

ENERGY MATTERS

Soundbite summaries of the energy news you need to know

AN OFFICIAL PUBLICATION OF



AMERICAN ENERGY SOCIETY

May 1, 2023

- The Power Read -

- **Fossil fuel trend-spotting insights:** Sneak-peek: CCUS :-)/ biodiesel :-)
- **Low-carbon:** OSW, batteries, H2, and nuclear.
- **Policy:** The debt-ceiling fight in Congress is also a fight about climate change.
- **Policy II:** 12 states have passed ROFR laws.
- **Climate:** Baseball players are hitting more home runs.
- **Markets:** Spotlight on EVs.
- **Electricity:** "Net EROEI" might be the best metric to measure efficiency.

- News from the Society -

- The energy sector is hiring! There are thousands of unfilled jobs. [Contact us](#) if you're curious about new professional opportunities, including openings at Schneider Electric.

- **Thank you for being a Member of AES!** Please encourage your colleagues to [join](#) AES as a **Member** for unrestricted access to all publications, reports, datasets, primary source links, special discounts, trend-spotting analysis, networking support, archives....

- Fossil Fuels -

- Oil -

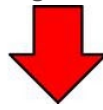
- AES trendspotting insights for oil sub-sectors:

Surging



1. CCUS / hydrogen (tie)
2. petrochemical integration
3. renewable diesel

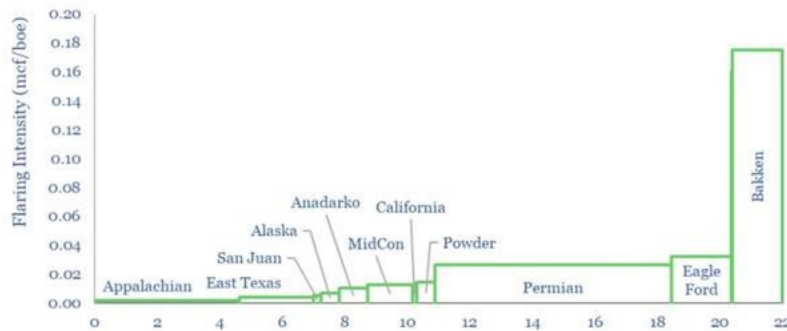
Fading



1. sustainable aviation fuel
2. biodiesel
3. onshore E&P

- Natural Gas -

- Methane slips or leaks from flaring are entirely preventable. **Methane leakage rates in the US have fallen about 22% in the last 5 years**, or about 0.21% of the total volume of gas, though the Bakken (North Dakota) is much worse. Methane slips in some parts of the world are as high as 8%. *Insert - US CO2 and methane intensity, in mboed by basin:*



- Coal and Mining -

- *The state of global coal:* Global coal production hit an [all-time high](#) of 8.3GTpa in 2022, of which 7GTpa is thermal coal and ~1GTpa is metallurgical coal. Meanwhile, international thermal coal prices reached \$340/ton, and revenues for the sector also set records in 2022. **Coal is often the cheapest thermal energy source**; usually, thermal coal costs \$60/ton and contains 6,250 kWh/ton of thermal energy, implying a cost of 1c/kWh; **however, coal is the highest-carbon fossil fuel**, with an average CO2 intensity of 0.37 kg/kWh, or about 2x more emissions than natural gas. The countries that produce the most thermal coal YoY are:

1. China (4GT)
2. India (1GT)
3. Europe (0.6GT)
4. All other Asian countries, excluding China and India (0.55GT)
5. US (0.5GT)

- Carbon Capture -

- The US is inviting the world's countries to participate in the Carbon Management Challenge, an **international race to store CO₂**. The [competition](#) kickoff will happen at COP28-Dubai in November 2023.

No- / Low- Carbon and Renewable Energy

- Offshore wind: About 3MWh of energy is consumed to manufacture and install 1kW of offshore wind turbines, but the energy [payback time](#) is about one year and **total energy return on energy invested (EROEI) is more than 20x**.

- Batteries: **Bottlenecks in battery materials set limits on the ability of this sub-sector to scale. The 5 most significant bottlenecks are, in order:**

1. lithium
2. fluorinated polymers
3. battery-grade nickel
4. graphite
5. copper

Note: there are no bottlenecks for the global supply of cobalt, especially because there are sufficient no- and low-cobalt alternatives.

- Hydrogen: **Many renewable energy sources rely on steel** (wind turbine towers, solar panel mountings and trackers, etc.) Steel is the source of about 10% of global CO2 emissions. In 2021, [H2 Green Steel](#) (Sweden) used green hydrogen to make the first "green steel"; it costs about 2x more than conventional steel.

- Nuclear: **Active global nuclear capacity is about 400 GW total.** There are about 700 individual nuclear reactors in the world, including 440 in [operation](#), 200 that have been shut down or decommissioned, and around 60 that are in construction. The average nuclear plant today has been running for 36 years, which means that about 10GW of reactor capacity should age-out and shut down each year through 2050. The top 5 countries with the most nuclear power capacity are:

1. US (100 GW)
2. France (60GW)
3. China (50GW)
4. Japan (45GW, but some of the installed base remains offline post-Fukushima)
5. Russia (30GW)

- Energy Policy & Geopolitics -

- Beltway Buzz -

- **The debt-ceiling fight in Congress is also a fight about climate change.**

- No Republican lawmakers voted in favor of Biden's \$369 billion climate law last year, but analyses of the resulting energy investments so far have found that about **two-thirds of the \$150 billion distributed since the Inflation Reduction Act became law in August have gone to Republican districts.**

- **The Biden administration is publicly supporting the development of the Mountain Valley pipeline**, an embattled natural gas project championed by Senator Joe Manchin (D-WV), who has threatened to pull his swing vote and walk back the IRA. The FERC has already approved the pipeline though it's held up in legal proceedings — AES Members have access to the most recent issue of [Energy Today, Oyez! Oyez! "A Mountain Valley Mess."](#)

- The US EPA announced **\$400 million for the Clean School Bus Program** (created by the Bipartisan Infrastructure Law), with an application deadline of August 22, 2023.

- State Spotlights -

- On the one hand, the US grid needs upgrades and a lot more transmission lines. On the other hand, 12 states have passed "[ROFR](#)" legislation (or, "right of first refusal") which gives local utilities the first option to build and own transmission projects before opening up a competitive bidding process. This Constitutional issue (Article 1) is destined for the SCOTUS. See also [Energy Today](#), "Don't Mess With Texas." **The 12 states that have passed legislation giving local utilities the ROFR to build and own transmission lines:**

Mississippi
Montana
Oklahoma
Texas

Alabama
Indiana
Iowa
Michigan

Minnesota
Nebraska
North Dakota
South Dakota

- Global Spotlights -

- **Africa:** The worst effects of the changing climate are happening in the [Horn of Africa](#) (includes Kenya, Somalia, Ethiopia). Millions of animals have died, about 20 million people have become acutely food insecure, and many are climate refugees migrating from famine.

- **Asia:** About 90% of India's total area now lies in [extreme heat](#) danger zones.

- **C/S America:** After nearly two decades of steady declines, [Mexico's](#) petroleum and liquid fuels production has remained stable since 2019 and will remain so through 2024 and maybe beyond.

- **Europe:** The European Union passed the world's first carbon import tax, the Carbon Border Adjustment Mechanism ([CBAM](#)). CBAM is meant to address what the EU calls "carbon leakage," or the emissions created by EU-based companies' carbon-intensive production in countries with less stringent emissions policies. Industries most affected by the tax include iron, steel, aluminum, cement, fertilizers, electricity, and hydrogen. (*Editor's note:* by taxing goods produced abroad, the EU is also incentivizing or protecting regional businesses.)

- Climate and Sustainability -

- **Glaciers are melting faster than anticipated.**

- **Temperatures in the world's oceans have set new record highs**, especially since March 1, 2023.

- **Baseball players have hit about 500 home runs in the last 15 years that benefited from the changing climate.** [AES Members](#) have access to the peer reviewed research.

- **There are eighteen kinds of soft contact lenses that have detectable levels of organic fluoropolymers**, a PFAS "[forever](#)" toxic chemical.

- Research and Markets -

- **Congruent Ventures, a climate focused VC firm, closed its first Continuity Fund** with about \$300 million in commitments.

- **2013 vs. 2023: a comparison of the most common early-stage climate tech investments**, by sector:

- **2013:** Mobility, including electric and autonomous vehicles ([63% of total](#) climate tech investments); solar panels; biofuels
- **2023:** Decarbonized food, carbon-removal, metals and elements, next-generation fuels, circular economy.

- All 10 EV models that are **eligible** for the full \$7,500 IRS tax credit in 2023 (all are about \$80,000 except where noted):

- Chrysler Pacifica (plug-in hybrid)
- Ford F-150 Lightning (production [halted](#) due to engine fires)
- Lincoln Aviator Grand Touring (plug-in hybrid)
- Chevrolet Bolt (\$55,000) *Note*: General Motors will stop producing the Chevy Bolt
- Cadillac Lyriq
- Chevrolet Blazer
- Chevrolet Silverado
- Chevrolet Equinox
- Tesla Model 3 (\$55,000)
- Tesla Model Y

- Related, **EVs accounted for 7.2% of US vehicle sales** in Q1 2023.

- Related II, see an interactive [map](#) of where essential EV battery materials come from. (*Editor's note: EV manufacturers need to clean up their supply-chain.*)

- Related III, **Tesla's stationary storage business is growing** four times [faster](#) than its vehicle vertical.

- Electricity, Power and Efficiency -

- The median approval time to connect to the grid for a new US power project was about 30 days in 2001 but is now [more than 1,000 days](#) (almost 3-years). **Wind and solar projects take the longest to interconnect with the grid** due to prevalence, low power quality, or remoteness.

- Related to the above, **the queue of proposed power projects waiting to connect with the US grid is substantial**. Below is a summary of a recent [study](#) of the Southwest Power Pool by Berkeley National Lab:

- SPP has 109 GW of generation and storage capacity seeking grid interconnection;
- Capacity in SPP's queue is almost entirely (>96%) clean energy, including solar and solar hybrids (51 GW), wind (35 GW), and standalone storage (13 GW);
- SPP's queue has ballooned over the past decade: the cumulative active queue is now more than five times larger than in 2013;
- Broadly speaking, it is possible to divide all of projects in the SPP queue into 3 categories: "completed", "active", and "withdrawn";
- A main difference between all three categories is simple: projects with stable and reliable interconnection and operation costs typically succeed ("completed") while those that have costs changes and increases get bypassed or are "withdrawn."
- Typically, average costs for "withdrawn" projects are now five times the costs of "completed" projects.

- **Energy efficiency is hard to measure**. Net EROEI (energy return on energy invested) is perhaps the best metric to compare end-to-end energy efficiencies. Using net EROEI metrics, fossil fuels outperform most renewable energies; however, renewables produce significantly less emissions, which isn't necessarily measured using net EROEI.

- **Joint energy prices were the highest on record in 2022.** The previous record was in 1979/1980, during a global oil crisis. (Note: primary energy costs as a percentage of GDP):

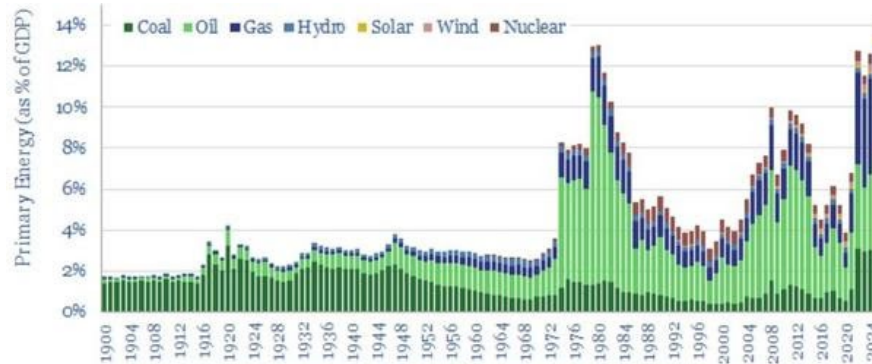
\$100/bbl Brent

+ \$6.5/mcf Henry Hub

+ \$40/mcf European gas

+ \$18/mcf LNG

+ \$385/ton Australian coal



- University Spotlight -

- GCP is looking for college students who are interested in serving as a [climate ambassador](#). If you are faculty, please distribute this notice to your classes; if you are a student, please distribute this notice to your clubs and networks.

- *Featured:* The incubator/accelerator programs at **Michigan State** are looking for short-term CEOs to lead companies in their portfolio to market. [Contact us](#) if you are interested.

- *Save the date:* **West Virginia University** [Energy Conference](#), September 20-21, 2023.

- Scientists at **UCLA** are working on SeaChange, which boosts the amount of CO₂ that can be absorbed by the ocean.

- Researchers at the **University of Wyoming** have completed a study on key advances in CO₂ storage and [published](#) the results.

- Researchers at **SLAC, Stanford University, Manchester Metropolitan University, and University of Oregon** pulled [hydrogen](#) from ocean water.

- The evidence is growing — diversity enhances divergent and innovative thinking. At **CISTAR**, it's about finding safer and more environmentally responsible ways to use US hydrocarbon resources.

- The **Tulane** Law School offers Master of Jurisprudence degrees in Energy [Law](#) and Environmental [Law](#) for professionals in the wide-ranging fields working with energy, sustainability, and the environment.

- Quotes -

"The IRA has made capital frothy..."

"There are billions and billions and billions of dollars sitting on the sidelines, waiting to find a home around renewable assets."

- John Ketchum, CEO of NextEra Energy

"If global energy markets were a baseball game, the IRA would move the US from first base to third base."

- Chelsea Jean-Michel, BloombergNEF OSW analyst

"The IRA is a tremendous tailwind for renewable energy."

- David Hardy, CEO of Ørsted Americas

"The breadth and scale of opportunities in renewable energy has never been greater."

- Kirk Crews, NextEra Energy CFO

Note: WSGR has updates to its Clean Energy and Climate Solutions Federal Funding [Database](#).

- Bulletin Board -

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- **SPOTLIGHT:** **Schneider Electric** is hiring [Performance Assurance Consultants](#), [Senior Account Executives](#), [Automation Engineers](#), and [Project Development Managers](#).

- Join leaders from tribal and federal governments at the Tribal Energy Equity [Summit](#), May 22-25, Ojibwe & Dakota Territory, St. Paul, Minnesota.

- **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.

- **Fire2Fission** is currently looking for a volunteer podcast editor who is interested in gaining experience in media creation and wants to get access to some energy industry professionals.

- **Unearth** 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.

- **SustainabiliD** offers strategic advice, leveraging thought leadership, tailor-made tools, top talent, and an ecosystem of industry associations and knowledge platforms focused on [innovating](#) to net zero.

- Gratitude -

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