

ENERGY MATTERS

Soundbite summaries of the energy news you need to know

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AMERICAN ENERGY SOCIETY

April 5, 2021

– News from the Society –

Empowering Impact 2021: A Report on Incubators and Accelerators of Energy in the US. Over two years, the American Energy Society studied all incubators and accelerators in the United States with energy- and climate-tech in their portfolios. Our new report offers critical insights about where tomorrow's energy technologies are emerging today.

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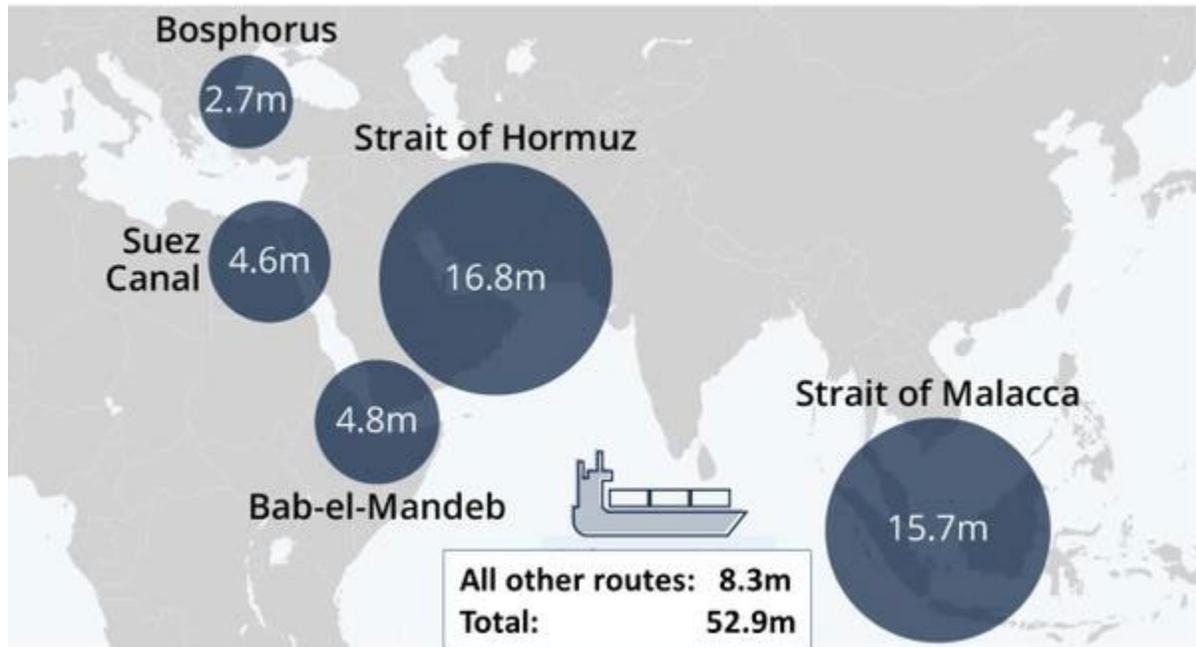
- In this issue of Energy Matters –

- **Geothermal**: Utah FORGE digs in (*insert*).
- **Electricity**: DER ready for take-off.
- **Oil**: Ever Given highlights the five global oil chokepoints.
- **Policy**: 2020 sets records.



Fossil Fuels

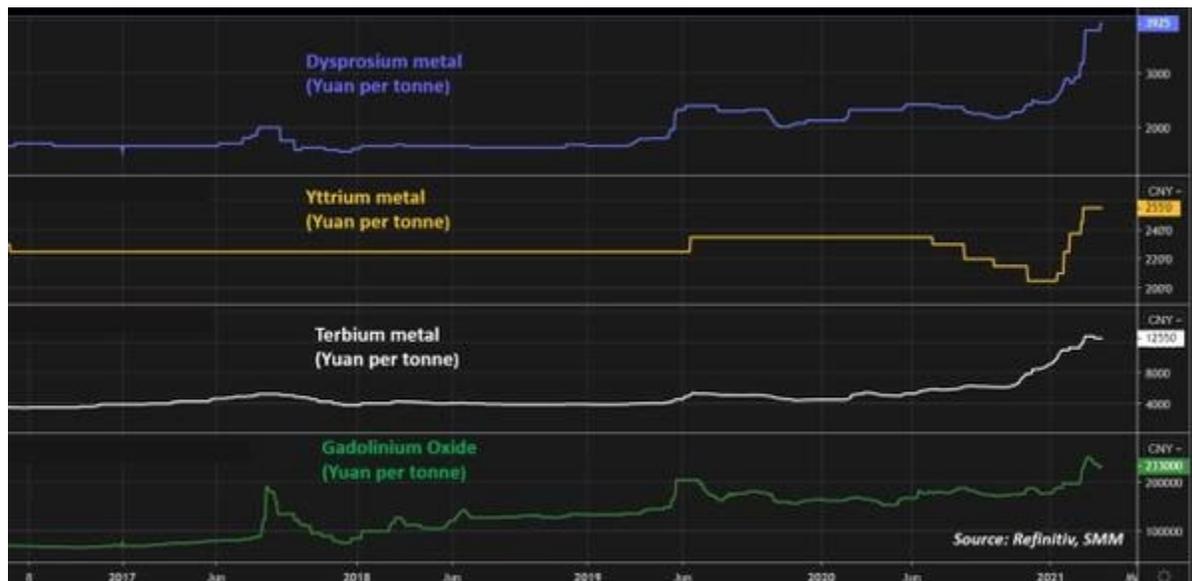
- **Oil:** Seaborn oil in transit - possible chokepoints, by million barrels per day.



- **Natural Gas:** [Chaotic](#) natural gas markets in Q1-2021:

- LNG prices in Asia rose from historic lows (\$2/mmBtu) to record highs (\$30/mmBtu).
- Global gas markets experienced their largest recorded drop, with an estimated 2.5% year-over-year decrease in consumption (or about 100 bcm).
- A cold December, warm January, and cold February contributed to unpredictable prices
- Europe is starting to [build back](#) its natural gas storage inventories.

- **Mining, Minerals and Coal:** The market for rare earth elements and minerals is so sensitive that prices soared when the Ever Given blocked the Suez Canal and a military coup in Myanmar took over the government. (Insert: historical price comparisons for four REEs and REMs; all prices in ¥ Chinese Yuan.)

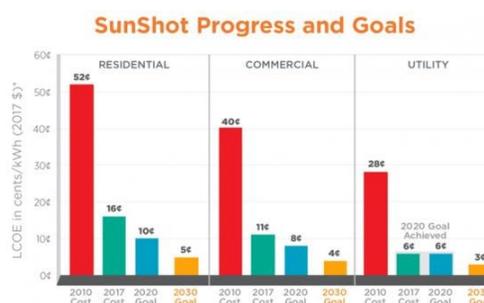


- **Carbon Capture:** The current 45Q tax credit is \$50 per ton for carbon captured and \$35 per ton for carbon tech and enhanced oil recovery (EOR). These [incentives](#) were enough to entice the storage of 40 million tons of CCS; however, the current **45Q rates are not enough to support direct-air-capture (DAC)**, which needs to be closer to \$180 per ton.

Low-Carbon Energy

- **Solar:** The DoE Solar Energy Technologies Office (SETO) announced a **more aggressive new SunShot target**, from 4.6 cents per kilowatt-hour (kWh) to 3 cents/kWh by 2025 and 2 cents/kWh by 2030. *Below:* funds support advancing two materials used to make solar cells. *Insert:* the first SunShot goal: lower solar costs by 75% between 2011 and 2020 was achieved.

- \$40 million for perovskite R&D
- \$3 million for a perovskite startup prize
- \$20 million for CdTe thin films (program run by NREL)
- \$7 million to increase the lifetime of silicon-based PV systems from 30 years to 50 years.
- \$33 million for concentrated solar-thermal power (CSP) advances, broadly conceived
- \$25 million to demonstrate next-gen CSP power plans (program run by Sandia NL).



- *Shovel Wars Redux:* Batteries require REMs that are very expensive. For instance, **rhodium, has gone from about \$640 an ounce five years ago to \$21,900 an ounce this year.** (*Note:* rhodium is also used in catalytic converters that help to scrub emissions from gas-powered car and truck tailpipes; not surprisingly, thieves are hacking off catalytic converters and then selling the parts back into the supply-chain.)

- **Geothermal** directional (horizontal) drilling at high-temperatures is rarely done and very difficult. However, the Utah FORGE team (Frontier Observatory for Research in Geothermal Energy) set a **new US record, drilling vertically 4,700 feet and then steering 65° to a vertical depth of 8,559 feet to tap into 442°F temperatures.**



- **Offshore wind:** **The US has 42 megawatts of operating offshore wind utility-scale capacity.** For comparison, Germany and the UK have both installed roughly 10,000 megawatts of offshore capacity; China, Denmark, Belgium and the Netherlands have 1,000 megawatts. (*Note:* offshore wind has a new 30% investment tax credit and support at the federal level to streamline permitting processes.) *Below:* a comparison of the most active offshore wind developers in the US.

<u>Aggressive</u>	<u>Moderate</u>	<u>Passive</u>
Maine	Connecticut	North Carolina
Maryland	Delaware	
Massachusetts	New Hampshire	
New York	Rhode Island	
Virginia		

- **Top 3 states with "high hazard potential" dams**, by total dams and percentage "high risk":

1. Pennsylvania 1,525 (73%)
2. California 1,585 (53%)
3. North Carolina 3,444 (47%)

Note: AES Members have access to all reports, including [Water Works](#) (hydropower) and our latest release, [Empowering Impact](#) (energy-tech accelerators and incubators).

Policy

- **Nearly 100 individual cargo ships were waiting to go through the Suez Canal when the Ever Given got stuck.** Within hours, nearly 1,000 ships were waiting in the Mediterranean and Red seas and in the Canal itself—entire supply-chains were disrupted. The canal, by the numbers:

- > Used by 50 vessels a day, or 19,000/year.
- > 12% of all world trade passes through the canal.
- > 193.3km long, 24m deep and up to 210m wide.
- > In 2015, a 35km-long parallel channel was added.
- > It takes 12 to 16 hours to get through the canal.



- **The American Jobs Plan: a few energy-related items from the \$2.25 trillion dollar [proposal fact sheet](#)** (thank you AES expert member [Logan Jenkins](#) for the review):

- > 40% of infrastructure investments for disadvantaged communities
- > \$174 billion in incentives for EVs and charger stations
- > \$46 billion for government purchase of EVs
- > \$100 billion for resilient electric grid expansion
- > \$85 billion for public transportation, and \$80 billion for Amtrak and freight railways
- > \$46 billion for clean energy manufacturing
- > \$35 billion for "climate technology" R&D
- > \$16 billion for fossil worker's transition
- > \$10 billion for Civilian Climate Corps
- > \$400 billion in clean-energy credits

- The descendants of FDR and some of his Brain Trust involved in the New Deal wrote to President Biden urging an expansion of the Civilian Conservation Corps. The signatories include James **Roosevelt, Jr.**; Henry Scott **Wallace**; June **Hopkins**; Tomlin **Perkins** Coggeshall; and Harold **Ickes**. AES Members have access to a true and correct copy of the [letter](#).

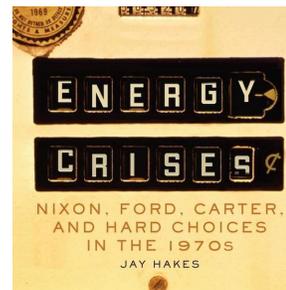
- **Canada's Supreme Court ruled 6-3 that the federal government's carbon tax is constitutional.** AES Members have access to a true and correct copy of the [Court's ruling](#).

- American Petroleum Institute, the largest oil and gas industry lobby group in the US (members include ExxonMobil and Chevron), [endorsed](#) a federal price on carbon dioxide emissions.

- *Featured insight:* **The nine major multilateral development banks are [switching away](#) from financing fossil fuel projects**, with at least \$12 billion directed toward clean energy and only \$3 billion to fossil fuels. The European Investment Bank spent almost nine times as much on clean energy funding as on fossil fuels, though the European Bank for Reconstruction and Development increased its funding for fossil fuel projects.

- Breakthrough Energy, an initiative launched by **Bill Gates**, **wrote a letter to Congress** urging more funding for innovation in climate and energy. AES Members have access to a true and correct copy of the [letter](#).

- A new book by AES Member and friend, Jay Hakes: [Energy Crises: Nixon, Ford, Carter, and Hard Choices in the 1970s](#).



Climate and Sustainability

- **Summers are 17 days longer than they were 50 years ago** (worldwide average). AES Members have access to the [peer-reviewed research](#).

- **The storage potential of one of Earth's biggest carbon sinks – soils – may have been overestimated**. AES Members have access to the research article.

- A new board game, [Climate Crisis](#), allows players to **implement various mechanisms (from individual action to regulatory policies) in response to the changing climate**. How do you win? If all players collectively reach "net-zero."



- When power plants and pipelines froze during the Texas storm in February, oil field wells **burned off about 1.6 billion cubic feet of gas in a single day**. For comparison, that is five times higher than average and enough to power thousands of homes for one year. AES Members have access to satellite [images](#) of the flaring from the Black Marble [project](#).

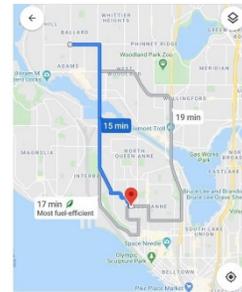


Research and Markets

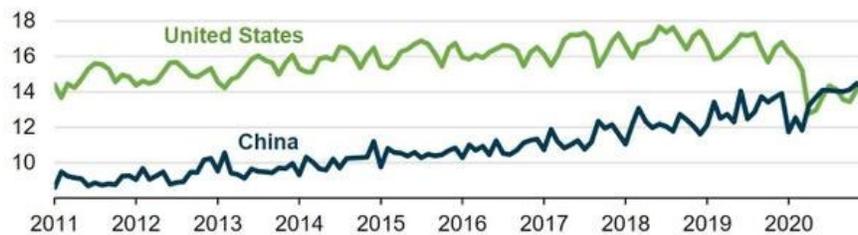
- Gasoline demand in the US is [higher](#) now than it ever was in 2020.

- Volkswagen “[accidentally](#)” announced that it was changing its name to Voltswagon - the draft press release was scheduled for April Fools' Day.

- Google Maps will now default to the route with the lowest carbon footprint when it has approximately the same ETA.



- For the first time ever, **China's refineries are processing more crude oil than US refineries.** *Insert:* monthly crude oil processed by US and China's refineries, in million barrels per day.

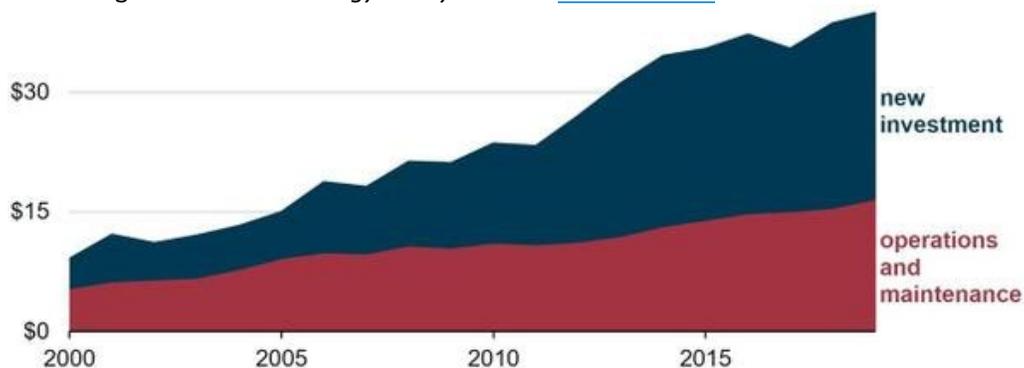


Electricity, Power, Efficiency and the Grid

- *Featured:* FERC clarified its landmark [Order 2222](#), which grants demand response (DR) unimpeded access to wholesale electricity markets when part of a distributed energy resource (DER) package. Until Order 222, numerous states, from Louisiana to North Dakota, exerted their right to [prohibit](#) DR. The FERC ruling follows the [2016 Supreme Court decision](#) that confirmed the right of DR to participate in wholesale markets. AES Members may also like the *Energy Today* issue on the [most important SCOTUS cases](#) in energy history.

- For the first time ever, [nuclear energy](#) (790 MWh) generated more electricity than coal (774 MWh).

- Annual spending by US electric utilities on infrastructure [increased](#) from \$9.1 billion in 2000 to \$40 billion in 2019. Of the \$40 billion that major utilities spent in 2019, \$23.5 billion was on new transmission investment and \$16.6 billion on transmission system operations and maintenance (O&M). AES Members might also like the *Energy Today* issue on [infrastructure](#).



Cybersecurity spotlight

- Suspected Russian [SolarWinds hackers](#) were able to gain access to the email account belonging to the Trump administration's head of the Department of Homeland Security, Secretary Chad Wolf, and the department's cybersecurity staff.

- Member Bulletin Board -



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- April 13 - 16: [Island Finance Forum 2021](#); Investment for Sustainable Development.
- [April 14](#), 8:00 AM – 12:30 pm, a virtual climate conference hosted by Argonne NL.
- [April 22](#), White House Virtual Climate Summit; President Biden announces his administration's emissions targets (live-streamed).
- April 22, [Biden 100 Days](#) - Climate Group Event
- [April 29](#), 2:00 pm ET, C3E Webinar - Decarbonizing with Scale and Urgency
- Commercial Vehicle Cleantech Challenge; deadline to apply is [May 6](#).
- May 24 - 26: ARPA-e *virtual* [energy innovation summit](#).
- **Organization spotlight: LiSA**, an Energy Innovation Hub of more than 100 scientists (with headquarters at CalTech) is devoted to advancing the science of [liquid solar fuels](#).

- Quotes -

Spotlight: Lithium

"The fundamental enabling technology for electric cars is lithium-ion.... In the absence of that, I don't think it's possible to make an electric car that is competitive with a gasoline car."

– Elon Musk

- Schlumberger New Energy launched [NeoLith Energy](#), a lithium extraction (DLE) pilot plant in Clayton Valley, Nevada.
 - AES recommends [Lithium Valley](#), a report by New Energy Nexus.
 - "[Calendar Aging](#)", noun. Definition: a process in which battery electrolytes attack lithium-metal anodes and create negative electrodes which drain 3% of a lithium battery charge.
 - New microscopy [techniques](#) offer insight into solid-state batteries.
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- Gratitude -

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