

ENERGY MATTERS

Soundbite summaries of the energy news you need to know

AN OFFICIAL PUBLICATION OF



AMERICAN ENERGY SOCIETY

January 10, 2022

- The Power Read -

- **Natural gas:** The US LNG export market is ready for a second wave.
- **Low-Carbon:** Lithium markets are out of balance.
- **Climate:** The current social cost of carbon is \$51/ton (USD).
- **Electricity:** 2021 set a record for negative electricity prices.
- **Electricity II:** The cost to transmit electricity \cong the cost to generate it.
- **Electricity III:** [Electrification 2022](#), hosted by EPRI, is March 14 - 17, 2022, in Charlotte, NC, (AES is a "supporting organization").
- **University spotlights:** See below (at the bottom)!

- News from the Society -



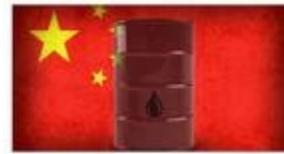
- AES has launched **Datasets**, a new resource for Members! [Contact us](#) for more information.
- **Support the Society - [join](#) as a Member.** Access all publications, services, reports, restricted content, datasets, and more.
- Did you miss [Top Energy Stories 2021](#)? Did you miss other end-of-year publications? Members get access to the archives along with many other benefits and services. Are you a [Member](#)? Are you supporting AES?

- Fossil Fuels -

- Oil -

- Each year, the Chinese oil major CNPC releases its domestic "peak oil" demand projections: ***the year always stays the same, but the projected volume always increases:***

2018 - peak oil demand in 2030: 690m tons
2019 - peak oil demand in 2030: 705m tons
2020 - peak oil demand in 2030: 740m tons
2021 - peak oil demand in 2030: 780m tons



A few other things to think about (thank you [@JavierBlas](#)):

- In just 4 years, the CNPC has increased its Chinese peak oil demand forecast by 90 million tons, or about 1.8 million b/d.
- The IEA forecasts that China will reach "peak oil" demand in 2022 or 2023.
- Basically, Chinese demand for oil is so voracious that no one can get ahead.

- Gas -

- There are 7 LNG [export](#) terminals operating in the US; however, a "[second wave](#)" of terminals is in development and almost all of them are along the US coast of the Gulf of Mexico: 4 are FERC-approved projects (*list below*) and 15 others are delayed. Meanwhile, Canada has about 16 delayed LNG export projects. (Thank you AES Member and SME [David Scull](#).)



1. Sabine Pass, Louisiana (0.7 Bcfd)
2. Cameron Parish, Louisiana (1.41 Bcfd)
3. Sabine Pass, Texas (2.25 Bcfd)
4. Calcasieu Parish, Louisiana (4.0 Bcfd)

- Mining, Minerals and Coal -

- **New coal plants are under construction** in China, India, Indonesia, Turkey, Mongolia, Vietnam, Singapore, Zimbabwe, South Africa, Greece, Bosnia and Herzegovina, Serbia, Poland, Kazakhstan, Colombia, Brazil and Mexico. AES Members have access to an interactive coal-plant [map tracker](#).

- Carbon Capture -

- The 10 "new" leading research centers in the field of [direct air capture](#) (DAC) are:

[Washington State University](#)
[Oklahoma State University](#)
[University of Illinois](#)

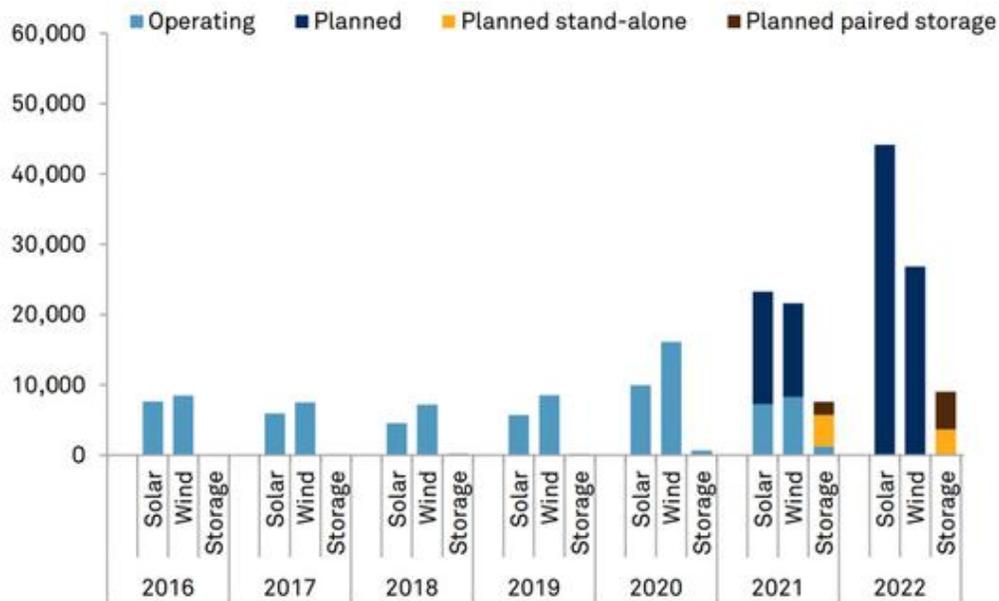
[ORNL](#)
[LBNL](#)
[North Carolina A&T](#)

[Case Western Reserve](#)
[Oregon State University](#)
[Northwestern University](#)

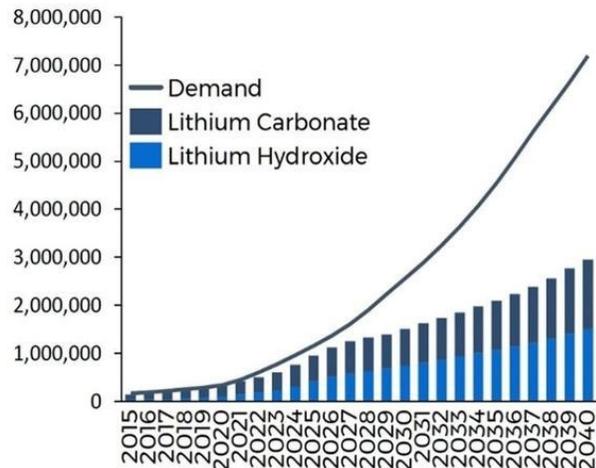
Probably the leading DAC center is at [Arizona State University](#) (led by Klaus Lackner).

- Low-Carbon Energy -

- Based on planned installations, it appears that **2022 will be the [best year](#) for US renewables, especially wind and/or solar paired with storage** (*insert: annual installed capacity of wind, solar and battery storage, 2016 - 2022*).



- There is a profound imbalance between the supply of and demand for [lithium](#) (*insert: lithium, in tons*):



- *Featured:* Multiple prominent research organizations (World Energy Outlook, US Energy Information Agency, International Energy Agency, etc.) **consistently underestimate decreasing prices for renewable energy**. New research shows that economic models tend to under-appreciate [Wright's Law](#) and over-emphasize [Moore's Law](#). AES Members have access to a [research paper](#) about renewable energy prices that has not yet gone through the peer-reviewed process and [another](#) that has.

- [Tidal turbines](#) generate electricity from the power of the ocean. Two turbines (known as "sea dragons" or "tidal kites") move underwater in a figure-eight pattern, absorbing energy from the ocean tide. They are tethered to the seabed by 40-metre metal cables. Their movement is generated by the lift exerted by the water flow — just as a plane flies by the force of air flowing over its wings.



- **Fusion is hot ... again.** For instance, Commonwealth Fusion Systems raised more than \$1.8 billion in the largest private investment for nuclear [fusion](#) ever (investors include Bill Gates and George Soros). Other fusion companies, like [Helion Energy](#), have also secured very large funding rounds. In addition, according to the Experimental Advanced Superconducting Tokamak ([EAST](#)) program in China, their fusion reactor achieved temperatures five times hotter than the sun for over 17 minutes.

The Geothermal Entrepreneurship Organization (GEO) at UT-Austin has formed a new consortium, the [Texas Geothermal Institute \(TGI\)](#), co-founded by [Jamie Beard](#) (*insert*).



- Policy -

- Next month, the **2022 spring session of the US Supreme Court will be dominated by [West Virginia v. EPA](#), one of the most important cases in years.** The justices are poised to issue a blockbuster ruling on the extent to which the US EPA can regulate greenhouse gas emissions and potentially the extent to which all federal agencies can wield their administrative authority. (*Note: AES Members have access to the AES archives, including the [Energy Today](#) issue: "The Three Most Important Energy and Environment Cases in Supreme Court History."*)

- Omicron combined with record snow fall in Washington, DC, means Congress got off to a slow start in the new year; no matter, **next week is the real start for the policy year.** (Thank you [@fvmaisano](#).) As always, the policy-making process begins with a lot of Hill experts talking: the Chamber, API, EPRI, the AC, SEIA, Wilson, USEA, EESI, ICF....

- *Beltway Buzz:* **the Biden administration is trying to speed up the permitting process for high-voltage power lines** as part of its drive to promote renewable energy. The changes, which include giving the federal government more authority to intervene in state-level permitting decisions, are meant to [expedite the approval of new transmission lines](#), which often encounter regional opposition and face years of delays.

- The US EPA extended the [comment period](#) for its **proposed regulations on methane emissions** (new source performance standards, emissions guidelines, etc.) until January 31, 2022. AES encourages its members to submit comments.

- **Bill McKibben has a new project and a new team: [Third Act](#), a community of "experienced" Americans** (aka Senior Citizens) "determined to change the world."



- Energy policy around the world -

- Since 1963, Lake Chad in northern Cameroon has lost 90% of its water ([drought and overuse](#)) and can **no longer meet the demands of the population**; about 25,000 people have migrated out of the region. The drought has also intensified war along the Chad/Cameroon border.



- A [draft text](#) released by the European Commission **proposes classifying some nuclear power and natural gas projects as green investments.**

- Climate and Sustainability -

- According to the Biden Administration, the current "**social cost of carbon**" (SCC) for a ton of CO₂ emitted in 2020 is [\\$51](#) (USD), which is significantly higher than the amount used by the Trump Administration (\$1/ton to \$8/ton). Meanwhile, [science](#) calculates the SCC twice as high as the Biden Administration, while other SMEs think it should be even [higher](#) than that.

\$51/ton
of CO₂

- Looking ahead to March and April 2022, Working Group 2 (Impacts, Adaptations and Vulnerability) and Working Group 3 (Mitigation) **will release their follow-up IPCC studies** (*note: these international reports are the most rigorous peer-reviewed documents published*). Expert members like [Maximilian Auffhammer](#) anticipate that these two follow-up reports will be "even scarier reads" than the last IPCC (Working Group 1) [report](#).

- Humans have emitted about 2,500bn tons of CO₂ (GtCO₂) into the atmosphere since 1850, leaving less than 500 GtCO₂ of the remaining carbon budget to stay below 1.5C of warming. In other words, **the world has collectively burned through 86% of its carbon budget.**

- The US has released more than 509GtCO₂ since 1850 and is responsible for the largest share of historical emissions — about 20% of the global total.
- China is second with 11%, followed by Russia (7%), Brazil (5%) and a tie between Indonesia, Germany and the UK (4%).

- **Spotlight: Delhi, India, has severe year-long pollution that [gets worse in winter](#). Every Nov. thru Jan., the government implements a series of reforms to "[clear the air](#)":**

- Elementary schools shift to home schooling;
- Construction work in the city is banned;
- Half of all coal-fired power plants are shut down;
- The city turns on its one air purifying tower (24 m tall);
- A public relations campaign lists government "clean the air" projects and asks Delhi residents to do the same.



- *Continued, Delhi air pollution in the winter*, by micrograms per cubic meter (*note: according to the World Health Organization, 100 micrograms of toxic particles per cubic meter is the baseline: below is healthy, above is not, and 171 micrograms is considered "very unhealthy."*)

- 2016: 289
- 2017: 349
- 2018: 392
- 2019: 458
- 2020: 535
- **2021: 607**

- The world's three largest [tropical rainforests](#) are located in the Amazon, Congo River basin and Southeast Asia.

1. Southeast Asia rainforest is a net positive "carbon source."
2. The Amazon River basin teeters as "carbon neutral."
3. **Congo River basin (insert) is the last "carbon sink."**
The Congo's tropical rainforest sequesters 600 million metric tonnes more carbon dioxide per year than it emits, or about one-third of the CO2 emissions from all US transportation.



- The [most polluted](#) place on Earth could be Norilsk, Russia.

The most northern city in the world was built by gulag prisoners. Norilsk Nickel, a smelting company, has poisoned rivers, killed off boreal forest, and emits more sulfur dioxide than active volcanoes. Even the Russian Federation government [admits](#) there's a problem (translation required).



- Earth has a new [Black Box](#) in Tasmania, Australia.

Earth's new [Black Box](#) in Tasmania, Australia, collects and makes available for future generations a time capsule (about the size of a large school bus) that collects and saves all climate information just in case the current civilization dies.



- The new year's **winter [wildfire](#) near Boulder, the most damaging wildfire in Colorado's history**, was immediately followed by single-digit temperatures and more than a foot of snow.



- Research and Markets -

- In H2 2020 and H1 2021, **about [\\$87.5 billion](#) was invested in climate tech startups**, or about 14 cents of every venture capital dollar committed. According to AES data-trends, **the top-3 hottest climate-tech sectors**, by number of deals and investment totals:

1. Mobility-as-a-Service
2. AgriTech
3. Carbontech (primarily software)

Note: the number of seed and Series A deals focused on climate tech startups has remained relatively stagnant on an annual basis since 2018 (which does not bode well).

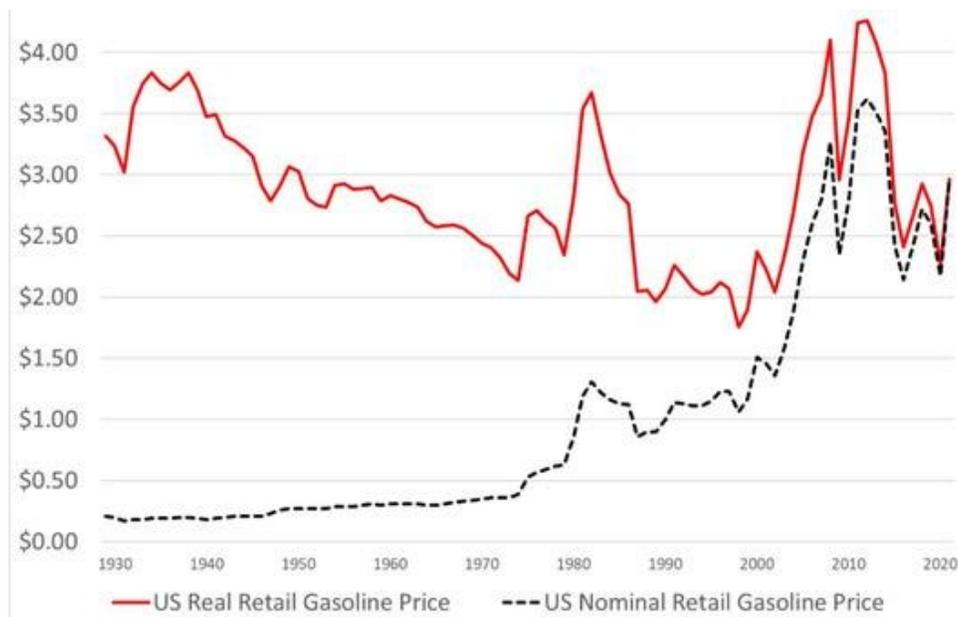
- Two defects in **Chevy Bolt batteries can lead to sudden explosions**; Chevy's battery manufacturing plant is now [closed](#). Recently, GM sent a letter with instructions to 141,000 Chevy Bolt owners: do not park the car within 15 meters of other vehicles; do not charge the car overnight; fully charged Chevy Bolts should not be kept in the garage.



- It may be possible to bring "dead" [lithium batteries](#) back to life.

- The US DoE has announced its "topics of interest" for the next SBIR/STTR grants (America's Seed Fund); the deadline to submit an [application](#) (PDF) is February 22, 2022.

- Gas prices seem high; however, the price of a gallon of gas in the US has remained almost [the same](#) since 1929. **Real gas prices are about the same as they were in 1960, when gas cost \$0.31 per gallon**, but not as low as 1998, the cheapest gas ever.



- *Featured resource:* The US DOD provides extraordinary funding opportunities in support of research, development and deployment. AES strongly recommends a ["living map"](#) of the **US Defense innovation ecosystem** (Air Force, Army, Marines, Navy, Coast Guard, etc.).

- A new program in Mississippi **pays "[carbon credits](#)" to farmers** to store carbon.

- Our Next Energy (ONE) installed their own [battery](#) in a Tesla and **traveled 752 miles on a single charge**.

- **Norway's oil and gas production is at an [all-time high](#)**; for instance, Equinor's oil and gas revenues have doubled and new discoveries by the company suggest that Norway will continue to produce fossil fuels well into the coming decades.

- Every G20 government has failed to meet their own Paris Agreement targets and broken all commitments to provide \$100 billion in support climate resiliency efforts for developing regions; on the other hand, [private markets](#) are **increasing investments in the net-zero economy**:

- Energy Impact Partners has a \$1 billion fund (includes commitments from utilities);
- TPG's Rise Climate Fund raised \$5.4 billion;
- Brookfield Asset Management has a \$7 billion fund;
- Bezos Earth Fund will invest \$10 billion;
- Venture capitalists are participating, too, including: Lowercarbon Capital (\$800 million), DBL Partners (\$600 million) and World Fund (\$406 million).

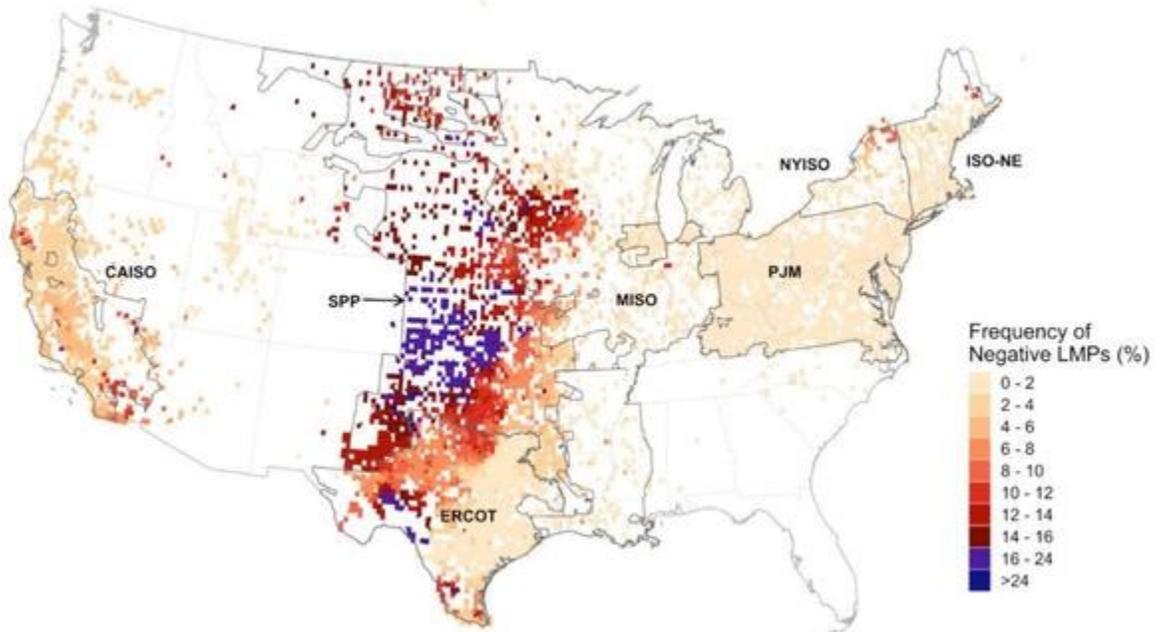
- [Barbara Burger](#), president of Chevron Technology Ventures and a legend in CVC, is retiring.



- Electricity, Power, Efficiency, and the Grid -

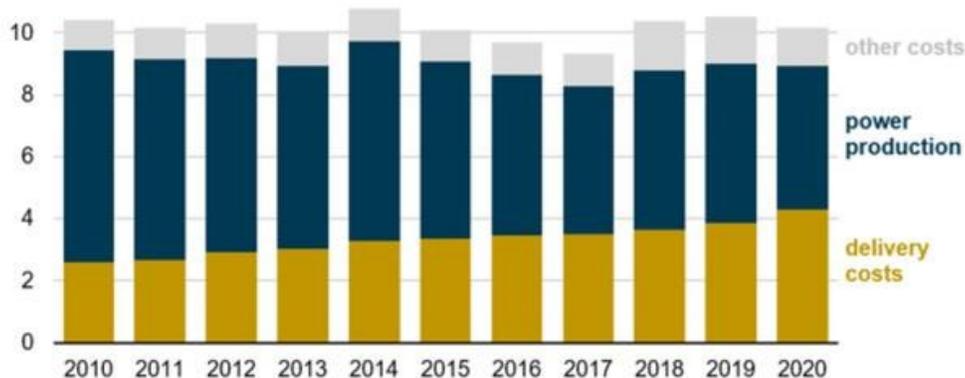
- On average, energy prices ended 2021 59% [higher](#) than the first trading day of the year.

- **Negative electricity (wholesale) price events occurred about 4% of all hours and all markets across the US in 2020, but they were not distributed evenly and happened most often in the Midwest (ERCOT, MISO and SPP markets).** *Insert:* a map of negative pricing events in the US. AES Members have access to the [peer reviewed research](#).



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

- The [cost](#) to transmit and distribute electricity (build, operate, and maintain the electric wires, poles, towers, and meters) is about the same as the cost to generate it, or 4.3 cents/kW compared with 4.6 cents/kWh, respectively.



- Cybersecurity Spotlight -

- Thought leader [epicenters](#) in energy cybersecurity:

<u>Small epicenters</u>	<u>Mid-sized epicenters</u>	<u>Large epicenters</u>
1. Idaho Falls, ID	1. Bloomington, IL	1. Colorado Springs, CO
2. Ithaca, NY	2. Huntsville, AL	2. Washington, DC
3. Rapid City, SD	3. Trenton, NJ	3. Albuquerque, NM
4. California, MD	4. Charlottesville, VA	4. Dallas, TX
5. Harrisonburg, VA	5. Columbus, GA	5. Charlotte, NC

- University Spotlight -

- January [20](#) & [21](#): The Institute for Energy Efficiency at **UC Santa Barbara** is hosting a 2-day virtual workshop on Emerging Energy Technologies.
 - **UC Davis** EEL [career fair](#) starts on January 25; registration opens tomorrow, Jan. 11.
 - **University of Hawaii** Economic Research Organization (UHERO) has completed a study of the benefits of "[green fees](#)" paid by tourists to offset their carbon footprint.
 - **Colorado School of Mines** offers an [MS](#) in Natural Resource and Energy Policy.
 - Oregon Renewable Energy Center ([OREC](#)) at **Oregon Tech** specializes in energy use in rural settings.
 - The Nebraska Center for Energy Sciences Research ([NCESR](#)) at **University of Nebraska-Lincoln** is taking applications for the summer undergraduate internship in energy sciences research - **\$5,000 per recipient for the summer of 2022**.
 - **University of Chicago** is seeking an [Executive Director](#) for its epic EPIC.
 - **University of New Orleans** Energy Conversion and Conservation Center ([ECCC](#)) conducts fundamental research on power generation and energy conservation.
 - **TCU** will host its [Energy Innovation Case Competition](#) on Jan. 14 - 17.
 - **UL Lafayette** [Energy Institute](#) has launched the [Louisiana C1 Extension Service](#) to help the region set and achieve zero-carbon goals.
 - The [Earth Source Heat](#) project is **Cornell University's** version of a geothermal system that would use the Earth's internal heat to warm the campus.
 - [CISTAR](#) at **Purdue University** is dedicated to creating a diverse, inclusive center where members from all backgrounds can lead the new global energy economy. For example, its NSF-sponsored summer Research Experience and Mentoring program supports STEM students in a 6-week program doing cutting-edge research on energy and then 4-weeks mentoring kids at the National Society of Black Engineers' Summer Engineering Experience for Kids [camps](#).
 - According to Higher Education Research and Development (HERD) data, the **University of Wisconsin-Madison** [ranked 4th](#) in national research rankings for US Department of Energy (DoE) funding for public and private universities.
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- 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 [DroneDeploy](#).
- **EPRI's Incubatenergy Labs is accepting [applications](#) until January 14th.**
- [The Green Program](#) experiential sustainable development program has added Belize and Austria to its other programs in Iceland, Peru, Japan and Nepal.
- Unearth has published a report on [wildfires and utilities](#).
- **Clearpath has published a new report on [clean hydrogen](#).**
- We aren't quite sure what it is, but keep an eye on the new energy project, [Veriten](#).
- For startups working on a technology that's enabled by optics, photonics, or imaging, applications for [Luminate's](#) six-month accelerator close on January 17. [Apply now!](#)

- Quotes -

Recent Tweets by [@CarbonWrangler](#)
(aka [Julio Friedmann](#), [@ColumbiaUEnergy](#))

Sigh. No energy transition yet - just energy addition ([Dec 27](#))

"If you want peace, you don't talk to your friends. You talk to your enemies." - Desmond Tutu, Rest In Peace ([Dec 26](#))

100% zero-C is harder than 100% renewables ([Dec 9](#))

- Sometimes, only a Gary Larson cartoon can describe the moment correctly. Welcome 2022!
([Jan 1](#))



- Gratitude -

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