

Energy Matters

The energy news you need to know.

April 29, 2019
(Every two weeks)

The official e-newsletter of ...



**AMERICAN
ENERGY
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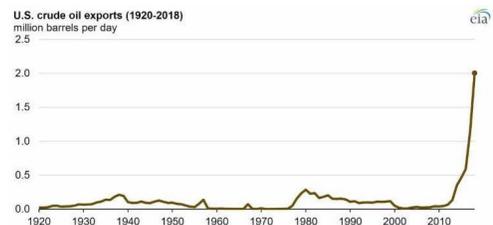
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Headline News

Fossil Fuels

Oil: The [US exported](#) an average of 2 million barrels of crude oil per day in 2018 to 42 destinations. The top-3 export destinations, in order:

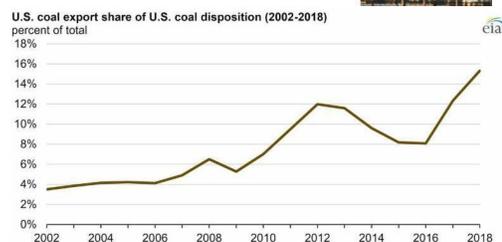
1. Canada
2. South Korea
3. China (however, exports to China decreased in late 2018 and thru 2019).



Gas: Permian drillers are [flaring gas](#) at the rate that is equivalent to the entire residential demand in the state of Texas; since gas prices are crashing right now, it is likely that the volume of flared gas is climbing. Furthermore, the amount of natural gas in storage in the US is at its [lowest](#) (1,137 billion cubic feet) in the last five years.



Coal: While domestic coal consumption (in million short tons, or MMst) is the lowest amount in the last 40 years, [US coal exports are at a record high](#). Meanwhile, in the last ten years more than half of all coal plants in the US have closed.



Carbon Capture: [Special report](#)

Cost to capture carbon emissions directly from the air:

- Current average cost (in 2018): \$600/ton.
- Venture capital profitable ROI target: \$100/ton.

Carbon capture companies leading the field:

- [Carbon Engineering](#) (Canadian company with Bill Gates as an investor)
- [Climeworks](#) (just signed a deal with Coca Cola)
- [Global Thermostat](#) (says it has broken the \$150/ton barrier)

Proposed Congressional funding: A [bill](#) in the US Congress would mandate that the DoE spends up to \$5.2 billion through fiscal 2024 to fund carbon capture RD&D.

Best articles about carbon capture in *Energy Today*, the AES e-magazine:

- [Klaus Lackner's Once Wacky Idea](#)
- [The Potential Pitfalls of Sucking Carbon from the Atmosphere](#)
- [The Fuzzy Math of Carbon Capture](#)
- [What Does 45Q Mean for Carbontech?](#)

Low-Carbon Energy

Wind: [The 6 largest wind farms in the world](#)

1. Gansu Wind Farm, Gansu, China. Capacity – 6,000MW
2. Alta Wind Energy Center, California. Capacity – 1,548MW
3. Muppandal Wind Farm, Tamil Nadu, India. Capacity – 1,500MW
4. Jaisalmer Wind Park, Rajasthan, India. Capacity – 1,064MW
5. Shepherds Flat Wind Farm, Oregon. Capacity – 845MW
6. Roscoe Wind Farm, Texas. Capacity – 781.5MW

Storage: In direct competition between a [lithium-metal battery](#) versus a lithium-ion battery, the lithium-metal battery flew a drone 70% longer.



Nuclear:

- The number of advanced nuclear RD&D projects in the US, 2015: 48
- **The total number of advanced nuclear RD&D projects, in 2018: 75**
- The "hot" new [advanced nuclear RD&D project](#): "micro-reactors."

Hydrogen: Nikola has multiple contracts to sell [hydrogen fuel cell trucks](#); for instance, Anheuser-Busch ordered 800 tractor trailers and a contract to buy hydrogen from Nikola fueling stations.

Storage/renewables: *Special Report:* A number of large companies (General Electric, Siemens, Mitsubishi, Hitachi, etc.) are rapidly modifying their [battery-hybrid manufacturing facilities to build storage technologies that pair with specific sources of renewable energy](#) (like solar, wind and hydro).

Energy Policy - Beltway Buzz

- **Department of Energy Secretary Rick Perry might be preparing to resign** his position in the Trump administration and there is a rumor that he is finalizing the terms of his departure. However, in a statement provided to the American Energy Society and others, DoE spokeswoman Shaylyn Hynes denied the report: "He is happy where he is serving President Trump and leading the Department of Energy."

- [RFS policy](#) : The Trump administration recently reinstated Renewable Fuel Standards, (which requires a minimum amount of ethanol blended into all gasoline); however, **the administration has also granted 39 exemptions to refiners**. So, about 2.5 billion gallons of corn-based ethanol will not be blended into gasoline as per the mandate.

- [2020 Presidential campaign watch](#) : A survey of 20 declared Democratic presidential candidates (and incumbent President Trump's response) on climate change policy:

- All 20 Democrats support and would commit to the Paris climate agreement.
- 4 of 20 candidates fully support the Green New Deal (including Harris, Klobuchar, Sanders as an Independent candidate, and O'Rourke if he runs).
- 7 of 20 "unequivocally" support a carbon tax (Booker, Buttigieg, Castro, Delaney, Gillibrand, Williamson and Yang); 5 have said they are considering it.
- 7 of 20 support nuclear energy and its expansion (Booker, Delaney, Hickenlooper, Inslee, Klobuchar, Ryan and Yang).
- The incumbent and projected Republican candidate, President Donald Trump, vigorously opposes the Paris climate agreement and any carbon tax, dismisses the GND, and supports nuclear energy.

- **Nuclear policy**: There are 60 operating nuclear power plants with 98 nuclear reactors in 30 US states. The US Nuclear Regulatory Commission has acknowledged that **the US nuclear power fleet is not designed for climate change resiliency**:

- 90% of all nuclear plants have at least one new climate risk that exceeds design.
- 54 individual nuclear plants are not designed to handle flood risks.
- 53 were not built to withstand intense precipitation.
- 19 were not designed for extreme storms.
- 19 face three or more threats that have no resiliency response design.

Climate and Environment

- **The fastest warming cities in the US** (by temperature change from 1970 to 2018, in Fahrenheit). Below are cities 6 thru 10; visit the [AES website](#) for a list of the five fastest warming cities:

6. Chattanooga, Tennessee (+4.11 degrees)
7. Helena, Montana (+4.10 degrees)
8. Erie, Pennsylvania (+4.06 degrees)
9. McAllen, Texas (+4.03 degrees)
10. Las Cruces, New Mexico (+4.01 degrees)

Editor's note: though unconfirmed, perhaps rising temperature in cities is a result of a phenomenon known as "[urban heat islands](#)."

- **The 5 fastest warming states** (by temperature change 1970 to 2018, in Fahrenheit):

1. Alaska (+4.22 degrees) - note: Alaska has more [new parasites](#) and insects.
2. New Mexico (+3.32 degrees)
3. Arizona (+3.23 degrees)
4. Delaware (+3.15 degrees)
5. Utah (+3.02 degrees)

- **The most endangered rivers in the US**. Below are rivers 6 thru 10; visit the [AES website](#) for the 5 most endangered US rivers:

6. Chilkat River, Alaska
7. South Fork Salmon River, Idaho
8. Buffalo National River, Arkansas
9. Big Darby Creek, Ohio
10. Stikine River, Alaska

- **NASA has released a new "global temperature data-set."** Its conclusion: **the Earth is warming faster.** AES Premium Members have access to the [data-set](#).

- **The most recent issue of [Energy Today](#) featured "the changing climate."**

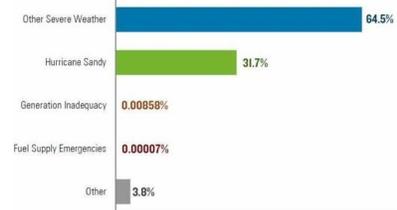
- **GoT Actor Jason Momoa (aka "Drogo") released a [YouTube video](#) in which he shaved off his signature beard and mustache in order to promote recycling and "bring awareness that plastics are killing our planet."** (Editor's note: Momoa is the lead investor in a company that produces a line of sparkling water in aluminum cans.)



Electricity, Power and Efficiency

- *Retrospective:* The issue of federalism (and "states' rights") has a long and turbulent history in the US. RTOs (regional transmission organizations) are a modern version of this controversial balance. RTOs coordinate, control, and monitor multi-state electric grids, and the complex process is regulated by the Federal Energy Regulatory Commission (FERC). However, **in 2016 the SCOTUS issued a precedent-setting 8 - 0 ruling in [Hughes v. Talen Energy Marketing](#), which affirmed that "[s]tates, of course, may regulate" in the public interest** even when their laws have a negative effect on inter-state energy markets. In other words, states have priority over the federal government when it comes to electricity markets.

- Since 2012, **most electricity power outages have been caused by extreme weather, with special emphasis on Hurricane Sandy;** statistically speaking, there is essentially no other cause of outages.



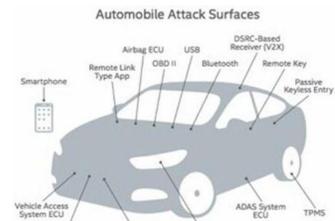
- Last year, the US **consumed more energy** than ever before. On the other hand, the amount of electricity consumed by US residential household is at its **lowest** in the last 5 years.

- A group of electric companies are planning to build the [West Coast Electric Highway](#), an **interconnected network of electric vehicle fueling stations along the Interstate 5 corridor**, from the border of California/Mexico to the border of Washington/Canada. (Editor's note: In California, transportation accounts for about 80% of air pollution and 40% of greenhouse gas emissions. At almost 1,400 miles long Interstate 5 is the only US interstate highway to touch the borders of Mexico and Canada, and it is a [lifeline](#) for goods shipping through West Coast seaports.)



Energy Security Threat-Post

- **Hackers have gained access to and exploited vulnerabilities in virtually all newly manufactured "connected cars,"** infiltrating insecure systems and stealing sensitive data. (Right: the 15 most common attack "surfaces" on all new cars.)
- Cyber-terrorists gained access to encrypted key-strokes on [Qualcomm](#) products and "sensitive keystrokes" stored on most Android devices.
- The cyber-group ShadowHammer inserted [malware](#) into a number of gaming devices in order to geo-locate users.



Research and Markets

- *Retrospective:* **Lithium.** From 2014 to 2017, lithium prices began rising from less than \$6,000/ton to more than \$16,000/ton (USD). With demand soaring (for consumer electronics, utility grid, and vehicle storage), billions were invested in new mines, especially in Chile and China. Then, almost overnight, supply began outpacing demand; indeed, one mine in Chile was on pace to double market supply. That sent lithium prices plummeting (on the Chinese exchange, lithium carbonate prices fell 50.31%). **The market is starting to recover, and three companies are at the forefront** because they have reduced mining costs and sped up the supply chain:

- [Albemarle](#) (has been in operation for more than 30 years; considered the safest major mining company)
- [Tianqi](#) (the Chinese firm operates the legendary Greenbushes mine)
- [Power Metals](#) (controls and operates the mine very near the Tesla battery gigafactory in Australia)

- Most new model electric vehicles are being released only in [China](#) (such as ID.RROOMZZ, made by VW - *right*), where government subsidies and policies provide attractive market conditions.



- Elon Musk has proposed a " [loop](#) " project to connect Washington and Baltimore via an underground tunnel (*right*), even though the boring project in Los Angeles [didn't work out](#).



- Under the leadership of Principal Scientist Lucy Woodall, the British-led Nekton just **completed a scientific expedition of [deep waters](#) in the Indian Ocean**. Little is known about the world deeper than 30 meters (the limit of a normal scuba dive and where there is virtually no sunlight). A summary of the research:

- Evidence of several coral islands in the rariphotic zone (a "twilight zone" between 130 and 300 meters deep).
- Photosynthesis is not possible, but species rely on particles falling from above for sustenance.
- There are far more "vibrant" communities of fish than anticipated, including an assortment of eels, crabs, fish, and a new species of shark, *Mustelus mangloreensis* (aka "gummy shark" - image insert).



Features

Spotlight: A.G. Kawamura

Arthur Gen "A.G." Kawamura, a third generation fruit and vegetable grower from Orange County, served as California Secretary of Agriculture (2003 to 2010) and has advised the Agriculture Cabinets for both Democratic and Republican Presidents, including Bill Clinton and Donald Trump. In his spare time (!) AG is also the co-chair of [Solutions from the Land](#), a project supported by the UN Foundation, The Nature Conservancy, and other philanthropic organizations.



Reflecting on a lifetime of experiences, AG is concerned about the ag-water-energy nexus and its circular economy: "We have tremendous inefficiencies on all sides — pre-harvest and post harvest — all across our country." The only way to address concerns about soil, water, nutrition, and energy, he says, is to mobilize farmers and inform the people: "We need everyone involved. This is a human issue. It's not political."

Quotes: Energy "Dad Jokes"

- What did the light bulb say to the generator? *"I really get a charge out of you."*
- Why do transformers hum? *They don't know the words.*
- Greenland's been on Jenny Craig. *It's lost a couple trillion tons.*
- Why did the lights go out? *Because they liked each other.*
- What would a barefooted man get if he steps on an electric wire? *A pair of shocks.*
- Why did the gardener plant a light bulb? *He thought he would get a power plant.*
- What would you call a power failure? *A current event.*

In case you missed it

The Ghawar oil field in Saudi Arabia is pumping 3.8 million barrels a day - well [below](#) the 5 million bpd that the company claimed. Premium Members have access to the newly released [Saudi Aramco Bond Prospectus](#), previously one of the world's most secretive companies. (Note: the document is 469 PDF pages long.)

Contacts

- [The American Energy Society](#)
- American Energy Society [LinkedIn Group](#)
- American Energy Society introductory [video](#)
- [Contact us](#) with comments about the Society or this issue of *Energy Matters*.

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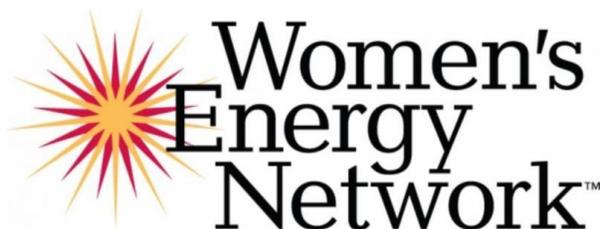
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