



ENERGY MATTERS

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— HEADLINE NEWS —

Conventional

Petroleum

- **The cost to build a typical shale well fell about 25 to 30 percent from 2012 to 2015:**

- Bakken: \$7.1 million/well in 2014, but \$5.9 million in 2015.
- Eagle Ford: \$7.6 million/well in 2014, but \$6.5 million in 2015.
- Marcellus: \$6.6 million/well in 2014, but \$ 6.1 million in 2015.
- Permian Basin: \$5 million/well in 2015 (the most cost-effective drilling area in the world).

(Note: the sector is rapidly developing new drilling and extraction technologies, so total cost numbers are fairly [abstract](#); in general, a 10,000' vertical well costs roughly the same as a 7,500' horizontal/lateral well.)

Gas

- About 120 entities operate nearly [400 active underground natural gas storage facilities](#) in the US (excluding Alaska). But **the near-term development of new natural gas storage facilities does not look good**. A total of 194.4 MMDth of storage capacity is under development over the next eight years, compared to one year ago when 292.4 MMDth was under development, down from 455.4 MMDth in September 2014, and 663.5 MMDth in January 2013. (Note: "MMDth" = Million dekatherms; one dth equals one million Btu)

Coal

- **The world's biggest coal users — China, the United States and India — have [boosted coal mining in 2017](#)**. It is an abrupt departure from last year's record global decline. (However, [China is worried about overcapacity](#) and has put 25 provinces on "red alert," suspended coal production, and another four regions have been put on "orange alert," reduced coal production.

Nuclear

- NuScale is developing an "SMR" (small modular reactor) that can follow and immediately **respond to [unpredictable surges and drop-offs](#)**. These NuScale SMRs are specifically designed to provide baseload support and protection against random and unanticipated shifts in renewable energy production.

Renewables

- The province of Qinghai in the northwest corner of China - larger than the state of Texas - **[used only renewable energy \(wind, solar, hydroelectric\) for seven consecutive days](#)** - from June 17-23, 5.8 million people used 1.1 billion kilowatt hours of electricity. The previous record was held by Portugal last

year when the European nation of 10 million ran on just renewable energy for 4 days.

- Coal India Ltd, the world's largest miner of coal, has generated [1 gigawatt \(GW\) of renewable \(solar\) electricity](#) so far this year.

- Germany's portion of power produced by renewable energy [rose to 35 percent](#) in the first half of 2017, from 33 percent the previous year.

- Shares of solar companies soared in [a rush of bullish activity](#) a day after US President Donald Trump spoke about placing solar-power panels on his proposed wall along the Mexican border. First Solar Inc's shares rose 3.2 pct to \$38.42, SunPower Corp shares were up 13 percent to \$8.69, and shares of the Guggenheim Solar fund rose 2.5% to \$19.39.

- Tesla will reveal its first mass-market car, the [Model 3](#) (price tag: \$35,000 to \$40,000) next month, and delivery will take place at the end of the year. Meanwhile, [Volvo Cars](#) has announced that all the models it introduces starting in 2019 will be either hybrids or powered solely by batteries; it will never again manufacture internal combustion engines.

Policy

- AES editorial insight: It seems that President Trump's primary Year 1 objective is to establish the US as "energy dominant." Though the President hasn't been entirely clear when describing his "vow to unleash American energy," it appears that he means the following: bolster the ailing nuclear industry; open up new offshore areas for drilling; reach agreement on deals for oil pipelines and coal exports; draw-down the US oil reserves and sell the excess abroad; and most of all, push harder on the wave of shale drilling that doubled the country's total oil and gas production during the Obama administration.

- The Interior Department is trying to **speed up the permitting process for oil and gas drilling on federal lands**. The Bureau of Land Management (BLM) had 2,802 oil and gas drilling permit applications pending when Trump took office in late January. The average approval time for a drilling permit during the Obama administration was between 220 and 257 days. Secretary Zinke is trying to get the average closer to 30 days. AES Members have access to the DoI [Order \(#3354\)](#) issued by Sec. Zinke. (Note: Federal land accounts for only 4.8% and 11.3% of total US crude oil and natural gas production, [respectively](#).)

- The White House and DoE Secretary Perry **tout carbon capture but simultaneously cut its funding**. A number of advocates responded with letters to the [President](#) and committee chairmen in the US [Senate](#) and [House](#) in support of the technology.

- The litigious wrangling over the Clean Power Plan continues as **the Trump administration seeks to undo the Obama-era limits on pollution** emitted by electric utilities. AES members have access to the [legal briefs](#) submitted by both sides.

- In the first four months as EPA administrator, **Scott Pruitt has undone, delayed or blocked more than 30 environmental rules**, the most expansive 4-month regulatory rollback in the agency's 47 year history. (*NYT story by the 2015 AES co-energy writer of the year, Coral Davenport.*)

- **The science division of the White House's Office of Science and Technology Policy is now empty.**

- The Senate Energy and Natural Resources Committee has [fast-tracked a new energy reform bill](#). Dubbed the Energy and Natural Resources Act of 2017, the bipartisan bill emphasizes energy efficiency, infrastructure and cybersecurity, as well as federal land management and sportsmen's access. It has been over a decade since Congress was able to pass a national energy bill.

- "*Atmospheric trust law*": a legal doctrine that argues that the federal government, through actions like fossil fuel subsidies, has actively undermined the right to a livable climate. Atmospheric trust law is based on an old legal doctrine that holds that the federal government must preserve certain commonly held elements, like shorelines and waterways, for public use. A group of 21 young people (the plaintiffs) have used this doctrine to sue the federal government over climate change. The lawsuit had been lightly-regarded, but it turns out **the kids (ages 9 to 21) will have their day in court**: the trial is scheduled to begin on February 5, 2018. AES Members have access to the legal [brief](#) filed by the plaintiffs.

- A [summary](#) of the G20 Summit in Hamburg, as it relates to energy and the environment:

- UK Prime Minister Theresa May is "dismayed" by the US decision to leave the Paris Agreement;
- Angela Merkel promised that there was "solidarity" among EU participants in the Agreement;
- the German Chancellor also suggested that they could revisit and reconsider some of the pledges made by the US under the Obama Administration;
- President Vladimir Putin expects that Russian O&G production will remain on course (+3.1% GDP YOY) and that his country will maintain its economic growth;
- In the concluding Chair statement, Angela Merkel expressed her gratitude to all 20 members of the summit and then made it clear that the Paris climate accord was irreversible: "I think it's very clear that we could not reach consensus, but the differences will not be papered over."

Climate

- [Seven important climate hotspots](#):

1. Murcia, Spain - [drought](#)
2. Dhaka, Bangladesh - flooding and erosion
3. Mphampha, Malawi - heat
4. Longyearbyen, Norway - ice melt
5. Manaus, Brazil - humidity and deforestation
6. New York State, US - changing/shifting seasons
7. Manila, Philippines - extreme weather

- **Total US greenhouse gas emissions, by sector in 2015** (AES Members have access to [report](#)):

- Electricity: 29% of total emissions
- Transportation: 27%
- Heavy industry: 21%
- Commercial and Residential: 12%
- Agriculture: 9%

- A new study on the effect of climate change on the US has found that **the southeast will suffer the most and the northeast will suffer the least** and may even benefit. The study also found class-based differences, many of which correlate regionally. AES Members have access to an [interactive map](#) of the findings. (Sneak peak: seven of the ten hardest-hit counties are in Florida, two are in Texas and one in Georgia. Half of these ten counties are among the poorest in the nation.)

- Last year, Isle de Jean Charles, Louisiana, became the first US town to get government money to move because of global warming. Eighteen months later, what started as a model has become a warning. The greatest challenge to the project may be the people it's meant to help. [The residents of the Isle de Jean Charles can't agree](#) on exactly who is part of the community, where they should go, or when.

- On Thursday, June 29, 2017, the city of Ahvaz, Iran, posted a temperature of 128.7 degrees Fahrenheit (53.7 degrees Celsius), which tied for the [hottest temperature](#) ever recorded - the previous record was set on July 21, 2016, in Mitribah, Kuwait.

- It was so warm that it [rained](#) in the western region of Antarctica - this is a first in recorded history.

- According to Stephen Hawking, the Earth's climate is [moving towards](#) that of Venus, "with a temperature of two hundred and fifty degrees, and raining sulfuric acid."

Electricity, Utilities and Power

- The 5 most significant state policy initiatives that are **improving energy storage deployment** (AES Members have access to the Corporate Clean Energy Procurement [Index](#), by state):

1. *California* in 2013 enacted a storage mandate requiring 1.3 GW of storage capacity by 2020. Storage projects are eligible to receive funding through the state's Self-Generation Incentive Program (SGIP), and is incentivized through the state's distributed resource planning processes.
2. *Oregon* passed a law in 2015 requiring its two major utilities to procure 5 MWh of storage by 2020.
3. *Massachusetts* has until the end of 2017 to decide whether to create the nation's third energy storage mandate. This comes on top of 2015's creation of an Energy Storage Initiative to study how storage can help the state's clean energy industry.
4. *Hawaii* failed to pass storage incentive legislation in 2016, but the state's 100% renewable goal and the end of net metering (not to mention the nation's most costly energy) will likely boost its storage market. (Without net metering providing the ability to sell electricity back to the grid, it makes more economic sense to store it onsite.)
5. *New York's* Reforming the Energy Vision (REV) initiative is opening the door for storage. ConEdison, the state's largest utility by number of customers, offers incentives for storage devices and other demand-reducing technologies.

- California state policymakers are discussing the terms for **extending its cap-and-trade market to 2030**. The Energy Institute at Haas has extend its earlier analysis of the 2013-2020 cap-and-trade program([Borenstein, Bushnell, Wolak and Zaragoza-Watkins \(2016\)](#)) to analyze the new legislative proposal. According to the EI at Haas -- assuming a base case in which safety valve allowances from the Allowance Price Containment Reserve (APCR) are available only at a ceiling price \$60 above the floor price and a hard price ceiling is enforced at that level -- there is a 34% probability that the price will hit its ceiling, a 47% probability of the price settling at the floor, and a 19% probability of a price between the floor and the ceiling. The distribution implies a probability-weighted expected price in 2030 of \$51.62. AES Members can download the new [paper in PDF](#).

- **A summary of "the electricity reliability and resiliency report,"** by NERC (AES members have access to the [report](#) - 208 pages):

- Resiliency to severe weather continues to improve.
- Transmission outages due to human error have increased slightly in frequency.
- To date, there are "no reported instances of the malware in North America," but the threat of cyberattack that will cause widespread outages on bulk power system is significant and inevitable.

From Basic Research to Tech-to-Market

- Researchers have developed a **paint that can generate hydrogen fuel** from moist air and sunlight. The team expects the technology to be ready for commercial use in five years. The paint combines the titanium oxide already used in wall paints with a new compound: synthetic molybdenum-sulphide. The latter acts a lot like the silica gel packaged with many consumer products to keep them free from damage by absorbing moisture. The material absorbs solar energy as well as moisture from the surrounding air. It can then split the water into hydrogen and oxygen, collecting the hydrogen for use in fuel cells or to power

a vehicle.

- Researchers used 12 years of data - health records from nearly 61 million Medicare beneficiaries - to link specific air quality levels to death rates. They found that for every increase of just 10 micrograms in small-particle pollution known as PM2.5, **the death rate went up 7.3 percent**. That's the equivalent of 120,000 fatalities among people age 65 and older. AES Members have access to the [peer-reviewed article](#).

- The federal tax credit for electric vehicles is coming to an end, but California legislators don't want zero-emissions vehicles to meet the same fate. The state is considering a bill - dubbed the California Electric Vehicle Initiative - will **provide rebates to EV buyers at the time of purchase**, reducing the sale price by as much as \$10,000. The bill, which proposes giving the most cash to low-income buyers, looks to set aside as much as \$3 billion for the incentive program. AES Members have access to the [bill](#).

- Polls show that Tennesseans are among the least worried nationwide about global warming, yet the state is **the fastest growing electric car market** - one out of every 400 new cars sold in the state in 2016 was an EV, ranking Tennessee 11th nationwide. To put that in perspective, in California one out of every 50 cars sold last year was a plug-in, a rate that has remained consistent over the years; in Alabama, which shares its northern border with Tennessee, it was one out of every 1,000.

- **Tesla is building the 'world's biggest' lithium-ion battery in Australia - three times bigger than anything else that exists. But some believe that the claims are just a bit exaggerated.**

- **A new problem** for the Keystone XL: in general, US O&G companies don't want it.

- **Geothermal startup Dandelion has left Alphabet's moonshot accelerator X to become its own company outside of Alphabet.** (Yes, X was working on geothermal energy, and no, you're not crazy for thinking you had never heard about this. X had never spoken about Dandelion's work publicly.) The company decided to strike out on its own because there wasn't enough overlap between its technology and that of other parts of Alphabet to justify remaining a part of Google's parent company.

— FEATURES —

Featured energy professional - Jessica Lubetsky, and the [E2e Project](#)

The American Energy Society would like to recognize the appointment of Member-expert Jessica Lubetsky as the new executive director of the [E2e Project](#), a joint initiative of economists, engineers, and behavioral scientists from the University of California, Berkeley, the Massachusetts Institute of Technology, and the University of Chicago, who conduct interdisciplinary studies of the energy efficiency gap. Energy efficiency matters, and E2e encourages investments in cost-effective energy efficiency improvements, a politically neutral way to mitigate global climate change and reduce dependence on foreign fuel. AES recognizes the work of E2e and applauds the appointment of Jessica Lubetsky as its new Executive Director.

Quotes - an energy mix

"If you look at those three countries, everyone else is irrelevant."

- Tim Buckley, energy finance director for the Institute for Energy Economics and Financial Analysis, on the world's biggest coal users — China, the United States and India — all boosting coal mining in 2017.

"It's not because US LNG is cheaper than Russian gas - Russian gas is actually cheaper. But it is because the LNG is guaranteed to show up."
- Gary Cohn, President Trump's chief economic advisor, on why world leaders are desperate for US LNG over Russian LNG

"It'll go right under the solar wall."
- President Donald Trump, on the State Department approving permits for the New Burgos Pipeline, which will cross the US/Mexican border near Peñitas, Texas.

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