

ENERGY MATTERS

Soundbite summaries of the energy news you need to know

AN OFFICIAL PUBLICATION OF



AMERICAN ENERGY SOCIETY

January 24, 2022

- The Power Read -

- **Oil:** Global sell-off of oil inventories.
- **LNG:** US LNG finally arrives in fuel-starved Europe.
- **Policy:** China Belt & Road Initiative recent energy deals.
- **Climate I:** Using "EJ" metrics to measure environmental injustice.
- **Climate II:** GHG emissions in all US sectors increased last year.
- **Climate III:** The changing climate is changing the taste of beer.
- **Markets:** The 5 leading climate-tech epicenters are: SF, London, Berlin, NYC, Boston; the leading autonomous driving epicenter is Israel.

- News from the Society -

AES recommends in its podcast archive:



PODCAST

- [The Carbon Copy](#)
- [Catalyst, with Shayle Kann](#)

Whether you are already a fan of podcasts or haven't yet tried this "new" media, Members enjoy these and other podcasts available in the AES podcast library.

AES internal & external datasets



- **AES has launched *Datasets***, a new resource for Members! [Contact us](#) for more information.
- **Support the Society - [join](#) as a Member.** Access all publications, services, reports, restricted content, datasets, archives, and more.

- Fossil Fuels -

- Oil -

- A fair number of **fossil fuel companies around the world are selling more of their inventories**, maximizing output from their vast hydrocarbon reserves, or in the case of a few petrostate NOCs, trying to manipulate markets. For instance...

- Energy companies in the [Persian Gulf](#) have borrowed \$30.5 billion (USD), the highest level in at least 25 years.
- [OPEC+](#) agreed to another output increase and will do so [again](#) in February.
- [Norway](#) is expanding production.
- [Venezuela](#) is increasing production despite its prevailing [disfunctions](#).
- If the US lifts sanctions, [Iran](#) is ready to invest heavily and immediately in its oil industry and boost production.
- Of course, [Russia](#) continues to manipulate natural gas markets, notably in Europe and especially with Ukraine, while non-OPEC producers like [Kazakhstan](#) have been called out for not complying with cuts and keeping domestic prices high (which has led to civil unrest, see "Policy" below).
- [China](#) continues to "acquire."
- Meanwhile, [US](#) crude oil inventory is about 7% [less](#) than the five-year average, [rig count is surging](#) (AES Members only), and some US oil majors expect record profits (for instance, ExxonMobil: \$1.9 billion [higher](#) quarter-on-quarter).

Note: From a macro-perspective, the reason for this market event right now isn't clear. Many SMEs in the Society believe it's probably a logical response in a strong market; however, some SMEs think it might also be an attempt to sell off stranded assets ahead of the next energy transition.

- Gas -

- A flotilla of liquefied natural gas (LNG) [imports](#) from the US has arrived in fuel-starved Europe, offsetting fewer Russian shipments.



- Mining, Minerals and Coal -

- Coal-fired power generation in the US [increased](#) 17% in 2020.

- Carbon Capture -

- The current cost of Direct Air Capture (DAC) is about [\\$500 per ton](#) of carbon dioxide (tCO₂), which is higher than most other options for removing CO₂.

-*Ombudsperson*: The previous issue of *Energy Matters* (8.2) stated that the [CNCE](#) at Arizona State is the top direct-air carbon capture research center; however, it should have been noted that [Georgia Tech](#) is the other top DAC epicenter in the US:

- more than 120 [peer-reviewed](#) scientific and engineering papers by GT faculty;
- 15 funded GT PIs working on DAC in ChBE, ME, Physics, ISyE, CEE, PP, and ECE;
- about \$15M external funding for DAC-related research;
- and, in collaboration with the Dreyfus Foundation, GaTech also offers energy-education programs for grade 6-12 students.

Note: Internationally, the leading DAC research center is [Carbon Engineering](#) in British Columbia, Canada.

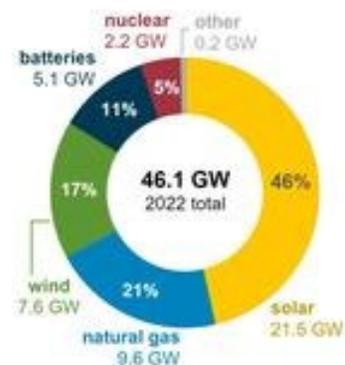
- Low-Carbon Energy -

- The 17 [rare earth elements](#) (REEs) critical for clean energy technologies are:



lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb), lutetium (Lu), scandium (Sc), and yttrium (Y).

- [Solar power](#) accounts for nearly half of new electric generating capacity in the US. (*Insert*: by planned US utility-scale generating capacity additions in gigawatts.)



- Three take-aways from the new IEA report, [Renewable Electricity](#):

- Annual additions to global renewable electricity capacity are expected to average around 305 GW per year between 2021 and 2026, an acceleration of almost 60% compared to renewables' expansion over the last five years.
- Solar PV is breaking new records despite rising prices.
- The expansion trend is not on track to meet the IEA Net Zero by 2050 Scenario.

- The four largest nuclear power plants:



1. Tokyo Electric Power Co.'s ([TEPCO](#)) Kashiwazaki-Kariwa nuclear plant; net capacity 7,965MW.
2. EON's [Isar-2](#) nuclear power plant (Germany) produces 11.5TWh of electricity (scheduled for closure).
3. [Bruce Power](#) Nuclear Generating Station in Ontario, Canada; owned by Ontario Power Generation (6,430MW).
4. The [Hanul Nuclear Power Plant](#) is the largest in South Korean (gross installed capacity of 6,189MW and net design capacity of 5,908MW).

Note: For comparison, each of these nuclear power plants produces more electricity than all of the wind turbines in Denmark combined.

- **About 75%+ of the total solar energy absorbed by a solar panel is generated heat**, which greatly increases the temperature and decreases the energy efficiency and lifetime of photovoltaic panels. AES Members have access to the [peer-reviewed research](#).

- Policy -

- *Beltway buzz*: Congress is at a critical inflection point, with the Senate moving from voting rights and possibly pivoting to the climate agenda in the Build Back Better package. **Climate measures in BBB are thought to be more secure than social measures**, such as the child tax credit and paid family leave.

- **The US DoE is hiring 1,000 new employees for the “Clean Energy Corps.”** [Apply now](#).

- **No state has a smog check program for diesel-fueled big rig trucks**; trucks and other heavy-duty vehicles make up about 3% of all vehicles on all roads, but they emit about [half](#) of all auto emissions.

- Half of all US states are **applying for some of the \$4.7 billion in the new infrastructure law for [cleaning up abandoned oil and gas wells](#)**. (Note: the number of [abandoned wells](#) in the US has grown over the last decade.)

- "[contemporaneous reclamation](#)" (*noun*): a federal [law](#) that requires [rehabilitating](#) land harmed by surface mining activities; efforts include but are not limited to backfilling, grading, topsoil replacement, and revegetation.

- The US Department of the Interior said it will [overturn](#) the **Trump administration's decision that authorized expanded leasing and development in the National Petroleum Reserve, Alaska**. (Note: E&P in Alaska has already fallen to a 43-year low in 2020 as drillers focus on Texas and the other lower 48 states.)

- The California Public Utilities Commission (CPUC) has issued a [proposed decision](#) (PD) to **gradually scale back subsidies that support rooftop solar** (e.g., reduced subsidies, halt net energy metering, a monthly surcharge, etc.).

- Energy policy around the world -

- *Spotlight* on **China's Belt & Road Initiative, recent deals**:

- **Azerbaijan** has signed a deal with Huawei to [digitize](#) its economy.
- **Albania** will have three hydropower [dams](#) built by China's Gezhouba Group.
- **Bosnia** will have a [hydropower plant](#) built on the Trebjsnjica River by the Gezhouba Group and the Export-Import Bank of China.

In exchange, China will have access to, among other benefits, energy-related natural resources in each country (oil and gas reserves, mining for rare earth elements, etc.), though *exclusivity* rights are not known.

- The Norway "[paradox](#)":

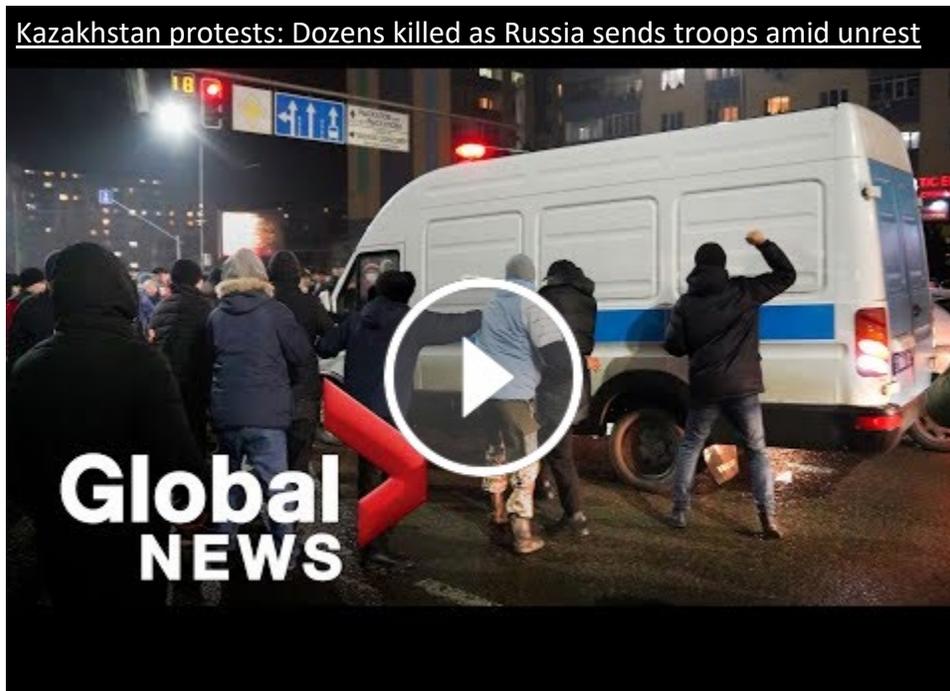


On the one hand ... Norway is at the forefront of the new clean energy transition (65% of all cars in Norway are EV; [93%](#) of electricity generated from hydropower, and [6%](#) of remaining 7% derived from solar and wind; etc.)

On the other hand ... Norway is the 15th top oil-producing country, and eighth in the world for natural gas production, behind Australia but ahead of Saudi Arabia.

Context ... most of the revenue from Norway's oil and gas production is kept in a sovereign wealth fund created for the Norwegian people and future generations. The fund has amassed \$1 trillion since its inception in the 1990s and is a source of stability for the nation in times of economic instability (like the coronavirus pandemic).

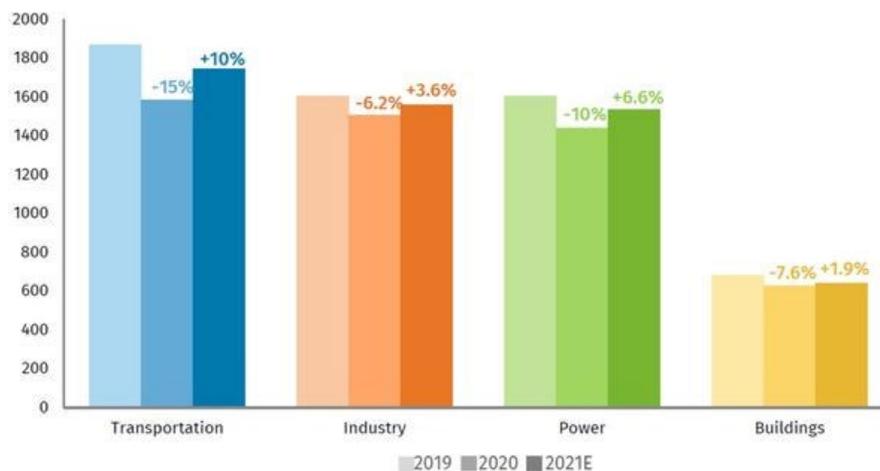
- **Kazakhstan is paralyzed by fuel riots**, which have escalated into broader protests against the government. Now Russia is sending in troops.



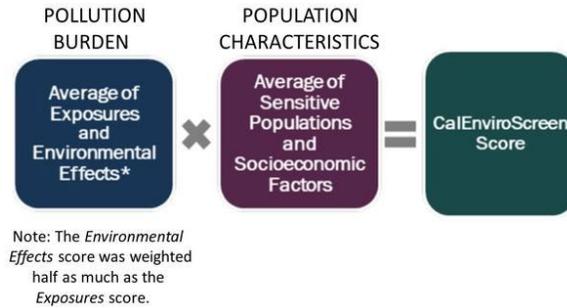
- Climate and Sustainability -

- **GHG emissions in the US increased 6.2% relative to 2020** (all sectors), largely due to an increase in coal-fired power generation.

- **Insert: Emissions** by major emitting sector, in million metric tons CO₂e and % change:



- Several states use a variety of measurements to identify communities that struggle with historical and current environmental injustices ("EJ"). **California is leading the effort with a mapping tool, [CalEnviroScreen 4.0](#)**, that ranks all census tracts in the state by a relative score using the following formula:



- **The last seven years were the world's [hottest](#) on record**; the world is now 1.2C hotter than pre-industrial levels.

- **The changing climate is changing the taste of [beer](#).**

- **There are 728 [combined sewer systems](#) in the US** (rainwater, snowmelt and toilet waste that flows through the same pipes). Most of these systems are in regions that face increased flooding: the Midwest, Mid-Atlantic, and Northeast.

- **A thin layer of topsoil is responsible for [95%](#) of all the global food produced.**

- **Phototrophs (phytoplankton) are declining in 8 of 10 ocean regions around the world.** AES Members have access to the [peer reviewed research](#).

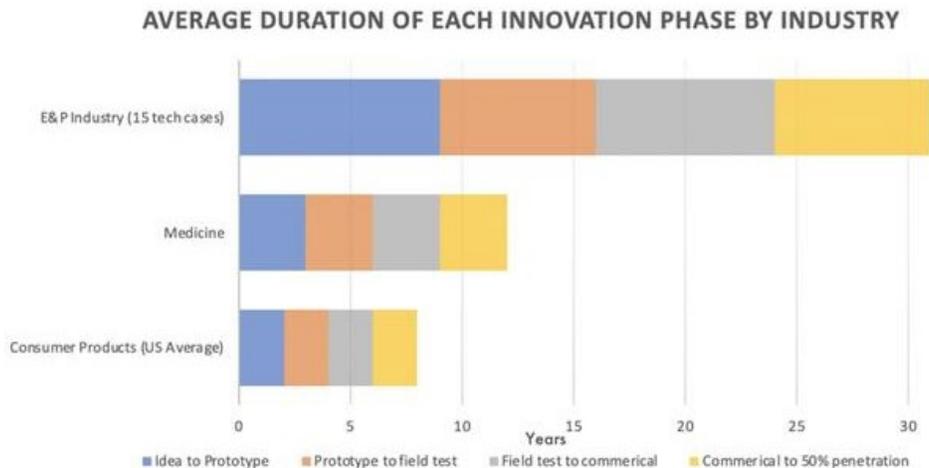
- Research and Markets -

- *Featured opportunity:* **The US DoE has a \$240 million FOA for EFRCs** that will focus on early-stage climate solutions ([PDF](#)).

- Q. What sector takes the longest time to bring a technology from idea to market?

A. [Fossil fuel](#) exploration and production; on average 31 years (see insert below).

(Source: McKinsey analysis; thank you SME and AES member [Kirk Coburn](#))



- There are thirteen new [battery cell](#) gigafactories under construction in the US right now, led by GM, Ford, Tesla, SK, and LG (most will be operating by 2025).

- *Related:* the top-5 companies with international patent applications for "[EV automotive batteries](#)" (AES Members have access to the Battery Report); startup [Form Energy](#) will soon join this group.



- The top-5 [climate tech](#) investment hubs are:

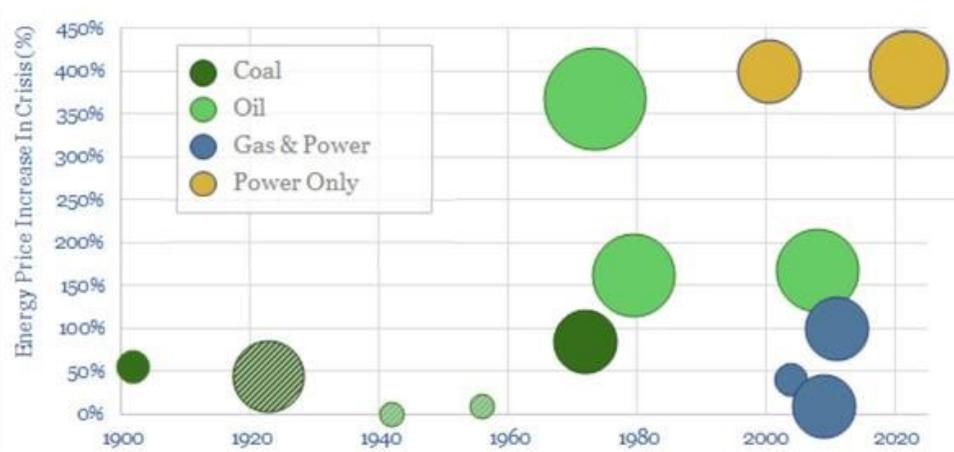
- San Francisco Bay Area
- London, UK
- Berlin, Germany
- New York City, New York
- Boston, Massachusetts

Note: [Israel](#) is the global tech-to-market epicenter for cybersecurity and autonomous driving.

- Researchers have found a way to convert CO2 into graphite. AES Members have access to the [peer-reviewed research](#).

- Electricity, Power, Efficiency, and the Grid -

- [Energy crises](#) since 1900, by sector (color of dot), scale (size of dot), and time:



- The electric power sector, which accounts for 28% of net US emissions, increased 6% (95 million metric tons CO2e) above 2020 levels, **due to a [sharp rise in coal generation](#)** (the first annual increase in coal generation since 2014).

- *On the one hand* ... renewable energy's share of US electricity generation has surged from 10% in 2010 to 20% in 2020. *On the other hand* ... the power industry needs to add as much as 70 GW to 100 GW of both solar and wind each year to achieve 100% clean electricity by 2035 and net zero emissions by 2050.

- [Electrification 2022](#): **Collaborating for a Clean-Energy Future**. American Energy Society is proud to be a "Supporting Organization" for the EPRI Electrification 2022 conference. Attend in person March 14-17 in Charlotte, NC ... and don't miss the closing party at the NASCAR Hall of Fame. [Register now](#) before prices increase on February 1st.

- Cybersecurity Spotlight -

- There has been a surge in cybersecurity [threat-attacks](#) on [Connecticut](#) utilities.

- A 19-year-old German IT student [hacked](#) into 20 Teslas in 13 different countries (without the knowledge of their owners) through a vulnerability in the owners' third-party software.

- University Spotlight -

- The Center for Midstream Management & Science at **Lamar University** is hosting [Major Issues Facing the Midstream Industry](#) on March 2, at 10:00 am (CST).
- AES considers [Jefferson College](#) the top community college for sustainability.
- [St. Mary's](#) will soon announce the winner of the *River of Words* contest, hosted by the Center for Environmental Literacy.
- The NSF is awarded funding for a quantum technologies research center, thru the Clean Energy Institute at the [University of Washington](#).
- [University of Alaska, Fairbanks](#), is hosting a free virtual workshop conference series.
- **Syracuse** has been named one of the [EnergyTech UP](#) Regional Conveners.
- [CCAST at UConn](#) contributes to the energy-water nexus with its support of advanced work with membrane configuration.
- On Feb, 26, the [UCLA Anderson Energy Management Group](#) will host an all-day virtual event, Energy Innovation Conference.
- The **IEE at UCSB** just hosted a 2 day virtual event on [Emerging Energy Technologies](#); on to the next event: the energy needs of [next-gen computing](#).
- The [SUNY Clean Energy Consortium](#) is expanding!
- The [CREATe at Virginia Tech](#) received funding to advance its work in wind energy aerodynamics and aeroacoustics at its wind tunnel.

- Bulletin Board -

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- Many companies are implementing drone programs; **here's what a successful drone program looks like**, from AES expert member [Drone Deploy](#).
- Uearth has published a report on [wildfires and utilities](#).
- **Clearpath has published a new report on [clean hydrogen](#)**.

- Quotes -

"Over the past 25 years there have been three certainties in life: death, taxes and lower prices for solar panels. It's not so evident that is the case today."

- Nick Parsons, head of research at the ThomasLloyd Group, on the impact of the supply-chain crisis, COVID, and inflation

"Nuclear power is by no means a silver bullet.... But at the same time, when we refer to climate change as a crisis and existential risk, too often we do not act as if we believe that rhetoric.... When it comes to

nuclear power, support would be much stronger if we took our own rhetoric seriously."

- Jason Bordoff in [Foreign Policy](#)

"Efficiency's the key, and our technology will drive down the (battery) pack size in this car. And driving the pack size will drive down the cost. And that's where we get to a \$25,000 car. And I think that could come three to four years from now."

- Lucid Motors CEO Peter Rawlinson

- Gratitude -

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