

WORLD POWER SYSTEMS REVIEW

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Jordan, Iraq electricity interconnection network commences operations

Iraqi Minister of Electricity Ziad Ali Fadel on Saturday announced that the electricity interconnection between Jordan and Iraq commenced operations. Fadel said that the first phase of this project is now supplying electricity to the Rutba Power Station in Anbar province, located near the Jordanian border, adding that this move has ended a decade-long power shortage caused by sabotage from terrorist groups in 2014, according to the Jordan News Agency, Petra.

He also noted that the power line, operating at a voltage of 132 kilovolts, spans 330 kilometres within Iraqi territory and extends an additional 6 kilometres within Jordanian territory. Fadel also said that the initial stage is supplying approximately 40 megawatts of energy. He also said that upon completion of the line to the Qa'im Power Station, the second stage will boost the supply to 150 megawatts, adding that the supply capacity could potentially reach up to 500 megawatts in the future. Adnan Kubaisi, a representative of the local government in Anbar province, hailed the cooperation of Jordanian officials since the inception of the electrical line project, Petra reported.

The Jordan Times
<http://jordantimes.com/>

1 April 2024

New England to become the second coal-free region in the US

Both of New Hampshire's coal plants are shutting, making New England the second coal-free region in the US. That's following a settlement between Sierra Club, The Conservation Law Foundation, EPA, and Granite Shore Power. The Bow, New Hampshire-based power station has committed to retiring the coal-burning units at Merrimack and Schiller Stations in New Hampshire, by 2028 and 2025, respectively. Schiller Station (pictured), which is on the coast, will host a solar and battery storage system. It will be integral in supporting reliability daily during peak hours and acting as storage for the wind power now being built off the coast of Martha's Vineyard and in the Gulf of Maine

That will make New Hampshire the 16th coal-free state. New England is the nation's second entirely coal-free region, following the Pacific Northwest. "Today's announcement is the culmination of years of persistence and dedication from people across New England who knew coal was a dirty, expensive, and unreliable source of energy that would cut people's lives short, and that a better way was possible for our economy, for our health, and for our planet," said Gina McCarthy, Bloomberg Philanthropies senior advisor and former White House national climate advisor.

With the retirement of all eight coal plants in the region, 2.9 GW of coal will have been taken offline, a reduction of 15.6 million tons of carbon emissions from New England. That's equivalent to taking more than 3.1 million cars off the road for a year. There's almost 33 GW of wind, solar, and storage planned for New England. Bloomberg Philanthropies' Beyond Carbon and the Sierra Club's Beyond Coal campaign have successfully secured the retirement of 72% of coal-fired power plants in the US – 381 out of 530 plants.

Electrek
<http://electrek.co/>

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UK Tidal Power Project set to be world's largest

The Liverpool City Region Combined Authority has spent three years undergoing technical planning for the world's largest tidal range project, which could install 28 turbines

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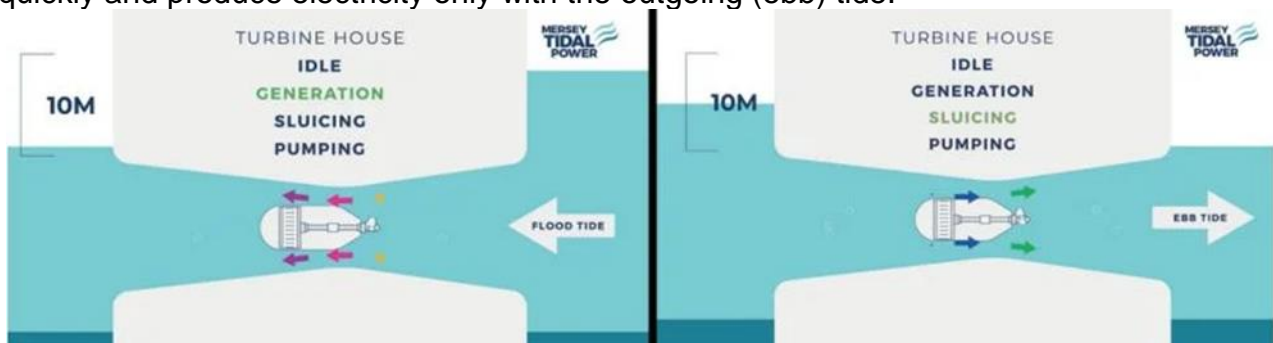
totaling 700 MW over the next decade. The first-in-the-U.K. concept is expected to generate 2 TWh of electricity annually for up to 1 million local homes—serving 30% of the region's demand.

Located on Liverpool's River Mersey, the project would incorporate a cycling and pedestrian route connecting the city to Wirral via a barrage. This design also provides flood defenses as the river's water levels rise. Planners initially considered a lagoon layout, but documents submitted to the Combined Authority stated the barrage option would be cheaper and avoid the large-scale material imports needed to build the lagoon structure.

The Mersey Tidal Power project is expected to have a 120-year operating life, similar to hydropower plants. Details on the grid connection haven't been disclosed yet, but authorities have said the system wouldn't require new long-distance transmission lines because it's close to urban infrastructure. The project now moves to the planning and consent phase. Planners are expected to submit a scoping opinion in the third quarter of this year outlining the proposed development and approach to gathering onshore and offshore data for the environmental assessment. That would mark the first step in preparing a Development Control Order, which typically takes up to three years.

Mersey Tidal Power would be the world's largest tidal range scheme, applying the technology for the first time in the U.K. The range concept differs from tidal stream technology, in which smaller, submerged turbines are placed in tidal flow channels, usually in more remote areas. Tidal range systems pull energy from the difference in water height between tides (up to 32.8 feet), benefitting from a predictable generation pattern. The U.K.'s resources account for 5–15% of worldwide tidal range generation.

The tidal system operates with two-way generation. Before the tide flows in, the turbine house sits idle with the opening closed on one side. When the tide arrives, the gateway opens, generation starts from the turbines, and the sluicing (water flow) continues as water is pumped out. The process repeats during the ebb tide in the opposite direction. One-way generation is also possible when the system is adjusted to allow the tide to flood quickly and produce electricity only with the outgoing (ebb) tide.



The project concept will draw inspiration from existing tidal barrages like South Korea's Sihwa Lake Tidal Power Plant. The 254 MW installation has been operating since 2011 and features eight sluice gates and 10 turbines rated 25.4 MW each. It supplies electricity to about 500,000 people. In 2022, the Liverpool City Region mayor signed an agreement with South Korean water company K-water to share lessons from its experience owning and operating the plant, which stands as the world's largest tidal range power installation. EDF's La Rance Tidal Power Plant in France is another blueprint for the project. It was the world's first tidal power facility, opened in the 1960s. According to data from the Pacific Northwest National Laboratory, the 2,460-foot-long barrage has a peak rating of 240 MW generated by 24 bulb turbines, with an annual output of about 600 GWh.

The multi-billion-dollar project still needs government backing for the development stage, and specific cost estimates haven't been released yet. However, the price tag topped 3.5 billion pounds (or \$4.4 billion) when the concept was conceived over a decade ago.

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Developer Peel Energy pulled out in 2011 due to high construction costs and concerns over medium-term profitability. Natural tidal resources along the U.K.'s west coast could join the island nation's rapidly growing wind power sector. According to RenewableUK, more than 2,700 offshore turbines operate across 44 projects, totaling 14.7 GW of capacity. Another 8,993 onshore turbines supply 15 GW across 2,631 projects. These sites produce 83.5 TWh annually, powering 25.8 million homes.

An auction for clean power contracts is set to take place this summer. RenewableUK estimates 14 wind farms could be eligible to bid, totaling nearly 10.3 GW of new capacity. Another 14.9 GW of offshore wind projects could also qualify—roughly equal to the U.K.'s existing 14.7 GW of offshore wind capacity, accounting for around 14% of national electricity demand. The Liverpool City Region is home to the U.K.'s second-largest wind farm cluster, supported by port infrastructure. Other offshore wind projects span Liverpool Bay and the northwest coast.

Eepower

<http://eepower.com>

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Southwest Power Pool completes and files Markets+ Tariff with collaboration and support from western stakeholders

Southwest Power Pool (SPP) reached a significant milestone in the development of its western day-ahead electricity market on Friday, March 29 when it filed its Markets+ tariff with the Federal Energy Regulatory Commission (FERC). The achievement underscores SPP's leadership in market development and dedication to fostering fair and equitable partnerships that prioritize the interests of all parties involved.

SPP President and CEO Barbara Sugg expressed enthusiasm about this step in the Markets+ effort, stating, "SPP's mission and success depends on working together effectively, and it's been a privilege to work alongside our new western stakeholders to craft market policy that will create a brighter, more resilient energy future in the West. We celebrate the high-quality tariff we've created together, and we look forward to bringing Markets+ to life."

Work on the Markets+ tariff began less than a year ago, when 38 entities from states across the West executed agreements to participate in the development process. With guidance and support from SPP and oversight from an independent panel of directors, the entities organized into committees and working groups that drafted terms and conditions that will govern the administration of the western region-wide day-ahead electricity market.

"While SPP has proven our expertise in designing and administering fair, equitable and beneficial markets, it's been critical to us that the development of Markets+ be driven by western stakeholders," said Antoine Lucas, SPP Vice President of Markets and sponsor of the Markets+ program. "We're excited to see this approach has yielded a market design that will enhance electric reliability and affordability, enable participants to meet clean energy mandates and goals in a cost-effective manner and do it all in a way that ensures equity for every market participant."

Western stakeholders who have participated in writing and approval of the Markets+ tariff applauded the collaborative approach and outcomes of the development process.

"The filing of the Markets+ tariff is a significant accomplishment for SPP and western stakeholders. The Markets+ effort has resulted in a market truly for the West, designed by the West, and it benefits from the collective knowledge and expertise of SPP staff and a very broad coalition of western stakeholders," said Scott Simms, CEO and Executive Director of the Public Power Council located in Portland, Oregon.

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“Bonneville Power Administration appreciates the collaborative and transparent stakeholder-driven governance model used by SPP to develop the Markets+ tariff language,” said Rachel Dibble, BPA’s vice president of bulk marketing. “The result is an end product that recognizes the needs and perspectives of all participants and accounts for BPA’s legal obligations.”

“Chelan celebrates the Markets + tariff filing,” said Chelan County PUD General Manager Kirk Hudson. “We view Markets+ as a promising framework for ensuring Chelan can continue to provide its customers with affordable and reliable power, while supporting decarbonization of the electric grid. We thank our partner utilities and each and every stakeholder who contributed through the Markets+ consensus-based governance process. We also thank SPP for guiding us towards this milestone.”

“NIPPC applauds the commitment and hard work of the Markets+ participants, stakeholders, and SPP’s staff on reaching this critical milestone for improving wholesale energy markets in the West,” said Northwest & Intermountain Power Producers Coalition Executive Director Spencer Gray. “The Interwest Energy Alliance is pleased to see market options developing in the West, and to see the Markets+ tariff moving into the next phase reflects strong support and collaboration among a diverse set of utilities and stakeholders, said Rikki Seguin, Executive Director.

“The filing of the Markets+ tariff with FERC is an important milestone in the member-driven development of a day-ahead market in the West, and its development is a testament to the durable governance structure that was established for Markets+,” said Josh Robertson, Salt River Project’s (SRP) Director of Energy Market Strategy. “SRP was encouraged that a broad array of utility, trade associates and stakeholder representatives were able to work through numerous complicated and detailed issues to arrive at a market structure that has the potential to benefit SRP’s customers and the West.”

“Energy needs for Arizona Public Service (APS) customers will increase dramatically over the next several years,” said Brian Cole, APS Vice President of Resource Management. “As a result, APS is thoughtfully exploring market options to ensure we continue providing reliable, top-quality service. SPP’s Markets+ provides a promising framework to serve the West with dependable, diverse and cost-competitive power supplies.”

“This is a significant step toward expanding wholesale market options that can provide cost savings for our customers while supporting reliable service and greater use of cleaner energy resources,” said Erik Bakken, Senior Vice President, Energy Resources, and Chief Sustainability Officer for Tucson Electric Power. While awaiting FERC’s review of the draft Markets+ tariff, SPP will continue to work with stakeholders to define detailed protocols for the market’s administration, work that is already underway. Markets+ is expected to go live in early 2027.

SPP

<http://www.spp.org>

1 April 2024

CAISO proposes \$6.1B transmission plan, mainly for offshore wind

CAISO released a draft transmission plan April 1 identifying 26 new transmission projects aimed at accelerating California’s ability to meet its ambitious clean energy goals and costing an estimated \$6.1 billion. The 2023-2024 Draft Transmission Plan is based on projections the state needs to add more than 85 GW of capacity by 2035, a “significant increase” from the base portfolio amounts used in last year’s plan, reflecting the rapidly escalating need for new generation.

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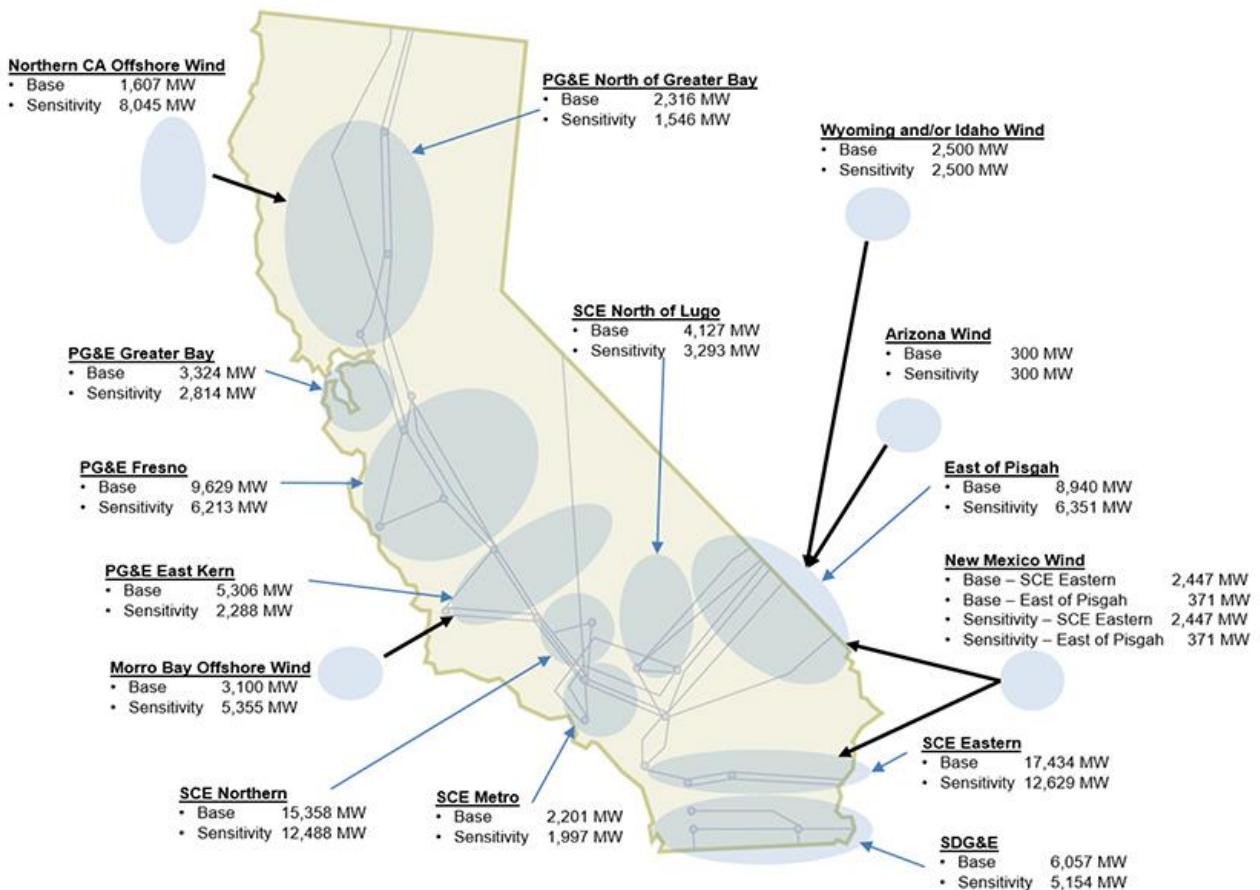
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"The ISO's 2023-2024 draft Transmission Plan identifies the next installment of critical infrastructure development that will be needed to bring historic amounts of new clean energy onto the grid, including the first projects to deliver offshore wind from California's North Coast," CAISO spokesperson Anne Gonzales told RTO Insider in an email.

As with last year's plan, the ISO coordinated with the California Public Utilities Commission and the California Energy Commission to implement the blueprint outlined in the joint memorandum of understanding signed by the three agencies in December 2022.

The MOU "tightens the linkages" between resource and transmission planning, interconnection processes, and resource procurement to meet reliability needs and clean energy policy objectives set in Senate Bill 100, which requires the state's electricity system be emissions-free by 2045.



"To help ensure we have the transmission in place to achieve this transition reliably and cost-effectively, the ISO's 2023-2024 Transmission Plan builds on the much more strategic and proactive approach adopted in last year's 2022-2023 Transmission Plan to better synchronize power and transmission planning, interconnection queuing and resource procurement," the plan reads. The plan outlines the resource development needed to meet emissions reductions targets, including:

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- More than 38 GW of solar generation in regions that include the Westlands area in the Central Valley, Tehachapi, the Kramer area in San Bernardino County, Riverside County, southern Nevada and western Arizona.
- More than 3 GW of in-state wind generation in existing wind development regions, including Tehachapi.
- More than 21 GW of geothermal development, mainly in the Imperial Valley and southern Nevada.
- Access for battery storage projects co-located across the state with renewable generation project and standalone storage located closer to major load centers in the Los Angeles Basin, greater Bay Area and San Diego.
- The import of more than 5.6 GW of out-of-state wind generation from Idaho, Wyoming and New Mexico.
- More than 4.7 GW of offshore wind, with 3.1 GW in the Central Coast (Morro Bay call area) and 1.6 GW in the North Coast area (Humboldt call area).

This year's plan places a greater emphasis on the development of floating offshore wind off California's North Coast. Major projects include a new Humboldt 500-kV substation, a 260-mile HVDC line interconnecting the Humboldt substation to the Collinsville substation, a 140-mile 500-kV AC line connecting Humboldt to the Fern Road substation and a 115-kV line from the new Humboldt station to the existing Humboldt station.

"The infrastructure investments also have tremendous reliability and economic benefits for California and its dynamic economy and in this year's plan, significant amounts of new offshore wind generating capacity and the associated transmission upgrades are required to cost-effectively bring reliable decarbonized power to California consumers and industry across all seasons of the year," the plan says.

Out of the 26 newly identified projects, 19 are reliability-driven, representing \$1.54 billion of the total cost. Examples of reliability-driven projects that CAISO recommended for approval include PG&E's Martin-Millbrae 60-kV area reinforcement in the greater Bay Area, the Eldorado 230-kV short circuit duty mitigation project led by Southern California Edison, and San Diego Gas & Electric's Valley Center System Improvements.

CAISO also identified seven policy-driven projects, those needed to meet renewable generation requirements established by the CPUC, representing \$4.59 billion. Projects include PG&E's new Humboldt substation and the new line connecting to Fern Road.

The ISO also conducted studies aimed at identifying economics-driven projects, those that could reduce ratepayer costs, but no such projects were recommended. CAISO scheduled a stakeholder meeting April 9 to discuss the plan and expects to seek approval from its Board of Governors on May 23.

RTO Insider

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

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IRENA: Global solar power capacity surpasses hydropower in 2023

The world's renewable electricity capacity additions in 2023 hit a record 473 GW, International Renewable Energy Agency (IRENA) said. They accounted for 86% of all new capacity. China's share in green power additions was a whopping 62.9%. Photovoltaics nominally took over from hydropower as the biggest renewables segment. Global solar power capacity surged 32.4% to 1.42 TW and had a 73% share in annual additions. Total wind power surpassed 1 TW last year. The organization warned that many countries are cut off from the benefits of the energy transition.

The [Renewable Capacity Statistics 2024](#) report, released by IRENA, shows that 2023 set a new record in renewables deployment in the power sector by reaching a total capacity

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of 3.87 TW globally. Renewables accounted for 86% of all capacity additions. However, growth is unevenly distributed across the world and the goal to triple renewable power by 2030 is still out of reach. The 13.9% renewables expansion rate (473 GW) was led once again by China. The country accounted for a head-spinning 62.9% of the entire increase, with its 298 GW. Its own expansion amounted to 25.7%, to 1.45 TW. For comparison, global growth was 10% in 2022. The level was revised upward from the initial reading.

China's highest share in global additions last year was in wind power

Overall solar power capacity excluding concentrated solar power (CSP) expanded 32.4% to 1.42 TW, remaining the renewable energy sector's main driver by far. China is in the front seat, with 62.8% of total additions and a national growth rate of 55.3% to 609 GW. Photovoltaics crossed the 1 TW mark in 2022 while wind power achieved the landmark just before the end of last year. More precisely, the latter expanded 12.9% or 116 GW to 1.02 TW. China contributed by far the most solar and wind power and bioenergy capacity in the world last year

Here, China participated with 65.5%, an even higher share than in photovoltaics or the total. Its growth amounted to 75.9 GW or 20.8% to 442 GW. The United States, while next in the world chart, connected only 6.3 GW to the grid, increasing the domestic wind power capacity by 4.5% to 148 GW. All in all, solar power advanced by 346 GW in nominal terms last year in the world, compared to 116 GW in the wind power segment. But notably, wind farms generated 89% more electricity per unit of capacity in 2021 than photovoltaics, according to IRENA's statistics.

Solar power had a 73% share in new renewables capacity and wind power was at 24.5%. It shows that growth disparity doesn't only affect geographical distribution but also the deployment of technologies, the organization pointed out. The patterns of concentration in both geography and technology threaten to intensify the decarbonisation divide, IRENA's chief warned.

"Policy interventions and a global course correction are urgently needed to effectively overcome structural barriers and create local value in emerging market and developing economies, many of which are still left behind in this progress. The patterns of concentration in both geography and technology threaten to intensify the decarbonisation divide and pose a significant risk to achieving the tripling target," said Director-General of IRENA Francesco La Camera. He urged decision makers to address planning questions such as grid flexibility. The 11 TW goal for 2030, adopted at COP28, now implies the need to add 1.05 TW per year. At the end of 2023, renewables accounted for 43% of installed electricity capacity.

Hydropower capacity excluding pure pumped storage advanced just 0.6% to 1.27 TW, which means photovoltaics became number one last year. Again only nominally, as annual hydropower output is three times higher per unit of capacity. On the other hand, the sector is facing a heavy impact from droughts and climate change. The bioenergy sector's expansion continued to slow, coming in at 3%. Total capacity reached 150 GW. China accounted for 42.7% of growth and 31.3 GW in total. Geothermal energy increased by a modest 1.3% to 14.8 GW, led by Indonesia.

IRENA

<http://www.irena.org/>

2 April 2024

Biden-Harris Administration approves eighth offshore wind project

The Biden-Harris administration today announced its approval of the New England Wind offshore wind project – the nation's eighth approval of a commercial-scale, offshore wind energy project under President Biden's leadership. With today's approval, the

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Department of the Interior has approved more than 10 gigawatts of clean energy from offshore wind projects — enough to power nearly 4 million homes.

“The Biden-Harris administration has built an offshore wind industry from the ground up after years of delay from the previous administration. Today, we celebrate the incredible progress being made toward achieving our goal of 30 gigawatts of offshore wind energy capacity by 2030,” said Secretary Deb Haaland. “The New England Wind project will help lower consumer costs, combat climate change, create jobs to support families, and ensure economic opportunities are accessible to all communities. With the approval of the New England Wind project, we have now approved more than 10 gigawatts of offshore wind projects in under three years,” said Bureau of Ocean Energy Management Director Elizabeth Klein. “BOEM is proud of our open communication and frequent collaboration with federal partners, Tribal Nations, states, industry and ocean users to shape project reviews and avoid or minimize conflict with existing users and marine life.”

“Because of President Biden’s vision and leadership, we’ve made remarkable progress scaling-up America’s offshore wind industry – with eight large-scale offshore wind projects now approved under this Administration, totaling more than 10 gigawatts,” said President Biden’s National Climate Advisor Ali Zaidi. “Today’s approval of New England Wind continues a surge of momentum that the Biden-Harris administration is delivering to grow the American offshore wind industry, power millions of American homes with clean energy, and create good-paying, climate jobs. Just last month, we approved the seventh offshore wind project and expanded pathways for offshore wind projects to be eligible for the Energy Communities tax credit bonus. We will continue to use every available tool to ensure America leads the future of the offshore wind industry. This is a win-win-win for workers, communities, and our ability to tackle the climate crisis.”

Bidenomics and the President’s Investing in America agenda are growing the American economy from the middle out and bottom up – from rebuilding our nation’s infrastructure, to driving over half a trillion dollars in new private sector manufacturing and clean energy investments in the United States, to creating good-paying jobs and building a clean energy economy that will combat the climate crisis and make our communities more resilient.

In addition to the milestones achieved today, since the start of the Biden-Harris administration, BOEM has held four offshore wind lease auctions which have brought in almost \$5.5 billion in high bids, including a record-breaking sale offshore New York and New Jersey, and the first-ever sales offshore the Pacific and Gulf of Mexico coasts. BOEM has also advanced the process to explore additional opportunities for offshore wind energy development in the U.S., including in the Gulf of Maine and offshore Oregon and the U.S. Central Atlantic coast. The Department has also taken steps to drive towards union-built projects and a domestic-based supply chain.

The New England Wind project is expected to generate up to 2,600 megawatts of electricity, enough to power more than 900,000 homes with clean renewable energy. The project is situated approximately 20 nautical miles (nm) south of Martha’s Vineyard, Massachusetts, and about 24 nm southwest of Nantucket, Massachusetts. Park City Wind, LLC proposed a two-phased project plan comprising up to 129 wind turbine generators (WTGs), with up to five offshore export cables transmitting electricity to onshore transmission systems in the Town of Barnstable and Bristol County, Massachusetts.

On Feb. 26, 2024, BOEM announced the final Environmental Impact Statement (Final EIS) for the proposed New England Wind project, which analyzes the potential environmental impacts of the activities outlined in the project’s construction and operations plan and considers reasonable alternatives. During a 60-day public comment period, BOEM

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hosted three virtual public meetings to gather feedback on the Draft EIS from Tribal Nations, members of the public, commercial fishing interests, and other ocean stakeholders.

DOI

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

4 April 2024

Germany shuts 15 coal-fired power plants as phase-out ramps up

Germany shut down 15 coal-fired power plants over the weekend as its government ramps up plans to phase out the fossil fuel in an effort to meet climate targets. On Sunday, seven of the 15 coal plants, with a total combined capacity of around 3.1GW, were disconnected from the grid in the Rhenish mining area and in Brandenburg. On Monday, the economy ministry announced that eight additional coal power stations with a total capacity of 1.3GW will also be taken offline.

Germany has a target to fully phase out coal power by the end of the decade. After Russia's invasion of Ukraine in 2022 and the subsequent European energy crisis, the government decided to keep several coal plants online as backup amid concerns over market prices and energy security. German economy minister Robert Habeck told reporters the plants were now "neither necessary nor economical". He added: "Several coal-fired power plants that were still on the grid as a precautionary measure over the last two years are therefore now superfluous and can be taken off the grid for good."

Coal-fired electricity had already declined in the country's energy mix significantly last year, falling to 26.1%, down from 33.2% in 2022. However, coal remains Germany's third-biggest source of electrical generation after oil and gas. Jointly, the three fossil fuels make up roughly three-quarters of the country's total energy mix, according to data from the International Energy Agency.

Last week, Germany energy major RWE permanently shut down five of its coal-fired power plant units in the country as the company also looks to phase out the fossil fuel from its energy production by 2030.

Power Technology

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

9 April 2024

FERC approves second PJM and NJBPU OSW Transmission Study Agreement

The Federal Energy Regulatory Commission has approved the next phase of a historic collaboration between PJM and the New Jersey Board of Public Utilities to use PJM's competitive planning process to help New Jersey continue to advance its offshore wind goals.

In its April 1 order (DOC), FERC signed off on the next phase of the State Agreement Approach Study Agreement, or SAA 2.0. This marks the second time New Jersey has leveraged a provision in PJM's Operating Agreement that enables the state to take advantage of PJM's expertise and planning process to develop transmission improvements necessary to support the reliable interconnection of public policy resources.

This request asks PJM to solicit transmission solutions to serve an additional 3,500 MW of offshore wind energy, totaling 11,000 MW, by 2040. PJM filed the agreement, signed by PJM and NJBPU, with FERC on Feb. 2, and it was made effective as of Jan. 3, 2024, as requested. New Jersey is the first state to use PJM's State Agreement Approach process to advance public policy goals. PJM's work with NJBPU under the SAA has been cited as a model for other states to develop the transmission infrastructure needed for their own energy policies.

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NJBPU in November 2020 requested use of the SAA to incorporate New Jersey's initial offshore wind goals (7,500 MW by 2035) into PJM's regional transmission planning process. That culminated in NJBPU awarding \$1.1 billion in projects to construct the onshore transmission facilities necessary to deliver those 7,500 MW to New Jersey customers, while minimizing community and environmental impacts and customer costs. Those enhancements to the grid are currently being implemented by the designated entities that were awarded project components.

Insidelines PJM
<http://insidelines.pjm.com/>

9 April 2024

India's Adani will invest US\$28bn to quadruple its renewable capacity by 2030

The Indian conglomerate Adani Group plans to spend INR2,300bn (US\$27.6bn) through 2030 to expand its renewable power generation and double its solar and wind manufacturing capacity. Specifically, its renewable affiliate Adani Green Energy Ltd (AGEL) is expected to invest INR1,500bn (US\$18bn) to increase wind and solar capacity at Khavda in Gujarat's Kutch from 2 GW to 30 GW (+28 GW). In addition, the company intends to develop 6-7 GW of wind and solar elsewhere in the country for an investment of INR500bn (US\$6bn). AGEL is targeting 45 GW of renewable energy capacity by 2030, including 30 GW at Khavda. The Adani Group's subsidiary currently has an operating capacity of 10.9 GW, including 7.4 GW of solar, 2.1 GW of wind-solar hybrid and 1.4 GW of wind.

Earlier this year, in March 2024, AGEL commissioned 1 GW of solar capacity at its Khavda Renewable Energy Park, which is set to become one of the largest renewable energy installations in the world. Once completed, the project should be able to generate 81 TWh/year of electricity. India has set one of the most ambitious renewable capacity targets in the world with 344 GW expected in FY2027 (including large hydro), and 569 GW in FY2032 according to the NEP 2022.

Enerdata
<http://www.enerdata.net/>

9 April 2024

Grid operators report reliable operations during eclipse

Grid operators reported zero issues managing the bulk electric system April 8 as a total eclipse briefly shaded solar panels across ISO-NE, NYISO, MISO, SPP and ERCOT.

MISO reported that it and its members "successfully managed" grid conditions as the solar eclipse moved through its footprint, cutting a path of totality over its offices in Little Rock, Ark., around 1:51 p.m. CDT, and Carmel, Ind., at 3:06 p.m. EST.

The grid operator said it increased its short-term, 30-minute reserves, regulation reserves and ramp requirements to manage the eclipse's impacts. MISO said prior to the eclipse, its solar fleet was producing nearly 4 GW, which dropped to just below 300 MW during totality and returned to about 3.8 GW afterwards. "We accessed our increased regulation reserves to manage the rapid changes in system conditions," MISO spokesperson Brandon Morris said in an emailed statement to RTO Insider.

ERCOT said it operated normally through reduced solar generation. Its solar fleet slowed to about 800 MW around 1:30 p.m. CDT. Fifteen minutes earlier, ERCOT recorded a 5-GW contribution from its solar fleet. By 2 p.m. CDT, ERCOT's solar production was back to 5 GW and spiked to more than 13 GW by 3 p.m. CDT, supplying more than 25% of the fuel mix. ERCOT relied on a combination of natural gas, wind production and energy storage during the temporary darkness.

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ISO-NE said operations went smoothly as the moon crossed in front of the sun in New England. Preliminary estimates from the system operator indicate the eclipse led to about a 4-GW reduction in solar production, with 3-3.5 GW coming from behind-the-meter sources and 650 MW from grid-connected installations. “Our preparations paid dividends. The work done ahead of time to understand how the eclipse would impact the regional power system was crucial to a smooth operating day,” said Steven Gould, ISO-NE’s director of operations.

NYISO said it maintained reliable operations while the sun’s corona was observable to crowds. Prior to the eclipse, NYISO said its front-of-meter and behind-the-meter solar resources collectively generated a little more than 3 GW. When New York went dark around 3:30 p.m. EST, solar output dwindled to just under 600 MW. By 4 p.m. EST, solar generation in NYISO had ramped back up to 1.2 GW. NYISO said it dispatched thermal generation and hydropower to make up for the loss of solar output.

Before the eclipse, SPP said it expected no significant grid impacts and a dip in grid-connected and distributed solar generation no greater than 1 GW. It said it had ample output from other types of generation available to compensate. SPP said most of its footprint experienced 50-75% eclipse coverage.

RTO Insider

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

10 April 2024

Europe’s largest PV plant goes online

German investment firm Hansainvest Real Assets has inaugurated a 605 MW solar plant in Witznitz, near Leipzig, Germany. The facility is currently Europe's largest operational PV project. Before it was commissioned, Europe's largest solar installation was the 500 MW Núñez de Balboa project located between the municipalities of Usagre, Hinojosa del Valle, and Bienvenida, in southern Spain’s Extremadura region.

The developer of the 605 MW plant, Move On Energy, will install another 45 MW at the site by summer 2024. It took less than two years to build the Witznitz project. The groundbreaking ceremony for the facility took place in June 2022. Move On Energy deployed around 1.1 million solar modules over 500 hectares of the former “Witznitz II” open-cast brown coal mine. As part of the project, new cycle and riding paths were created. Hedges were created along the fences around the huge power plant.

Hansainvest Real Assets also plans to test “parallel agricultural use on the area below the solar modules.” There is a test area of 5 hectares to 10 hectares for this purpose. In 2023, the investment firm concluded a long-term PPA with Shell Energy Europe to purchase solar power from the facility.

Pv-magazine

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

10 April 2024

CATL launches Tianheng energy storage system with 5-year 0-attenuation

Chinese battery giant Contemporary Amperex Technology Co Ltd (CATL, SHE: 300750) has launched its new energy storage system Tianheng to further tap the energy storage market. The company rolled out Tianheng at an event on April 9, saying it is the world's first mass-producible energy storage system with 0 degradation for 5 years.

Tianheng is a standard 20-foot containerized energy storage system equipped with CATL's energy storage-specific L-series long-life lithium iron phosphate cells. The energy density of the storage system is 430 Wh/L with a total capacity of 6.25 MWh, which CATL claims is the highest in the world. Tianheng has a cycle life of more than 15,000, which is

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1.7 times the current mainstream level, and will not decay in the first five years of its 20-year life expectancy, CATL said.

Demand for energy storage systems is climbing rapidly as new energy generation continues to grow. By the end of 2023, China's share of wind and photovoltaic power generation reached 15.3 percent, and in some regions exceeded 20 percent, said Hui Dong, chief technology expert at the China Electric Power Research Institute, at CATL's launch event. However, the actual operating life of power-based energy storage systems in China is currently less than three years on average, compared with an expected life of 10 years, and the actual operating life of energy-based energy storage systems is less than eight years on average, compared with an expected life of 15 years, Hui said.

As the new energy sector grows, demand for energy storage will continue to grow, placing higher demands on the regulation capabilities of energy storage systems, Hui noted. CATL has been involved in 0-attenuation long-life battery technology for a long time, achieving a balance between energy density and safety on the Tianheng system, said Xu Jinmei, CTO of the company's energy storage business unit.

The Chinese battery giant's revenues are now mainly contributed by power batteries, while its energy storage business is growing rapidly. CATL's revenue for the full year of 2023 was RMB 400.92 billion (\$55.4 billion), up 22 percent year-on-year, according to its 2023 results report announced on March 15. The power battery business generated revenue of RMB 285.25 billion in 2023, up 20.57 percent year-on-year, contributing 71.15 percent of the total. Its energy storage battery business revenue was RMB 59.9 billion, up 33.17 percent year-on-year, contributing 14.94 percent. CATL's chairman Robin Zeng estimated last year that by 2030, the energy storage business revenue would be comparable to the automotive battery business.

CNEVPOST

<http://cnevpost.com/>

10 April 2024

At least three killed in blast at Italian hydroelectric plant

At least three people have been killed and four are missing after a fire and explosion underground at a hydroelectric power plant in northern Italy on Tuesday, the local mayor said. Italian utility group Enel (ENEI.MI), opens new tab confirmed that a fire had broken out on one of its transformers at its hydro power plant in Bargi, close to Bologna, in the early afternoon.

The fire brigade said earlier that an explosion had occurred around 3 p.m. (1300 GMT) at a dam on Lake Suviana, one of three artificial lakes that feed the power station. Marco Masinara, the mayor of the nearby town of Camugnano, said three dead bodies had been found and four people were missing, while three were "badly hurt" and taken to hospital. He added that the initial indication was that the incident was probably caused by a defect in a turbine. Enel has not commented on the cause. The company said the dam basin had not been damaged and that the plant was offline at the time of the incident so there was no impact on electricity supply. The deaths are likely to fuel concerns expressed by trade unions about workplace safety in Italy. Two of the country's largest unions were already due to hold a four-hour nationwide strike on Thursday to protest over the issue.

In a high profile accident in February, five workers were killed and three seriously injured while building a supermarket in the city of Florence. Enel said it had evacuated workers from the Bargi site and was coordinating with rescue workers from the fire department. Masinara said flames erupted below ground level, adding that "the plant is all below the level of the lake, at about 30 metres' depth". He told Italy's Ansa news agency that initial information suggested that work was being done on a turbine at the time of the

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accident. "I have been told that the fire brigade are trying to get access but are having difficulties," Masinara added.

Reuters

<http://reuters.com/>

11 April 2024

Germany accelerates photovoltaic expansion, 13 additional GW in 2024 and 18 GW in 2025

The German government has adopted the "Solar Package I", a legislative package designed to further accelerate the expansion of solar energy in Germany. The bureaucracy involved in the construction and operation of photovoltaic systems of all sizes will be reduced and the installation, in particular, of small "balcony power plants" will be facilitated.

New photovoltaic systems are already being installed at a rapid pace: almost twice as many new solar plants were installed in 2023 as the previous year. The Solar Package will help achieve the goals of expanding solar energy by an additional 13 gigawatts in 2024 and 18 gigawatts in 2025. About half of the additional capacity will be installed in open spaces and the other on rooftops.

Evwind

<http://www.evwind.es/>

12 April 2024

California's Virtual power plant potential is high, new report says

California's market potential for virtual power plants (VPPs) could hit 7.5 GW by 2035, exceeding 15% of peak demand and 5 times the existing capability, according to a new report from the Brattle Group prepared for GridLab.

The report, California's Virtual Power Potential: How Five Consumer Technologies Could Improve the State's Energy Affordability, argues that VPPs could create consumer savings of \$550 million per year in California by 2035, and new policies could help facilitate growth in areas limited by a "variety of technical, regulatory, economic, and market barriers." The estimates are based on achievable participation rates and technologies that are commercially available today, Brattle said.

A residential customer with all four VPP technologies considered in the analysis could potentially receive incentive payments of \$500 to \$1,000 per year, the report said.

The purpose of the report, Brattle said, was to estimate the market potential for VPP deployment in California, with market potential defined as "all cost-effective VPP capacity that can be developed at achievable, voluntary participation rates by the year 2035." The report focused on smart-thermostat-based air-conditioning control, behind-the-meter (BTM) batteries, residential electric vehicle charging, grid-interactive water heating, and automated demand response for large commercial buildings and industrial facilities. The report argues this "technological diversity" could allow accelerated adoption of a different technology if one specific technology lags behind expectations.

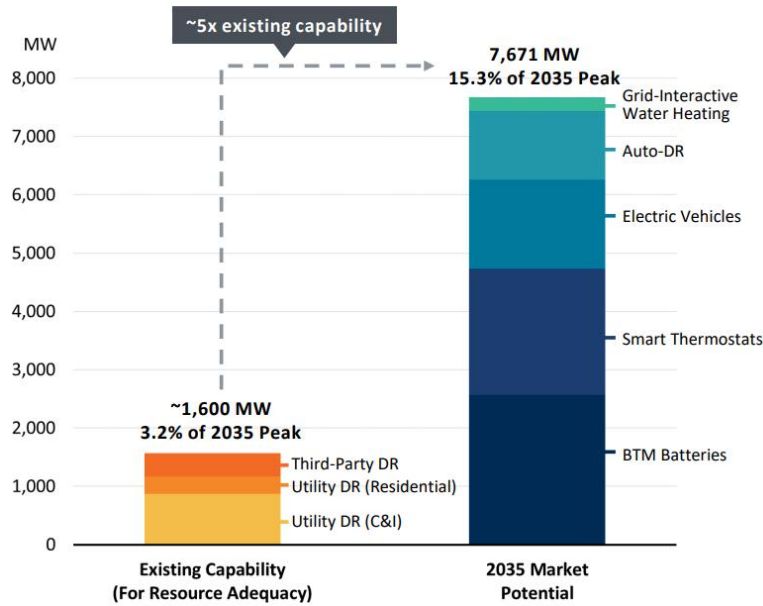
The report notes that California consumers are already adopting clean and flexible technologies, such as smart thermostats, electric vehicles, and batteries, at a "rapid" rate. VPPs could take advantage of this adoption to create a resource that can "reduce, shift, or generate" electricity when needed, the report says.

Additional VPP technologies could increase the potential estimate, Brattle said, such as vehicle-to-grid capability advancing to the point of commercial development resulting in an increase in EVs, or standalone energy efficiency programs targeting savings during peak hours. Thermal energy storage, behavioral demand response, and managed EV fleet charging are other sources of "virtual" capacity, the report says.

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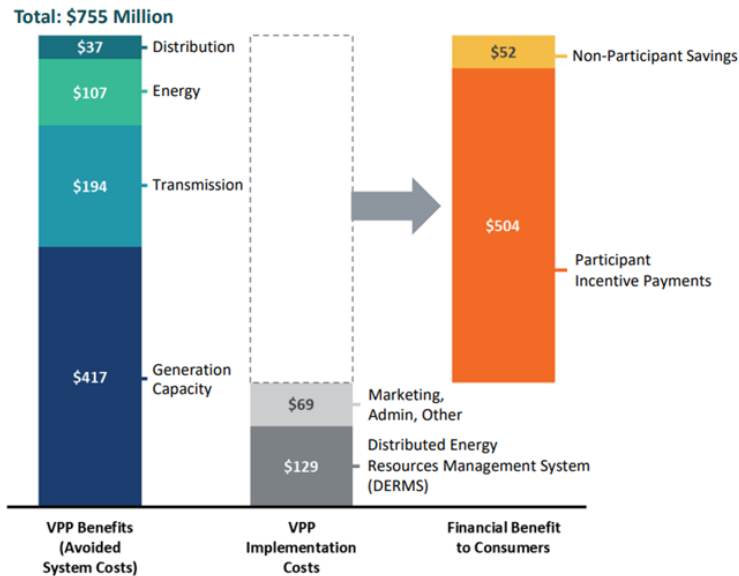
2035 California Statewide VPP Market Potential



NOTE: VPP capacity is presented as a percentage of maximum system peak demand during the resource adequacy window of 6 to 11 p.m. (March–July) and 5 to 10 p.m. (other months).

By 2035, a statewide portfolio of VPPs could avoid over \$750 million per year in traditional power system costs, the report said. The majority of VPP costs would come in the form of participant incentive payments, with an estimated \$500 million per year paid back to participating consumers.

2035 Benefits and Costs of Statewide VPP Market Potential (\$ Millions)



NOTE: Values shown in 2023 dollars. Split between participant incentives and non-participant savings will vary depending on program design.

Individual households participating in all four VPP options examined in the study could possibly receive \$500 to \$1000 per year from their contributions. Additionally, the report says, the lower cost of power for VPPs would be lower than alternative power supply options, which could result in net cost savings for all ratepayers, including non-participants.

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In addition to the cost benefits analyzed in the study, Brattle says VPPs could reduce risks associated with interconnection delays, as VPPs can be “built” as quickly as customers adopt new technologies and enroll in programs. VPPs can also scale flexibly as demand grows, the report says.

However, achieving the VPP potential estimated in the report would require “high but achievable” levels of technology adoption and enrollment. Statewide policy goals could help, the report says. California has a 7,000 MW load shifting goal and load management standards that could facilitate VPP adoption, and new draft legislation could establish the equivalent of a renewable portfolio standard for VPPs across the state, the report said.

Renewableenergyworld

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