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SOCIETY

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ENERGY MATTERS

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

Special Issue:

The Energy Year in Review, 2016

A Look Back at the Year in Energy ... from 30,000 feet.

"2016 - The year that shale stabilized"

The unconventional gas (and oil) revolution settled down in 2016. When the year opened, oil and gas markets were in a tailspin, which affected everything from commodities to consumer products, conventional to renewables, geopolitics to American politics. But, dramatic mid-year production reductions allowed the oil and gas sector to regain its footing, and near the end of 2016 prices began to settle slightly above the record lows set a few months before.

Unlike the past few years, 2017 will plateau for the entire sector ... momentarily. Make no mistake, there is another wave of new US-based innovations coming - in oil and gas there are new drones, high-resolution 3D and AR/VR geological maps, advanced data analysis; renewables (especially storage) and nuclear can also anticipate robust RD&D pipelines. The overall consequence is that North America will solidify as the new epicenter of energy production for the next few years. Any region or sector (e.g. OPEC or coal) that fails to innovate rapidly will be shocked to see that energy output in North America will surge every time prices nudge slightly higher.

Energy Writer of the Year

The American Energy Society has selected [Mark Mills](#) as 2016 Energy Writer of the year.

Energy has some of the best writers in any field, but what sets Mark Mills apart is his superior ability to make difficult topics in energy accessible to a wide audience. In each of his publications, Mr. Mills consistently demonstrates his extraordinary skill in capturing scale, his deep awareness of technological innovation, and his unique ability to step back and provide critical context.

We first took notice of Mr. Mills in 2015 with his essay, "[Shale 2.0](#)," a compelling discussion about the cause and context of the oil and gas revolution. Then, in 2016, Mr. Mills published a series of thought-provoking articles, including one of our favorites, "[Drone "Coincidencias:" Marilyn, Reagan & North Dakota](#)," a brilliant piece on the emerging relationship between energy and data.

Mr. Mills has been a prolific writer for many years. In 2005, "[Why We Will Never Run Out of Energy](#)" was #1 on Amazon's science and math rankings. His work has been recognized by some of the most prestigious news outlets in the country: "must read" - *New York Times*; "required reading" - *Wall Street Journal*; "powerful, eloquent" - *Publisher's Weekly*. Mr. Mills has also been a frequent guest on CNN, Fox, NBC, PBS, and even [The Daily Show](#) with Jon Stewart.

The breadth of talent that supports energy is remarkable, but it requires the skills of a great writer to draw in and engage diverse audiences and help them to understand vital issues that affect us all.

Thank you, Mr. Mills, for all that you do for energy.

The Best and Worst Energy News Stories in 2016

Energy Article of the Year

- 2nd place: "[Step On It](#)," **The Economist**. The system of linking long-term contract [prices](#) for natural gas to the price of oil is broken and grossly out-of-date.
- 1st place, [America's Third Era of Petroleum Power](#), by Mark Mills. People and goods cover 10 trillion ground-miles and 3 trillion passenger-air-miles annually; global travel will double in coming decades. What does this mean for the future of transportation?

Most Popular AES Story of the Year

- 3rd place: **The discovery of a new shale oil and/or gas fields** in "Alpine High" near the Permian Basin of West Texas ([vol. 19](#)) and the [Wolfcamp Shale Formation](#) in West Texas (vol. 24).
- 2nd place: ISIS's annual income was about \$2.9 billion two years ago when oil prices were much higher, but today ISIS revenues are much lower. ([vol. 10](#))
- 1st place: **Itchu, a remote Himalayan village** inaccessible by road and with no air or water transport system, [now has electricity powered by solar micro grids](#). ([vol. 23](#))

The Story That Should Have Received More Popular Attention...

- 3rd place: **The Porcupine Glacier** - a massive chunk of iceberg (the largest in recorded history) – fell into a lake in British Columbia - the glacier fell nearly two kilometres from its origin. Why is this important? [The volume loss of all glaciers](#) is speeding up faster than scientists predicted.
- 2nd place: **100,000 trees die every day** in Montana.... and Wyoming... and Colorado... and Idaho... and Washington... and Oregon... and California.
- 1st place: **Shale 3.0** - recent [innovations](#) have transformed the oil and gas sector, and this is only the beginning: look for more drones, 3D and AR/VR geological maps, [data](#) analysis, the Internet of Things,

The Most Neglected Energy Story of 2016...

- 2nd place: **Utilities can now distribute stored energy**. *Why is this important?* Literally overnight FERC established a massive market for storage.
- 1st place: **Heavy crude oil from Canada is essential for US refineries**. While shale oil from the US is light, Canada produces the heavy crude that has to be added to US supplies. *Why is this important?* US refineries require a mix of light and heavy crude to function properly, which means the Dakota and TansCanada pipelines that transports shale and heavy crude oil between Canada and the US are foregone conclusions, no matter the political opposition.

The story that received too much attention ...

- **Worry that the Trump Administration will get out of the COP21 Paris Agreement**. The agreement doesn't require the US to do anything more than participate in mandatory GHG reporting, which it is already doing as an administrative procedure that cannot be undone.

Looking ahead - the Best Publication of 2017 will be ...

- **Energy Today, the official magazine of the American Energy Society**. We may be biased, but we believe advance copies of this new e-publication are impressive. Please [let us know](#) if you are interested in receiving this innovative publication, if you are interested in contributing an article, if you'd like to know more about sponsorships, or if you have colleagues who might be interested.

Biggest Winners and Losers of 2016

2016 was a Good Year for ...

- *3rd place*: **US consumers**, because gas prices were lower and that meant downward pressure on many commodity prices, too.
- *2nd place*: **Texas**, particularly producers in the Permian Basin, when OPEC decided to cut production.
- *1st place*: **Pipeline operators in North America**, especially TransCanada. All but left for dead, TransCanada was resuscitated the moment Trump was elected President.

2016 was a Bad Year for ...

- *Honorable mention*: **the climate**. Only an honorable mention because it is first every year but that would be boring.
- *3rd place*: **conventional fuels in Southern California**. Its a long list: the Alyso Canyon gas leak, the Santa Barbara Bay spill II, the Ventura leak, the closure of Diablo Canyon...
- *2nd place*: **Coal miners**. President-elect Trump promised to bring back jobs in the coal industry. This reminds AES of a quote by J.R.R. Tolkien: "False hopes are more dangerous than fears."
- *1st place*: **Merrick Garland**, because he was sooooo close.

Sores Winner in 2016 ...

- **TransCanada** - see 1st place above. Rather than just enjoy their unexpected victory, TransCanada is preparing to sue the Obama administration for unfairly blocking its business operations.

"Energy Person of the Year" **Bo Copley**

The American Energy Society selects Bo Copley as the "Energy Person of the Year." Mr. Copley was not selected because he has exceptional influence in the sector - he is an unemployed coal worker from Appalachia, the region that the rest of the US is too comfortable ignoring. Rather, Mr. Copley was selected because we believe he has had more influence than anyone else in determining *who* will have influence in the sector.

This was one of the most unusual Presidential elections in US history. The electoral outcome of certain swing-states (Ohio, North Carolina, Pennsylvania) from Clinton to Trump certainly swung the election. The most important moment in the most unusual election was when Hillary Clinton said, "*We're going to put a lot of coal miners and coal companies out of business.*"

To Bo Copley, a 39-year-old unemployed West Virginia coal miner, her remark at a CNN forum in March was a direct threat to his livelihood, family and town. "I was upset [by] the way she said it and the smile that was on her face." "That really hurt," Copley continued, "because it's not a nameless thing, not a faceless industry. It sparked a lot of anger throughout this state." So, when Clinton showed up to campaign in Williamson, West Virginia, Copley let her know how he felt. "I just want to know how you can say you're going to put a lot of coal miners out of jobs and then come in here and tell us how you're gonna be our friend?" And then he slid a picture of his three children across the table toward her — a moment captured by reporters that catapulted him to local and then regional fame.

Mr. Copley did not intend to inspire an entire bloc of voters - he didn't necessarily believe Donald Trump's promise of bringing back the coal sector, nor did many others like him. But Mr. Copley knew he opposed Hillary Clinton because he did not believe as president she would represent his interests. That opinion was shared by many in the swing states that determined the outcome of the most unusual election in US history.

Was there a sinister smile on Clinton's face when she spoke about putting coal miners out of work, as Copley says, or just an awkward grimace? As a political veteran, she must immediately have realized that she had just made a mistake that would turn history on a pivot. [You be the judge](#) (11 seconds into the recording).

*--Energy Insights
From AES Member Thought-Leaders*

- **Gary Dillabough**, Partner at the [Westly Group](#): Autonomous cars seem to be gaining more traction than most of us expected. They are ready for prime time.
- **R.C. Vaughn** of Vaughn Resources. The most significant events in energy occurred during the 2016 commodity price down cycle: the realization of a bottoming in global capital expenditures, which arrested production decline rates; and, the continuing increase in leasehold and underlying mineral values in multi-horizon unconventional plays.
- **Marilyn Waite**, Senior Manager at [Village Capital](#). Negative prices for electricity in Germany.
- **Thomas Tanka**, Senior Engineer, the [National Energy Technology Laboratory](#). France shut down 1/3 of its nuclear power plants for inspection after the discovery of both falsified safety records and systemic problems with steel used in these plants. This could be a worldwide problem given that many of the effected parts were also shipped to reactors around the world.
- **Michael Brownell**, President and Founder of [Dayaway Careers](#) (in energy). The steady, unrelenting growth of the EV industry - despite low gasoline prices - strongly suggests a future where energy for transportation will come from a plug and not a pump. Remember, a flat screen TV was a \$4,000 novelty purchase 10 years ago.
- **Tim Duane**, [Professor](#) at the University of California, San Diego and Santa Cruz; [attorney](#) and consultant. A long-term PV PPA for \$35-40/MWh, just as the "Duck Curve" has fully landed in California and curtailment has expanded; the result is that low cost PV may mean much bigger curtailment problems in the future.
- **Elena Crete**, [Sustainable Development Solutions Network](#). While renewables gain a competitive edge in a more sustainable world, solar has become a headline solution in 2016 with reduced costs, innovative applications in roadways and rooftop shingles, and as an essential pillar to support a growing urban world.
- **Ed Davis**, Professor of Geography at [Emory & Henry College](#). The US coal sector was declared DOA when 2016 opened; but at the close of 2016 the sector seems to have stabilized and has found new markets overseas.
- **Larry Jacobsen**, Vice President of Research and Development, [Campbell Scientific](#). The absolute peak performance of a human for one full hour (which is physically impossible even for Usain Bolt, Michael Phelps, or LeBron James) produces about 500 watts of total energy, worth about one US nickel. This is not even close to the energy consumption of one human being per hour, reminding us that humanity has far surpassed its ability to be energy self-sufficient. Our insatiable demand for more energy requires efficient production

on a massive scale, and we need even *more* power for the 3 billion un- or under-electrified people on the planet, too.

- **Christine Csizmadia**, Senior Manager at the [NEI](#). Some key developments in energy happened at the state level: NY's development of a clean energy standard; Illinois' passage of the Zero Emissions Standard; Tennessee's Watts Bar 2 nuclear unit was the first new nuclear plant to come online in decades, a real milestone for the industry.
- **Taite McDonald and Stephen Bolotin**, Senior and Public Affairs advisors at [Holland & Knight](#), respectively. A paradigm shift in how utilities perceive energy storage as enabling renewable energy to support the grid. It's not just that storage is a must to allow intermittent generation (wind, solar) to play a bigger role, it's the realization that storage may be a better tool for providing broader grid support, hardening/resiliency, and other ancillary services (like frequency regulation, demand-response, power quality) than new conventional power plants.

The above are excerpts of full individual opinions. For more insights and full quotes please visit your [individual AES account](#).

Strange but True Energy News Stories in 2016

The Strangest Energy Story of 2016

- *2nd place*: On Oct. 24, Tesla's stock price increased 4.45% (\$9/share) *after hours*, which led to a most San Francisco crime. Early in the morning on the 25th, someone went to a SF neighborhood and **spray-painted graffiti on Teslas** parked outside with the new afterhours stock price.
- *1st place*: **Governor Rick Perry, the next Secretary of the US Department of Energy**. An honest question no matter what your politics: did anyone see this coming?

Unusual Energy Stories of 2016...

- *3rd place*: **Apple as a utility/power company**. Apple filed for and was [granted status](#) as a utility by FERC. Other companies will follow Apple's lead - not the first time that phrase has been uttered.
- *2nd place*: **Mass defection of the largest energy consumers from NV Energy**: MGM Resorts, Las Vegas Sands, Wynn Resorts, [Caesars](#) ... will all generate their own renewable power.
- *1st place*: **US House Republicans**. The majority party in the Lower Chamber has voted against every single appropriation request by the Department of Defense in 2016. For those who grew up during the Cold War, this might be the most dramatic political realignment of this generation. (Note: the reason for this impasse is that the DoD believes that "climate change" is going to be a primary cause of future geopolitical conflicts.)

The Anti-Teddy Roosevelt Award (for speaking loudly without a stick)...

- *2nd place*: President-elect Donald Trump and his promise to protect coal jobs
- *1st place*: In a futile attempt to force the US to turn to cleaner energy sources, Rodolfo Lacy Tamayo, Mexico's Under Secretary for Environmental Policy and Planning, publicly threatened to implement "a carbon tariff against the US." Sr. Tamayo: "There is no need to start a trade war over climate change ... [but it might happen](#)."

The Most Forgotten Statistics of 2016...

- *3rd place*: **More than one billion watts (1 GW) of solar PV have been [installed](#) for 11 consecutive quarters**; there is more than 18,200 megawatts of wind power at or near capacity, and this does not include the 2,000 MW WindXI project by Mid-American Energy in Iowa - the largest wind project in the world.
- *2nd place*: During both the Afghan and Iraq wars, **a US Marine was killed or wounded for every 50 convoys of fuel that was moved in-country**. This single statistic inspired a paradigm shift in military policy - today, [the military relies on renewable energy](#) for half the fuel it needs for operations.
- *1st place*: **The world uses 4 million barrels of oil every hour of every day**.

The Most Confused Thought-leaders of 2016...

- *2nd place*: **Policy makers in California**. [California may have forgotten about transmission](#). The state is the world's leader in generating renewable energy, but it has not had commensurate investment in its transmission system, which means it isn't able to take full advantage of its own capacities. But, at least state legislators are [thinking about doing something](#) to solve the problem.
- *1st place*: **Policy makers in New York**. The Cuomo administration seems to be having an argument with itself about nuclear energy. On the one hand, Cuomo's administration responded to a suit by a powerful coalition of generation companies over a state subsidy to upstate nuclear plants by extolling the virtues of nuclear power and its necessity in keeping carbon emissions down. On the very same day, lawyers for the governor argued in court that the Indian Point nuclear plant — which requires no subsidy and has no adequate power alternative — [should be closed](#).

The Good, the Bad, and the Ugly...

Good: For the third straight year, global carbon dioxide emissions did not increase much in 2016.

Bad: A record that will hopefully never be broken. 2016 is the [hottest year on record](#). (In addition, sea temperatures are averaging nearly 4C higher than usual.)

Ugly: At the end of 2015 at the COP21 Conference in Paris, Japan, Korea, China and India all pledged to cut coal consumption; in 2016, all increased coal consumption.

Looking Ahead to 2017 and Beyond...

Comeback Player of the Year for 2017

- *3rd place*: **TransCanada**. See above.
- *2nd place*: **Nuclear**. The industry is beginning to rewrite its [message](#): "Congress and business needs to act with more urgency to promote nuclear power ... in order to meet their electricity needs and climate goals."
- *1st place*: **Renewables, [at the state level](#)**. Certain individual states are already laboratories for carbon-cutting policies. For example, many Northeastern states have banded together to create their own cap-and-trade program called the Regional Greenhouse Gas Initiative; California has its own cap-and-trade program along with one of the nation's most ambitious climate goals; and, Hawaii is well on its way toward converting to 100 percent renewable energy.

Biggest Stories in 2017

* **NIMBY and the climate wars**. More than 2,300 scientists, including 22 Nobel Prize recipients, have a warning for Donald Trump: Respect science or prepare for a fight. In an open [letter](#) to the president-elect and Congress, scientists representing all 50 states called on the incoming

administration to sufficiently fund scientific research as well as “support and rely on science as a key input for crafting public policy.” Anything short of that, they stressed, is a direct threat to the health and safety of Americans and people around the world. Key phrase: “direct threat.” Translation: if any action has a harmful consequence to anyone anywhere, it is worthy of a response. But is it?

* **Migration:** Climate change will continue to cause socio-economic and geopolitical disruption leading to migration that will cause a refugee crisis of “unimaginable scale”, according to senior military figures, who have long warned that global warming could multiply and accelerate security threats around the world by provoking conflicts and migration. They are now warning that immediate action is required.

* **Energy security.** If you had to pick the next crisis, geopolitical, climate, accidental, or ...

- *Cybersecurity.*
- *Geopolitical unrest along oil and gas [shipping routes](#).* About half of all crude oil that is shipped around the world passes through waters with a high probability of piracy, terrorist attack, or local government shut down. There are seven main global crude oil routes, four of which are serious geopolitical chokepoints (and they happen to be the biggest).

Looking Ahead to 2018 and Beyond ...

The rapid development of battery technology. Storage will shape electric utilities and automotive companies, creating polarizing competition between winners and losers. Any company, especially renewables companies, will significantly increase their market share as batteries help solve the problem of intermittent supply.

Our Greatest Wish for 2017

The end of climate denial. There is irrefutable consensus among climate scientists regarding the basics of climate science, but there is less certainty about specifics. The foundation of science is skepticism, and climate models can become extraordinarily complicated very quickly. However, right now, climate science is clouded by “noise.” We lack but desperately need thoughtful scientific, economic and policy consideration about:

1. Rising sea levels.
2. Natural disasters and a better understanding of the consequences of changes to micro-climates.
3. The rate of a warming planet, especially in the oceans.

— Thank you! —

With great appreciation for another great year ...

- AES staff and its supporters; Joseph Taylor and Ed Davis at Emory & Henry College; Mike Brownell at Dayaway; Chris Rackens and Rachel Gentile - staffers in the US House of Reps; Lyn Jeffery at IFTF; Bob O'Conner and Greg Miller at WSGR; Kate Ronan; Regan Curry at S&P Global; Anke, Karin, Matthew and Spencer at DeGruyter; Kaitlyn Khoe at Paly; AES BoD's, especially Scott Magargee and Greg Allen; Ted Larson, and Heidi Hackford.

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