



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 O&G sector almost [woke up](#)** from its long slumber, which started in the middle of 2014:
 - * The number of active rigs in the US had [risen by 149, or 40 percent](#), since hitting its low in May.
 - * Until this week, the active rig count had [risen in 18 of the last 21 weeks](#).
- However, oil drillers have [start cutting the number of operating rigs again](#), leading many to wonder ... "[what comes next?](#)"**

- Ayatollah Ali Khamenei, Iran's Supreme Leader, accused unnamed OPEC members of "[using oil as a weapon](#)" to benefit the US and made reference to the 1973 oil conflict as an example.

Natural gas

- **Featured story:** In the US, the replacement of coal plants with gas generation has created a "[long-term tailwind](#)" for natural gas, with the possibility that gas will start to command a "scarcity premium" that it has not seen in a very long time.
- **Featured resource:** AES Members have complimentary access to "[2016 Strategic Directions: Natural Gas Industry Report](#)," by Black & Veatch. Key takeaways: "nearly 70 percent of all survey respondents indicated they were either "optimistic" or "very optimistic" for future growth..."

Coal

- **US thermal coal exports are again [economical](#) for every major coal basin;** moreover, US coal mine producers have [increased production](#) in the third quarter of this year. *However*, US exports of subbituminous coal will [barely clear 2 million tons in 2016](#), a decline of more than 83% from 2013.
- **Southern Co.'s \$6.9 billion "[clean coal](#)" power plant in Mississippi produced electricity for the first time.** After years of delays and cost overruns, this is the first large-scale power plant in the US to gasify coal and capture carbon before it's released into the atmosphere. (Note: The US DoE provided \$245 million in grants for the project.)

Nuclear

- The Tennessee Valley Authority became the **first utility to apply for a permit from the NRC to build a small nuclear reactor**. (Note: Unlike other nuclear reactors that produce about 1,000 megawatts of electricity, small nuclear reactors (SNRs) produce 50 to 300 megawatts, and rather than using electrically operated pumps and motors to keep the core of the nuclear reactor at a low temperature, SNRs use no pumps and motors and instead rely on passive means such as gravity and conduction to cool the reactors.)

- For more information on "high-temperature gas-cooled" and "liquid-metal gas-cooled fast" SNRs, or for a more complete description, please visit your personal [AES Member account](#).

Renewables

- In December, Congress extended a tax credit that included solar panels. Yet instead of energizing the industry, **the extension has hurt growth, as solar companies no longer rush to meet a deadline**. After jumping more than 1,000 percent since 2010, panel installations are projected to grow by only 0.3 percent in 2017.

- **An editorial opinion: The six most important green cars in automotive history are...**

6. Early 20th-C electric cars made by Detroit Electric, et al. (Battery-electric vehicles from 1890 to about 1910 competed head-to-head with the gasoline and steam powered vehicles of the day.)

5. Volkswagen Beetle

4. The Mini, by the British Motor Corp., from 1959 - 2000

3. Toyota Prius, 1997.

2. GM EV-1, 1998. (This car was specifically designed to meet CA's zero-emission regulations.)

1. Tesla Model S, 2012.

(Editor's request: please [reply by email to this Newsletter](#) if you would like to challenge this list - responses will be published in the next issue of *Energy Matters*.)

- There are almost 500,000 electric vehicles in the US, but **only 14,349 electric vehicle charging stations**. Most electric vehicle owners charge their EV's at home.

- **Q. How much land would be required to power the nation with wind energy? A. Rhode Island**

(Visit your personal AES Member account for the mathematical assumptions behind the calculation; however, please note that this calculation does not take transmission into consideration.)

- **Off-grid home solar systems in Africa can now provide a household with electricity at a cost of about \$56 a year**. Of the estimated 600 million people living off-grid in Africa, about 10 percent of them are now using off-grid clean energy to light their homes.

Policy

- Featured story: Controversy suddenly surrounds the new global agreement to eliminate HFCs (see [Energy Matters, vol. 21 for background](#)). International negotiators recently agreed to a plan that will **eliminate HFCs, which industry endorsed. However, new opposition is coming from the US Senate**. The State Department is preparing to [bypass the Senate](#), arguing that the deal is an amendment to the Montreal Protocol and not a stand-alone treaty. On the other hand, the four previous changes to the Montreal Protocol were all approved by the Senate, the latter two by voice vote. (Note: Even though the HFC deal has a majority of support in the Senate, it probably cannot get the necessary support from 67 senators, which is required for all treaties. The American Energy Society recommends a useful [summary](#) of the controversy by Member Coral Davenport.

- The DC Court of Appeals continues to mull over the Clean Power Plan; meanwhile, opponents of that rule are [preparing a legal attack on a "second front."](#) Rather than a direct challenge to the Clean Power Plan, opposing states are challenging its sister rule that regulates carbon emissions from new, modified

and reconstructed fossil fuel power plants.

- Featured story: Immediately following the Aliso Canyon natural gas storage facility leak in Los Angeles, **the White House set up a task force to study the state of the country's natural gas storage**. The report found that "while incidents at US underground natural gas storage facilities are rare, the potential consequences of those incidents are significant." AES Members have access to the White House [task force report](#).

- The US EPA issued its final **guidelines to reduce smog-forming emissions from the oil and natural gas industry**; however, the nonbinding guidelines do not "impose any requirements on the oil and natural gas industry" - they only provide recommendations. AES Members have access to the [new EPA guidelines](#). (Note: the document is 343 pages long.)

- The EPA said it will **re-examine the emissions formulas used to regulate flaring** at natural gas drilling and production sites across the country, according to the consent decree filed with the US District Court for the District of Columbia. AES Members have access to the [Consent Decree](#).

- Many of the world's biggest ship owners - Maersk, Cargill, the Danish Shipowners' Assoc. - have called for swift and "ambitious" action to **implement stronger regulations that force carbon emission cuts on their industry**, the only sector in which emissions are not regulated.

Climate

- [A Climate Change Bucket-List](#) - Top 5 places to visit before the climate changes the landscape:

1. Snorkeling and scuba diving in the Great Barrier Reef
2. Winter activities in the Alps
3. Wine tasting in the Rhone Valley
4. Venice
5. The Amazon ecosystem

- Two teams of researchers **tracked the path of ozone from China** - the world's biggest greenhouse gas emitter - and found that from 2005 to 2010, enough pollution spread from China to the US West Coast that it [offset American reduction of ozone pollution](#) by 43 percent.

- From 2011 to 2015, [358 billion gallons of water was used](#) to 'fracture shale oil and gas wells'— an amount equal to the annual water needs of 200 mid-sized cities; on the other hand, the total amount of water used for hydraulic fracturing dropped from 105 billion gallons in 2014 to 85 billion in 2015.

- Courtesy of Bloomberg Philanthropies, AECOM, and CDP, AES Members have access to "[It Takes A City: The Case For Collaborative Climate Action](#)," a new report that calls on **cities to collaborate** with companies, investors, and governments to mitigate the impact of climate change.

- In its report to Congress, the **DoD has requested funding to prepare for a changing climate**: update forecasting equipment; acquire cold-weather gear; and improve base protection, with special emphasis on the Arctic region, in the Asia-Pacific, and on domestic and international coastal bases. AES Members have access to the [Report to Congress](#).

- "**Negative emissions**": Removing carbon dioxide emissions from the atmosphere to prevent global warming from becoming catastrophic may be a fool's game amounting to a "moral hazard par excellence." **Nobody knows if atmospheric carbon removal — known as negative emissions — will work**. AES Members have access to the [peer-reviewed Science article](#).

Electricity, Utilities and Power

- **Featured story:** [Energy "intensity"](#) — the amount of energy needed to generate a unit of global GDP — improved by 1.8% last year. **The US and most of Europe improved their energy intensity by an average of 14%.** That's the equivalent of powering Japan for a whole year. AES Members have access to the [IEA report](#).
- **Featured report:** Though a summer publication, the American Energy Society recommends to its Members "[From Growth to Modernization: The changing capital focus of the US utility sector](#)," by Deloitte. Summary: electric and gas utilities will continue to invest in a safer, more reliable energy infrastructure, but they might have to renew their focus on keeping energy supplies affordable.
- **The "duck-curve" will [look more normal](#) and widen this winter:** national temperatures will be markedly different from last year but more "normal"; US natural gas production is down slightly from last year, which means that both gas and power prices are likely to be moderately higher.
- The California ISO's real-time energy imbalance market has agreed to consider allowing the participation of Mexico's Baja California Norte electric grid system operator, El Centro Nacional de Control de Energía, or [CENACE](#).
- A security advisory firm recently conducted **a study of the 1,000 utility substations around the country and found that about [half were secured only by a padlock](#).**
- Over the past several years, **FERC has been [trying to integrate energy storage](#) into the operation of wholesale power markets.** Starting in 2011, with Order 755, FERC made room for fast responding resources like batteries in wholesale markets, and followed in 2013 with Order 784, which directed wholesale market operators to find ways to compensate fast response resources.

Basic Research and Tech-to-Markets

- Dr. Rajiv Singh, a scientist at Honeywell in Buffalo, NY, has **developed HFO-1234, the primary replacement for HFCs.** It has already become the standard industry replacement adopted throughout Europe because it does not contribute any greenhouse gases, which is a significant improvement over the HFCs that it replaces. There is only one catch, or maybe two. HFO-1234 is [ten times more expensive](#) than HFCs, and it is extremely flammable.
- The Tennessee Valley Authority will hold a [live auction Nov. 14](#) to sell its unfinished Bellefonte nuclear plant. The minimum auction price starts at \$36.4 million.
- **Iran is inviting foreign firms to [bid on oil and gas projects](#),** including exploration and production at its fields. Applications should be submitted by Nov. 19 and winners will be announced Dec. 7.
- **Featured story:** The Department of Energy's National Energy Technology Laboratory has awarded \$80 million for a 10 MW, six-year pilot project that **uses [supercritical carbon dioxide \(sCO2\)](#) in gas turbines to enhance efficiency.** The award will be managed by the Southwest Research Institute (SWRI), the Gas Technology Institute, and GE Global Research. The power plant will be located at SWRI's campus in San Antonio, TX, and is slated to begin operation in 2020.
- An engineer from Japan has designed an extremely durable, [eggbeater-shaped wind-turbine](#) that can withstand the awesome forces generated by a typhoon.
- The Internal Revenue Service has issued three private rulings confirming that a [30% investment tax credit can be claimed on batteries](#) that are installed as part of renewable energy projects; however, the batteries must operate as a necessary part of the electric generating equipment.

- A new technology that claims it can [catch 90% of carbon dioxide from coal-fired power stations](#) has been patented by US government scientists. Employing an enzyme-based membrane fabric 10 times thinner than a soap bubble, it could **separate carbon dioxide from nitrogen or oxygen and speed up its dissolution in water** by a factor of 10 million - at \$40/per ton.

- In 1978, at the same time that it was not disclosing its own climate-change research, **Exxon researchers developed a motor that could power an electric vehicle.** "The future of an electric automobile was questionable—until now," according to marketing materials. Exxon said its technology "is not in developmental stages; it is ready now." However, American auto manufacturers were not interested; Toyota, on the other hand, entered into a collaboration, and in 1981 Exxon's engineers [delivered a hybrid gas-electric Toyota Cressida to Japan](#).

— FEATURES —

What we're reading

- The American Energy Society strongly recommends "[How the western water wars may end](#)," by Zach Colman, which explores a new and innovative water deal that many experts think might provide a solution for the struggle over shrinking water supplies in the drought-stricken West.

- [Energy Democracy](#), Morris and Jungjohann. A well-documented story about Germany's *unexceptional* transition to a renewable energy-based economy - aka, the Energiewende.

- Two articles about the limits and challenges of innovation:

- [Why Big Companies Can't Innovate](#), by Howard Anderson;
- [Reinvention](#); It's a Good Thing for Innovation that the Age of Monolithic-Corporate Labs Is Over," by Henry Chesbrough.

Quotes

"*Small-modular [nuclear] reactors may represent a new paradigm.*" - Dr. Steven Chu

"*The [HFC] agreement is just the first step. Our industry is hard at work doing research on HFC alternatives ... and getting that right is certainly as important as reaching agreement.*" - Steve Yurek, head of the Air Conditioning, Heating & Refrigeration Institute

"*The duck curve is real, growing fast, and impacting operations.*" Consulting firm ScottMadden

"*Better learn balance. Balance is key. Balance good, everything good. If balance bad, better pack up, go home. Understand?*" - An O&G executive references the turbulent O&G market by quoting Mr. Miyagi in *The Karate Kid* at a conference in Houston.