

WORLD POWER SYSTEMS REVIEW

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General Services Administration awards historic electricity contract

Today, the U.S. General Services Administration (GSA) announced a historic long-term purchase of electricity, including carbon pollution-free electricity (CFE) from Constellation New Energy, Inc. The purchase marks GSA's first long-term, multi-agency purchase of electricity, a portion of which is bundled CFE, and will increase resilience and reliability for federal agencies while protecting against price increases.

This energy procurement is the largest in GSA history. GSA estimates that it will comprise over 10 million megawatt-hours (MWhs) over the contract's ten-year term, which would provide electricity equivalent to powering over one million homes annually. The procurement will deliver electricity to 80 federal facilities located throughout the territory of PJM Interconnection, a regional transmission operator (RTO) that covers portions of eleven mid-Atlantic and Midwest states and the District of Columbia.

"This historic procurement locks in a cost-competitive, reliable supply of nuclear energy over a 10-year period, accelerating progress toward a carbon-free energy future while protecting taxpayers against future price hikes," said GSA Administrator Robin Carnahan. "We're demonstrating how the federal government can join major corporate clean energy buyers in spurring new nuclear energy capacity and ensuring a reliable, affordable supply of clean energy for everyone."

In the face of uncertainty over future electricity prices and increasing electricity demand from data centers and AI facilities, for instance, this contract provides federal agencies with budgetary stability and protections from future price increases by keeping their electricity costs fixed for 10 years, while also continuing to bolster the domestic nuclear industry. These nuclear facilities will operate safely and responsibly to protect public health, safety, and the environment, consistent with the U.S. government's goals and the 2024 nuclear energy framework for action.

The contract will enable Constellation to extend the licenses of existing nuclear plants and invest in new equipment and technology that will increase output by approximately 135 carbon-free megawatts. GSA will purchase 2.4 million megawatt-hours (MWhs) of this new nuclear capacity (together with the associated Energy Attribute Certificates) over the life of the 10-year contract. Together with CFE already on the electrical grid, the purchase will enable the agencies covered in the procurement to transition to 100% carbon pollution-free electricity (CFE) by 2030.

"This agreement sends a clear message that nuclear energy must continue to play an important role in providing clean, reliable, affordable and secure energy to power our nation's infrastructure and economy at a time of rising demand," said Joe Dominguez, president and CEO, Constellation. "The investments we make as a result of this contract will keep these plants operating reliably for decades to come and put new, clean nuclear energy on the grid while making the best use of taxpayer dollars."

The procurement will supply power to GSA and 13 additional entities, including the Washington Metropolitan Area Transit Authority, the Department of Veterans Affairs, the Architect of the Capitol, the Department of Transportation, the Federal Bureau of Prisons, the Federal Reserve Board of Governors, the National Archives and Records Administration, the National Oceanic and Atmospheric Administration, the National Park Service, the Social Security Administration, the Army Corps of Engineers, the U.S. Mint, and the Railroad Retirement Board. The contract is set to begin April 2025.

"Always-on, secure, clean nuclear energy is widely recognized as key to an affordable and reliable low-carbon electric grid," said Maria Korsnick, President & CEO of the Nuclear Energy Institute. "GSA's procurement of 2.4 million MWh of electricity over the next decade

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from Constellation’s nuclear plants builds on commitments by the private and public sectors to invest in reliable, clean energy while promoting innovation and growth in the nuclear industry.”

The procurement is modeled on the state-of-the-art long-term CFE procurement methods pioneered by large private-sector corporate clean energy buyers, while advancing the Biden-Harris Administration’s clean and carbon-free energy goals.

The Clean Energy Buyers Association (CEBA) applauds the announcement from CEBA members the US General Services Administration and Constellation of a major purchase of clean firm power. “Utilizing the buying power of more than a dozen agencies of the US Federal government to advance low-cost, reliable, carbon emissions free energy sources like nuclear is a powerful signal to the broader market to drive new generation investment and new infrastructure to support it,” said Rich Powell, CEO of CEBA.

“It’s not just industry that is recognizing the importance of clean, reliable and affordable nuclear energy,” said Jeremy Harrell, CEO of ClearPath, a nonprofit that develops cutting-edge policy solutions on clean energy and clean manufacturing innovation. “The federal government’s commitment to use nuclear energy to power 14 government agencies from Constellation’s nuclear fleet demonstrates how the public and private sectors can work together. As U.S. electricity demand grows, this partnership can serve as a model to accelerate power uprates at existing nuclear sites and the construction of new nuclear reactors.”

With more than 300,000 buildings and 600,000 vehicles, the federal government is the nation’s largest energy consumer. The Federal Sustainability Plan aims to achieve net-zero emissions for federal operations by 2050 by transitioning to zero-emission vehicles, energy efficient buildings, and CFE. In particular, the government seeks to transition to 100% CFE by 2030, at least half of which will be locally supplied clean energy to meet 24/7 hourly-matched demand. Over the past three years, the Administration has developed a clean and carbon-free electricity procurement pipeline in partnership with energy suppliers across 36 states that will move the federal government from its current 40% clean and carbon-free electricity match to 70% by 2027, on its way to 100% by 2030.

GSA

<http://www.gsa.gov/>

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Equinor secures over \$3bn funding for 810MW Empire Wind 1 offshore wind project

Equinor has secured more than \$3bn in project financing for its 810MW Empire Wind 1 offshore wind project in New York, US. According to the Norwegian energy firm, the project achieved its financial close in late December 2024.

Located 24-48km southeast of Long Island, the Empire Wind 1 project spans 80,000 acres. It is expected to become the first offshore wind installation to connect to the New York City grid. The Empire Wind 1 offshore wind farm is anticipated to deliver clean energy to around 500,000 households in New York upon its slated commercial operation in 2027. Total investments, including redevelopment costs for the South Brooklyn Marine Terminal (SBMT), are estimated at \$5bn, taking into account anticipated tax credits.

Construction is underway, with the project expected to create over 1,000 union jobs during the development phase. Equinor renewables acting executive vice president Jens Økland said: “This is an important milestone for Equinor, in line with our plan to enhance value and reduce exposure in the Empire Wind 1 project. “As we now enter full execution mode, we continue our efforts to increase robustness and value-creation in the project.” In June 2024, Equinor signed a purchase and sale agreement (PSA) with the New York State Energy Research and Development Authority, agreeing to supply power for 25 years.

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Equinor acquired the Empire Wind lease area in 2017. BP acquired a 50% stake in Empire Wind and Beacon Wind assets in 2020 for \$1.1bn. The arrangement was restructured in April 2024 through a cash-neutral swap, giving Equinor full ownership of the Empire Wind lease and projects, while BP assumed complete ownership of the Beacon Wind lease and projects.

The Empire Wind 1 project forms part of a larger development, with Empire Wind 2 expected to add over 1.2GW of potential capacity. Equinor plans to farm down part of its stake in the project to a new partner to enhance value and manage risk. The SBMT redevelopment is central to the project. It will serve as the operations and maintenance hub for Empire Wind 1 offshore wind farm and house the project's onshore substation.

NS Energy

<http://www.nsenenergybusiness.com/>

6 January 2024

Officials approve Duke Energy's plan to replace coal with gas-fired units

Regulators in North Carolina have approved Duke Energy's plan to replace some of the utility's coal-fired units with natural gas-fired generation. The North Carolina Utilities Commission in December issued orders in support of the gas-fired units. The state's Dept. of Environmental Quality (DEQ) on Dec. 20 granted air permits for the gas-fired plants.

Duke plans to replace two of the four coal-fired units at Person County's Roxboro plant with gas-fired combined cycle units by 2029 that would have 1,360 MW of generation capacity. The utility in its permit application said the new turbines would enter service by 2029 as part of the Person County Energy Complex. The coal-fired Units 1 and 4 at the site would be retired, while the coal-fired Units 2 and 3 would continue to operate until 2034. Duke also plans to replace two of the four coal-fired units at the 2,100-MW Marshall plant in Catawba County with gas-fired generators that would have a total of 850 MW of capacity. The Marshall station was commissioned in 1965.

"We appreciate the support of Person and Catawba counties. We look forward to working together as we transition to cleaner energy in a manner that keeps North Carolina's economy thriving, while continuing to protect grid reliability and affordability for our customers," Bill Norton, a Duke Energy spokesman, said in a written statement. Duke has said it needs to use natural gas, instead of intermittent renewable energy, in order to maintain grid stability and reliability as it transitions away from coal-fired generation. Duke last year said the utility plans to have at least 17.5 GW of solar energy in its portfolio within 15 years.

The Utilities Commission approved the new facilities as part of its joint carbon dioxide reduction and resource planning process. Critics have argued that Duke should invest in more renewable energy. "We are disappointed that the two permits have been granted and we're hopeful that steps can be taken to address what we see as unfortunately an increasing trend for more and more gas to be built out in our state, which is contrary to what state law requires and is contrary to the state's overall clean transition objectives," Munashe Magarira, a Southern Environmental Law Center senior attorney, told The News & Observer newspaper in Charlotte.

The DEQ as part of its approval said Duke must shut down the two remaining coal-fired boilers at the Marshall plant once the new gas-fired units are operating. Duke said that after 2029 there will be a period of time when the two new gas-fired turbines at Roxboro are operating along with the current four coal-fired units, giving the station more than 4 GW of generation capacity until two of the coal-fired boilers are retired.

Power Engineering

<http://www.power-eng.com/>

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Puerto Rico Receives Us DOE Loans to Boost Battery Storage to 1 Gwh

Puerto Rico's fragile grid has been given a boost, with the US Department of Energy (DOE) offering more than half a billion dollars via the Loan Programs Office (LPO), under certain conditions, to build solar, storage, and solar-plus-storage on the island

Puerto Rico suffered a sweeping blackout in the US territory on New Year's Eve, with a preliminary investigation by Luma Energy, the private company overseeing transmission and distribution of power, pointing to a failure in underground line in a southern location.

Pv-magazine

<http://www.pv-magazine.com/>

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DOE issues draft energy storage road map to accelerate cost reductions, diversify supply

The U.S. Department of Energy is seeking public comment by Feb. 3 on the draft Energy Storage Strategy and Roadmap it released last month. The new document updates DOE's Energy Storage Grand Challenge Roadmap to "improve the execution of its energy storage activities" and reflect significant advances in energy storage technology and deployment since 2020, the agency said.

Among other objectives, the legislatively-mandated roadmap aims to accelerate long-duration storage cost reductions in line with DOE's \$0.05/kWh Long Duration Storage Shot goal while diversifying and "re-shoring" a U.S. energy storage portfolio dominated by lithium-ion batteries, it said.

While the U.S. Energy Information Administration has projected that "new storage capacity additions [eclipsed] wind, nuclear, and all fossil capacity combined" in 2024, lithium-ion batteries comprise more than 95% of U.S. storage deployments, underscoring the need for a wider range of technology options to improve supply chain resilience, DOE said in the road map. The recent oversupply of battery materials, which has pushed down global prices since 2023, is unlikely to endure and masks vulnerabilities in a supply chain that remains heavily reliant on Chinese suppliers, the International Energy Agency said in May.

In September, the Biden administration increased to 25% the import tariff on lithium-ion batteries produced in China, in part to protect the United States' emerging battery manufacturing industry. The tariff already applies to electric vehicle batteries and will take effect for non-EV batteries beginning in 2026. President-elect Donald Trump has threatened higher and broader tariffs on Chinese imports after his administration takes office on Jan. 20, though media reports this month raised questions about those plans.

The updated road map guides DOE to "support U.S. re-shoring, skilling, and scaling of U.S. manufacturing [and] evaluate the viability of new domestically-sourced and -processed materials for energy storage applications to ensure robust, secure and resilient supply chains," it said. DOE must also invest in research of next-generation energy storage technologies to accelerate commercialization and enable domestic producers to "overtake international competitors," it said.

The research emphasis follows DOE's August cost analysis of 11 long-duration energy storage technologies. Without further innovation, levelized costs for most of the 10-hour-plus, non-lithium technologies would exceed the project's 2030 target of \$0.05/kWh, the analysis found. The road map identified seven outcome-based use cases to guide DOE's research and commercialization efforts, including:

- Improved power quality and reliability of supply;
- Energy load management;

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- Access to electricity in isolated locations, including islands and remote mainland communities;
- Outage mitigation and management;
- Infrastructure investment alternatives;
- Reduced electricity supply costs; and
- Mass electrification.

DOE should evaluate various energy storage technologies in accordance with their suitability for these use cases, their technological readiness levels, and cost and performance metrics that influence how well they perform in different markets, such as stationary storage versus mobile applications, the road map said.

To reduce costs and enhance energy storage systems' value, the road map advises DOE to target "strategic, high-value use cases," refine implementation cost and valuation assessments, and develop compensation mechanisms for various technologies, the road map said.

DOE can also raise awareness and adoption of suitable energy storage technologies by providing decision-makers at utilities, public utility commissions, grid operators and other energy-system stakeholders with "unbiased and fact-based information and analysis to enhance their energy storage-related investments, policies and goals," it said.

These and other strategies can enable "broader market deployment of energy storage technologies to reliably meet a variety of electricity needs and applications, at an affordable cost," by 2035, the road map said

Utility Dive

<http://www.utilitydive.com/>

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Wind Britain's top electricity source in 2024

Wind power was Britain's largest source of electricity in 2024, topping gas-fired power plants for the first time, data showed on Tuesday. Britain has almost 15 gigawatts (GW) of installed offshore wind power and aims to quadruple that to 60 GW by 2030 as part of plans to largely decarbonize its power sector by then. "Wind was the largest source of electricity generation in 2024 for the first year ever, accounting for 30%," the National Energy System Operator (NESO) said.

Gas plants accounted for 26.3% of the total electricity mix while imports provided 14.1% and nuclear power plants 14%, the data showed. Britain closed its last coal plant last year as coal accounted for just 0.6% of the country's electricity. During the year several clean power records were broken, with a maximum wind capacity of 22,523 GW hit on December 18 when wind contributed 68.3% of the country's electricity.

Reuters

<http://www.reuters.com/>

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European wind stocks take beating after Trump calls turbines 'garbage'

European wind power stocks fell on Wednesday after U.S. President-elect Donald Trump said he would try to ensure that "no windmills" are built on his watch, criticising the sector less than two weeks before he is due to take office.

Trump's latest swipe against the industry raises concerns about how the U.S. wind market, the world's second-biggest after China, will develop in his second term, causing investors of companies with skin in the game to sell.

Shares in the world's two biggest offshore wind farm developers - Denmark's Orsted, opens new tab and Germany's RWE, opens new tab - as well as turbine makers Siemens

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Energy, opens new tab, Nordex, opens new tab and Vestas, opens new tab closed 2.4%-7.4% lower.

"It's the most expensive energy there is. It's many, many times more expensive than clean natural gas so we're going to try and have a policy where no windmills are being built," Trump said of wind energy at a press conference at his Florida resort late on Tuesday, calling wind turbines a disaster. "They litter our country, they're littered all over our country like dropping paper, like dropping garbage in a field ... They're rusting, rotting, closed, falling down ... And they put new ones next to them because nobody wants to take them down, because why should they take them down? It's very expensive to take them down."

DNB Markets analyst Douglas Lindahl said it was unclear how Trump would implement his plans given wind power's relevance in large Republican states, such as Texas. Trump has been highly critical of efforts under current President Joe Biden to boost the U.S. green technology sector via the Inflation Reduction Act, creating a major growth prospect for players from the solar, wind and hydrogen sectors.

The fear of regulatory changes in Trump's second term has already caused companies to scrap, adjust or delay expansion plans, with offshore wind being a regular target of his criticism. Germany's Siemens Energy, the world's largest maker of offshore wind turbines with substantial business in the United States, said turbines installed off coasts were just one part of its portfolio. "The vast majority of our current offshore projects are in Europe, where we also see the biggest market demand," it said in response to Reuters questions.

Reuters

<http://www.reuters.com/>

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9 US electric power sector issues to watch in 2025

From rising electricity prices and demand to emerging opportunities and challenges around nuclear, VPPs, renewables and more, we've highlighted nine of the most important issues for the year ahead. 2024 was a busy year for the U.S. power sector with a number of significant policy advancements in renewables, transmission, nuclear energy and other areas. The year ahead will undoubtedly be an active one, too, as the sector navigates ongoing business challenges and the impacts of the 2024 elections. Here are nine key issues to watch in 2025.

The price U.S. consumers pay for electricity will continue to ascend in 2025, driven by a range of factors including rising demand, transmission and distribution cost increases, and an anticipated rise in the price of natural gas, experts say. Across all customer classes, U.S. electricity prices are expected to average 13.2 cents/kWh in 2025, up from 12.68 cents/kWh in 2023, according to data from the U.S. Energy Information Administration. Residential electricity prices across all regions will average 16.7 cents/kWh in 2025, up from 15 cents/kWh in 2022.

"Both transmission and distribution cost increases are driven by decarbonization and that is expected to continue nationwide," Paul Cicio, chair of the Electricity Transmission Competition Coalition, said in an email. Natural gas prices were low in 2024 but as liquefied natural gas export terminals come on-stream in late 2025 and in 2026 and more U.S. natural gas is shipped out of the country, "we expect higher natural gas prices and resulting higher electricity prices," Cicio said.

U.S. LNG exports have tripled over the past five years, are expected to double again by 2030 and could increase even further under existing authorizations, Secretary of Energy Jennifer Granholm said in December. The rise in natural gas exports is also a threat to reliability, Cicio said, "because there is inadequate natural gas pipeline capacity on a

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regional basis, to add generation.” The increased LNG exports are happening at a time when building and transportation electrification, data center growth, artificial intelligence, cryptocurrency mining and battery and fuel cell manufacturing are contributing to higher electricity consumption and rising electricity prices.

U.S. electricity demand is projected to grow 9% by 2028 and 18% by 2033, an increase of 2% per year, on average, relative to 2024 levels, consulting firm ICF said in a September report. Peak demand could grow 5% over the next four years, ICF said.

The North American Electric Reliability Corp. rang in the New Year with a stark call to action for the electric power sector, signaling years of warnings may now be an immediate threat. “I’m asking everyone in the electricity supply chain ... to take all appropriate actions,” NERC CEO Jim Robb said in a Dec. 31 recorded address, ahead of the cold weather now blanketing parts of the United States.

After nearly two decades of stagnant electricity demand growth, the United States is seeing data centers and electrification drive consumption higher. Combined with generator retirements and a changing resource base, the nation’s grid reliability watchdog says this is a perilous moment for the power system. Data centers could account for 44% of U.S. electricity load growth from 2023 to 2028, Bain & Co. said in an October analysis. U.S. utilities are facing “potentially overwhelming demand,” the consulting firm said.

NERC published an assessment in December concluding more than half of the U.S. electric grid could see energy shortfalls in the next five to 10 years, particularly under extreme weather conditions. Peak summer demand is forecast to rise by more than 122 GW in the next decade, adding 15.7% to current system peaks, NERC said, while generation retirements of up to 115 GW are possible by 2034. Federal policies are needed to support energy production, manufacturing and infrastructure, according to National Rural Electric Cooperative Association CEO Jim Matheson. NERC’s report “continues painting a grim picture of our nation’s energy future and growing threats to reliable electricity,” he said.

NERC said it is now worried about the potential for arctic cold to bring extremely low temperatures, damaging winds, snow and freezing rain to Midwestern, Eastern, and Southern states. “NERC is especially concerned about natural gas supply given the significant amount of [gas] production in the mid-Atlantic and Northeast,” the reliability organization said in a Dec. 31 warning.

Natural gas producers have taken “a multitude of proactive measures to prepare for winter weather so that we can provide safe and reliable service to our customers,” according to Natural Gas Supply Association President and CEO Dena Wiggins.

Making sure there is enough power supply to meet the growing needs of U.S. energy users is one of the top issues facing the operators of U.S. wholesale power markets. With demand forecasts growing sharply for the first time in years, grid operators like the Midcontinent Independent System Operator are working to ensure their markets send appropriate signals to spur new generation while also working to unclog their interconnection queues. The PJM Interconnection may be facing the most challenges as it is trying to overhaul its capacity market amid warnings that it may soon face major supply shortfalls. PJM has for several years taken steps to reform its capacity markets — which led to capacity auction delays and a condensed auction schedule — but the record-high prices of its last capacity auction in July sparked unprecedented turmoil.

The auction will cost ratepayers across the grid operator’s footprint \$14.7 billion for the delivery year that begins in June, up from \$2.2 billion in the previous auction. Since the results were released, at least three market-related complaints were filed at the Federal Energy Regulatory Commission, PJM has proposed a one-time, fast-track process for shovel-ready projects and more market changes are in the works.

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Other grid operators are responding to similar supply/demand challenges. MISO, for example, in November proposed, for a second time, setting a megawatt cap on its annual interconnection queue to limit its study size, as well as exemptions to the cap. Meanwhile, the California Independent System Operator and the Southwest Power Pool are planning to expand wholesale markets in the West. CAISO aims to launch the Extended Day-Ahead Market in 2026 while SPP plans to start its Markets+ initiative in 2027, pending approval of the tariff by FERC.

In 2025, ongoing load growth in the U.S. will continue driving demand for renewable energy, while the sector simultaneously faces uncertainty due to President-elect Donald Trump's vow to prioritize fossil fuel-based generation. Beyond the incoming administration, connecting renewable energy to the grid remains a challenge, with wind and solar constituting the vast majority of capacity in interconnection queues across the country. A lack of sufficient transmission to deliver renewable energy to where it's needed is also seen as a key challenge. Congress has been considering bipartisan permitting reform legislation that aims to facilitate transmission buildout, but the prospects for such legislation remain uncertain. Advanced Energy United President and CEO Heather O'Neill said the renewable energy industry is currently "stymied" by bottlenecks, "whether it's interconnection or siting."

Despite federal uncertainty, work to solve these bottlenecks is ongoing at the state level, O'Neill said – bolstered by the Federal Energy Regulatory Commission's Order 1920, which affirmed states' role in transmission planning, and by emerging solutions to get more out of the current power system like grid-enhancing technologies. "We know we need to build more, but we also know that we can get a heck of a lot more out of the existing transmission grid," she said. "When we talk to governors, their staff, commissioners – they want to attract economic development in their state." Felisa Sanchez, a partner with law firm K&L Gates' maritime and finance groups, said that permitting reform legislations could play a significant role if Trump attempts to block offshore wind projects. "One of the big, key ways that Trump could affect projects is by delaying that permitting process over the next four years," she said.

While Trump's reelection and his strong anti-offshore wind stance have created concerns for the offshore wind industry, Sanchez said project developers "are still engaged in these conversations with the understanding that even if there is a slowdown or a halt to the industry, they anticipate being able to pick up again in four years." Trump is expected to implement even stricter tariffs in his second term, including on imported solar components, which could increase costs and contribute to supply chain constraints. However, as solar technology advances and domestic supply grows to meet demand, prices continue to drop.

From game-changing federal legislation, to groundbreaking on what could be the United States' first new grid-connected non-light-water reactor in decades, to commitments by some of the world's biggest tech companies to power data centers with existing or next-generation reactors, 2024 was a busy year for the U.S. nuclear industry. Momentum for nuclear energy gathered amid rapidly rising projections of future load growth due to the electrification of buildings and transport, reshoring and decarbonization of heavy industry, and above all, the expected proliferation of power-hungry AI models. "2024 was the year that we all woke up to the need for nuclear," said Craig Piercy, CEO of the American Nuclear Society. "2025 is the year we really get down to serious business." A reinvigorated U.S. Nuclear Regulatory Commission will be instrumental, experts say. More than a dozen advanced reactor developers are engaging with the NRC on licensing-related matters, "but licensing timelines and costs remain uneven, often attributable to inconsistent quality in mundane but important practices," Nuclear Innovation Alliance Executive Director Judi Greenwald said in a December paper. In 2025, the agency must continue work on the new,

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technology-neutral Part 53 licensing framework as Congress holds it accountable for implementing ADVANCE Act provisions like lower application fees, early-mover prizes and hiring incentives to expand its own workforce, Greenwald said.

Developers of smaller-scale reactors, like Oklo and Last Energy, could begin to benefit in 2025 from an ADVANCE Act provision that establishes an 18-month licensing timeline for microreactors and may enable even faster approvals for subsequent microreactor license applications. “The NRC has acknowledged that these timelines are doable,” said Ryan Duncan, vice president of government relations at Last Energy. While it remains to be seen if the Trump administration will aim to maintain current funding levels for emerging nuclear technologies, the U.S. Department of Defense is likely to remain “very interested” in procuring nuclear reactors for on-base resiliency and could advance initiatives announced by the U.S. Army, Navy and Air Force, Duncan said.

In the civilian world, Holtec could reactivate its 800-MW Palisades nuclear generating station in Michigan by the end of 2025, the company said last fall. Meanwhile, utilities are looking at about 2 GW of uprate opportunities to “wring as much performance out of the existing fleet as possible” and may propose additional nuclear capacity — possibly SMRs at existing nuclear or coal power sites — in integrated resource plans published this year, Piercy said.

The United States installed 3,806 MW/9,931 MWh of energy storage in Q3 2024, and the industry is on track for 30% growth in storage deployments for the full year, Wood Mackenzie and the American Clean Power Association said in December. Though Wood Mackenzie sees annual deployment growth decelerating to 10% from 2025 to 2028 due to “early-stage development constraints,” the industry has powerful tailwinds, including recent and expected future declines in battery input costs and ambitious storage procurement targets in states like New York, California and Massachusetts. Increasingly, state storage procurements focus on installations capable of full-power discharge over durations longer than four hours.

“No one in their right mind would bet against longer and longer duration energy storage at lower cost,” said Intersect Power CEO Sheldon Kimber, whose company in December announced plans to colocate gigawatt-scale wind, solar and battery plants with Google data centers beginning later this decade. Non-lithium technologies like Form Energy’s iron-air and CMBlu’s redox flow battery are more economical for discharge durations beyond approximately four to eight hours, experts say. Form expects to commission a 1.5 MW/150 MWh commercial demonstration project in Minnesota later this year as it expands its West Virginia factory to meet near-term demand. The potential for higher tariffs on imported lithium-ion battery components could benefit emerging storage technologies with simpler, easier-to-onshore supply chains, including iron-air, Kimber said.

But “lithium-ion has a huge head start [and it will be] hard to overcome that leadership position,” especially with lithium battery costs expected to decline further, said Mark Repsher, partner and energy markets expert at PA Consulting.

Only 19.5%, or 33 GW, of total North American distributed energy resource capacity — residential and commercial solar arrays and batteries, electric vehicles, smart thermostats, water heaters and more — is enrolled in a virtual power plant, according to a July report from Wood Mackenzie. Smart thermostats alone could provide up to 70 GW of dispatchable VPP capacity, said Renew Home CEO Ben Brown. Inadequate policy, overcomplicated program design and technological challenges conspire to slow uptake, Wood Mackenzie said. But DER experts interviewed by Utility Dive are optimistic that the tide is turning as load growth outpaces generation capacity additions. “[Utilities] are running out of levers to flip to keep up with capacity and demand,” said Viridi CEO Jon Williams.

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In November, Renew Home and NRG announced plans to deploy a 1-GW smart thermostat VPP in Texas by 2035. The following month, the Electric Reliability Council of Texas proposed a doubling of capacity in its aggregated distributed energy resource pilot program. In addition, the Electric Power Research Institute is leading two initiatives to advance common DER interoperability standards. In 2025 and beyond, state policy could take center stage with DERs, Brown and Williams said. With most parts of the U.S. distribution grid running well below full capacity outside of peak periods and an average five-year wait for bulk interconnections, Williams said policymakers should incentivize distribution-connected energy storage over new transmission-connected generation assets.

“You can’t just add a gas plant because you’re too lazy to use technology,” Williams said. In October, California Gov. Gavin Newsom, D, ordered the California Public Utilities Commission and other state agencies to find ways to reduce electricity bills in a move that could pave the way for CPUC to set new targets and incentives for utilities to adopt VPPs and make it easier for consumers to get rewarded for participating in VPPs, Brown said. FERC, DOE advance major transmission policies as permitting, other challenges remain

2024 saw several major developments in U.S. transmission with more to come in the year ahead as new policies move closer to implementation.

“With increased load from AI and other drivers, and resource adequacy needs as highlighted by NERC’s 2024 Long Term Reliability Assessment, transmission will continue to play a key role in meeting these needs as cost effectively as possible,” said Christina Hayes, executive director of Americans for a Clean Energy Grid.

In terms of interregional transmission, the Federal Energy Regulatory Commission on Nov. 21, largely upheld its Order 1920 on transmission planning and cost allocation, first issued in May, but gave state regulators a bigger role in shaping scenario development and cost allocation. Grid operators must now file plans with FERC indicating how they will comply with the order. In addition, on Oct. 3, the Department of Energy released the National Transmission Planning Study, which provides a framework for interregional transmission development. Siting and permitting issues have been a persistent challenge for new transmission. While permitting reform legislation failed to pass in 2024, efforts will continue in the next Congress.

“It will be incumbent upon policymakers to streamline regulatory processes and actively and effectively incentivize investment in new transmission if meaningful progress is to be made on building a robust and modernized grid,” said Larry Gasteiger, executive director at WIRES.

“The prior Trump administration took significant steps to streamline siting and permitting; the Biden administration pushed a number of individual projects over the finish line and issued [Coordinated Interagency Authorizations and Permits] rules on implementing section 216(h) of the Federal Power Act,” Hayes noted. Some key questions around transmission, according to Hayes, include “how will the next administration support siting and permitting of transmission through the federal process Will it support backstop siting in FERC’s Order No. 1977? What else will this administration do to support siting and permitting of transmission projects?” The last four years have seen a major push to electrify building and transportation systems, with federal incentives helping to drive the popularity of heat pumps and electric vehicles. But with a second Trump administration set to begin this month, supporters of the shift away from fossil fuels are counting on momentum and the private sector to continue progress.

“As we move into the deployment phase and the implementation phase, it’s going to be more and more important that folks are using that money well,” said Jeff Allen, executive director of Forth, a nonprofit focused on EV adoption. “That’s probably going to be a lot of the funding you have to live off, for the next few years. There’s also going to be a lot more

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people looking over your shoulder,” Allen said, speaking during a Dec. 17 webinar focused on the outlook for electrification.

Through the Infrastructure Investment and Jobs Act and the Inflation Reduction Act, President Biden has made billions available to support the clean energy transition. Heat pump incentives have been rolled out on the state-level and more than half of the authorized funds will be distributed to the states before Trump takes office, experts say. But Trump has talked about ending EV tax credits, which can total up to \$7,500 per vehicle. The incentives helped push sales of EVs to almost 9% of U.S. light-duty vehicle sales in the third quarter of last year.

JD Power in August said it expects EV sales to achieve a 36% market share by 2030.

“I do think we’re going to see some of these tax incentives really come under fire,” said Lynda Tran, CEO of Lincoln Room Strategies. But the bulk of the EV transition work will continue, Tran said, with the private sector continuing to ramp up investments in clean energy manufacturing. “They’re planning to double down,” she said.

Development of EV charging infrastructure is also key.

The \$5 billion National Electric Vehicle Infrastructure program authorized by the IIJA aims to install thousands of EV chargers around the country but relatively few have been rolled out so far, said Ryan McKinnon, spokesperson for the Charge Ahead Partnership. “The slow pace has turned the program into a poster child for sluggish federal bureaucracy,” he said. If the NEVI program is scaled back “it will not have a major impact. Businesses that are poised to turn a profit, gain new customers and expand into a new revenue stream will continue to build, own and operate EV charging stations.”

Utility Dive

<http://www.utilitydive.com/>

8 January 2024

Indiana data center could soon be powered by coal

Hallador Energy Company – owner and operator of a 1 GW coal-fired plant in Indiana – is a step closer to a final agreement that would provide power for a leading data center’s operations. Hallador and the unnamed data center developer signed an Conversion Transaction Commitment Agreement effective January 2, 2025. During the third quarter of 2024, Hallador signed a non-binding term sheet with the developer to support the delivery of energy and capacity, through a utility partner, for 10+ years.

Hallador Power’s Merom Generating Station is a two-unit, 1080 MW coal-fired power plant located in Sullivan County, Indiana. During the company’s Q3 call in November, after the non-binding term sheet was signed, executives told investors the offtaker would receive a “majority of the output of the plant.”

Hallador Power has been interested in marketing its Merom site to data centers and other high-density power users. The company issued an RFP in March 2024, offering up to 1 GW of coal-fired power generation for purchase, with varying dates of availability. At that time, the company said it would be willing to consider partnering on “additional generation and/or future transition of plant to alternative generation sources including gas and/or solar”.

This latest agreement with the data center developer provides exclusivity in negotiations for a period of 105 business days and cumulative payments of up to \$5 million to Hallador Power Company, with \$1 million due in January, \$2 million of payments due in March if the parties have not satisfied certain conditions, and an additional \$2 million in June if such conditions have not been satisfied by the end of the exclusivity period. The parties will use the exclusivity period to finalize selection of a utility partner and to negotiate and complete other definitive agreements related to the proposed transaction.

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If Hallador Power Company is successful in executing definitive agreements and once the transaction commences, it is expected to contract the majority of the its energy and capacity at prices higher than the forward curve for more than a decade, it said. Hallador Energy Company has two core businesses: Hallador Power Company, which produces electricity and capacity at Merom Generating Station, and Sunrise Coal, which produces and supplies fuel to the Merom plant and other companies.

The company could not be reached for comment on Wednesday.

Under different ownership, Merom Generating Station was expected to be retired in May 2023. But in October 2022, Hallador Energy Company finalized the purchase of the plant from Hoosier Energy. The transaction includes a 3.5-year power purchase agreement (PPA). Hoosier would purchase 100% of the plant's energy and capacity through May 2023, reducing purchases to 22% of energy output and 32% of its capacity beginning in June 2023 and through 2025.

The companies' existing renewable PPA – signed in May 2021 and representing 150 MW of solar generation and 50 MW of battery storage – would be retained, with its start date delayed until Merom's eventual retirement. Through that PPA, the companies would develop up to 1 GW of renewable energy at the site. Hoosier had previously said it would sell the plant if the right deal came to fruition. After entertaining interest from a number of different parties, the company found a partner in Hallador, which said it could operate the plant at a much lower cost, given ownership and control of fuel supply.

Coal for data center power?

While the rise of data center development has ushered in discussions on meeting the subsequent increased demand with clean energy or advanced and traditional nuclear power, some projects are sticking to the classics like coal- or gas-fired generation.

Residents of a low-income North Omaha community celebrated the planned closure of a coal plant in 2023, because it caused high asthma rates and poor air quality. But the closure was postponed due to increased electricity demand from data centers. Coal is now planned to burn in North Omaha through 2026.

Power Engineering

<http://www.power-eng.com/>

9 January 2024

PJM 'shovel-ready' interconnection plan draws mixed reviews at FERC

The PJM Interconnection's proposal for a fast-track interconnection review for shovel-ready generation projects sparked a mixed response at the Federal Energy Regulatory Commission, according to Wednesday filings at the agency.

State utility regulators, PJM's market monitor, the PJM Power Providers Group, or P3, and electric utilities were among the supporters of PJM's proposed Reliability Resource Initiative. Renewable energy developers, including Invenergy, and advocacy groups, such as the Sierra Club, oppose the grid operator's plan, partly because they say it could delay pending interconnection reviews.

PJM floated its Reliability Resource Initiative in early October to address potential near-term grid reliability problems. After a fast-track review by stakeholders, who didn't vote on the initiative, PJM asked FERC in mid-December to approve it by Feb. 11. PJM estimates that its proposal could bring online at least 10 GW of capacity with high effective load carrying capability, or ELCC, ratings by 2028. Under the plan, PJM would let 50 projects enter an interconnection review process — Transition Cycle 2 — that is set to start early this year. The projects must meet scoring criteria for reliability, viability and availability. About 1,060 projects were eligible to enter Transition Cycle 2 as of mid-December, according to PJM.

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The Organization of PJM States, Inc., which represents state utility regulators, supports the initiative. "While PJM is working towards clearing its interconnection queue backlog, the reality is that resources waiting in line or attempting to respond to high [capacity] price signals cannot get through PJM's interconnection process in the near term," OPSI told FERC. "The RRI is a response to these challenges."

Dominion Energy, East Kentucky Power Cooperative, Exelon, FirstEnergy and PPL Electric also support PJM's proposal. The utility companies said they were especially concerned that PJM could fall below its 17.8% reserve margin target in 2026 because of power plant retirements, the slow pace of bringing intermittent generation online and load growth. P3 said the proposal could be improved and that the trade group for power plant owners in PJM didn't agree with all of PJM's justifications for it. "However, considering this is a one-time PJM initiative and the need for timely FERC resolution is paramount, the filing is within the zone of just and reasonableness such that it warrants commission approval," P3 said.

Utility Dive

<http://www.utilitydive.com/>

9 January 2024

California power outages swell to 400,000 as fires multiply

The number of California homes and businesses without electricity ballooned to more than 400,000 on Wednesday, as multiple wildfires raged uncontrollably around Los Angeles.

Fires that started on Tuesday have killed at least five people, destroying hundreds of homes and stretching firefighting resources and water supplies to the limit, as more than 100,000 people were ordered to evacuate. Virtually all of the state's outages were in southern California, primarily in Los Angeles and Southern California Edison's (SCE) primary outage management system is offline, according to PowerOutage.us.

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Virtually all of the state's outages were in southern California, primarily in Los Angeles and Southern California Edison's (SCE) primary outage management system is offline. SCE, a subsidiary of U.S. utility Edison International (EIX.N), opens new tab operating in California, said in a statement that "as of 4 p.m. PST on January 8, about 413,639 SCE customers are without power... and 453,872 customers are under a Public Safety Power Shutoff (PSPS) program watch."

"Given the unsafe conditions for electric power restorations, customers may experience several days of outages. SCE will restore service as soon as it is safe to do so." So-called power safety shutoffs happen, in part, to reduce the risk that airborne objects spark additional blazes when they strike power lines, said company spokesperson Jeff Monford, who implored the public to stay away from any downed lines.

It was unknown when power would be restored as the company would have to wait for the period of concern to pass to get crews to fix power lines and other distribution facilities in the affected areas, Monford said. Shares of the utility tumbled as much as 13.8% to \$66.70, hitting its lowest levels since April and on track for the biggest one-day percent drop since the onset of the COVID-19 pandemic.

The Palisades wildfire has so far burned more than 15,000 acres in the Pacific Palisades area between the beach towns of Santa Monica and Malibu. Other wildfires have sprung up in neighboring areas, including a 10,600-acre fire near the city of Pasadena and

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a new blaze in the Hollywood Hills on Wednesday evening, forcing fresh evacuations. Parts of Malibu and Santa Monica are also under evacuation orders.

Reuters

<http://www.reuters.com/>

10 January 2024

World's Largest Pumped Storage Power Plant Fully Operational in China

The Fengning Pumped Storage Power Station, the world's largest facility of its kind, has commenced full operations with the commissioning of its final variable-speed unit on December 31. Located in Fengning County, Hebei Province, near Beijing and Tianjin, the plant is a key part of China's renewable energy infrastructure, supporting a nearby 10 GW wind and solar base in Zhangjiakou, which is located nearby.

Developed by State Grid Xinyuan Group Co., Ltd., a subsidiary of the State Grid Corporation of China, the project represents a total investment of CNY 19.24 billion (\$2.6 billion). Construction began in May 2013 and took more than 11 years to complete. The plant features 12 reversible pump-turbine units, each with a capacity of 300 MW, including two variable-speed units, bringing the total installed capacity to 3.6 GW. It is designed to generate 6.61 TWh annually while consuming 8.71 TWh of electricity for pumping, and it connects to the North China power grid via four 500 kV transmission lines.

Pv-magazine

<http://www.pv-magazine.com/>

10 January 2024

Fingrid: Estlink 2 failure could strain power supply on frigid winter days

Damage to the Estlink 2 power cable between Estonia and Finland may impact Finland's electricity supply during extremely cold days, according to an updated assessment by national grid operator Fingrid. On typical winter days, Fingrid said the electricity supply should be sufficient, provided power plants and transmission networks operate normally.

However, in severe cold and windless conditions, there may be a shortage of power supply, according to the grid operator. "If the weather turns exceptionally cold and windless, the role of demand flexibility becomes crucial in ensuring the adequacy of electricity supply," said Tuomas Rauhala, Senior Vice President responsible for System Operations at Fingrid. The Eagle S oil vessel is suspected of damaging the subsea electrical transmission link in the Gulf of Finland on Christmas Day. It was earlier reported that repairs to the cable could take up to seven months and cost tens of millions of euros, based on Fingrid's estimate.

YLE

<http://yle.fi/>

10 January 2024

India adds record 24.5 GW of solar in 2024

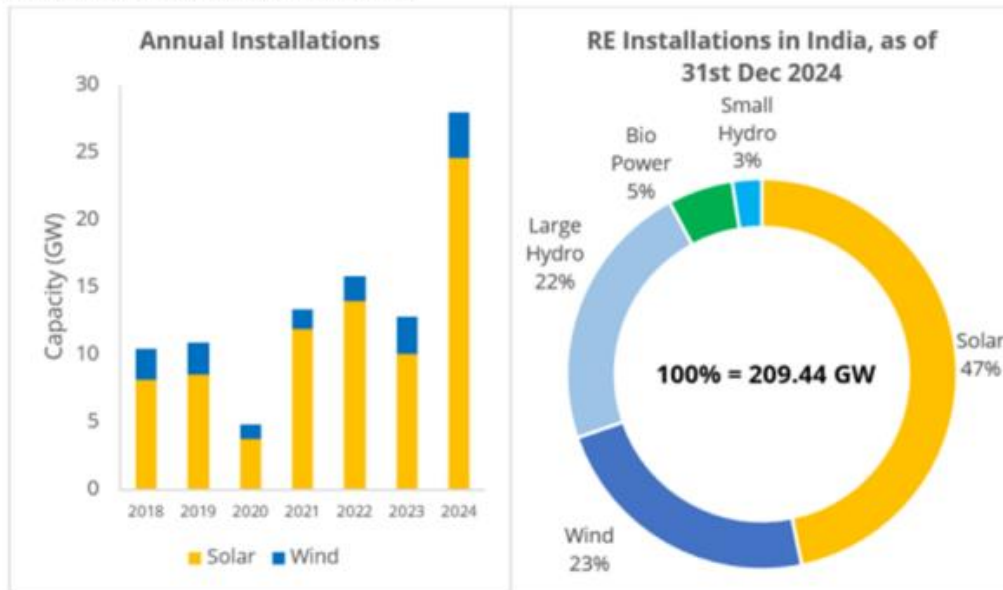
India added 24.5 GW of solar and 3.4 GW of wind capacity in 2024, doubling solar installations and increasing wind capacity by 21% from 2023, according to JMK Research & Analytics. These additions brought India's total renewable energy capacity to 209.44 GW, with solar accounting for 47% of the total.

The nation's 24.5 GW of solar capacity additions included 18.5 GW of utility-scale PV, 4.59 GW of rooftop systems, and 1.48 GW of off-grid installations, according to JMK Research. "This growth can be attributed to the launch of the PM Surya Ghar: Muft Bijli Yojana," said the consulting firm.

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RE installation trends in India



Source: CEA, MNRE, JMK Research

Note: Solar capacity includes utility-scale solar, rooftop solar, and off-grid/distributed solar capacity

Utility-scale additions nearly tripled from 2023, while rooftop and off-grid installations rose 53% and 197%, respectively, driven by the PM Surya Ghar: Muft Bijli Yojana, which spurred 700,000 rooftop installations in 10 months.

Pv-magazine

<http://www.pv-magazine.com/>

11 January 2024

Tesla's full self-driving computer failure is leaving customers in bad situations

Tesla's Full Self-Driving computer failure leaves customers in bad situations without many important features and depletes battery packs faster for months.

Last month, Electrek released an exclusive report about Tesla having a major issue with a new version of its onboard "Full Self-Driving computer," AI4.1, failing due to a short circuit, and Tesla must replace the computers. We found examples of the issue arising as far back as July. The problem can start quickly, within a few miles on a brand-new car or after a few hundred to a few thousand miles. When the computer fails, many vehicle features stop working, like active safety features, auto wipers, auto high beams, cameras, and even GPS, navigation, and range estimations. Tesla's fix was to replace the computer completely, but sources also mentioned a temporary software fix to enable some of the features in the meantime.

It's hard to estimate precisely the affected population. At the time of the article, we had received dozens of customer complaints and had sources inside Tesla estimating that, based on service requests, thousands of new Tesla owners are experiencing this issue. We reported that this should lead to a recall since features like backup cameras are now considered a safety feature and required on new vehicles by NHTSA, but Tesla hasn't released a service bulletin nor has a notice been posted with NHTSA.

Electrek contacted NHTSA to ask if they were aware of this issue. We will update if we get an answer. There are now dozens of customer complaints about this specific issue on NHTSA's Tesla Model Y and Model 3 pages.

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Since publishing our original report on this issue last month, dozens of other customers reached out about the problem. They are reporting long wait times to get a new computer as Tesla tells them that it needs more parts, presumably the new computers. Some showed documents to Electrek that showed they didn't have an appointment to replace their computers until into February. For some customers, that would mean more than two months with severely handicapped vehicles.

On top of the previously mentioned disabled features, customers have voiced other problems living with their brand-new vehicles without a working computer. The computer appears to get stuck in an "auto-update loop", which drains the battery faster. A customer with this issue estimated that his Model 3 is consuming about 5 kWh per day when parked, doing nothing with this computer issue.

Some owners expressed concerns about faster battery degradation and wear on other components because of this issue. It's also a major issue for people who don't have home charging yet, and their vehicles are stuck discharging faster with this issue. Electrek has seen documents showing that Tesla acknowledges that the computer issue is an "internal short."

Electrek
<http://electrek.co/>