

ENERGY MATTERS

Soundbite summaries of the energy news you need to know

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News from the Society

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TOP ENERGY STORIES 2020

JANUARY

- Renewables surging - planned renewable energy projects for 2020 will exceed 42 gigawatts (GW) of new capacity; onshore wind capacity exceeds 100 gigawatts.
- 440 million pigs in China either died from African swine fever or were killed to stamp out the virus (for perspective, half of the world's population of pigs).

FEBRUARY

- OPEC+ starts cutting production to promote price increases, but Russia delays cuts.
- FERC commissioner Bernard McNamee announces retirement, leaving the agency with two commissioners and no quorum.

MARCH

- A bizarre shift of focus - a majority of the world's population suddenly focuses on outbreak of coronavirus; economists warn of "black swan" potential.
- Saudi and Russia price war underway, sending oil prices to the bottom.

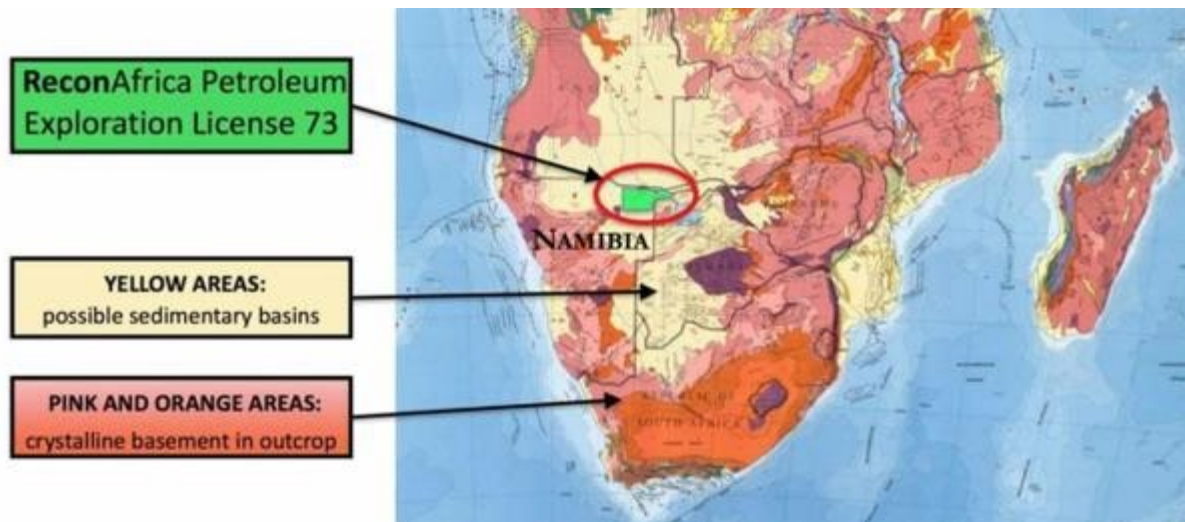
APRIL

- COVID-19 outbreak warps power grid patterns - weekday demand resembles weekend days, as more people work remotely.
- Mark this day in history: April 20, 2020, the day oil prices went negative (in other words, an oil barrel ... as in, the physical container ... cost more than the oil that it contains).

Fossil Fuels

- Oil -

- **The next elephant might be the 6.3 million acre [Kavango Basin](#) in Namibia.** ReconAfrica holds a 90% working interest in the Kavango and the Namibian government holds the other 10%. The Kavango is a sedimentary basin with depth and thickness comparable to the Gulf of Mexico, the Delaware Basin in the Permian, and the big sedimentary basins of the Middle East and Russia.



- Natural Gas -

- Longest pipelines in the US:

1. Cochin Pipeline: 1,900 miles (this pipeline once transferred hydrocarbons from Illinois to Fort Saskatchewan; however, the route was reversed in 2014)
2. Keystone Pipeline: 1,853 miles (includes Canada portion)
3. Appalachia-to-Texas Pipeline ("EPD"): 1,205 miles
4. Dakota Access Pipeline: 1,172 miles
5. Overland Pass Pipeline: 1,035 miles

- Coal and Mining -

- A survey of energy-related REE mining [projects](#):

- The [Tres Quebradas](#) ('3Q Project') lithium project in Argentina is a large lithium-rich brine mine with the lowest impurities in the world.
- Galaxy Resources ("[Galaxy](#)") runs three "pure play" lithium mines in Australia, though production was cut in response to the collapse of lithium prices.
- [Jervois Mining](#) in Idaho has several high grade cobalt, copper, and gold mining projects.
- Amur runs a massive [Kun-Manie](#) nickel-copper sulphide mine in Russia.
- [IGO Ltd](#) operates a top-tier nickel sulphide mine in Australia.
- [Syrah Resources](#) operates the largest natural graphite mine in the world.
- **AES Editors recommend, [Building Lithium Valley](#)**, a Report by New Energy Nexus.

- Carbon Capture -

- A sample survey of carbon market prices:

1. [Norway](#) long-term carbon price: \$240/ ton of CO₂
2. California [LCFS](#) currently trading around \$200/ ton of CO₂ (as of Nov 2020)
3. Goldman Sachs DAC [Carbonomics](#) abatement: \$180/ ton (*note: p. 7, exhibit 6*)

Low-Carbon Energy

- Trend-spotting renewable energy in 2021:

- *Solar* installations of 15.4 GW will surpass the 2020 record of 12 GW; four states will host more than half of the new utility-scale solar PV capacity in 2021 (Texas, Nevada, California, and North Carolina).
- More than half of *wind* power additions will be in Texas and Oklahoma.
- More than 70% of the planned 6.6 GW natural gas-fired additions will be in Texas, Ohio, and Pennsylvania.

- Top investors in renewable energy-tech in the last five years (by unique deals):

[Shell Ventures](#) (21)

[EIT InnoEnergy](#) (19)

[Energy Impact Partners](#) (17)

[Breakthrough EV](#) (16)

[Prelude Ventures](#) (15)

[GM Ventures](#) (15)

[SOSV](#) (13)

[BASF VC](#) (12)

[Braemer EV](#) (12)

[Total CNV](#) (12)

[BP Ventures](#) (10)

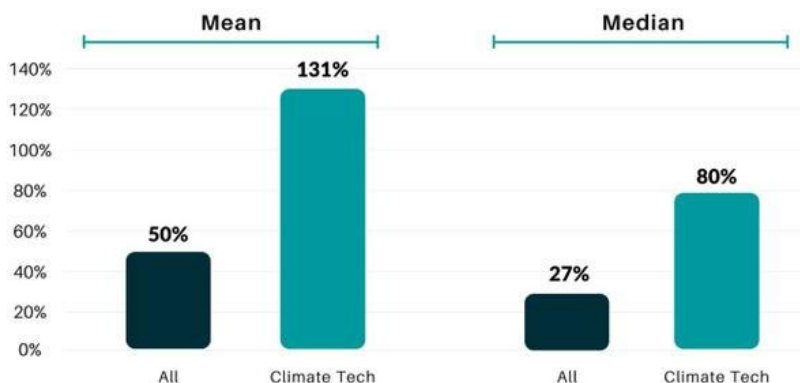
[Chevron Tech Ventures](#) (10)

GE Ventures (10) - n/a

[SET Venture Partners](#) (10)

- Climate tech SPACs that completed mergers in 2020 are **outperforming** all other SPACs. (Insert: a comparison of 2020 SPAC post-merger performance, "all" vs. climate-tech.)

- Swell Energy, a provider of residential virtual renewable power plant, is raising \$450m.
- OhmConnect, a demand response startup, raised \$100m, with \$80m for a virtual plant.
- Gotham Greens, an operator of tech-enabled greenhouses, raised \$87m.
- SeeTree, an AI-powered tree intelligence company, raised \$30m.



- Since 2018, a startup called [Commonwealth Fusion Systems](#) has been **researching fusion** -- the epitome of an energy **moonshot**. (Note: fusion, or forcing atoms together, is considered much safer than fission-powered reactions.) However, **CFS has not resolved two key issues**: 1) the process of heating a cloud of hydrogen isotopes to ten million degrees; 2) containing the cloud, which is hot enough to turn anything it touches into a pile of smoldering goo.

- Related, the Korea Superconducting Tokamak Advanced Research (KSTAR) fusion device recently **set a world record** by maintaining its plasma at a super-hot 180 million degrees Fahrenheit for 20 seconds. The previous record was eight seconds ... also held by KSTAR.

Policy

- Surprisingly, **the US Supreme Court [agreed to hear a case](#)** on small refinery RFS exemptions that has been in the news over the past 2+ years (the appeal was filed by HollyFrontier Corp. and Wynnewood Refining Co.); also, Justices will hear arguments for the [BP v Mayor of Baltimore](#) climate case.

- Beltway Buzz ... the final days of the Trump Administration -

- The Trump administration submitted to Congress a request to cut \$800 million from the EPA budget. It did not pass, but the request caused funds to be frozen by OMB for 45 days.

- The EPA published a new rule that effectively prohibits the future regulation of greenhouse gases from any stationary industry other than power plants: "Any stationary source whose industry-wide emissions make up less than 3% of total US greenhouse gas pollution will be deemed 'necessarily insignificant'." The old rule was primarily how the Obama administration regulated greenhouse gases from power plants and other sources under Section 111(b) of the Clean Air Act.

- The agenda for the [last FERC meeting](#) during the Trump administration was packed with 19 items labeled "omitted" because Chairman James Danly determined that it was "not humanly possible to cover everything." Some of the last-minute omitted items included: build more utility transmission infrastructure; state subsidies for clean energy; and, the classification of battery storage as "generation," "transmission," or something else. AES Members have access to a true and correct PDF copy of the [updated agenda](#) (including omitted items).

- EPA unveiled a portrait of Scott Pruitt, President Trump's administrator who resigned from the agency under a series of ethics issues.



- Energy policy spotlight Norway -

- There is growing opposition in western Europe against wind energy. For instance, **Norway is tightening rules for wind turbines**. Policy changes include height restrictions, noise limits, and location (a turbine cannot be closer to a building than the distance equal to four times the height of the turbine). Note: Although Norway has a growing wind sector, hydropower meets virtually all the nation's power needs. (AES Members have access to the whitepaper [Water Works](#).)

- **Norway has found deep-sea deposits of rare earth elements and minerals** as well as copper, zinc, cobalt, gold and silver (6 to 22 tons), and will now begin an [environmental impact study](#) on offshore REE and REM exploration and production.

Climate and Sustainability

- "[Committed warming](#)" *noun, definition: the anticipated increase in future temperature based on past carbon dioxide emissions.* An analogy as an example: "Committed warming" is like the distance a speeding car travels after the brakes are applied.

- There is satellite evidence that **China has 11 hydropower dams that have a [harmful downstream impact](#)** on Laos, Myanmar, Thailand, Cambodia and Vietnam. The China Renewable Energy Engineering Institute says "the US satellites do not provide good evidence" that its dams cause downstream harm. AES Members have access to an [online platform](#) that provides near-real-time monitoring of the Mekong dams.

- **Potpecko Lake in Serbia is covered in [garbage](#).** Several landfills are dumping garbage into the Lim River upstream:



- Dolphins along the US Gulf Coast are developing painful, crusty, pus-filled [skin lesions](#). The cause: hurricanes generate more volume and unpredictable fresh water, which causes a condition called "ulcerative dermatitis" skin lesions that lead to rapid death.



Research and Markets

- The US Department of Energy has announced eight distinguished US scientists and engineers as recipients of the [Ernest Orlando Lawrence Award](#) for their contributions in research and development supporting the Energy Department's missions.

- [Krista Walton](#) (Georgia Tech). Atomic, Molecular, and Chemical Sciences
- [Susannah Tringe](#) (Lawrence Berkeley NL). Biological and Environmental Sciences
- [Robert Ross](#) (Argonne NL). Computer, Information, and Knowledge Sciences
- [Zahid Hasan](#) (Princeton University and LBNL). Condensed Matter/Materials Sciences
- [Yi Cui](#) (Stanford University and SLAC Lab). Energy Science and Innovation
- [Dustin Froula](#) (University of Rochester). Fusion and Plasma Sciences
- [Dana Dattelbaum](#) (Los Alamos National Lab). National Security and Nonproliferation
- [Daniel Kasen](#) (UC Berkeley and LBNL). Nuclear Physics

- *Featured research:* Cement is a key ingredient in concrete, which is the second most consumed material in the world after water. However, in spite of concrete's strength, longevity, and reliability, the material eventually cracks. **The PNNL has developed [new polymers](#) — strong and flexible — that can be added to cement to produce concrete that heals itself** within 24 hours of when cracks occur.

- The winner of the US Department of Energy Water Power Technologies Office (WPTO) Innovations in Advanced Manufacturing for Hydropower (I AM Hydro) Prize is Cadens, for "Utility of Large Area AM for Small Hydro" - **a 3D-printer that produces turbine components**. Note: AES Members have access to [Water Works](#), a white paper on hydropower, by AES.

- [QuantumScape](#) has built a **solid-state battery cell that can charge to 80% capacity in 15 minutes**, works in colder temperatures, lasts longer, and doesn't require lithium on the anode - which can reduce efficiency - because it technically doesn't have an anode. However, QuantumScape has yet to scale manufacturing.

- Last year, **Volkswagen tripled its EV sales** when its new compact ID.3 came on the market. Further, Germany, long a laggard in adopting electric vehicles, saw more people buy electrics in December than any other year combined. (The ID.3 will arrive in the US in 2022 and will cost about \$40,000 USD.)



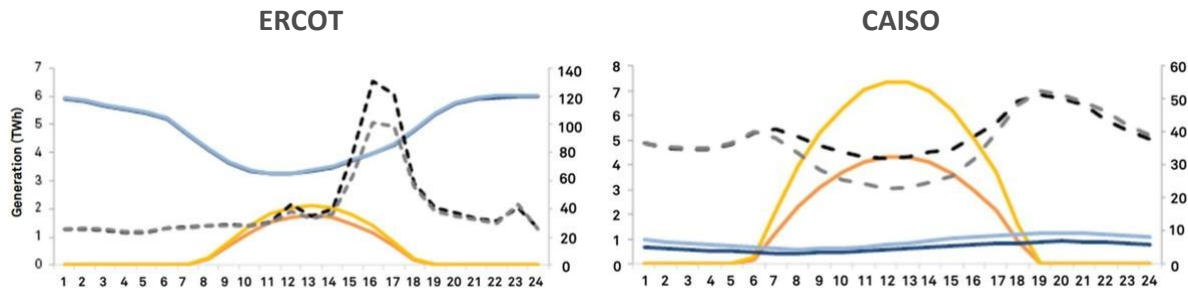
Electricity, Power and Efficiency

- *Featured:* **China has a voracious [appetite](#) for electricity**. National consumption increased 9% in November, compared with the same month a year earlier, one of the fastest year-on-year increases on record. (*Note:* The rate of increase is roughly equivalent to adding the entire consumption of Texas, Arkansas, Oklahoma and Louisiana to China's grid in twelve months - [tmsnr.rs/2LSi94q](#)). Electricity use rose across all sectors of the economy despite milder than normal weather. (*Related:* China's [demand](#) for natural gas is surging.)

- [Energy efficiency scorecard](#) (note: Minnesota, Colorado and Virginia are regional winners; Nevada is most improved):

1. California
2. Massachusetts
3. Vermont
4. Rhode Island
5. New York

- Although California is thought to be the leader in renewable energy in the US, **Texas has more installed capacity and is quickly catching up in its renewable market share.** *Insert:* how high **solar** and **wind** penetration in electricity markets affects hourly power prices, a comparison of **solar** and **wind** in ERCOT and CAISO, by generation and prices.



ERCOT: The build-out has had minimal impact on average hourly prices; **solar** has more economic value than **wind**.

CAISO: Even if/when storage is included, the duck curve is still growing - prices are at their lowest when **solar** is the most abundant but price increases when **wind** is available and solar is not.

- AES Editors recommend: [Electrification Futures Study](#), by NREL (5th in the series) - an analysis of the potential impacts of widespread electrification in the US.

- Cybersecurity Spotlight -

- President Trump issued an Executive Order [prohibiting](#) interactions “with persons that develop or control” eight Chinese connected software applications: Alipay, CamScanner, QQ Wallet, SHAREit, Tencent QQ, VMate, WeChat Pay, and WPS Office.

New Feature! Member Bulletin Board



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- The Atlantic Council [Global Energy Forum](#), January 19 (recorded)
- The Cleantech Group Forum's [Rising Stars](#), January 19 - 21 (recorded).
- [Bifrost Talk](#) on energy data, Nordic Innovation House, January 21 webinar (recorded).

- The USEA's 17th annual [State of the Energy Industry Forum](#), January 28.
- 2nd annual Nordic [IndTech Industry Data Workshop](#): February 03 2021
- The annual US Clean Energy Education and Empowerment (C3E) Awards to raise the visibility of women in the clean energy sector. [Nominations](#) due February 25, 2021.
- The MIT Energy Conference - [Charging Ahead to a Cleaner Future](#), March 10th - 12th.

Quotes: "being better"

"I don't think it's one of these things where we as an industry get in a room and say, 'Man that was a good four years.' It was more like 'meh.' The Biden Administration has made it clear they aren't pro-oil, **and yet, the next four years will probably be better.**"

— Oil lobbyist who requested anonymity because they were not authorized to give their opinion.

"It's legitimate to oppose wind power - I understand that wind power can stoke strong feelings and heated debate. But I do not like insults, harassment, threats and vandalism. **We are better than this.**"

— Tina Bru, Minister of Petroleum and Energy for Norway, on growing backlash against wind power throughout western Europe.

"Many of us, especially those of us who work in the Capitol, were deeply disturbed by the disrespect for the building and its institutions -- regardless of your politics. It was embarrassing and a horrible day for all Americans. **We know we can and must do better.**"

— Frank Maisano, Partner - [Bracewell Law](#), on the riots in the Capitol building.

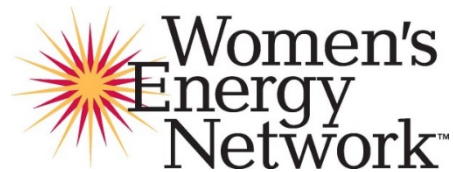
Gratitude

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