

Energy Matters

The energy news you need to know.

June 10, 2019

(Every two weeks)

The official e-newsletter of ...



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ENERGY
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Save the date: [CyberCon](#), a cybersecurity conference for executives and decision makers in the power & utility industry. November 19-21, Anaheim Convention Center

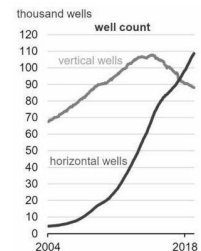
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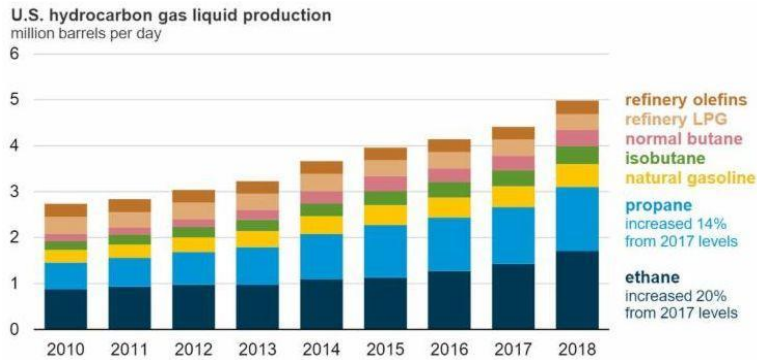
Headline News

Fossil Fuels

Oil: Wells drilled horizontally into tight oil and shale formations continue to account for an increasing share of crude oil production in the US. (Note: In 2004, horizontal wells accounted for about 15% of US crude oil production. By the end of 2018, that percentage had increased to 96%.)

Gas: Natural gas gets the most attention (due to its use by power plants to produce electricity), but there are at least seven primary hydrocarbon gases used for commercial purposes. As natural gas production has grown, an increasing share of other gases (HCLSs) are also produced at natural gas processing plants. **US production of all hydrocarbon gases increased 13% over 2017**, the highest volume on record - again.





Coal: The amount of coal consumed by power plants usually follows the seasonal pattern in overall electricity generation: coal consumption is typically highest in hot summer and cold winter months. However, **this year US coal stockpiles have been at their lowest during all seasons.**

Carbon Capture: Direct air capture (DAC) refers to machines that remove CO₂ from the ambient atmosphere. Although the concept is relatively simple, the process is expensive (and inexact, since CO₂ is 0.4% of the total amount of gas in the atmosphere). **The current state of DAC**, by the numbers:

- The cost to remove and store CO₂ is about \$100 per ton (not economical).
- Companies can receive a \$35-\$50 tax credit for each ton of CO₂ they remove (note: doubling the tax credit would make the process economical).
- Private investment in DAC technology is about \$200 million.
- Current DAC facilities in operation remove only a few thousand tons of CO₂ YoY.

Low-Carbon Energy

Solar: The solar investment tax credit ("ITC") phase-down:

- 2019: 30%
- 2020: 26%
- 2021: 22%
- 2022: 10% (ongoing)

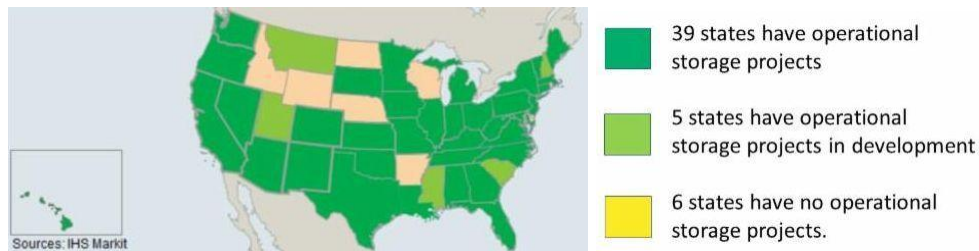
Nuclear: At the current rate of retirement of old nuclear power plants, advanced economies are on pace to lose 25% of their nuclear capacity by 2025 and as much as two-thirds by 2040. (Meanwhile, investments in wind and solar have [stalled](#) in 2019.)

Hydrogen: The hydrogen-as-power sector in Europe, by the numbers:

- 70% of all hydrogen comes from natural gas.
- 5% of hydrogen is produced by solid-oxide fuel cell electrolyzers.
- 25% is an oil and/or coal byproduct.
- Europe currently produces approximately 47.5 million tons of hydrogen per year.

Source: [Energy ConFusion](#), Skelleftea, Sweden (June 4, 2019).

Storage: The [grid energy storage](#) market in the US is on pace to double in 2019.



- Start-up CleanTech Pitch-fest at [ConFusion](#) , Skelleftea, Sweden - finalists. **See the [AES website](#) for the top 3 finalists and winning team.** For a personal introduction to any of the below companies, please [contact AES](#) .

- [Hepta Airborne](#) - provides drone-based airborne inspection and technical analysis.
- [Smart Climate](#) - environmentally friendly heating and cooling units for parked commercial aircraft.
- [Sol-ionics](#) - patented technology enhances lubrication for industrial applications.
- [SCMTgroup](#) - SMEs develop monitoring systems for railroad tracks and wheels.
- [Oazer](#) - infrastructure connects vehicle fleets to hydrogen refueling stations.
- [Umeå Wheels](#) - buys, repairs and sells shared bike fleets.
- [Eco-Oil](#) - CO2-neutral renewable fuel for petrol-, diesel- and aircraft engines.
- [Jukolux](#) - SMEs provide product-design solutions.
- [Fluid Intelligence](#) - platform monitors use and performance of industrial fluids.

Energy policy in the US

- All nuclear waste in the US goes through a process known as "[downblending](#)," in which radioactive elements are mixed with special inhibiting materials to make the waste safer for disposal. The primary site for downblending radioactive waste is the Pantex Plant in Amarillo, Texas. However, **because of rapid decommissioning of nuclear power, a second downblending site - the Mixed Oxide Fuel Fabrication Facility on the Savannah River - is being expanded** at a cost of \$48.8 billion to finish construction.

- In 2014, more than one-third of all natural gas was flared (i.e. burned off) in North Dakota. To reduce that number, the state's legislature passed a mandate requiring oil companies to [voluntarily limit flaring](#) to no more than 15% by 2016 and to 10% by 2020. **So far, voluntary compliance with the state's flaring policy is not working.** (Note: the national average for flaring in the rest of the country is less than 1%.)

- A number of **bills currently in the House and Senate would support energy storage**; the following are getting the most attention:

- [The Clean Energy for America Act](#), co-sponsored by Senators Whitehouse (D-RI) and Wyden (D-OR), would consolidate the current 44 energy incentives into three technology-neutral provisions that support storage RD&D.
- [The BEST Act](#), co-sponsored by Collins (R-Maine) in the Senate and [Foster](#) (D-Illinois) in the House, would authorize an energy storage RD&D program within the DoE at \$60 million per year (the current funding level is \$46 million).
- [The Promoting Grid Storage Act](#), sponsored by Smith (D-MN), would boost RD&D of energy storage capabilities for the electric grid.

(*Editor's note:* for more energy storage policy in Congress, see the Senate Energy and Natural Resources Committee [testimonies](#), chaired by Alaska Senator Lisa Murkowski.)

Energy policy around the world

- About 80 countries have publicly stated that they want to increase their climate pledges ahead of schedule under the Paris Climate Accord. However, no country has made a formal policy commitment, most likely because **[none of the countries are on track](#) to meet even their original pledge.**

Climate and Sustainability

- The [Deep Time](#) exhibit at the Smithsonian National Museum of Natural History, which encourages visitors to contemplate climate change and humans' role in it, is currently **the most visited museum exhibit in the world.**



- Grass lawns use about **9 billion gallons of water per day** - the **largest** irrigated "crop" in the US.

- As of 2018, **the global number of people over the age of 64 eclipsed** the number under the age of 5, probably the first time in history that this has happened.

- **Three factories in eastern China (in the provinces of Hebei and Shandong) are still manufacturing trichlorofluoromethane, or CFC-11**, a gas banned under the Montreal Protocol because it is the substance

most harmful to the protective ozone in the upper atmosphere. [AES Premium Members](#) have access to the peer reviewed article.

- There are 1,337 individual "priority" [Superfund sites](#) in the US and 53 in the pipeline waiting for final determination. All are categorized as known to have or threatening to have uninhabitable concentrations of hazardous poisonous substances or pollutants.



Electricity, Power and Efficiency

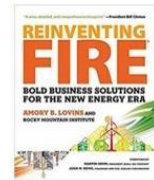
- The amount of energy the average US [household](#) uses per day and the amount of energy in each gallon of gasoline is almost the same: 170,000 Btu for the former, 110,000 Btu for the latter.

- The sectors adopting self-contained [microgrids](#) at the fastest rate in the US (typically, those that cannot afford a momentary loss of power):

- Hospitals
- Computer-chip makers
- US Department of Defense

- Electricity markets in the summer of 2019 will be unpredictable due to lower electricity demand, volatile natural gas prices, intermittent renewable energy generation, and new generation investments. **A summary of summer 2019 electricity markets in the US:**

- Prices for PJM and ERCOT will go up.
- Supply concerns are emerging in New England and Southern California.
- Coal retirements are causing generation gaps in the Midwest and Desert Southwest.



- What we are reading, retrospective: [Reinventing Fire](#) (2011), by Amory Lovins, makes a case for greater energy efficiency using business- and market-driven techniques.

Energy Security Threat Post

- *AES featured story*: The data center industry consists of big cloud service companies like Amazon, Google, IBM and Microsoft, as well as global co-location and hosting companies such as Equinix and Digital Realty. These companies have invested deeply in cyber-security to protect data in the cloud. However, many companies do not trust the cloud's cybersecurity and are choosing to protect their own data center activities — "on premises" is the formal term used by the IT world, but "DIY-cyber" is the popular term used by its practitioners. Trends point to a heightened pace of on premises servers disconnected from the cloud, supplemented by DIY investments in cybersecurity software and technologies. **Two leading companies that have chosen the DIY path are VMware and chip behemoth Intel.**

- Conventional wisdom seriously [under-estimated](#) the number of women going into cyber-security ... it is **much higher** than assumed and growing fast.

- *Save the date*: [CyberCon](#), a cybersecurity conference for executives and decision makers in the power & utility industry: November 19-21, Anaheim Convention Center. [Contact AES](#) if you are interested or have questions.

Research and Markets

- The [aviation sector emissions](#), by the numbers:

- The global aviation industry produces about 2% of all human-induced CO2 emissions, or 12% of all emissions from transportation (compared to 74% from road transport).
- About 4.1 billion passengers were carried by the world's airlines last year.
- A typical jet airplane (i.e. a Boeing 737) produces about 53 pounds of carbon dioxide (CO2) per mile.

- New research may have found a way to reduce airplane emissions by coating engines' combustion chambers with heat-resistant foam.

- Electric vehicles obviously don't use oil as a source of fuel, but oil *is* used to make plastics that make electric vehicles lighter (improving range and efficiency). **The average electric vehicle uses 775 lbs. of plastic** (carbon-fiber composites) made from oil. A comparison of minerals used to manufacture electric vs. traditional vehicles:

<u>Electric vehicles contain:</u>	<u>Mineral:</u>	<u>Traditional automobiles contain:</u>
70 kg	Copper	20 kg
46 kg	Nickel	4 kg
17 kg	Zinc	10 kg
14 kg	Cobalt	0
12 kg	Lead	10 kg

- [Dr. Frances Arnold](#), winner of the 2018 Nobel Prize in Chemistry, **changed her professional commitment from energy-related research to microbiology when oil prices dropped, which reduced interest in her original work on biofuels.**



- The DoE has announced \$8 million in [funding](#) to support RD&D in cybersecurity.

Features

Spotlight: Cool Energy Jobs

In honor of all graduating classes of 2019, AES is featuring **cool energy jobs**:

- Google Energy is hiring:
 - [Product Manager](#), Energy Software, Nest Thermostat (Mountain View, CA).
 - [Product Manager](#), Energy Hardware (Mountain View, CA).
- The Energy Charter Secretariat in Brussels, Belgium, is hiring an [Assistant Secretary General](#).
- The World Energy Council in London is seeking a new [Secretary General and CEO](#). The search has concluded, though AES can [assist](#) the application.
- Store No° 8, Walmart's startup incubator working on products that are 10 years out (think: Google X, but focused on commerce), [is hiring](#) data engineers, software engineers, and more.
- The Robertson Foundation in New York City is seeking a Program Staffer to lead their Environment Portfolio. If interested, please email a cover letter and resume to [Ruth Brenner](#).
- Shell in Houston, Texas, is seeking a [Trading Finance Advisor](#) to provide deal support for storage and transport deals.
- Edelman in Washington, DC, is hiring an [Executive Vice President](#) to lead their Energy and Sustainability Practice Area.

Quotes: A Problem of Scale

"We need an energy miracle."

- Bill Gates, responding to the challenge of replacing hydrocarbons, which supply about 85% of the energy the world uses today (For the US, the figure is similar: about 80%.)

"We desperately need an exponential increase in ambition."

- Luis Alfonso de Alba, a Member of the UN Secretary General's envoy on climate change, on the need for a climate agreement that is much stronger than the 2015 COP21 Paris Accord

"Whichever way you look, we are storing up risks for the future."

- Fatih Birol, IEA Executive Director, on declining investment in traditional energy generation and cleaner energy technologies (AES provides access to the IEA's World Energy Investment 2019 [report](#).)

In case you missed it

- [Oil](#). *Spotlight*, California: In 1985, California was the second highest oil producing state in the US; since then, output has declined about 60% to about 460,000 barrels per day. In the meantime, total US crude oil production has soared to record highs. The **separation between California and all other oil producing states took place when the shale era began in 2008** - crude oil reserves have since doubled to 45 billion barrels while California's production declined 25%.



Contacts

- [The American Energy Society](#)
- American Energy Society [LinkedIn Group](#)
- American Energy Society introductory [video](#)
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