WORLD POWER SYSTEMS REVIEW

15 January 2022

3 January 2022

Enel Green Power completes first US solar-plus-storage hybrid project

Huaneng Power International (HPI) has completed the world's largest floating PV project – a 320 MW facility in Dezhou, in China's Shandong province. It deployed the floating array on a reservoir near Huaneng Power's 2.65 GW Dezhou thermal power station.

It built the solar plant in two phases with capacities of 200 MW and 120 MW, respectively. The first phase, which included the deployment of 8 MWh of storage capacity, was completed in 2020, while the second phase was finished between mid-September and the end of December. The facility is expected to generate around 550 million kWh of electricity per year, the company said, without disclosing additional technical details.

In mid-December, the company also commissioned a 130 MW solar plant in an intertidal zone near Yuhuan, Zhejiang province. It described the Qinggang Photovoltaic Power Station as China's first intertidal PV project, with 242,000 solar modules deployed across an area spanning 1.2 million square meters.

The project is expected to produce around 150 million kWh per year. It will be resistant to typhoons and water corrosion, among other harsh environmental factors, said the company. Huaneng Power also plans to build a 2 GW solar plant in Fengcheng, Jiangxi province. The experimental array will include floating PV, agrivoltaics and solar parks on fishponds. The first 320 MW unit will be completed this year, with the rest of the capacity to be installed by 2026.

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

5 January 2022

Elia: Federal government gives green light to the energy island

On Thursday 23 December, Belgian electricity transmission system operator Elia welcomed the federal Council of Minister's approval – further to a proposal made by the Ministers for Energy and the North Sea – of the planned extension of the modular offshore network to include the future Princess Elisabeth zone.

This decision aligns our energy system with future developments by confirming the energy island as the solution that is not only most appropriate but also most conducive to integrating the offshore wind energy generated in the future zone and continuing efforts to ensure Belgium's interconnectedness with other countries. Thanks to this decision, efforts can continue to develop the project while respecting the schedule based on climate goals. The artificial energy island is the first step in developing an integrated offshore grid at European level and further underlines our country's status as a pioneer in offshore electricity.

Elia
https://www.elia.be

5 January 2022

Enel Green Power completes first US solar-plus-storage hybrid project

Enel Green Power North America announced the completion of its first solar-storage hybrid project in the US shortly before the late December holiday period.

The Lily solar + storage project combines 181MW of solar PV with 55MWdc of battery energy storage. The facility forms part of Enel's bid to install 600MW of energy storage capacity in Texas' power grid by 2022.

The site is located east of Dallas and Paolo Romanacci, head of Enel Green Power in the US and Canada, said its completion was a "milestone" that "signals a new era for our company".

"We are ready to answer the call of policymakers and business leaders to accelerate the energy transition in North America. As such, we are committing more investment than ever before to achieve accelerated growth targets," he added.

Energy Storage
http://www.energy-storage.news

5 January 2022

PJM 2022 Long-Term Load Forecast Predicts Slight Growth

PJM released its annual long-term forecast report Dec. 30 to show estimated load growth of 0.4% per year for summer peaks, 0.7% for winter peaks, and 0.8% for net energy over a 10-year planning horizon starting in 2022.

PJM's independent load forecast was derived using improved modeling techniques to estimate upcoming peak and energy usage trends. In the 2022 Load Forecast Supplement, PJM describes significant revisions to the load forecast model to better capture granularity in sector models and response to summer and winter weather.

The load forecast process and variables include residential, commercial and industrial load; weather- and non-weather-sensitive load; plug-in electric vehicles; behind-the-meter solar generation; zone-level estimates and more.

Summer Peak Estimates

The forecast estimates summer peak load growth to average 0.4% per year for the next decade and 0.4% per year over 15 years. Those estimated rates are expected to result in an RTO-wide summer peak of approximately 154,000 MW in 2032 and 158,000 MW in 2037. The 2022 summer's upcoming peak is forecast at approximately 149,000 MW. PJM's record summer peak took place in 2006 at 165,563 MW.

Winter Peak Estimates

PJM's record-high winter peak measured 143,129 MW in February 2015. PJM estimates a winter peak of approximately 133,000 MW for winter 2022/2023. In 10 years, modest annual 0.7% growth contributes to the projected 2032/33 winter peak of approximately 141,500 MW, continuing through 2037/38 to approximately 145,000 MW.

Year	Summer Peak	Winter Peak	PJM RTO Total Energy
2022	148,938 MW	132,980 MW	781,318 GWh
2032	154,381 MW	141,516 MW	845,133 GWh
2037	157,689 MW	145,220 MW	877,586 GWh

The Long-Term Forecast Process

This report presents an independent load forecast prepared by PJM staff. The load forecast process considers residential, commercial and industrial sectors, each with its own

set of models and inputs, including input variables for end-use saturation and efficiency as well as for economic drivers. Insights from this process, combined with data on historical weather, are the starting point for determining peak and energy forecasts. PJM staff then makes adjustments based on forecast growth in behind-the-meter solar generation, battery storage and plug-in electric vehicles, and also considers information from electric distribution companies on non-modeled trends such as data centers.

New to the report this year are tables for the peak load impact of battery storage and for the net energy impact of plug-in electric vehicles.

Evolving Summer Peak & Energy Outlook

In comparison to last year's long-term forecast, the 2022 estimate trims the summer peak forecast by approximately 1,028 MW (or -0.7%). The forecast estimate for the 2025 summer peak (the usual three-year-ahead capacity market auction year) declined by 763 MW (or -0.5%). By the summer peak of 2027, the next study year of the Regional Transmission Expansion Plan, the long-term forecast dipped by 0.2% or about 249 MW.

The total amount of energy consumed annually, or net energy, is expected to grow at an annual rate of 0.8% between 2022 and 2037. This estimate represents an increase from the 0.3% annual growth estimated in last year's 15-year forecast for 2021–2036.

PJM Inside Lines
http://insidelines.pjm.com

6 January 2022

Ethiopian GERD Mega-Dam Readying to Test Power Production

Ethiopia is reportedly gearing up to begin testing hydropower generation at its flagship 5.2-GW Grand Ethiopian Renaissance Dam (GERD), despite a continued diplomatic row about its potential implications on water consumption on the Blue Nile.

Citing unnamed project sources, Capital, a weekly Ethiopian business newspaper, reported this week that work to begin test power generation at two units—an estimated 700 MW—has been completed. While officially unconfirmed, the Office of the National Council for the Coordination of Public Participation to the Construction of GERD widely shared the story on social media.

A spotlight on the massive project—which could become the largest hydropower project in Africa when operational—also ramped up this week as Ethiopia's ministerial offices gathered at GERD to discuss their 100-day plan implementation following Prime Minister Abiy Ahmed's re-election in June 2021. Reporters covering the event posted images of the project.

Dr. Sileshi Bekele, Ethiopia's former Water and Irrigation minister, who was in October appointed as its chief negotiator and advisor on Trans Boundary Rivers and GERD, in November told reporters that overall construction progress of the dam had then reached 82%. The nation marked its second-year filling of the dam's massive reservoir in the summer of 2021.

GERD is located on the Blue Nile—a significant Nile River tributary—in the northwestern Ethiopian region of Benishangul-Gumuz-Gumaz, about 500 kilometers (km) northwest of Ethiopia's capital Addis Ababa and 15 km from its border with Sudan. The project is being built by Webuild Group, a subsidiary of Italian construction giant Salini Costruttori S.p.A., for state-owned Ethiopian Electric Power. When finished, it will comprise

a main dam in roller compacted concrete with two power stations installed at the left and right banks of the river.

According to WeBuild, the project's original plans were to outfit the power plant with 16 375-MW Francis turbines that could produce about 15,759 GWh per year. However, while originally envisioned as a 6.4-GW project, Ethiopian officials in 2019 reportedly slashed the number of turbines to 13, bringing the dam's total capacity to 5.2 GW.

Ethiopia's reported progress on GERD comes amid a complex decade-long diplomatic dispute embroiling Ethiopia, and Egypt and Sudan, its neighbors downstream the Nile River, as well as the international community.

Sudanese authorities have said GERD could help regulate waters of the Nile and reduce the risk of flooding, but the country has expressed concerns about the project's impact on the efficiency of its 280-MW Roseries Dam, and it has strongly decried unilateral action by Ethiopia to fill the GERD reservoir. Egypt, meanwhile, has similar fears about its water security, especially concerning its 2.1-GW High Aswan Dam (HAD), which is today Africa's largest hydropower facility. The dam also pivotally serves Egypt's agricultural, municipal, and industrial water requirements through regular annual releases of 55.5 billion cubic meters (bcm).

While the United Nations (U.N.) has sought to alleviate tensions between the three countries, the U.S. has now also ramped up mediation efforts, and the African Union (AU) continues to broker negotiations to invigorate talks between the three nations and maintain peace in the volatile dispute. In September, the U.N. Security Council encouraged Egypt, Ethiopia, and Sudan to resume negotiations under an AU-led process "in a construction and cooperative manner."

Egypt, which recently rallied support from the Gulf Cooperation Council (GCC) on the issue with regard to its water security, is already mulling strategies to avoid future water crises, including through investment and construction. During a 2050-vision presentation in mid-December, Egyptian Minister of Water Resources and Irrigation Mohamed Abdel-Aty stressed 97% of the nation's water resources come from the Nile. Egypt's water needs amount to about 114 billion cubic meters but it faces a deficit of about 54 billion cubic meters annually. The country fills that gap by reusing water, and Egypt imports agricultural crops equivalent to about 34 billion cubic meters annually, he noted. To avoid future shortfalls, the government should spend $50 billion to rationalize water use, improve water quality, and provide additional water resources, he said.

Powermag
http://www.powermag.com

6 January 2022

Texas power plants 'ready for winter' following weatherization assessment, ERCOT says

The Public Utility Commission of Texas (PUC) on Thursday adjusted the scarcity pricing mechanism in the Electric Reliability Council of Texas (ERCOT) power region, lowering the high systemwide offer cap to $5,000/MWh from $9,000/MWh.

The change is a response to the extreme winter weather in February, which knocked out power to millions of customers and left some consumers facing bloated energy bills.

The PUC on Nov. 30 also adopted a new rule regulators say is designed to "increase the coordination between the electric and gas industries during energy emergencies."

During the February blackouts, utilities cut power to some gas facilities, which exacerbated the state's energy woes.

Power plants and transmission facilities in the Electric Reliability Council of Texas area have been weatherized and consumers "can be confident" they will deliver electricity during the winter months, grid officials said in a Dec. 30 statement

ERCOT said it has completed on-site inspections of more than 300 generating units and 22 transmission stations, as required by new rules passed in October by the Public Utility Commission of Texas. The assessments found 10 generation resources and six transmission facilities required additional weatherization, though ERCOT officials said these were mostly minor issues and have since been corrected.

“New regulations require all electric generation and transmission owners to make significant winterization improvements and our inspections confirm they are prepared," ERCOT Vice President of Grid Planning and Weatherization Woody Rickerson said in a statement.

The power plant inspections cover 85% of the megawatt-hours lost during Winter Storm Uri, according to the Texas grid operator.

Utility Dive
http://www.utilitydive.com

7 January 2022

RWE, Northland partner to develop 1.3GW offshore wind cluster in Germany

RWE has partnered with Canada’s Northland Power to jointly develop a 1.3GW offshore wind farm cluster in the German North Sea. The two companies will develop, build and operate the cluster through a joint venture, in which RWE Renewables will own a 51% stake and Northland Power 49%. The cluster will consist of three offshore wind farms, which are expected to begin commercial operations between 2026 and 2028.

The offshore wind leases are located north of the island of Juist in the district of Aurich in Lower Saxony in Germany. RWE and Northland Power have already secured one offshore site (N-3.8) with a capacity of 433MW (Nordsee 2) in the latest German offshore wind auction. The other two leases, the 420MW N-3.5 (Nordsee 3) site and the 480MW N-3.6 (Delta Nordsee) site, are anticipated to be auctioned in 2023. Northland and RWE own step-in rights for Nordsee 2 and Nordsee 3 sites, while RWE has step-in rights for 100% of the Delta Nordsee lease.

RWE Renewables wind offshore CEO Sven Utermöhlen said: “Germany has set itself ambitious climate targets, thereby establishing a significant growth potential for renewable energies. “Offshore wind power plays a central role in this and is indispensable for supporting the decarbonization of industry in particular. RWE is making its contribution to this and is significantly stepping up the pace here.

“This includes the collaborative delivery of the 1.3 GW offshore cluster with Northland Power, through which we can achieve considerable synergies to deploy at our new wind farms, while at the same time actively supporting the energy transition in our home market Germany.”

For the formation of the new offshore wind cluster, Northland has partnered with RWE in the development of the Delta Nordsee site, while RWE has increased its stake to 51% in the Nordsee 2 and Nordsee 3 sites. The cluster will be located close to the existing 332MW

Nordsee One wind farm, which started commercial operations in December 2017. Nordsee One is owned by Northland and RWE.

NS Energy
http://www.nsenergybusiness.com

7 January 2022

NRC denies Oklo Power's plan to construct 1.5 MW advanced nuclear reactor in Idaho

The Nuclear Regulatory Commission on Thursday announced it denied without prejudice an application by Oklo Power to construct the United States' first advanced nuclear reactor, in Idaho. The small design, dubbed "Aurora," would be capable of producing 1.5 MW of electric power.

The NRC cited "significant information gaps" in the company's application, including details on potential accidents and its classification of safety systems and components. However, the company can resubmit its application and regulators said they are "prepared to re-engage" the company.

Oklo is reviewing the decision, but in a statement said it was "eager to continue moving forward" on the Idaho reactor as well as others. Opponents of the project say a failure to provide safety information could put the public at significant risk in the event of an accident or attack.

Utility Dive
http://www.utilitydive.com

8 January 2022

National blackout hits Lebanon; power company blames protester sabotage

Lebanon’s state electricity company said Saturday that its power plants had stopped working after protesters stormed a key substation and tampered with the electrical equipment. The small Mediterranean country is already grappling with round-the-clock power cuts that last at least 20 hours a day due to a financial crisis that has hampered key imports, including fuel for power stations. Demonstrators angered by the blackouts stormed an Electricite du Liban substation in the Aramoun region north of Beirut on Saturday, EDL said in a statement. “Protesters disconnected a 150-220 kilovolt power transformer and opened circuit breakers connecting the Zahrani power plant to the Aramoun station,” it said. “This caused disturbances on the electrical grid… which led to a total blackout across Lebanese territory as of 17:27 (1527 GMT).”

The disruption will pile more pressure on private generators that are already struggling to keep up with the near-total absence of state power. Private generator owners have hiked prices and rationed supply in recent months, with costs surging after the government gradually lifted fuel subsidies. The average generator bill for a Lebanese family usually costs more than the monthly minimum wage of 675,000 Lebanese pounds — now worth just $22, as the local currency hits record lows against the dollar on the black market.

The international community has long demanded a complete overhaul of Lebanon’s ruinous electricity sector, which has cost the government more than $40 billion since the end of the 1975-1990 civil war. Lebanon has reached an agreement on bringing Jordanian electricity and Egyptian gas into the country via war-torn Syria, while Shiite movement Hezbollah has separately started hydrocarbon deliveries from Iran.

The Times of Israel
http://www.timesofisrael.com

10 January 2022

Hungarian government partners with Framatome on nuclear innovation

French nuclear company Framatome and the Ministry of Innovation and Technology of Hungary have signed a memorandum of understanding (MOU) facilitating cooperation in the field of nuclear development.

The collaboration aims to advance education and training, research and development, the implementation of new technologies and knowledge transfer.

Frédéric Lelièvre, senior executive vice president, Sales, Regions and the I&C Business Unit at Framatome, said: "Framatome is committed to the development of the Hungarian nuclear fleet. We will work with the Ministry to use the wealth of existing industry expertise to help educate future nuclear professionals.

"We are preparing for generational change through a systematic knowledge management approach that leverages today's expertise for tomorrow." The agreement is aligned with the goals of the Hungarian nuclear energy strategy, according to Framatome, which aims to drive energy security and decarbonisation in the region.

This strategic agreement supports the joint work of the Hungarian Nuclear Industry Platform and will reinforce Framatome's existing footprint in Hungary through its subsidiary Framatome Kft. Framatome Kft provides maintenance support for long-term operations of existing plants, as well as supports the PAKS II nuclear project, a collaboration between the Russian and Hungarian governments.

The Framatome team delivered and implemented the safety I&C system of the current four units of the Paks Nuclear Power Plant, and the main I&C system of the Paks II Nuclear Power Plant will also be provided by Framatom, in collaboration with Siemens.

Power Engineering
http://www.powerengineeringint.com

11 January 2022

BOEM Initiates Environmental Assessment for Offshore Wind in the Gulf of Mexico

As part of the Biden-Harris administration's goal of permitting 30 gigawatts of offshore wind by 2030, the Bureau of Ocean Energy Management (BOEM) today announced it is preparing a draft environmental assessment (EA) to consider the impacts of potential offshore wind leasing in federal waters of the Gulf of Mexico.

The area that will be reviewed in the EA includes almost 30 million acres just west of the Mississippi River to the Texas/Mexican border. This is the same area for which BOEM requested public input when the agency published a Call for Information and Nominations in the Federal Register on Nov. 1, 2021. BOEM will narrow the area based on stakeholder and ocean user input before advancing any Wind Energy Areas, which are offshore locations that appear most suitable for wind energy development.

"The Gulf of Mexico is well-positioned to support a transition to a renewable energy future, as much of the infrastructure already exists to support offshore wind development in the region," said BOEM Director Amanda Lefton. "BOEM's Environmental Assessment is an important step to ensure that any development in the region is done responsibly and in a way that avoids, reduces, or mitigates potential impacts to the ocean and to ocean users."

BOEM Is preparing a draft EA on the call area now in order to be able to respond to future needs of the states and opportunities as technology develops for deeper waters and lower wind speeds. The draft EA will consider potential environmental consequences of site characterization activities (i.e., biological, archeological and geological, as well as geophysical surveys and core samples) and site assessment activities (i.e., installation of meteorological buoys) associated with the possibility of issuing wind energy leases in the Gulf of Mexico.

Should a lease sale advance, prior to approving the construction of any offshore wind energy facility in the Gulf of Mexico, BOEM will develop an Environmental Impact Statement to analyze the specific environmental consequences of any proposed project, in consultation with Tribes and appropriate federal, state, and local agencies, and with participation by stakeholders and the public.

Today's announcement represents the culmination of a collaboration between local, state, federal, and Tribal governments to utilize the best available science and traditional knowledge to minimize conflicts between ocean uses. These stakeholders comprise the Gulf of Mexico Intergovernmental Renewable Energy Task Force, which first met last June and is planning to meet again in early 2022. BOEM will continue to meet with the task force as the process moves forward.

BOEM
http://www.boem.gov

11 January 2022

Six 'swimming' robots will check melted fuel at Fukushima plant

More than a decade after the Fukushima nuclear accident, officials of Tokyo Electric Power Co., the plant operator, still have no idea about the condition of the melted nuclear fuel in the No. 1 reactor.

They hope to get a clearer picture through a study beginning Jan. 12 utilizing six submersible robots of what has to be dealt with and the sediment in trying to remove the highly radioactive material. "By learning about the details of the sediment, we want to obtain information that will help us decide what equipment and procedures will be needed to remove the melted fuel," a TEPCO official said.

The robots were jointly developed by Hitachi-GE Nuclear Energy Ltd. and the International Research Institute for Nuclear Decommissioning (IRID). The melting of the nuclear fuel in the No. 1 reactor at the Fukushima No. 1 nuclear power plant was the most severe of the three reactors where meltdowns occurred following the 2011 Great East Japan Earthquake and tsunami. Much of the so-called nuclear debris is believed to have melted through the bottom of the pressure vessel and has likely accumulated in the basement of the reactor building.

In 2017, a camera was inserted into the water collected in the containment vessel of the No. 1 reactor to check on the condition of the interior. However, no confirmation could be made of the debris because of the large amount of what appeared to be sand that covered the melted fuel.

The six submersible robots will have different functions and be deployed in a designated order to photograph and measure the depth of the sediment and to determine if melted fuel lies under it. The first robot will install four rings on the interior wall of the containment vessel using magnets. Subsequent robots will navigate through the rings to

avoid entangling the trailing cables transmitting electricity and signals. The robots have been dubbed "IRIDolphin" because they will swim through the rings much like dolphins during shows at aquariums.

The second robot to enter the reactor will have a camera to allow for visual inspection of the interior. Subsequent robots will measure the depth of the accumulated sediment, detect the debris by picking up the radioactive materials found in the fuel, collect small samples of the sediment and measure the distribution of the sediment on the floor. The robot with the camera will again be sent into the reactor as the final robot to try to navigate to a position right below the pressure vessel where the fuel melted through to get as close as possible to the melted fuel. Those involved in the project admit that this robot may have to be left behind if it becomes stuck with whatever is in that area.

The study will continue until August. The most progress in confirming the debris has occurred in the No. 2 reactor and plans call for removing small amounts from the containment vessel before the year-end.

The Asahi Shimbun
http://www.asahi.com

11 January 2022

Nuclear accounted for 52% of Belgium power mix in 2021

According to the Belgian power transmission system operator (TSO) Elia, nuclear accounted for 52% of Belgium's electricity generation in 2021 (compared to 40% in 2020) thanks to the high availability of the nuclear fleet, followed by natural gas (25%, compared to 35% in 2020), wind (12%, including 7% offshore) and solar (5%). Wind and solar power generation slightly increased in 2021 (+2%), mainly due to an increase in installed onshore (11%) and solar (17%) generation; offshore wind generation remained stable. Since 2019, Belgium has been a net electricity exporter, with 6.6 TWh of net exports in 2021. In 2021, exports increased by 59% to 21.7 TWh. Electricity consumption grew by 4% in 2021 to 84.2 TWh, and remains only 1% below the 2019 level. The average price of electricity tripled between 2020 and 2021 from €31.9/MWh in 2020 to €98.2/MWh in 2021, mainly due to high gas prices.

In December 2021, the Belgian government agreed, as previously pledged, to close all nuclear power plants by 2025. It will, however, reserve the right to extend operations on two reactors depending on the level of security of supply. In 2003, the country passed a law to phase-out nuclear power between 2022 and 2025 but the deadline was not fully adopted by the government.

Enerdata
http://www.enerdata.net

11 January 2022

NGESO: Domestic flexibility could reduce peak electricity demand by up to 23%, new study shows

The UK’s largest domestic flexibility study has found that active households could significantly reduce peak electricity demand by using time-of-use tariffs. Largest UK domestic flexibility study found that engaged households can significantly reduce peak electricity demand by using time-of-use tariffs. Study will help inform transition to net zero carbon emissions and could help reduce balancing costs Crowdflex, undertaken by National Grid ESO, Scottish and Southern Electricity Networks Distribution, Octopus Energy and

Ohme, investigated how 25,000 households responded to price signals by reducing or increasing electricity demand.

The study analysed the impact of two types of signalling to customers:

1. Enduring signals, created by customers who chose to move from a flat tariff to a time-of-use (ToU) tariff
2. One-off signals, which asked customers to sign up to a "Big Turn Up" or "Big Turn Down" event and rewarded those who changed their demand over a specified two-hour period

Customers on ToU tariffs significantly reduced their demand during the evening peak by 15-17 per cent and maintained that reduction over six months. Households that owned an electric vehicle (EV) showed a greater ability to flex their demand, achieving reductions of up to 23 per cent in the proportion of a household's daily demand consumed during the evening peak.

Responses to one-off signals were similarly significant and strongly affected by EV ownership. The "Big Turn Up" saw an increase in the magnitude of average electricity demand expected during a household's evening peak by 617 per cent for EV owning households, or 131 per cent in non-EV owning households. The "Big Turn Down" request saw very significant reduction in demand compared to the average evening peak power demand; a reduction of 59 per cent and 41 per cent in in demand over the period for EV households and non-EV households, respectively.

With electricity demand predicted to approximately double according to National Grid ESO's Future Energy Scenarios, the opportunities offered by time-of-use tariffs can help manage demand and help balance the grid which will be crucial in delivering a net zero future cost effectively.

Geoff Down, Innovation Manager, National Grid ESO, said: "System flexibility is vital for future system operation and we're encouraged to see that engaged consumers can, by participating in Time of Use tariffs, help manage and reduce peak electricity demand. With the use of low carbon technologies in the home set to grow rapidly, this project helps us understand the exciting opportunities for us in the future".

NGESO
http://www.nationalgrideso.com

11 January 2022

The United States is expected to add 46 GW of new capacity in 2022

In 2021, the United States added 17.1 GW of wind and 15.5 GW of solar according to early estimates released by the US Energy Information Administration (EIA). The public agency forecasts that the country will commissions 46.1 GW of new capacity in 2022, including 21.5 GW of solar, 9.6 GW of gas, 7.6 GW of wind and 5.1 GW of battery.

Most of the new solar capacity will be installed in Texas (6.1 GW, or 28% of the national total) and in California (4 GW), while 51% of the new wind capacity will be installed in Texas (with the 999 MW Traverse Wind Energy Center expected in Oklahoma in April 2022). New gas-fired capacities - mainly CCGT (8.1 GW) - will be added in Ohio, Florida, Michigan, and Illinois.

In addition, two new reactors at the Vogtle nuclear power plant in Georgia should come online, adding 2.2 GW of new nuclear capacity.

The installed capacity in the United States amounted to 1,246 GW at the end of 2020. It is dominated by gas (44%) and coal (19%). Renewables account for 26% and nuclear for 8% of the total capacity.

Enerdata
http://www.enerdata.net

12 January 2022

Utility scale ocean battery, a bedfellow for floating PV

Dutch start-up Ocean Grazer grabbed the limelight at the Consumer Electronics Show (CES 2022) in Las Vegas last week, where its new design for an offshore energy storage system based on hydro dam technology garnered the “Best of Innovation” award.

The Ocean Battery is a pumped hydro system in a box. Buried in the seabed, the battery provides storage up to the gigawatt-hour scale by connecting rigid reservoir elements, each with a storage volume of 10MWh. The system can be adapted to various forms of renewable power generation such as floating PV, offshore wind, tidal and wave energy.

“There is a perfect match between the Ocean Battery and floating PV arrays,” Ocean Grazer CEO Frits Bliek told pv magazine. “As we can adapt the charging capacity independently from the discharging capacity, we can tune the capex [capital expenditure cost] to rapidly absorb the solar peak around noun and discharge the accumulated power of the rest of the day. In this way we can optimally tune into the business case of a floating PV array.”

The Ocean Battery features technology that has been in use at hydroelectric dams for more than a century. While it has identical functionality and performance, it comes with one big difference, as the hydrostatic pressure comes for free and there is no need to build an entire hydro dam.

In other words, the Ocean Battery stores energy by pumping water from low-pressure rigid reservoirs, each holding up to 20 million liters of freshwater, into high-pressure flexible bladders installed on the seabed. During discharging, water stored as potential energy flows back from the flexible bladder to the rigid reservoir via hydro turbines that generate electricity.

“Minimal discharging time is 0.5 hours, sufficient for the highest demands in the utility sector,” said Bliek. “Any lower power-capacity-to-storage-capacity can be created, to support bulk shifting, for example. There is no self-discharge whatsoever so power can be stored as long as you want.”

The round trip efficiency of the Ocean Battery stands at around 78%. Its technical lifetime is rated at a minimal 20 years but is most likely 30-50 years, according to its developer. Ocean Grazer said the battery has low maintenance costs and is designed with sustainability in mind, enhancing marine life. It is made from readily available global materials steel, concrete, and rubber/PVC and uses clean water as the energy carrier.

According to its product sheet, the Ocean Battery is able to provide a wide range of grid services including frequency control, black-start power, and energy arbitrage. In addition to the traditional services provided by utility scale storage – such as curtailment prevention and congestion management – Ocean Battery can also allow “over-planting,” to maximize the energy yield of wind farms per square kilometer, ie it can make room for more turbine capacity at the same project, improving its economics.

Developer Ocean Grazer was spun out of the University of Groningen, in the Netherlands. The start-up describes itself as “the only company that provides a reliable, affordable and eco-friendly energy storage system that provides a flexible and modular solution for offshore and inshore energy storage at [a] gigawatt-hour scale.”

Ocean Grazer is developing its first commercial demonstrator for an inshore lake in the north of the Netherlands which hosts a floating solar installation. That system is slated for completion in 2023. “Next to that we are developing an offshore project connected to a wind farm,” Bliek added. “Potentially, a floating solar installation could be included in that project but details [have to be] worked out as we are in the middle of the scoping phase. The project will be completed in 2025.”

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