



ENERGY MATTERS

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— HEADLINE NEWS —

Conventional

Petroleum

- Since 2010, the US has been in an oil-and-gas boom; now, **domestic production is at [record levels](#)**:
 - * The US produces more petroleum products than any other country in the world.
 - * There are more than 900,000 active oil and gas wells in the US.
 - * More than 130,000 new oil and gas wells have been drilled since 2010.
- During late 2015 and most of 2016, oil companies like Exxon **[lost](#) about \$350 million in earnings for every \$1 decline in the price of a barrel of oil.**

Gas

- It appears that the **[recovery in the natural gas sector will continue](#)** through at least March; six of the seven shale plays are expected to increase, with only the Eagle Ford likely to show a decline. However, AES Member-experts anticipate a slow re-balancing and continued price volatility. AES Members have access to the [Fact Pack](#), a 36 slide-deck survey about the recovery, by SAFE.

Coal

- **The Top 4 [coal-exporting countries](#)** (by revenues, in USD):
 1. Australia - \$28.4 billion
 2. Indonesia - \$16.4 billion (though expect this total to [drop](#) significantly)
 3. Russia - \$9.3 billion
 4. United States - \$5.7 billion
- **Sulfur dioxide pollution from the nation's coal-fired power plants have [dropped](#) faster than the total amount of US coal generation.**

Nuclear

- Oak Ridge National Laboratory scientists have **verified the viability of Transatomic Power Corp.'s ["walk-away safe"](#) advanced reactor technology to reduce nuclear waste.**

- China is expected to [triple](#) its nuclear power capacity to 100 GW by 2026, overtaking the US as the biggest market of nuclear power; the country added 8 GW of nuclear power capacity in 2016.

Renewables

- Solar developers installed a [record](#) 14.6 gigawatts in the U.S. last year, almost double the total from 2015 and enough to make photovoltaic panels the largest source of new electric capacity for the first time. Solar panels on rooftops and fields accounted for 39 percent of new generation last year. Meanwhile, the number of [solar jobs](#) increased in 44 states in 2016, with California topping the list followed by Massachusetts, Texas, Nevada, and Florida.

- It appears that "community solar" is a sector on the cusp of becoming the new driver of US solar market growth. AES Members have access to the Solar Market Insight [Report](#).

- The US Navy is developing a **44-MW solar-plus-storage facility on Kauai**, Hawaii. AES members have access to the original [Draft Environmental Assessment](#) of the facility conducted by the Navy.

- Home battery storage systems (like the Tesla Powerwall) certainly have some benefits, but when it comes to energy consumption and carbon emissions **the system uses and loses as much energy as it stores and saves**. AES Members have access to the peer-reviewed [abstract](#).

- **The hydroelectric Oroville Dam is currently offline** and 180,000 residents downstream have been evacuated. However, there is no reliability threat to the California ISO grid.

- **Wind power replaced coal as the second largest source of power generation in Europe** in 2016. AES Members have access to the European [report](#).

Policy

- Federal agencies like the EPA, the Department of Energy, the Department of Interior, etc., are charged with executing Congressional laws on behalf of the President - aka, the authority to "fill in the blanks." Under the Congressional Review Act of 1996, Congress has legal oversight to make sure these agencies abide by spirit of the law, but it **must exercise its authority over these agencies within 60 days of a law going into effect**. Until now, Congress has used the CRA only once, in 2001. Now [Congress is using the CRA to take down](#):

- * Rules that regulate and limit methane emissions.
- * Rules that increase the permitting requirements and monitoring of coal mining operations.
- * Rules that require US O&G companies to disclose payments made to foreign governments.

- The EPA has [suspended](#) 31 regulations that had been issued by the Obama administration; most had already been published in the Federal Register but had not yet taken effect. However, EPA transition team-leader Myron Ebell says that **the Trump Administration will roll back even more EPA regulations**, including many that were in place before President Obama took office in January 2009.

- When Elon Musk met privately with President Trump this month, he argued in favor of a [carbon tax](#) policy. Musk has an obvious interest in such a policy, but Trump's new Secretary of State Rex Tillerson also advocated for the policy while he was CEO at Exxon Mobil Corp. Nevertheless, **the proposal by Mr. Musk was not well received by President Trump**.

- **TransCanada has formally re-submitted its application to build KXL** (Keystone Pipeline), as per President Trump's formal request. AES Members have access to the original US State Department [announcement](#), the 2017 [application](#), and the original 2012 KXL [application](#).

- John Bates, the recently retired principal scientist at the National Oceanic and Atmospheric Administration's National Climatic Data Center, confirmed during a hearing before the House Committee on Science, Space & Technology that **NOAA's 2015 climate change study was used "to discredit the notion of a global warming hiatus** and rush[ed]... the publication of the paper to influence national and international deliberations on climate policy." AES Members have access to the [minutes](#) from the SST House Committee.

Climate

- **Solve for "H," where $dE/dt = f(A,G, I, H)$** , and "A" is astronomical forcing, "G" is geophysical forcing, "I" is the internal dynamics of the Earth System, and "**H**" is **human activity**. This equation suggests that over the past six decades human anthropogenic forces have driven a rate of change significantly faster than the rate of change over the previous 4.5 billion years. The answer to "H" (the new rate of change) can be seen by AES Members who visit their [personal account](#); AES Members also have access to the equation and the peer reviewed [article](#) in which the equation appears.

- It is official: **greenhouse gas emissions in the US [declined](#)** by 2.2% between 2014 and 2015.

- The state that emits the **most methane**: [Pennsylvania](#) (please see the Air Emissions [Report](#)).
The US city with the **worst air-quality**: [Bakersfield](#), California.
The European country with the **fastest rising emissions**: [Germany](#) (the report is in German).

- Low-snow conditions in Alaska forced officials to [move](#) the starting line for the Iditarod sled race from Anchorage to Fairbanks; meanwhile, temperatures hit [100 degrees](#) F in Oklahoma this February.

- Scientists have detected "**extremely high levels**" of **organic chemicals in the fatty tissue of amphipods**, a type of crustacean that lives in the Mariana trench, the deepest part of the world's oceans. AES Members have access to the peer-reviewed [article](#) in Nature. In a separate study, researchers found a decline of more than 2 percent in ocean oxygen content worldwide between 1960 and 2010. The loss, however, showed up in some ocean basins more than others. The largest overall volume of oxygen was lost in the largest ocean — the Pacific — but as a percentage, the decline was sharpest in the Arctic Ocean, a region facing Earth's most stark climate change. AES Members have access to this Nature [article](#), too.

Electricity, Utilities and Power

- **American consumers spent less than 4% of total annual household income on energy in 2016**, the smallest share ever recorded. AES Members have access to the [Sustainable Energy in America Factbook](#), though the site requires users to submit personal information to access to the report.

- Researchers are testing "**blockchain technology**" to **more efficiently and safely manage the global electricity system**. (Note: "blockchain technology" is a combination of information technology, cryptography, and governance principles that enables transactions to occur without the need for a third party to establish trust between transacting parties, like Bitcoin.)

- **The [climate/utility feedback loop](#)**: Climate change is driven in part by the production of electricity. And, it is possible that the warming climate will drive greater consumption of electricity. If the intensity or frequency of extreme heat days increases, the current grid will be forced to meet the demand, which in turn creates more greenhouse gases that lead to a warmer climate, which leads to greater demand for electricity which leads to.... In other words, peak loads are getting "peakier."

- DoE released the [second installment of the QER](#) and then followed with a number of recommendations,

including: **the US power grid faces "imminent danger" from cyberattacks**. The DoE offers a number of solutions to this potential threat:

- * Give FERC more authority over cyber defenses of the power grid.
- * Fund a suite of RD&D programs to upgrade the network's technology to make it more resilient against potential attacks.
- * Encourage Congress to empower federal regulators to impose regulations that require the utility industry to do more to protect the nation's energy network.

From Basic Research to Tech-to-Market

- "[Dumb Generation](#)," describes conventional power plants, wind turbines or solar panels that produce megawatts and nothing more. In contrast, **"intelligent generation" systems not only produce megawatts, but also determine how and when to apply the megawatts to achieve a specific effect**. The generators gain this intelligence via software controllers. Such intelligence is at the heart of emerging microgrids.

- A research group at the prestigious **IIT in Kharagpur is having some success working with a variety of [carbon capture methods](#)**. Even though they have no public funding support, they have been able to get the cost of capture down to about \$30 per ton - about half the cost of other technologies on the market. Their next goal is to get the price down to or less than India's carbon-emissions tax, which means cutting the price in half again.

- Researchers from the University of Colorado Boulder, UC Davis, NIST, and aircraft operator Scientific Aviation are building **a ground-based laser system that will ["look at"](#) emissions** from natural gas storage facilities across the US.

- South African bank Investec Plc has become the **[go-to funding source for the US rooftop solar industry](#)**. Two years ago it arranged for \$880 million in debt financing for rooftop solar developers and financiers - more than half of the \$1.5 billion bank debt raised last year.

- **For sale:** All of Mexico's Alfa SAB de CV's [energy holdings](#) in Peru and in the Eagle Ford Shale.

- A firm controlled by Philip Anschutz will build the largest wind farm in the US to serve utilities in California. The \$5 billion project, however, will be constructed 700 miles away in Wyoming. The vast distance between the two states provides a different Anschutz-owned firm with another big opportunity: a \$3 billion project to [build transmission lines](#) to deliver the power.

- **Tesla Motors Inc. changed its name to "[Tesla Inc.](#)"**

- **Honda and General Motors are conducting a joint RD&D project to produce [hydrogen fuel cell power systems](#)** at a GM battery plant in Brownstown, Michigan.

- Just off a freeway in Southern California, 396 refrigerator-size stacks of Tesla batteries have been hastily erected with a mission to suck up electricity from the grid during the day and feed it back into the system as needed, especially in the evening. The installation, capable of powering roughly 15,000 homes over four hours, is part of an [emergency response project](#).

— FEATURES —

Feature - Marilyn Waite

- There are more than eleven million professionals working in traditional energy fields around the world. The size of this group, as well as its talent, capital and resources, is a validation of the importance of energy. However, so many great achievements happen every day that it is easy to overlook the importance of individual contributions. **The American Energy Society would like to recognize Marilyn Waite, Senior Manager at [Village Capital](#).** No matter who you are or where you live, Ms. Waite will make sure that Village Capital gives your venture in energy a real chance at success. Though financial investment is at the core of what Ms. Waite can offer, she is also the consummate connector, cheerleader, and visionary. The American Energy Society applauds Marilyn Waite and Village Capital for all they do for energy around the world.

- The American Energy Society is grateful for all the help received on its grant application to the EERE FOA, "Innovative Pathways": Ian Foraker, Executive Director of the Cleantech Open; William Farris at NREL (and Matt Ringer); Randall Gentry at NETL (and Tom Tarka); Jon Mathews at Penn State (and Brandon Schwartz); Susan Hovorka at UT-Austin; Brian Anderson at the WVU EI; Marilyn Waite at Village Capital; Daniel Maxwell at ExoGenius; Nicholas Flanders at Opus-12; John "J.R." Reale at Station Houston; and of course SMEs Pierre Pujol, Scott Mosher, Tom Rose, and Kyrea Njuguna. Thank you all for your help and support.

Energy Matters Editorial

- **AES original content:** As a national security precaution, the United States keeps almost 700 million barrels of oil in strategic petroleum reserves (SPRs) in a secret salt-cavern located along the Gulf of Mexico. (By law, the reserve is a precaution against "severe energy supply interruptions or supply shortages.") Selling off some of the SPR is highly unprecedented - it has happened only twice since the reserve was created in 1975. "The Strategic Petroleum Reserve is not an ATM," Senator Lisa Murkowski has said on many occasions. And yet, **the White House and Congress have announced that it will [sell 10 million barrels of crude from the US strategic reserve later this month](#).** This action begs two questions: 1) Why sell off some of the reserve when there is an oversupply? US shale producers benefit from unprecedented [market strength](#), and there is a commercial oil stockpile of about 13.8 million barrels. And, 2) Why now? Congress says that revenues generated from the sale will be used to pay off some of the national debt. This seems unconvincing - a proverbial drop-in-the-bucket. Perhaps instead the sale is an attempt to bring geopolitical stability to the Middle East - Iraq recognizes that breaking from OPEC is futile and falls in line? Or, perhaps this is an attempt to destroy OPEC, pushing individual nations in the cartel to disengage; the planned sale is almost equivalent to the cut in production by OPEC. AES Members have access to the [summary](#) petroleum data report for the week ending February 10.

Quotes - in consideration of tech-to-market innovations

"The longer action is delayed, the more critical CCS (carbon capture and sequestration) will become." - Fiona Wild, BHP Billiton Group VP of Sustainability

"The novelty and complexity of autonomous vehicles has created gaps between regulators, industry, and the general public - the technology is highly vulnerable in its current nascent state." - Mark Rosenker, former Chairman of the National Transportation Safety Board, current SAFE AV Commission Chairman

"There are a lot of things emerging that are driven by the customer, and we have to be responsive." Dora Nakafuji, director of renewable energy at the Hawaiian Electric Co.

"Energy efficiency, natural gas and renewable energy are benefitting American consumers, American businesses and American manufacturers. And that adds up to one conclusion: clean energy wins for America." - Lisa Jacobson, head of the Business Council for Sustainable Energy