



ENERGY MATTERS

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— HEADLINE NEWS —

Conventional

Petroleum

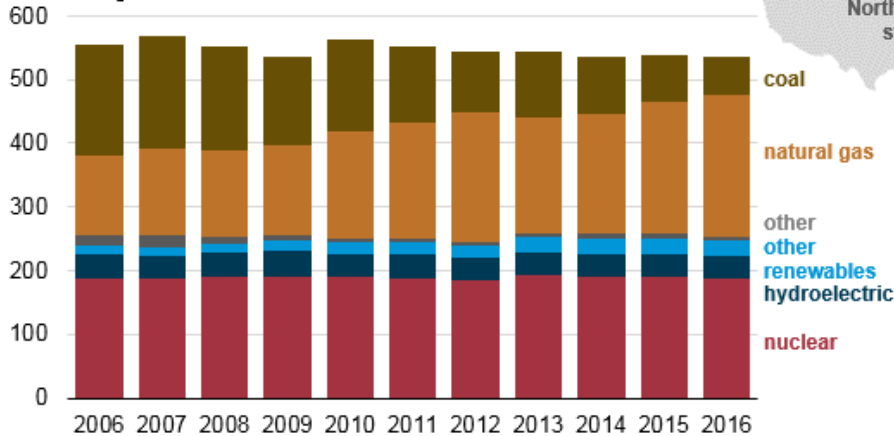
- US oil and gas companies (specifically, E&P) in the Bakken, Eagle Ford and Niobrara shale basins can be [profitable](#) when oil is at \$45/barrel, and the Permian can be profitable at \$40/barrel. In contrast, it costs [Saudi Arabia](#) less than \$9 to produce a barrel of oil - the cheapest in the world. However, Saudi Arabia's fiscal break-even point to [balance its national budget](#) is \$79.70/barrel, down from \$92.90 in 2015. In other words, **US companies can afford another oil price drop, but leading OPEC producers cannot.**

Gas

- In the last ten years, the nine states that comprise the northeast US energy grid have collectively **doubled the amount of natural gas used to generate electricity** - even as the region churned out slightly less power. Simultaneously, use of coal-fired power in the region has tumbled from 31 percent to 11 percent.

Net electricity generation by fuel in Northeast states, 2006-2016

million megawatthours



Coal

- The US coal industry continues to retract and cut jobs, and yet **the industry is somewhat [optimistic](#) - surprisingly, there has been a surge of new demand from Silicon Valley firms in need of metallurgic coal called "blue gem"** to increase production of silicon chips and silicon-based solar cells. (Blue-gem burns hotter and cleaner with less coal ash than cheaper thermal coal used by power plants.)

Nuclear

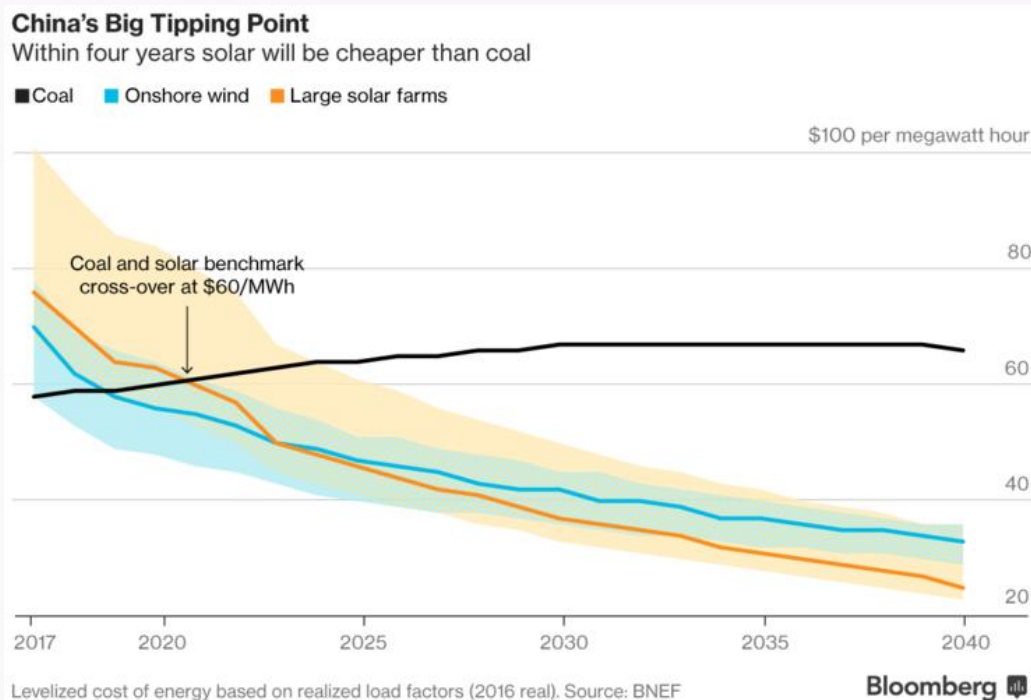
- **Nuclear demand** is highest where air pollution is at its worst and where economic activity is robust, in Asia generally, and in China and India in particular.

- The US DoE has set aside \$67 million in new money to fund advanced **nuclear technology research**.

Renewables

- For the first time, **wind and solar power provided about 10% of total US electricity generation** in March, and likely exceeded that level in April.

- **Solar is cost-competitive with new coal power plants in Germany and the US**, and by 2021 will be so in fast-growing markets such as China and India.



- *The New York Times* recently forecast the arrival of "**miniature power plants**" (aka, individual solar-battery home-systems that duplicate the 24x7 reliability of the 'old' grid - NYT 1/14/17). For this to happen, however, consider that all of the lithium battery factories in the world (including the new Tesla gigafactory) collectively manufacture enough capacity to store 100 billion watt-hours (Wh) of electricity annually. Sounds like a big number, but its not: the world uses over 50,000 billion Wh every day. And, if the world converts to electric vehicles the pressure to manufacture these mini-power-plants grows exponentially. At these rates, it would take 250 years of production from all of today's global battery factories to achieve *The Times'* vision of miniature power plants for today's demand levels.

- **Coal India**, the largest coal mine in the world (it produces around 82 per cent of India's coal) is **closing**

37 mines because they are no longer economically viable. Related, the government announced that an equal amount of renewable sources of power (primarily wind and solar) will replace the reduced coal-fired power.

- A recent survey of experts (including many AES expert Members) on the **impediments holding back speedier deployment of clean energy technologies** (AES Members have access to the [report](#)):

- Under-investment from the private sector in new energy sources.
- Existing energy infrastructure that was built to accommodate fossil fuels.
- "Inconsistent policy directions" make investors uncomfortable investing in new clean technologies.
- "Implicit and explicit" subsidies that benefit fossil fuels and make it hard for clean energy to compete.

Policy

- *Featured story:* In 1970, the smog over Los Angeles was so bad that the state made an exceptional appeal to and was granted permission by the US Congress and then-President Richard Nixon for a special exemption from federal environmental policy that would allow the state to set more stringent air-pollution rules for automobiles than was dictated by federal policy. Forty-seven years later, current Governor Brown has used that exemption to **aggressively position his state against the Trump administration's deregulatory agenda - for example, California signed a separate climate pact with Canada and Mexico**. Scott Pruitt, Director of the EPA, announced that he will [not challenge California's lone-in-the-country authority](#) to set air-quality standards that are tougher than the rest of the nation. Director Pruitt's hidden dilemma: in 1977, Congress allowed other states to adopt California's standards, rather than the national rules, opening the door for other states to follow California's lead today. To protect Trump's agenda, Director Pruitt implied that the President may change his mind about California.

- **ARPA-e is [succeeding](#)** at what it was created to do under the George W. Bush administration - support cutting-edge energy technologies with DoE funds. However, the current administration seeks to zero out its funding. AES Members can [download](#) a free copy of the National Academies assessment of ARPA-e (note that users must create a MyNAP account for the report).

- *Featured story and resource:* Each year the intelligence community compiles a "Worldwide Threat Assessment" report detailing all the dangers facing the US, and there are a lot. According to the report, the three greatest threats to global security: North Korea, cyberterrorism, and climate change. In the report, delivered to the Senate Intelligence Committee, **climate change is raising the likelihood of instability and conflict around the world**. AES Members have access to a copy of the [report](#) submitted to the Senate.

- **A survey of public money (aka, federal "subsidies") for all energy sectors (2014 - the latest data):**

- Fossil fuel production on federal lands received [government subsidies](#) of about \$7 billion (Interior).
- US taxpayers paid \$35 billion for cleanup of oil and gas projects in the Gulf of Mexico (BOEM).
- Every ton of coal produced in the US costs American taxpayers about \$49 dollars/ton in subsidies.
- In the past 8 years, alternative energy, electric cars, and rooftop solar received about \$20 billion in subsidies; the [top 20% personal income](#) received 60% of all subsidies, and 90% of all EV subsidies.
- There are currently about 700 duplicate or overlapping energy subsidies for renewable energy (for instance, IRS "production" and "investment" tax credits).

Climate

- "[cryosphere](#)" (noun); def.: the parts of the Earth where temperatures fall well below freezing point and are characterized by lots of ice and snow; roughly 70 percent of fresh water exists as ice in the Cryosphere. Used in a sentence: In response to the warming planet, **the Cryosphere is melting**, and the consequences go beyond rising sea levels and the opening of new polar-trade routes. The melting of the Cryosphere has a feedback effect that includes the absorption of extra sunlight and heat by the oceans, decreasing amounts of sunlight and heat reflected off the Earth's surface, and increasing visibility of heat-absorbing black carbon soot on the Earth's surface left behind after the ice has melted.

- In order, **Honduras, Burma, Haiti, and then Nicaragua are the four most at-risk nation in the world due to changing climates**. AES Members have access to the [Risk Index, 2017](#).

- **The mass bleaching of coral reefs worldwide, from 2014 - 2016, is finally easing**. The reason is unknown. (Note: about three-quarters of the world's coral reefs were damaged or killed during this period.)

- **The US Great Plains states are experiencing more frequent summertime storms**. This new weather pattern is depleting the protective ozone layer in the upper atmosphere of the region, putting humans in the region at greater risk of unhealthy exposure to ultraviolet radiation. AES Members have access to a peer-review [abstract](#) of related research.

- California signed an agreement with Mexico and Canada to tackle climate change following the federal government's decision to withdraw from the 2015 Paris agreement. Now **California is reaching out to Germany with a similar offer**.

Electricity, Utilities and Power

- **Access to electricity has improved over the past two decades**. In 1994, approximately 25% of the world's population lacked access to electricity; in 2014, it had shrunk to about 15% — approximately 1.1 billion people. Increased access is attributed to faster rates of population growth in urban areas, which tend to be more electrified. In 2014, 27% of the world's rural population did not have access to electricity, compared to 4% of urban populations. The electrification rate grew the fastest from 1994 to 2014 in Africa, the Middle East, and South Asia. AES Members have [access to the data](#).

- **An overwhelming number of preemptive rebuttals have been submitted to the US DoE in anticipation of Secretary Perry's forthcoming study of grid reliability and security**. Perry has postulated that "renewables weaken the US electrical grid." Opponents have submitted a bibliography of 36 studies that argue otherwise. AES members have access to the [bibliography](#).

- **The merchant generation sector is in "crisis-mode,"** due to stagnant demand growth, increasing renewable generation, and historically low gas prices. Moreover, flat demand amid a capacity boom is a recipe for forthcoming bankruptcies. AES Members have access to the Merchant Generation [study](#).

- **Southern Co. and Westinghouse have reached an agreement on a \$3.7B deal to complete the Vogtle nuclear plant**. Under the terms of the agreement, Westinghouse parent Toshiba has guaranteed \$3.68 billion in payments to Southern for completion of the project; Southern can abandon the project if regulators find it is not cost effective. Westinghouse (Toshiba) is working on a similar agreement with SCANA Corp., to complete construction of the Summer nuclear project it is building in South Carolina.

From Basic Research to Tech-to-Market

- Science is gradually gaining **a better understanding of fusion**. (Note: fusion reactors model themselves on the reactions that power the stars, like the Earth's sun.) Scientists have discovered new information about "runaway electrons," free-floating electrons with a charge that can be catastrophic for fusion reactors. Researchers have found a way to decelerate runaway electrons by injecting them with heavy ions, like neon or argon. The electrons collide with these neutral ions, which slows them down, making them less catastrophic. AES Members have access to the peer-reviewed [abstract](#).

- **University researchers have found that pollution from diesel trucks, buses and cars globally is more than 50 percent higher than the amount that was identified by independent government lab tests:** 14 million tons vs. 9.4 million tons. AES Members have access to a [summary](#) of the research.

- **California's economy uses about [one gallon of gasoline per person per day](#).** (Note: average gasoline consumption increases with household income.)

- **China may need to [postpone or cut the number of sectors covered](#) by its long-awaited national carbon-trading scheme.** Supposed to begin this year as part of pledges made ahead of the 2015 Paris climate change agreement, the national emissions trading platform would initially force firms in eight industrial sectors to buy permits to cover emissions: petrochemicals, chemicals, building materials, iron and steel, non-ferrous metals, paper-making, power generation, and aviation. But market designers are struggling to build a fair and reliable statistical system to cover all sectors.

— FEATURES —

Featured energy organization - [GreenTrees](#)

[GreenTrees](#) is a relatively new for-profit venture with an innovative business model that capitalizes on trees - nature's technology - as the only readily deployable and scalable solution to climate change. To date, GreenTrees has generated millions of tons of verified carbon credits by reforesting over 42 million trees on 120,000 acres in the Mississippi Alluvial Valley - easily the largest amount of domestic forestry credits registered on the voluntary market. However, [GreenTrees](#)' work is about much more than generating carbon credits. Since one-third of all emissions come from land-use change (aka, deforestation), by reforesting land GreenTrees is helping to bend the climate curve, restore species habitat, clean the water, and support the local and global economy. **AES applauds the work of [GreenTrees](#)** for its truly brilliant ability to carve out a niche at the intersection of regulatory policy, private markets, and climate.

Quotes - by Rick Perry, Secretary of the US Department of Energy

"We have a moral obligation to safely and permanently store the nation's nuclear waste ... and it should be stored in Nevada."

- On the importance of opening Yucca Mountain in Nevada to store over 70,000 tons of nuclear waste, during his first congressional testimony as secretary of energy

"The primary control knob [for climate change] is the ocean waters."

- On correcting the scientific belief of the primary driver of climate change, as opposed to carbon emissions

"[The US electrical grid is] losing its diversity by adding wind, solar, geothermal and fancy new batteries."

- On defending his request for a study of the US electrical grid and the idea that baseload power is weakened when renewable energy is a significant part of the mix.

" ____ (silence, stammer) ____ ... but I didn't write the [administration's] budget."

- In response to Senator Franken about cutting the budget for the Department of Energy and for research funding. Senator Franken reacted to Secretary Perry's non-answer, "You seem to be saying, 'I know he's guilty but I'm going to give him a robust defense.'" Perry grinned but refused to say anything again, then Franken laughed and said, "You're doing a good job."

"Canada, the United States, and Mexico have more known energy reserves than Saudi Arabia and Russia. So, by developing [these reserves] I think you'll see a major movement of people back into Mexico when that occurs and when these prices get back."

- On why it is important to help Mexico develop its energy sector

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