will restrict NOx emissions from power plants. The other 23 states already had the rules in place.



- The US Department of Transportation has launched the Charging and Fueling Infrastructure Discretionary [Grant Program](#), which makes **\$700 million available to cities, counties, local governments and tribes to support installation of EV charging infrastructure.**

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## - University spotlight -

- AES recommends a survey ([PDF](#)) of how IRA funds support sustainability efforts at universities and colleges.

- Researchers at **UCLA** have found that increased atmospheric dust is [masking](#) greenhouse gases' warming effect.

- The Center for Energy & Environmental Education ([CEEE](#)) at the **University of Northern Iowa** assists local governments in Iowa by developing community-wide greenhouse gas emissions inventories and emissions reduction plans to improve Iowa's communities.

## - Quotes -

*On the crash of SVB and its impact on climate tech*

"The FDIC is trying to find a buyer, but SVB's loans that it issued to startups makes it a tricky asset to value."

- Jessica Hamlin, PitchBook

"Once the federal government stepped in to backstop deposits, the situation went from 11 out of 10 on the danger scale to 2 out of 10."

- Zack Bogue of venture firm DCVC on the level of panic in the financial world

"[It] is a major blow to early-stage and even late-stage climate tech startups looking to get financing."

- Daniel Ives, technology sector analyst at Wedbush Securities

"If the reaction in the industry is ... that this is a systemic problem, that's going to have a much larger, much more pernicious impact on climate tech."

- Ethan Cohen-Cole, former economist at the Federal Reserve Bank of Boston and current CEO of direct air capture startup Capture6

## - Bulletin Board -

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- **Clearpath** has completed a white paper that examines the development of wind power in [Iowa](#), the #2 wind state in the US. The study highlights proponents and advocates of the industry and its plans to expand in the future.
- **Uneath** is a dynamic Mobile GIS that connects assets, data, and field teams for critical infrastructure providers. Start your [free](#) trial today.
- **Ubiquitous Energy**, a leader in transparent solar technology, is [developing](#) energy generating windows and door products.
- **Sunrun**, a residential solar and battery storage installer in the US, has partnered with Ford to launch a new [home electric vehicle \(EV\) charger](#) that is compatible with any EV model.

## - Gratitude -

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