Energy Matters

The energy news you need to know.

April 1, 2019

(Every two weeks)

The official e-newsletter of ...

AMERICAN ENERGY SOCIETY

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Headline News

Fossil Fuels

Oil: The production of hydrocarbons in the three main regions of Texas - the Permian, Eagle Ford and Barnett - is at capacity; experts project an immediate need for an additional 10,000 miles of pipelines. (Editor's note: there is a feedback loop involved - without the construction of pipeline infrastructure, production of oil and gas in Texas will be lower because the existing infrastructure cannot accommodate.)

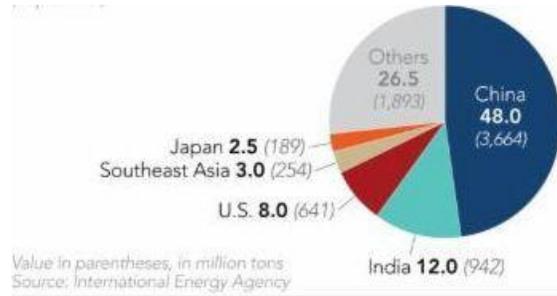Estimated Pipeline Infrastructure Funding Needs by region:

Permian Basin	Eagle Ford Shale	Barnett Shale
$676 million	$569 million	$271 million

Gas: Shell acquired the Lake Charles LNG terminal in Louisiana and has immediately set in motion plans to convert it from an import to an export facility. It is currently the largest facility waiting for FERC permit approval:

Terminal (state)	Owner	Capacity (in billion cubic ft / day)
Lake Charles, LA	Shell	2.4 Bcf/d
Sabine Pass, TX	Exxon	2.1 Bcf/d
Corpus Christi, TX	Cheniere	2.1 Bcf/d
Freeport, TX	Freeport LNG	1.8 Bcf/d
Hackberry, LA	Sempra	1.7 Bcf/d

Coal: "Unabated coal generation" (coal plants that *do not have* a system for capturing carbon, or "CCUS") is **surging** globally. In particular, China, India and Japan all have new fleets of unabated coal plants.

Carbon Capture: Much of the Permian Basin is ideal for CO2 EOR (or, carbon dioxide enhanced oil recovery), a process in which CO2 is injected into an aging reservoir, allowing for the extraction of more oil. The Permian's depth, permeability, viscosity, saturation, and pore space are almost perfect for EOR technologies. Below is the location of the 17 existing CO2 EOR projects and pipeline infrastructure:

Breaking news: Carbontech Labs is launching **a new carbontech accelerator program** that supports tech-to-market innovations. Start preparing projects for the forthcoming "Cohort One" application process.

Low-Carbon Energy

Wind: Top 10 largest wind farms in the US:
1 - 5 ... see the AES website.
6. Horse Hollow (Texas - 736 MW, owned by NextEra)
7. Capricorn Ridge (Texas - 663 MW, owned by NextEra)
8. Limon (Colorado - 601 MW, owned by NextEra)
9. Fowler Ridge (Indiana - 600 MW, owned by BP and AEP)
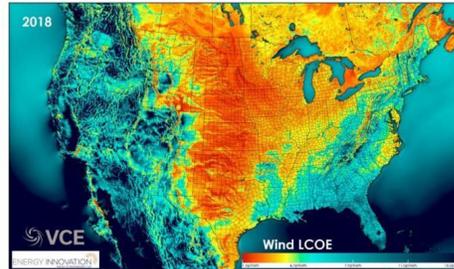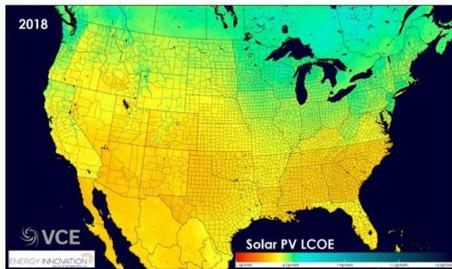10. Sweetwater (Texas - 593 MW, owned by Duke Energy and Leeward RE)

Nuclear: The Kilopower project is a near-term fission nuclear power system designed to enable long-duration stays on planetary surfaces. After successful completion of the Kilopower Reactor Using Stirling Technology (KRUSTY) experiment, the Kilopower development team is now performing risk reduction activities to prepare for possible human outposts on the Moon and Mars.

- **Renewable energy, by the numbers** (2016 vs. 2018):
    - 7.4% - The rate consumption of renewable energy increased.
    - 1.4%, 0.1%, and 2.6% - the rate that consumption of natural gas, nuclear, and coal decreased due to replacement by renewable energy, respectively.
    - 1.3% - the rate consumption of electric power decreased.
Note: AES Premium Members have access to the Renewable Energy Data Fact Book.

Solar / Wind: " ***The coal cost crossover*** " - wind or solar generated power is now less expensive than three quarters of the existing US coal fleet. AES Premium Members have access to the [report](#).

- **Powerhouse Fund in Oakland just completed an investment round** and will be [seeking](#) solar-related investments.

Energy Policy

Beltway Buzz

- The Senate voted on (and rejected) the Green New Deal; Majority Leader Mitch McConnell teased the vote for weeks, while Republicans railed against the proposal as socialism; however, **liberal activists upended the conversation about climate change and forced both parties to respond with GND alternative or competing policies**:

- "*Green Real Deal*": A resolution sponsored by Rep. Matt Gaetz (R-Fla.) that acknowledges climate change as a threat to national security and says the government should promote innovation to reduce greenhouse gas emissions. (AES provides Premium Members with access to a [draft copy](#) of the resolution.)
- "*Market Choice*" [Act](#): a $24-per-metric-ton carbon tax, to be reintroduced by Reps. Francis Rooney and Brian Fitzpatrick (both R - Pennsylvania).
- "*Energy Innovation and Carbon Dividend*" [Act](#): sets a carbon tax that starts at $15 per metric ton and gives net revenue back to households as a rebate.
- "*New Manhattan Project for Clean Energy*" [bill](#), drafted by Lamar Alexander, Republican Senator from Tennessee.
- "*European Energy Security and Diversification*" [Act](#): by Republican Rep. Adam Kinzinger; a bill that would counter Russian influence as the dominant energy provider in Eastern Europe.
- DoE Loan Guarantee for nuclear power (aka the "'*Real' New Green Deal*"): announced by Secretary of Energy Rick Perry, a $3.7 billion [appropriation](#) supports construction of the Vogtle **nuclear reactors** in Georgia (note: the total cost of the Vogtle reactors has exceeded $12 billion).
- *Pending* - Senators Mitt Romney (R-UT), Lamar Alexander (R-TN) and Lindsey Graham (R-SC) are [drafting](#) a bill for a new federal program that would provide incentives for businesses to develop technologies that reduce carbon emissions.
- *Pending* - Rep. Kathy Castor (D - FL) is drafting a [bill](#) that would require the US to comply with the Paris climate accord and that the Trump administration come up with a plan to meet emission reduction goals.

- According to a study conducted by the Congressional Research Service, **a carbon tax or fee could reduce emissions**, depending on the price (from $25 to $50 per metric ton) and would also decrease the federal deficit. AES provides access to the [study](#) for Premium Members (good reading for carbon tax wonks).

Policy around the world

- **115 of the 175 countries that signed the Paris Climate Accord are not meeting their targets and are less environmentally sustainable than when they signed the pledge.** The Top-5 best performers are the same as last year: Sweden retains first spot, followed by Switzerland, Norway, Finland, and then Denmark. The US ranks 27th on the index. AES Premium Members have access to the PDF [Index](#).

- **A bipartisan group of US senators is [drafting legislation](#) that would block Huawei Technologies from supplying solar energy generators**. 11 US lawmakers urged the Department of Homeland Security and the DoE to prevent Huawei from providing solar inverters, which convert solar energy to power that is usable on power grids.

Climate and Environment

- **Five countries are responsible for 70% of the world's remaining wilderness:** Australia, the US, Brazil, Russia and Canada. The data excludes untouched wilderness in Antarctica. AES Premium Members have access to the peer reviewed research.

- **A football field-worth of land is disappearing every hour along the Louisiana coast.** There are multiple causes: erosion from the powerful flow of the Mississippi River that is pushing lobes of silt into the sea, while the rising sea-level covers low-level land.

- The Jakobshavn glacier in Greenland was previously receding about 1.8 miles and thinning about 130 feet every year; however, **it has been growing for the last two years.**

- **The Great Lakes region is warming 1° (F) faster than the rest of the US**, or, 1.6° vs 1.2° Celsius for the rest of the lower-48 states. (Editor's note: more significant than an overall average is the extreme low and high temperatures in the Great Lakes region.)

- **Clothing manufacturers are responsible for around 10% of global carbon emissions.** Energy-intensive raw inputs like polyester and cotton are the dominant contributors. (In addition, the US sends ten billion tons of textiles waste to landfill every year.) AES Premium Members have access to the UN report on the fashion industry.

- **Trending in the animal kingdom:**
  - ↓ The last remaining herd of reindeer (American caribou) has gone extinct in the Lower 48 states.
  - ↑ New species discovered - a frog, about 2cm to 3cm long, named Astrobatrachus kurichiyana, although researchers who discovered it prefer "starry dwarf frog."
  - ↓ The most trafficked and poached mammal on Earth is the pangolin, considered a delicacy with medicinal properties in Asia.
  - ↓ Spiny dogfish sharks are washing up on beaches of southern New Jersey.
  - ↔ A Russian tourist was caught trying to smuggle "critically endangered" Sumatran orangutans out of Borneo. (Indonesian police also found geckos and chameleons in the luggage). The tourist fed the animals allergy pills mixed with milk so they would lose consciousness during his planned flight back home to Vladivostok.

Starry Dwarf Frog   Pangolin   Spiny dogfish shark

Electricity, Power and Efficiency

- **The chemicals industry energy consumption**, by the numbers:
  - 10% of global total energy consumption
  - 30% of industrial energy demand
  - 7 individual chemical products (of 1000s) account for about 50% of energy use: ethylene, propylene, ammonia, benzene, toluene, xylene (3 BTX aromatics), and methanol.
  - 4 fastest growing markets for chemical products: 1. China; 2. Latin America; 3. India; 4. Middle East

- **The manufacturing industry energy consumption**, by the numbers:
  - 50% of global energy demand is for heating; half of that total is for heating demands by industry.
  - 60% of total heat demand by the manufacturing industry is for low and medium temperatures (below 100 degrees C).
  - 30% of energy used by the basic metal industry (iron and steel) is for electricity.

- **The cement industry energy consumption**, factoids:
  - The cement industry is the most energy intensive of all manufacturing industries in the world (note: the cement industry accounts for about 5% of total global anthropogenic CO2 emissions).
  - Its share of national energy use is roughly 10 times its share of the nation's gross output of goods and services. In comparison, other energy intensive industries' share of energy use is roughly twice their share of gross output.
  - Texas consumes and produces the most cement; California is the second-largest cement producing state.
  - California's nine cement plants together produced about 10 million metric tons (Mt) of cement; these nine factories are the largest consumers of coal in the state. (Note: the 9 California factories emit approximately 7.9 Mt of GHG emissions each year).

- **The electricity consumption of "Edge Computing"**:
  - *Background*: There are more IoT devices than cell phones in the world; by next year, there will be about 22 billion IoT devices world-wide. (Note: The oil and gas industry uses a significant number of IoT devices.)
  - *The Market and the Problem*: All IoT devices are connected to the web for enhanced cloud-based platforms, speeds, predictive capabilities, neural networking, forecasting, automated safety monitoring, etc. Consequently, IoT devices use an enormous amount of electricity. For instance, in 2017 the wireless cloud consumes about 43 TWh of electricity, compared to 9.2 TWh in 2012, an increase of 460%.
  - *Electricity Consumption and a Solution*: Edge Computing allows all of this data to be processed closer to where it's created, which will require a lot less electricity.
  - *First-mover advantage*: The leader in Edge Computing is Amazon Web Services, though there are three up-and-coming Edge-Computing companies to watch:
    - Foghorn: edge intelligence software for IoT/IIoT applications.
    - AlwaysAI: a platform for building and deploying deep learning computer vision applications for embedded devices.
    - Greenwaves: AI embedded processors for battery-operated edge devices.

Cybersecurity

- **A UK cybersecurity agency found serious cybersecurity vulnerabilities in several hundred Huawei products**. UK government officials identified the risks and how Huawei's vulnerable equipment could be mitigated. Rather than repair the vulnerability across all devices, Huawei instead only patched select models; consequently, the vulnerability was exploited by cyberattacks on more than 18,000 separate occasions. AES Premium Members have access to the 2019 UK cybersecurity oversight report on Huawei.

Research and Markets

- The number of patents filed has consistently followed the same patterns throughout the last 150 years, regardless of time, country, or industry ... until now. **In 2012, China suddenly became a new global leader in patent applications (right behind the US), a vast majority of which have been energy-related submissions**. The company that filed the most patents in 2017? Huawei.
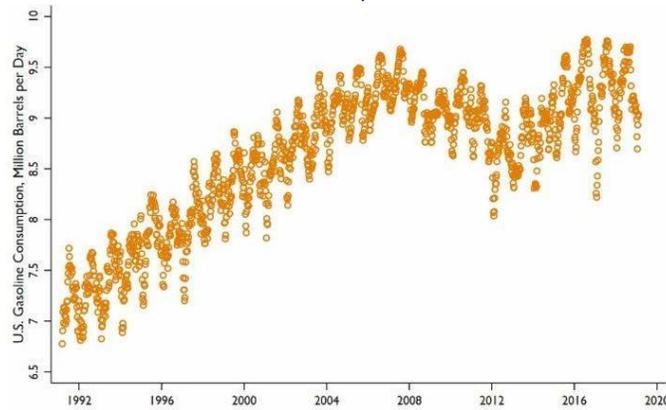
- **Winning scholarship, "the Built Environment,"** as determined by the expert-field:
  - Best paper, the Built Environment: *[Occupant behavior modeling for best building performance simulation: Current state and future challenges](...)*.
  - Best research: [How occupancy affects building performance](...). (Note: it was once considered a fixed variable.)
  - Best new resource: [global thermal comfort database](...).
  - BEYA (Black Engineer of the Year): Warren Davis - for re-creating natural, mechanical processes to solve problems in engineering.

- **Transportation and mobility** in 2018, by the numbers:
  - 1 billion: the total number of vehicles in the world (engine-driven cars, trucks, motorcycles, mopeds, etc.)
  - 10 billion: the total amount of fuel held by these vehicles.
  - 40%: the total amount of the corn harvest that is distilled into ethanol and blended into gasoline for fuel.
  - 5%: the total amount of gasoline consumed that consists of ethanol fuel.
  - 3.225 trillion miles: the total distance that cars traveled on US public roads and highways in 2018, a record (an increase of 12.2 billion miles from 2017).
  - 95%: the percentage of all transportation that uses oil as a fuel.
  - 7: consecutive years that US gasoline sales have increased (note: from 2008 through 2012, US gasoline sales had declined in consecutive years).

US Gasoline Consumption, 1992 - 2019

Features

Quotes - *Bipartisan Conversations About the Climate in Congress*

"We better hope it's (the changing climate) man-made, because if it's not we're in trouble." - Mitt Romney (R - Senator for Utah)

"The dawn of a new era - a price on carbon, one that is fair, that includes a just transition for the most vulnerable, one that is richly bipartisan and is durable and long term." - Ed Markey, (D - Senator from Massachusetts)

"Republicans are willing to put money into a system that encourages research and development. That's sort of the Bill Gates model, where you create a pot of money at the federal level and really incentivize the private sector to do its thing." - Lindsey Graham, (R - Senator from South Carolina)

"There's a difference between elimination and innovation. I'm for innovation, because we need to fix the problem (of climate change), we really do." - Joe Manchin, (D - Senator from West Virginia).

"Climate change is real but the solutions are not command-and-control, Soviet-style proposals but innovation, nuclear energy, research and development, and efficiency." - Lamar Alexander, (R - Senator from Tennessee).

"A single infrastructure bill alone will not solve our climate problem, but it is an important and necessary first step." - Chuck Shumer, (D - Senator from New York).

What you may have missed

- " Yang Laji" noun (Chinese philosophy). Formal definition: the active male principle of the universe. Mandarin slang: "foreign garbage." In response to the US/Chinese trade war, China has banned the import of all recycling items from the US and has formally established with the World Trade Organization that **it will no longer be the end point for *yang laji*, or foreign garbage.** Consequently, many American domestic landfill sites are overflowing and are burning massive amounts of garbage, which releases toxic pollution.

Contacts

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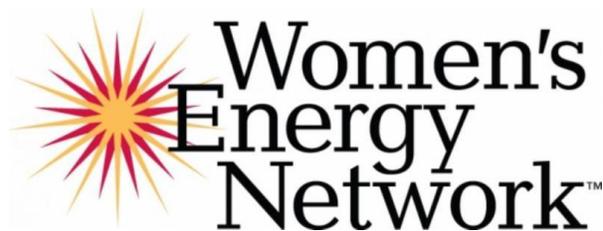

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