



ENERGY MATTERS

The trusted source for objective sound-bite summaries of the energy news you need to know

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— HEADLINE NEWS —

Conventional

Petroleum

- **A partial list of recent explosions, accidents, and incidences at some of [Iran's energy facilities](#):**

- January 2018 - [Collision](#) of an Iranian oil tanker with a Chinese vessel
- December 2017 - [Explosion](#) at the Mobin Petrochemical refinery
- October 2017 - [Explosion](#) at the Rag Sefid oilfield (well #147, rig #95)
- October 2017 - [Explosion](#) in Tehran refinery
- September 2017 - [Leakage](#) in one of the phases of South Pars
- September 2017 - [Explosion](#) in Bushehr Petrochemical

- **In Colombia, Marxist Rebels have resumed attacks [on critical oil industry/infrastructure](#)**, which has cut production and threatens the government's pursuit of foreign investors.

- In 2017, Venezuela's [oil production fell](#) by 649,000 bpd, a historic decline of 29 percent ... and no one has been able to identify a reasonable [cause](#).

Gas

- **[Natural gas imports into China are surging](#)** and have reached an all-time high. At 7.89 million tons (including pipeline flows and LNG shipments), the December total surpassed the previous record - in November - by 20%. Editor's note: a number of Chinese officials have said, in no uncertain terms, the lack of pipelines limits the amount they import.

Coal

- *Related to above story about natural gas imports*, **China has been unable to import enough natural gas, so it [ramped up its coal output](#)** to record-high levels, which has undermined the government's stated plan to boost alternative sources of energy and wean the nation off its most-used fuel.

- **Comparing coal-generated power in the US vs India:**

- **In the US, [74 coal units are scheduled for retirement in the next 3 years](#)** (20+GW generating capacity); just four coal units are scheduled to be built over the same period (about 1,927MW of capacity). This is a 6 percent net decline in generation capacity over the period.
- **In India, [coal provides 61.12% of total power capacity](#)**. Coal is the single most important source of electrical power in India, and it has increased from 60.59% of total capacity in 2015.

Nuclear

- **The US government is considering the sale of Westinghouse 1150 MW AP1000 nuclear reactors to Saudi Arabia.** However, Section 123 of the US Atomic Energy Act requires a bilateral agreement with any country that wants US nuclear technology. (According to Section 123, a country must categorically reject all plans for enrichment of uranium.) A total of 48 countries have signed such agreements, but Saudi Arabia refuses Section 123 conditions. The Trump Administration is now considering accepting Saudi Arabia's objections in order to support a Saudi bid for at least two (and as many as 16) Westinghouse nuclear reactors. At \$5,000/Kw, **Westinghouse could generate about \$12 billion in revenues if it is able to sell just two units to Saudi Arabia.** AES Members have access to [Section 123 of the NSA Atomic Energy Act](#) and access to a [list of all the countries](#) that have reached a Section 123 bilateral agreement with the US.

Renewables

- Global solar capacity is about to reach 100 gigawatts, primarily because of demand in China. **However, 100 gigawatts is [close to the top end of what can be achieved](#), based on the global manufacturing capacity of polysilicon.** Solar projects in some regions might be delayed or even canceled because market prices are higher than were estimated during the planning phase.

- **A new renewables sector is beginning - [bioplastics](#)** (plastic that is made from sugar cane, wood and corn) can replace plastics produced from petrochemicals (oil). Editor's note: right now bioplastics have just one percent of the market.

- **[Wind provided 15% of electricity in Britain](#) last year, up from 10% in 2016.** This increase is a result of both more wind farms coming online and a windier year.

- In a recent Colorado filing - with over 350 proposals for new renewables projects - the median bid price for wind-plus-storage was \$21/MWh, and for solar-plus-storage was \$36/MWh. **These are the [lowest renewables-plus-storage bids](#) in the US to date.** The previously low renewables-plus-storage price was \$45/MWh in Arizona.

- **A random sample of the [Top-10 clean energy developments in 2017](#),** according to the Rocky Mountain Institute. AES Members have access to the full list and notes, including RMI's lists from previous years.

1. US Cities, Businesses, and More Declare "We Are Still In" (the Paris Climate Accord)
2. Countries Ban Fossil Fuel-Powered Vehicles
5. Corporate Renewable Energy Purchasing Surges in North America
7. Solar Beats 2¢/kWh
10. Renewable Microgrids Take Off in Africa

Policy

- There are about **900 climate change lawsuits in 24 countries right now.** The following four are perhaps the most significant. For summaries and legal briefs, see your [AES account](#):

- *Citizens vs. the government of the Netherlands* - This is the first case in which regular citizens have tried to hold their government accountable for taking insufficient action to fight global warming.
- *Juliana vs. US* - The 21 plaintiffs - all between 10 and 21 years old and come from all over the US - claim they have been personally impacted by climate change.
- *Saúl Lliuya* (a Peruvian farmer) vs. *RWE* (a German energy company) - Sr. Lliuya, a Peruvian farmer, is claiming that RWE, a German energy company, to take on financial responsibility for damage to his home and property caused by their contributions to climate change.
- *ExxonMobil vs. US state attorneys* - The company is being sued for failing to safeguard against pollution and lying to the public.

- The California counties of San Mateo, Imperial Beach, Marin County, and San Francisco (among others) are [suing](#) ExxonMobil (and others) over climate change. However, **these same cities and counties are not disclosing the threat of climate-induced flooding to investors** who have purchased their government bond offerings. For example:

- San Mateo County's complaint says it is "vulnerable to sea level rise"; however, in the prospectus of its recent bond offering, the county noted that it is "unable to predict whether sea-level rise or other impacts of climate change or flooding from a major storm will occur."
- Imperial Beach claims that future coastal flooding will cause more than \$38 million in damages; however, the city has never warned in their own sale of city bonds to potential investors that such disasters await.
- Marin County alleges a 99% risk that it will experience a devastating flood before 2050; however, Marin County has not disclosed that risk to its bond investors or in any of its bond offerings.
- San Francisco has circulated bond offerings to fund its Municipal Transportation Agency, but none of the materials for these bonds warn of 'global warming' or 'climate change.'

- **Seven Governors have called Department of Interior Secretary Zinke to express their [opposition to offshore drilling](#)** (as confirmed by Zinke): South Carolina Gov. Henry McMaster, Rhode Island Gov. Gina Raimondo, California Gov. Jerry Brown, Washington Gov. Jay Inslee, Delaware Gov. John Carney, and North Carolina Gov. Roy Cooper. Of course, Gov. Rick Scott of Florida was the first to call.

- By law, Obama's Clean Power Plan must be replaced - it cannot be erased. That means the EPA has to [withdraw and then replace](#) the Obama climate plan simultaneously but in separate processes. *The Beltway Buzz: EPA staff are way behind all deadlines.* For instance, comments on withdrawal were due Jan 16, but the EPA is in the process of pushing back that deadline in order to host three required public hearings. Dates and locations are: Feb. 21 in Kansas City; Feb. 28 in San Francisco, and March 27 in Gillette, Wyo.

Climate - by the numbers

29.3 C: Sea turtle populations are skewing almost entirely female. Why? There is a pivot temperature that influences the gender of the growing embryo. For green sea turtles, this temperature is 29.3 degrees Celsius (85 Fahrenheit). A few degrees below 29.3 C, all the sea turtles are born male. Heat up the eggs and only females are born.

450 billion tons: The amount of carbon contained in Earth's current vegetation.

916 billion tons: The amount of carbon that could reside in the world's vegetation.

460 billion tons: The amount that human use of vegetation slashes from potential storage (roughly half).

12 million square miles (32 million square kilometers): How much ocean that does not have sufficient levels of oxygen for coral to survive (12 million sq. miles is a bit larger than Africa.) Southern California has lost about 20 to 30 percent of the coral off its outer shelf. The Great Barrier Reef, Guam, the Florida Keys, Puerto Rico, and Cuba have been the hardest hit.

25 teragrams: The total amount of methane that escapes into the atmosphere each year. Note: last year, scientists calculated the amount of methane that was escaping into the atmosphere (from the gas industry, agriculture, and marshes) and their results were way overblown, significantly higher than the actual 25 teragrams total. *New research found the missing methane!* Humans are burning a lot less vegetation (i.e. leaves and wood) than they used to ... enough to make the global methane numbers drop to about 25 teragrams in Earth's atmosphere (or, the equivalent weight of about 425,000 elephants).

37 percent: The percentage of river systems in the contiguous US that have "spiked salinity" - aka, too much salt. The cause? The use of salt as an anti-icing agent on roads and highways.

170 million: The approximate number of Americans who's drinking water contains radioactive elements that increase the risk of cancer. AES Members have access to a [map](#) that shows radium contamination sites.

Electricity and Efficiency, Utilities and Power

- **Update on Puerto Rico:** Four months after Hurricane Maria, about 83% of [normal peak load has returned to Puerto Rico](#), and about 63.5% of the population has electricity.

- *Featured story:* The United States Energy Association (USEA) is inviting prospective organizations or individuals through **Request for Proposals (RFPs)** for:

- **Ethiopia:** Submit proposals for conducting training of Substation Operation & Maintenance "Train-the-Trainers" Series for the Ethiopian Electric Utility in Addis Ababa, Ethiopia. Proposals due Feb 9, 2018. Forward proposals in soft copy to [Ms. Marina N. Barnett](#), Sr. Program Coordinator.
- **Tanzania:** Financial Modeling Training for Natural Gas Sector; closing date is January 24, 2018.
- **Kenya:** Development and Application of a Current State Network Simulation Model for Kenya in to Perform Power System Studies. The closing date has been extended to Jan. 31, 2018.
- **US Appalachia:** Industrial Carbon Capture And Utilization Regional Workshops and Development Of Pro-Forma Business Plans, closing date is January 19.

- Many countries in Africa cannot afford full-scale utility grids. As an alternative solution, **Nigeria is rolling out 1,200 minigrids to serve a projected 200,000 households and 50,000 local businesses.** Tanzania, Rwanda, and Sierra Leone are beginning to prepare mini-grid solutions, too.

- **US data centers use more than 90 billion kilowatt-hours of electricity a year**, requiring roughly 34 giant (500-megawatt) coal-powered plants. Global data centers used roughly 416 terawatts (4.16 x 10¹⁴ watts) (or about 3% of the total electricity) last year, nearly 40% more than the entire United Kingdom. At this rate, consumption will double every four years.

- **Bitcoin transactions consume more electricity than 159 countries**, including Ireland and most countries in Africa. [The top 6](#) countries that consume the most electricity for Bitcoin transactions: (1st) China; (2nd) US; (3rd) Russia; (4th) India; (5th) Japan; (6th) Germany.

- **India has an "electricity theft" problem** (AES Members have access to the peer-reviewed [summary](#)):

- One-third of electricity in India is "lost" each year.
- Electricity losses increase by 3% in periods leading up to scheduled statewide elections.
- Incumbent candidates are more likely to win re-election in areas where electricity losses (aka, "theft") has increased.

Research to Tech-to-Market

- AES is non-partisan and does not lobby. However, **Members of the Society should know that the Congressional legislative calendar is about to enter Appropriation Season** (after the current budget debacle is solved). Most Members of Congress like science but need a reason to protect it. The most significant action you can take to promote funding of research involves direct engagement with members of Congress. Meet with them or their staff, call them, attend one of their events in the district, or write them a letter. This works! For instance, Illinois Senator Tammy Duckworth wrote to Secretary Perry [asking for full funding of research](#) at the Argonne and Fermi national laboratories in DOE's fiscal 2019 budget.

- Researchers at University of Waterloo have been working with negative electrodes made of lithium metal, a material with the potential to increase battery storage capacity. Initial experiments **successfully increased storage capacity** - some speculate the work could have a direct impact on the distance that electric vehicles are able to travel. AES Members have access to the [peer-reviewed paper](#).

- GM has petitioned the Department of Transportation to deploy its no-steering-wheel, pedal-less autonomous car next year. The problem is that the DoT defines an automobile as having a steering wheel and pedals, which means **the Cruise AV doesn't qualify as a car according to the current definition:**

- Canadian startup Electra Meccanica Vehicles Corp is manufacturing a **3-wheel single-seat EV - called, "The Solo."** It has a self-reported 100 mile range and a \$15,500 price tag.

— FEATURES —

Spotlight - [ISSAC](#)

It seems that no topic in energy attracts as much intrigue (and bipartisan support!) as the transfer of basic research into successful commercial technologies. The amount of professional talent, capital, and resources dedicated to technology-transfer is validation of its importance: venture capital, corporate research labs, OTLs, T2M, T2.... And yet, thousands of new innovations that are available for licensing thru programs like Small Business Technology Transfer and the National Labs go unclaimed - representing thousands of missed opportunities (see for instance: [STTR](#), [Argonne TCP](#); [LBNL Innovation Portal](#); and, [ORNL-TL](#)).

Consider one example of what is possible: a few years ago, a group of entrepreneurs from Colorado identified an available algorithm that could sort vast quantities of data. They applied this technology to the Navy's unique medium-voltage "electric-ship" grids and found they could assess the reliability of a component or system within the grid and *predict its eventual failure*. With the help of a "Services-Disabled Veterans" SBIR-STTR program, these entrepreneurs launched **ISSAC, an advanced analytics company that is now doing business** with the armed services and Missile Defense Agency, various Intelligence communities, as well as organizations like Mayo and the University of Colorado Health System (medical professionals are using the technology to analyze complex data sets to fight cancer).

ISSAC is now applying the technology to energy. Their first energy product is a monitoring, analysis, and reporting system that identifies when a power system will hit peak power. ISSAC is also working on an advanced, AI-based power control system that can optimize the use of energy in a multi-source environment, such as an integrated solar, wind, thermal and grid solution.

The success of ISSAC leads to an obvious question: *how many other viable technologies go unnoticed, unused, unrealized?*

What You May Have Missed

- **The Kaya identity** (*noun*) def: A mathematical formula that evaluates a country's total emissions from energy (CO₂) as the product of four terms: (1) total population (Pop), (2) GDP per capita, (3) energy intensity of the economy (which is total energy divided by GDP), and (4) carbon intensity of energy (emissions per unit energy). By definition, emissions cannot decrease unless one or more of these Kaya factors also decreases. Also represented as:

$$CO_2 = Pop * \frac{GDP}{Pop} * \frac{Energy}{GDP} * \frac{CO_2}{Energy}$$

Quotes - Wants & Needs (*emphasis added*)

"This *must* be the year of major infrastructure investment."

- U.S. Chamber of Commerce President Tom Donohue

"Virginia *wants* the same exemption (from offshore O&G drilling) as Florida."

- Virginia Sen. Tim Kaine

"Unfortunately, the EPA *must* extend its deadline for public comments on replacing the Clean Power Plan."

- EPA spokeswoman Liz Bowman

"100 days is an indictment of the US and its lack of commitment to Puerto Rico. There *must* be a better way."

- Elizabeth Yeampierre, E.D. of UPROSE, a Latino community organization on behalf of Puerto Rico.

- "I don't *want* it or *need* it. At 89, anything with the word 'crypt' in it is a real turnoff for me."

- Tweet by T. Boone Pickens on his lack of interest in crypto-currencies.