



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

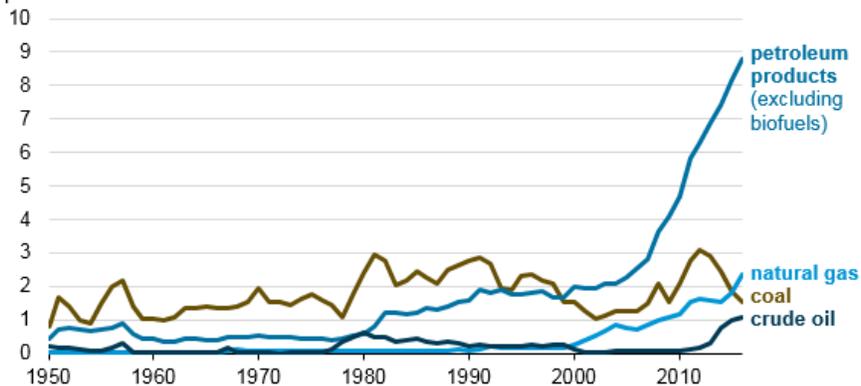
- The shale boom has transformed the US and global energy sector to such an extent that it has **made forecasting far more difficult**. On one hand, many investment banks and oil majors warn that huge spending cuts caused by a plunge in oil prices since 2014 will lead to a supply crunch in the next two years. Yet some, like Goldman Sachs, believe the newest wave of innovations will create another substantial surplus. As *Energy Matters* often reports, [rare is the forecaster](#) who appreciates the full impact of new innovations.

- AES Premium Members have complimentary access to the special report: *Downstream Oil Theft: Global Modalities, Trends, and Remedies*. This [report](#) is perhaps the first major study of refined oil theft around the globe.

GAS

- In yet more evidence of a market revolution within the oil and gas sector, for the first time ever, gross exports of natural gas from the US exceeded those of coal and crude oil (in energy-equivalent terms). If the recent trend in natural gas continues, the US will become a net exporter next year.

U.S. gross energy exports of selected fuels (1950-2016)
quadrillion British thermal units



Source: [U.S. Energy Information Administration](#).

COAL

- Coal, by the numbers:

- In 2015, 94 coal-fired power plants closed (an equivalent net summer loss of 13,556 MW).
- In 2016, 41 coal-fired power plants closed (a net summer capacity loss of 5,326 megawatts).
- In 2017, 8 coal-fired power plants have or will close.
- About 40 coal-fired power plants are scheduled to close during President Trump's first term.
- Six states — California, Hawaii, Idaho, Maine, Rhode Island and Vermont — no longer have coal-burning power plants other than combined heat and power facilities; and, Delaware, Connecticut, and South Dakota each have only one remaining coal plant.
- [No utility is planning to build new coal-fired power plants in the US.](#)

* [Editor's note](#): Most of the above states that do not have coal-fired plants or are heading in that direction tend to vote Democrat. But the same trend exists in red states, too: Alabama is slated to close 8 coal-fired power plants by 2019, Kentucky will close 4 plants in 2017, and Tennessee hasn't built a coal-plant since 1973. [AES Members have access](#) to more about "Coal by the numbers."

NUCLEAR

- **The consequences of Westinghouse Electric's Chapter 11 [bankruptcy filing](#) is still unclear.** However, it is clearly bad news for the only nuclear projects to begin construction in the US in three decades: the two 1,100 MW reactors for Georgia Power's Vogtle nuclear plants, and the two reactors of the same Westinghouse design for the V.C. Summer plant in South Carolina. At worst, Westinghouse's collapse could lead to the abandonment of these and any future nuclear project.

Renewables

- **Spotlight: [Lithium](#).** Lithium is an imperfect base mineral for rechargeable batteries; however, a number of characteristics make it the element of choice for storage:

- It is the lightest metal on the periodic table of the elements.
- Its ions move quickly and efficiently from negative electrode to positive electrode during discharge and back when charging.
- Its chemistry stores energy for long periods and provides more energy per weight or volume than other battery chemistries.
- It is cost-effective (lithium in a Tesla costs \$500 -- less than the Tesla roof rack).
- *However, only four companies in South America's "lithium triangle" (a region straddling Argentina, Bolivia, and Chile) provide about 75% percent of the world's lithium ... and they can't keep up. In the US, the only natural site of lithium is in Clayton Valley, Nevada.*

Editor's Note: There are **several [other energy storage options](#)** currently on the market or that soon will be. The leading alternative candidates to replace lithium ion: salt, silicon, or graphite.

- There are now **21 states with at least 20 megawatts each of storage projects** in service, under construction, or proposed. Ten have storage projects that exceed or will exceed 100 megawatts. [Top 3 states](#) for energy storage capacity: 1. California; 2. Illinois; 3. Hawaii.

- A consortium of researchers in the southeast US (coordinated by NETL) is closing in on whether one of the region's biggest liabilities – **coalmine waste – might become a valuable asset.** Is it possible to economically extract and process rare earth elements from the waste streams of coal mining companies in the region? In consideration of [Rare Earth Elements \(REEs\)](#):

- Wind turbines need REE's Praseodymium and Neodymium.
- Electric car batteries and light-emitting diode (LED) bulbs need REE Lutetium.
- Fuel cells in electric vehicles need Terbium, and hybrid engines need Neodymium.
- Catalytic converters use Cerium.
- Nuclear reactors need Samarium for the control rods.
- REEs are also used to make cell phones, computer hard drives, high-definition TVs, computer monitors, medical imaging devices, aerospace defense materials...
- *About 95% of the world's rare earth elements are produced in China.*

- **Global renewable energy, [by the numbers](#)** (AES Members have access to the 2016 Global Trends in Renewable Energy [survey](#)):

- Renewable energy generation grew globally by 161 gigawatts, pushing past 2,000 GW.
- China, Europe and the US account for 62% of the world's total installed renewable capacity.
- Six largest clean power portfolios, by country: China, US, Brazil, Germany, Canada, India.
- Asia was the fastest-growing region year over year (a 13% increase in renewable capacity).
- Africa installed 4.1 GW of new capacity in 2016, a 12 percent jump from 2015.
- *Investors spent less money to add more renewable energy capacity than previous years.*

Policy

- Special report: **AES has been able to obtain a 23-page draft of the G20 Action Plan on Climate and Energy for Growth.** The plan outlines how the most prosperous nations intend to support the Paris climate accord by cutting their own greenhouse-gas emissions and financing efforts to curb pollution in poorer countries. The plan appears to [tread carefully](#) around issues sensitive to the new US Presidential administration - it makes no mention of cutting coal production nor does it address automotive fuel standards. This document will be the centerpiece of the G7 and G20 meetings. AES Members have access to the draft [Action Plan](#).

- When Obama was President and blocked the request of TransCanada to permit its Keystone XL Pipeline, the company [sued](#) the US government. The new Trump administration reversed course and [greenlighted](#) the pipeline; however, TransCanada did not drop its lawsuit. In response, President Trump ordered one of his top economic advisers to **threaten an "anonymous" pipeline company** that he would [terminate](#) the project if they didn't drop what he described as a "\$14 billion" lawsuit.

- **The US DoE is [postponing five efficiency rules](#)**, including procedures for walk-in coolers and freezers, central air conditioners, heat pumps and compressors. The agency is also delaying energy conservation standards for ceiling fans and construction standards for federal buildings.

- On February 15, 2017, the US Government Accountability Office website described oil and gas drilling on federal lands as an "inherent risk" to human health and the environment. The next day, that language was been [replaced](#) with wording about the economic benefits of oil and gas activity. The Federal Highway Administration also [changed the name](#) of its program "Sustainable Transport and Climate Change" to "Sustainable Transportation and Resilience" - deleting the phrase "climate" change" from its name and mission. Other federal agencies, like the Department of the Interior and the EPA, made similar changes to their website.

- **It has been a slow two weeks in Washington, DC;** after the swearing-in of Gorsuch as the next Justice of the Supreme Court, Congress went on scheduled recess.

Climate

- A group of scientists are using crowdsourcing to gather information about coral "hope spots" and coral "hot spots" in order to steer conservation efforts toward species that with some extra protection may be able to survive a warmer, more acidic ocean. **AES Members who dive in coral reefs are [invited to participate](#) in this crowd-sourcing effort.**

- The Global Climate Risk Index has been released. AES Members have access to [the Top 10 list](#) and the report. The following are the **Top 3 most weather-related at-risk countries**:

1. Honduras
2. Myanmar
3. Haiti

Summary of key points from the Index:

- * Honduras, Myanmar and Haiti are the countries most affected by extreme weather.
- * Of the ten most affected countries in the last decade, nine were developing countries in the low income or lower-middle income group; only one was classified as an upper-middle income country.
- * Pakistan is responsible for 0.43% of global greenhouse gas emissions, but it is among the world's top 10 countries most vulnerable to climate change.

- **Sweden has been rated the EU's "climate leading" nation**, followed by Germany and France, while Poland is last. (Editor's note: the evaluation criteria is unclear; for instance, Poland sells coal-fired electricity to Germany, so Poland is evaluated poorly while Germany ranks higher). AES Members have access to the [ranking](#), courtesy of the [Nordic Innovation House](#).

- For the world to meet its overall Paris climate pledge, global CO2 emissions must fall by half in each decade. That is, in the 2020s, the world must cut emissions in half then do it again in the 2030s and then again in the 2040s. **Called the "carbon law," the formula is analogous to Moore's law for transistors.** AES Members have access to the peer-reviewed [paper](#) about the formula.

- It is never easy to predict the future. Nevertheless, **experts and agencies made a few [incorrect predictions about emissions in China](#):**

- * Prediction: Chinese emissions would not reach 20% of the global total in this decade.
FACT: Chinese emissions reached 29% of the global total in 2015.
- * Prediction: Chinese emissions will remain well below those of the United States thru to 2030.
FACT: in 2007, China passed the US in total emissions.
- * Prediction: China will always have low emissions per capita.
FACT: China emits more emissions per capita than the global average.

- **Airline flights are experiencing more severe and moderate-to-severe turbulence** as a result of increases in atmospheric CO2 levels. AES members have access to the peer-reviewed [abstract](#).

- **The global fashion industry is the [second most carbon-producing industry in the world](#).** In 2015, the industry consumed about 50 million tons of polyester — a petroleum product. Growing cotton, especially if it involves pesticides, herbicides, and oil-powered machinery, is also a large carbon emitter (though not as large as polyester). And then there is the transport by ship of multiple components: garments sewn in factories (powered by coal) are finished in another, buttons and zippers from another, then packaged and shipped to stores and eventually disposed of into landfill (which emits potent methane greenhouse gas).

Electricity, Utilities and Power

- **Top 5 states for [grid modernization](#):**

1. New York

2. California
3. Minnesota
4. Massachusetts
5. Rhode Island

Honorable mention: Maryland, Ohio, Illinois

- **Spotlight - "blockchain" in the power sector.** A number of neighborhoods in New York state are selling solar energy to one another using [blockchain technology](#). In Austria, the country's largest utility is taking part in a blockchain trial focused on energy trading with two other utilities. Meanwhile in Germany, the power company Innogy is running a pilot to see if blockchain technology can authenticate and manage the billing process for autonomous electric-vehicle charging stations. **Blockchain has grabbed the attention of the heavily regulated power industry** as it braces for an energy revolution in which both utilities and consumers will produce and sell electricity.

- **Total electricity produced in the US [fell](#) in 2016** for the first time since 2009. Historically, declining energy production corresponds to a weak economy. However, this time it is the result of improved energy efficiencies.

- **Utilities continue to recognize the value of conservation** and are spending more than ever on demand side management programs and energy efficiency - about \$8.7 billion in 2015, up 1% from 2014 levels. As the old electricity adage goes, "[the cheapest kilowatt is the one you never use.](#)"

- Arizona is experimenting with **Clean Peak Standards (CPS), a regulatory policy that requires utilities to obtain a specific portion of their peak demand generation from "clean peak resources."** The California legislature is also considering an increase in the CPS served by renewable resources and storage. AES Members have access to the State Senate [bill](#).

From Basic Research to Tech-to-Market

- Featured story: The Bipartisan Policy Center released a new report saying **America must embrace its unique abilities to innovate, especially in energy.** *Summary:* Access to reliable, affordable, safe energy has a profound impact on people's lives. Yet unlike other technologies, the energy sector suffers from underinvestment in research and development (R&D). Further, energy markets are highly fragmented and often face a significant amount of regulatory uncertainty. AES Premium Members have access to the [report](#).

- Engineers have begun to **inject and permanently store 1 million tons of carbon dioxide deep underground** in Decatur, Illinois. Partners on the \$207 million project include the US DoE, Richland Community College, and the Illinois State Geological Survey. The work is intended to [demonstrate the commercial-scale applicability of carbon capture and storage technology](#) in a saline reservoir.

- US scientists are sending aerosol injections 20km up into the earth's stratosphere in the world's **most ambitious geoenvironmental program to date** to study the potential of a future tech-fix for global warming by safely simulating atmospheric cooling effects.

- [Apply to join Cleantech Open](#), the longest-tenured cleantech accelerator. Receive training, mentoring, and funding opportunities that transform innovative ideas into high-caliber companies.

- The [Apollo Fusion](#) website, with a home page without links, had only two sentences - a definition of the phrase "nuclear fusion" and a company vision statement: "We're working on revolutionary hybrid reactor technology with fusion power to serve safe, clean, and affordable electricity to everyone." Normally, a website like this would be ignored, but this one is different - **Apollo Fusion was founded by former Google executives.** (Note: new content is being added to the website daily.)

- IBM has [developed a chip](#) that can be deployed near natural gas extraction wells, around storage facilities, and along distribution pipelines that pinpoint invisible methane leaks in real-time.

- In Australia, **autonomous killer robots are being used to invade the Great Barrier Reef**. The target is the crown-of-thorns starfish—a malevolent pincushion with an appetite for corals. To protect ailing reefs, divers often cull the starfish by injecting them with bile or vinegar. But Australian scientists have developed intelligent underwater robots called COTSBots that can identify the starfish among the coral and then execute them by [lethal injection](#).

— FEATURES —

UN Sustainable Development and Solutions Network

The [UN Sustainable Development and Solutions Network](#) "punches well above its weight class." Despite modest resources, the scope and scale of the Network's activity is remarkable:

- Global conferences:
 - International conferences on sustainable development - conference conveners are currently [accepting abstracts](#), and AES Members are encouraged to submit
 - Low Emissions Solutions [Conference](#), this summer in Bonn.
- Educational and professional development:
 - [SDG Academy](#) offers free, massive open online courses (MOOCS) on the SDGs.
- Resources, Indices, and Dashboards:
 - The Cities SDG Index and Dashboard for the US was recently published and is currently undergoing [public consultation](#) - AES Members are invited to contribute.
 - The global [SDG Index and Dashboards](#) is released every July.

Of all programs, **the most impressive might be their "youth solutions" project**. The Network is looking for professionals to mentor the development of young innovators around the world - AES Members interested in this uniquely fulfilling opportunity should not hesitate to [get involved](#).

The American Energy Society enthusiastically applauds the work of the UN Sustainable Development and Solutions Network. We admire its entire body of work in energy.

Quotes - on the future of coal

"I made a promise - we will put our miners back to work." President Donald Trump

"Criticism of coal appears to be based on exaggerations, personal agendas, and questionable predictions." Lamar Smith (Texas), Committee Chair and Member, House of Representatives.

"If Scott Pruitt is not up to that task, then maybe it's time he did the decent thing and handed over the reins to someone who is." Breitbart News, on EPA chief Scott Pruitt not doing enough to save coal.

Versus...

"I suggest that we temper our expectations." Robert Murray, founder and CEO of Murray Energy on the way market forces have hurt the coal industry.

"I'm not planning to build new coal plants." Ben Fowke, CEO of Xcel Energy, which operates in eight

states and uses coal for about 36 percent of its electricity production.

"The ship has sailed; the horse is out of the barn." Moody's Analyst Jairo Chung, on the decline of coal and the rise of natural gas and renewables.

"It's sheer nonsense. There is no future for coal. No one is building new coal-fired power plants.... There's already a glut of unwanted coal on the market. Coal's decline is too steep." Paul Bledsoe, lecturer at American University's Center for Environmental Policy, former Interior official under President Bill Clinton.

American Energy Society, 654 Gilman Street, Palo Alto, CA, 94301