

ENERGY MATTERS

Soundbite summaries of the energy news you need to know

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AMERICAN ENERGY SOCIETY

April 3, 2023

- The Power Read -

- **Oil:** The US is setting oil production records (again), but some contrarians expect US production will soon begin to decline.
- **Low-carbon:** Other sectors are not faring well, but investors like clean energy.
- **Policy:** Project developers are waiting for the IRS to announce its decision on tax credits.
- **Policy II:** Europe increased its targets for renewable energy but excluded nuclear power.
- **Climate:** The IPCC released its sixth and final assessment cycle.

- 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.

- Please consider [joining](#) AES as a **Member** for unrestricted access to all benefits and offerings.

- Fossil Fuels -

- Oil -

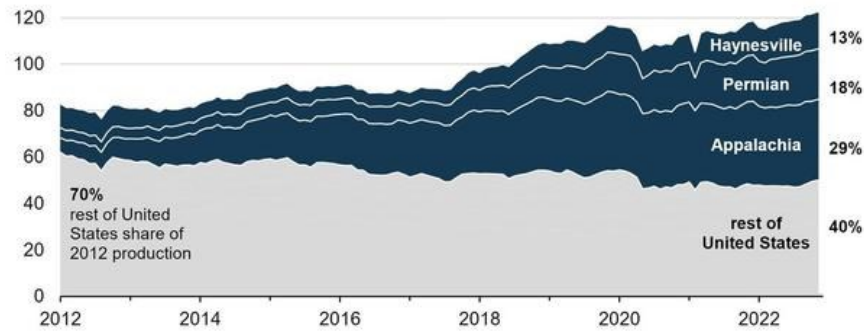
- *Conventional wisdom:* US crude oil production will continue to [increase](#) for the foreseeable future, surpassing the record high of 12.44 million bpd by the end of 2023. However...

- Economy-wide cost inflation has made development and operation of oil wells more expensive;
- Many new wells are not as productive as expected;
- Drilling inventories by the shale industry are declining.

Some **contrarians expect US oil production to [decline](#) by about 20% in 2023.**

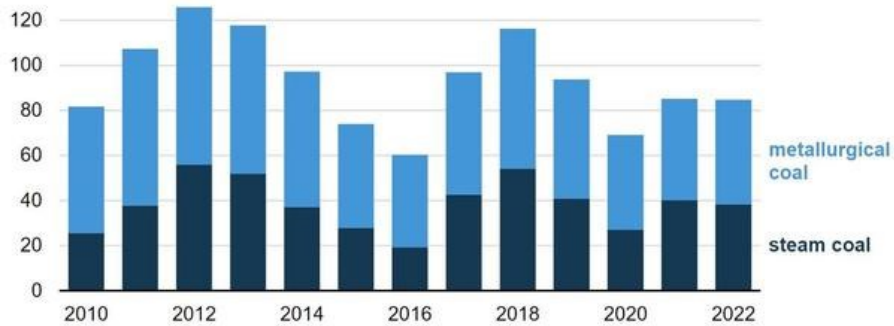
- Natural gas -

- [Three US regions](#) — Appalachia, Permian, and Haynesville — accounted for 60% of all US production in 2022, just like in 2021. *Insert:* monthly NG production, by region (as a percentage share of total US production).



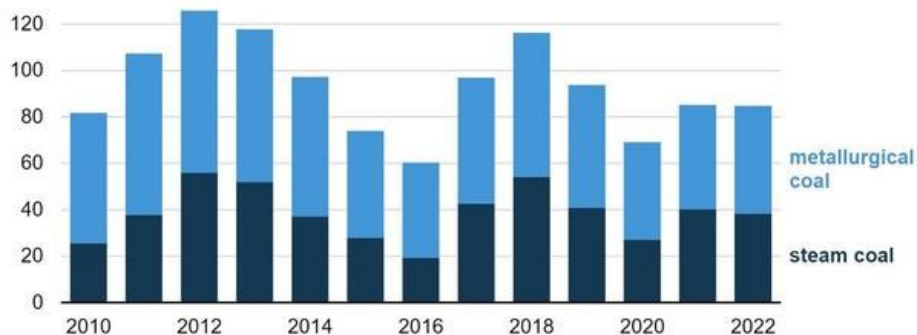
- Coal and mining -

- In 2021 and 2022 the total amount of coal the US exported was basically the [same](#). *Insert below:* annual US coal exports, in million short tons.



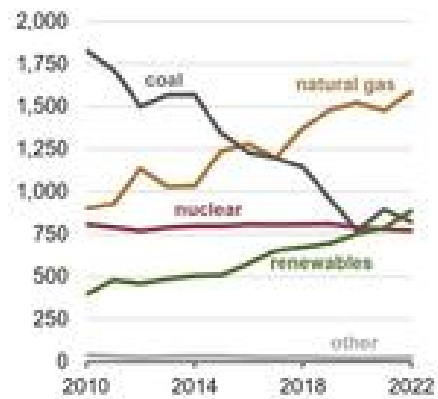
- Carbon capture -

- Terrestrial carbon sequestration — trees, soils, wood vaults, biochar — receives more attention than [ocean sequestration](#), even though **oceans are actually the biggest carbon sink on the planet**. They store 50 times more carbon than the atmosphere and 20 times more than terrestrial plants and soils.



No- / Low-Carbon and Renewable Energy

- In 2022, generation from [renewable sources](#) — wind, solar, hydro, biomass, and geothermal — **surpassed coal-fired generation in the electric power sector for the first time**; also, renewables surpassed nuclear generation for the first time in 2021 and continued to provide more electricity than nuclear generation last year. *Insert: US electric power sector electricity generation, in million megawatt hours.*



- While other sectors did not fare well, investors were [bullish](#) on clean energy in 2022, raising \$16.2 billion to beat 2021's deal value record of \$16 billion. However, VC deal value and count both dipped year-over-year in Q4. **The strongest sectors in Q4: renewable-powered batteries and grid-scale battery development** (especially \$450 million for Form Energy, and \$280.5 million for Hithium). In 2023, it appears that investors are interested in green hydrogen, as 2022's energy crisis caused a reckoning for natural gas.

- *Retrospective:* In an award-winning 1996 paper, Nobel laureate economist Bill Nordhaus traces how **the price of light has fallen throughout one million years of human history**. [AES Members](#) have access to the legendary paper.

- When light came from open fires, the price of lighting was the effort it took to gather wood. Nordhaus calculates that it took 60 hours of labor to generate 1000 lumen-hours.
- The Greeks and Romans had wax candles. A typical wax candle puts out 13 lumens, and according to Nordhaus' calculations, wax candles require 5 hours of labor to generate 1000 lumen-hours.
- Oil, gas, and kerosene lamps were developed in the 1800s, pushing the effective price of lumens down dramatically. Depending on the source of fuel, Nordhaus calculates as low as 0.2 hours of labor per 1000 lumen-hours.
- Developments in electric power, carbon-filament, and tungsten-filament enabled light bulbs to be commercialized in the 1880s and 1920s, respectively. These innovations pushed the price lower still, to 0.01 hours of labor per 1000 lumen-hours, by Nordhaus' calculations.
- Even with little additional technological innovation in light bulbs between the 1920s and 1980s, the effective price of lighting continued to drop precipitously as wages increased and electricity prices declined.
- By the time CFLs arrived in the 1990s, Nordhaus calculates that it took only .0001 hours of labor per 1000 lumen-hours, about 600,000 times cheaper than it was for prehistoric man gathering wood for open fires.

- Energy Policy & Geopolitics - - Beltway Buzz -

- **Congress is focused on budgets and appropriations.** There was already conflict between Congress and the EPA and DOE. US Interior Secretary Deb Haaland will face even more criticism from both parties given the Administration's mixed signals on oil/gas leasing/drilling (aka the Willow project in Alaska).

- There is **bipartisan support in Congress to pass [Permit America to Build](#)** ("meaningful, durable permitting reform") before the end of summer.

- Project developers are waiting for the IRS to announce its [decision](#) on **tax credits for EV battery minerals** and components sourcing provisions in the Inflation Reduction Act (IRA).

- DoE will probably issue **guidance on [48C, the Advanced Energy Manufacturing Tax Credit](#)**, before May 31, 2023. The first two rounds of 48C in 2009 and 2013 awarded 30% tax credits for capital expenditures of manufacturers of energy products (solar, wind, battery components, etc.), but the new round will expand coverage to include capital expenditures for industrial energy efficiency, generally, as well as for processing of critical minerals.

- Global Spotlights -

- **Alaska:** While all other oil majors are leaving Alaska, ConocoPhillips is [expanding](#) exploration and development. Their expansion began well before the Biden Administration approved the Willow oil project in the National Petroleum Reserve-Alaska (NPR-A), allowing three out of five proposed drill sites. (Note: The project is expected to produce 160,000 bpd – 180,000 bpd of crude oil.)

- **California:** In a special legislative session, Governor Gavin Newsom proposed an aggressive state tax on "extraordinary profits" by refineries. Though the proposal lacks details and may not get the support of the full legislature, no oil companies voiced opposition to the tax during the special session, though many implied very strongly that refiners will leave the state. Though the industry has faced in-state opposition in the past, the proposed bill could be the final straw.

- **Virginia/West Virginia:** The Mountain Valley Pipeline that would transport natural gas from West Virginia to Virginia — initially proposed nearly 10 years ago — will probably not get developed. (Note: last summer, Sen. Joe Manchin of West Virginia said he'd support President Biden's \$369 billion IRA climate law in exchange for support of the MVP.)

- Global Spotlights -

Europe: Negotiators from member states and the European parliament [increased](#) the overall binding target of renewable energy consumed in the EU to 42.5% by 2030, up from 32%. Meanwhile, at the end of a long night of negotiations, the countries agreed to limit the counting of nuclear power towards low-carbon targets. (Note: negotiators from France had pushed for nuclear energy to be counted toward those targets, but nuclear-skeptic countries like Germany and Austria argued against the inclusion of atomic power.)

Africa: Sub-Saharan Africa is the most vulnerable region in the world to "[displacement events](#)." For instance, in 2019 a deadly [cyclone](#) killed over 500 people in Malawi, which caused political unrest, which then led to about half a million people "displaced" in Malawi. Mozambique and Madagascar are experiencing similar displacement events.

L/S America: Supercharged El Niño is speeding up [warming](#) in the southern portion of South American and Antarctica.

Asia: Northern India is experiencing its hottest temperatures in the last 122 years and will reach 40°C in May and June (the hottest months of the year) and peak at 50°C. Note: it is estimated that when temperatures exceed 35°C, a human body can no longer cool itself through perspiration (aka a "[wet bulb](#)" temperature).

- Climate and Sustainability -

- **The IPCC released its sixth and final assessment cycle.** *Summary:* all countries — especially the wealthy countries that generate the most emissions — must eliminate emissions and pull more carbon from their atmosphere. Also, projections for the climate make for grim reading. (*Note:* [AES Members](#) have access to the 8,000 page report.) Four take-aways from the 6th IPCC assessment:

1. Climate impacts are more widespread and severe (an "atlas of human suffering") than anticipated in the first assessment.
2. Some climate impacts are irreversible.
3. More investment in resilience is needed.
4. Decarbonization and adaptation efforts must increase dramatically.

- *Also from the 6th IPCC assessment:* A person born in 1953 has experienced 0.85 degrees of warming in their lifetime, but someone **born in 2020 will experience about three times higher warming rates** by the time they are 70.

- The warming climate is creating conditions in which some trees (typically hardwoods) in some regions actually have had their **annual growing season extended** about one month. Leaves are staying on trees about 15% longer under the same conditions (type, region, etc.).

- Research and Markets -

- The normal summer surge in US gasoline demand is often referred to as "driving season." **Ongoing interest rate hikes canceled the season**, which means gasoline prices won't go up as much as they have in past seasons. In addition, there are some AES Member SMEs who see a strong correlation between peak gasoline use and housing activity.

(*Note:* high interest rates constrain housing starts and perhaps contribute to the collapse of lumber prices.) *Insert left:* **blue** = declining prices; **red** = increasing prices.



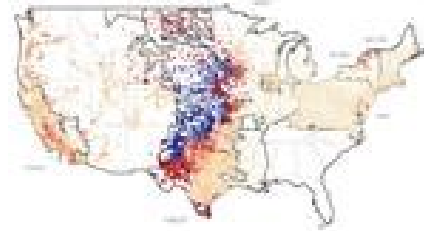
- **Air Liquide completed construction of an industrial scale ammonia (NH₃) cracking pilot plant** in the port of Antwerp, Belgium. (*Note:* when transformed into ammonia, hydrogen can be easily transported over long distances.)

- Researchers at **RMIT University** have developed a way to make hydrogen directly from seawater. [AES Members](#) have access to the peer-reviewed research.

- **Impulse Labs is planning to sell its first battery-enabled induction stoves this year.**

- Electricity & Power -

- There is a [correlation](#) between utility-scale wind farms and low- / negative-electricity prices. (Insert left: negative electricity price frequency in 2022.)



- "**solar capture ratio**" (noun/adjective). A statistical measurement for the year, calculated by taking the solar-weighted price for the entire year and dividing that by the simple average price for the entire year, where the simple average price includes all 8,760 hours in the year. With low levels of solar penetration, the solar capture ratio exceeds 100%. As the solar penetration rate increases, the capture ratio should go down. In the CAISO, the solar penetration rate is 34% and the capture ratio is about 68%. In every other market in the US, the solar penetration rate is below 5%.

- New research has determined that **too many EV owners in California are charging their cars overnight** and that it is better for the grid if cars were charged during the day at work or at public charging stations. [AES Members](#) have access to the peer-reviewed research.

- **Register for the 2023 NEUAC annual conference, June 13 - 15 in San Diego.** Note that the 2024 conference will be in Chicago, Charlotte in 2025, and Seattle in 2026.

- University spotlight -

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

- *Featured:* AidData, a research lab at **William & Mary**, recently launched a [new series of analyses](#), including dozens of country reports, indexes, and hundreds of indicators quantifying Kremlin influence on civic space, the media, and energy security.

- 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.

- **University of Houston** [signed an MOU](#) with the Directorate General Hydrocarbon in India to establish the energy-focused UH-DGH Data Center.

- AES applauds the Integrated Studies in Nanoscience and Nanotechnology Center at **Buffalo State University**, which takes a comprehensive approach to several fields, including the [environment and transportation](#).

- **University of Alabama** Center for Sustainable Infrastructure explores [linkages](#) between different infrastructure systems.

- Quotes -

On California Gov. Gavin Newsom's plan to limit oil companies' profits

"We're ending the oil industry's days of operating in the shadows. California took on Big Oil and won."

- California Governor Gavin Newsom

"At a minimum, this needs thorough time for analysis and discussion."

- Kevin Slagle, spokesperson for the Western States Petroleum Association.

"There are better alternatives."

- Michael Mische, professor at the University of Southern California Marshall School of Business.

- 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.

- **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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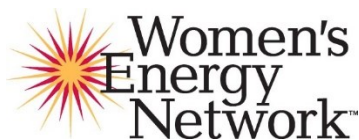
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