WORLD POWER SYSTEMS REVIEW

15 November 2022

1 November 2022

Conduit hydropower capacity could add 1.4GW to US grid

Conduit hydropower, which uses water from structures such as water supply pipelines and irrigation canals, has the potential to add 1.41GW of electricity to the US power grid. This was found in a unique analysis performed by the US Department of Energy's Oak Ridge National Laboratory (ORNL). The study looks at how to use existing hydro infrastructure to harvest otherwise wasted energy.

To harness conduit hydropower, existing tunnels, canals, pipelines and aqueducts, etc. that carry water are fitted with power generating equipment. The water channel must have sufficient water flow and hydraulic head to be utilised and according to ONRL researchers, there are millions of kilometres of pipelines and conduits available for use. More importantly, these resources can be tapped with minimal environmental impact and streamlined permitting processes. More than 350 conduit hydropower projects have been permitted or constructed to date, and this is just the beginning according to Shih-Chieh Kao, water power programme manager at ORNL.

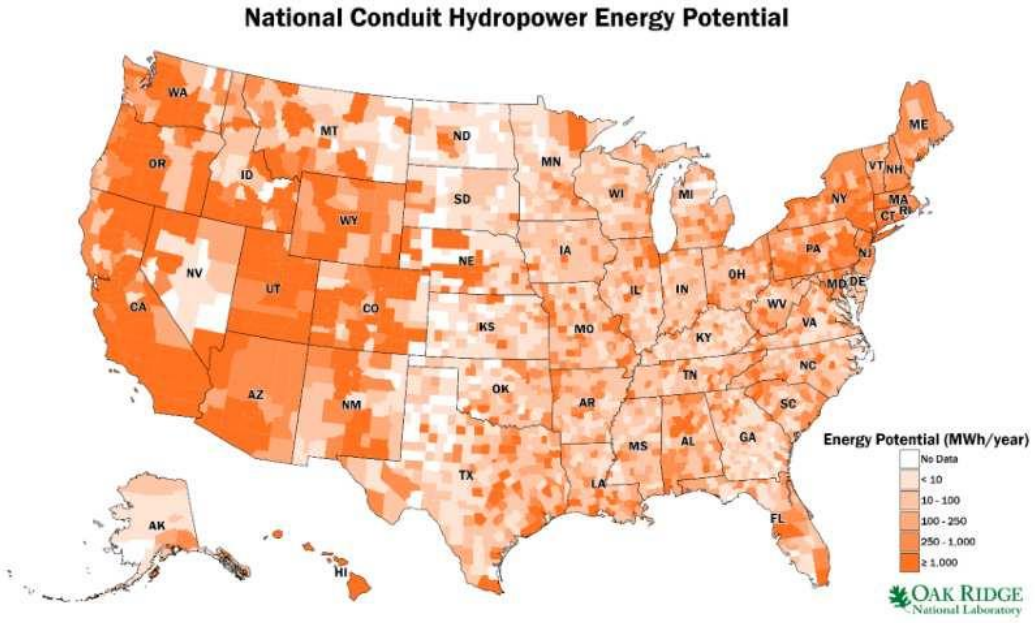

Figure ES.1. Map of overall conduit hydropower capacity potential by county.

"You can think of conduit hydropower as low-hanging fruit, and what has been started is a mere drop in the bucket," said Kao in a statement. "For all its benefits, the biggest barrier is a general lack of awareness of conduit hydropower's potential." The research suggests that the potential for conduit hydropower is the highest in five Western states — California, Colorado, Washington, Nebraska and Oregon. Agricultural conduits such as ditches and channels for crop irrigation showed the greatest potential for hydropower, with the highest agricultural conduit potential seen in Colorado, Washington, Nebraska, California, Oregon and Idaho.

In terms of drinking water supply and wastewater systems in the municipal sector, conduit hydropower potential was highest in California, which had twice that of the next-highest state, New York. Opportunities for conduit hydropower from industrial conduits, such as industrial pipelines or canals used at thermoelectric generating facilities, were present mostly in California, Texas, Missouri, New York and Maryland. "These assessments open

the door across multiple business sectors to what is possible," said Kao. "By further understanding the costs and benefits of conduit hydropower, decision makers can leverage what is already available and deliver on the promise of more renewable energy."

Power Engineering
http://www.powerengineeringint.com/

1 November 2022

Danish developer set to build Sweden's largest solar park

Denmark-based project developer European Energy is set to start construction on a 128.5 MW solar park in Svedberga, outside the southern Swedish city of Helsingborg. Upon completion, the plant will be the country's largest solar facility, with an annual production capacity of 175 GWh per year. Completion is expected by 2023, with production starting in 2024. Construction of the solar park was halted in April when the Skåne county council rejected its application. It said that the land would be better used to help maintain the nation's food supply. European Energy appealed the decision which the Land and Environment Court in Växjö. The court said that "the protective measures and adaptations that European Energy has proposed to protect the environment are sufficient."

"It is a milestone for large-scale solar power in Sweden. This case is extremely gratifying for both individuals and companies in southern Sweden who has suffered from shortages and high electricity prices," said Jens-Peter Zink, Deputy CEO of European Energy. "The solar park in Svedberga will generate new green electricity corresponding to the annual consumption of 35,000 residential households, which is the largest single contribution of new electricity to the region in many years." The solar park in Svedberga covers a total area of 232.5 hectares, with about one-third to be used for solar generation. The company said the remaining land could be used for agricultural cultivation. It also plants to reinforce biological diversity by planting trees and bushes on the outer edge of the solar park.mSweden's operational PV capacity reached 1.59 GW at the end of December 2021, up from 1.09 GW a year earlier, according to figures released by the Swedish Energy Agency (Energimyndigheten). The figures showed that 2021 was the country's best year for solar deployment yet, with around 500 MW of new capacity added to the grid.

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

2 November 2022

Egyptian-Saudi agreement to produce electricity from wind with capacity of 10 GW

Egypt and Saudi Arabia signed on Tuesday a memorandum of understanding (MoU) for the implementation of a 10 GW wind electric power project in Egypt. The MoU was signed between Egypt's New and Renewable Energy Authority (NREA), the Egyptian Electricity Transmission Company, and the Saudi ACWA Power Company.

It stipulates the desire of the three parties to implement a project to produce electricity from wind energy with a capacity of 10 gigawatts in Egypt, provided that the necessary lands are available to conduct the necessary measurements and technical studies for the project; in preparation for the discussion of the final project contracts. This came after a meeting held between the Saudi Energy Minister Prince Abdulaziz bin Salman bin Abdulaziz and the Egyptian Minister of Electricity and Renewable Energy Muhammad Shaker, in Riyadh, according to the Saudi Press Agency (SPA).

The two ministers discussed during the meeting the progress of the electrical interconnection between the two countries, and the aspects of cooperation in the fields of renewable energy and hydrogen, and working on preparing a memorandum of understanding between the two countries in the fields of electricity, renewable energy and

clean hydrogen, and strengthening cooperation with specialized companies in the two countries. The Egyptian Cabinet announced late October the intention of the Saudi company "ACWA Power" to implement a huge project to generate electricity from wind energy in Egypt.

In June, Saudi Company ACWA Power signed a contract with Egypt's Ministry of Electricity to invest $1.5 billion in the construction of the largest wind power plant in the Middle East. This came as a part of the signing of 14 joint investment agreements between Egypt and Saudi Arabia, worth $7.7 billion, in the fields of energy, petroleum, food industries, information technology and cybersecurity.

Egypt Today
http://www.egypttoday.com/

2 November 2022

Poland gives details on $20B nuclear power bid

U.S. nuclear power technology provider Westinghouse will build Poland's first reactor by 2033, Prime Minister Mateusz Morawiecki said Wednesday. "We assume the overall cost at around $20 billion," he told reporters, adding: "The upfront capital investment is big but once a nuclear power plant is operational, the cost of generating electricity is relatively low." Poland is looking at nuclear power to reduce its dependence on coal, which still accounts for around 70 percent of the country's energy mix. That also dovetails with an effort to end reliance on Russian coal, oil and gas.

Poland is one of the few countries in Central Europe with no nuclear power sector; an effort to build a power plant in the 1980s was thwarted by the 1986 Chernobyl disaster and by Poland's financial woes. Warsaw's nuclear plans are ambitious. The official strategy assumes building six reactors in two locations by the mid-2040s but Morawiecki said a third location is not out of the question. On top of the government program with Westinghouse, there is a parallel business-led effort with South Korea. Poland's utilities ZE PAK and PGE signed a letter of intent Monday with Korean company KHNP to analyze a power plant that would be built in central Poland.mThe Westinghouse power plant will be built in Choczewo on Poland's Baltic Sea cost, around 80 kilometers northwest of Gdańsk.The exact location will be pinpointed once the project secures an environmental permit, Climate and Environment Minister Anna Moskwa told the same briefing.

Politico
http://www.politico.eu/

3 November 2022

German tech startup Sono Motors unveils Sion, the first solar-powered EV car for the masses for just $25,000

Tesla is the world's largest electric automaker. But while Tesla dominates the headlines, one German tech startup is working on a new type of electric vehicle that will usher in a new era and forever change the way we look at electric vehicles. Sono Motors is a Munich, Germany-based EV tech startup that is pioneering a new category of electric vehicles called Solar EV, or SEV. The startup is developing an electric solar car that's partially powered by the sun. Dubbed Sono Sion, the solar car is covered with solar cells embedded in the plastic body panels on both the roof and the sides.

Early this month, the company debuted its flagship Sono Sion in New York City as part of its effort to explore demand for its among US customers. From a distance, the Sion looks like a hatchback. But when you get up close, its carefully-crafted solar panels can be clearly seen. The Sion dashboard app offers the driver information on the power status and when to charge. The dashboard also uses living moss as an air purifier. Unlike Tesla, the

Sion is fairly priced with a starting price of $25,000, which makes it significantly more affordable than other EVs on the market. Extra bells and whistles will set you back by a few thousand dollars. The Sion uses 465 integrated solar half-cells on its exterior to provide its power and it is expected to run for 70 miles a week on solar power alone.

The car is fitted with a lithium iron phosphate battery for customers that travel a long distance, giving it a total 190-mile range, with the ability to charge it to 80 percent in 35 minutes using a fast-charging station. "We want to really be that holistic company who's trying to have as minimal an impact on the environment as possible," said Sono Motors co-founder Laurin Hahn, who prototyped an early version of the car in a garage with his childhood classmate Jona Christians 10 years ago in Munich. For decades, countless inventors and engineers have tried to harness the power of the Sun. Thanks to advancements in photovoltaic cells, it's now more affordable to use solar energy to generate electricity for your homes. The dream of using solar energy to power transportation continues to push the technology boundary in the automotive industry.

Sono Motors is aiming to launch its $25,000 five-seater hatchback in Europe first, with production starting in the second half of next year. The startup has also received orders from customers in Germany, Austria, and Switzerland before the year is out. Sono plans to initial deliveries to customers before the end of the year. Sono Motors is very ambitious. The startup plans to produce a total of 200,000 units of the solar electric car Sion through a contract manufacturer. So far, over 7,000 customers have reserved and placed a down payment of at least €500 for one of the vehicles, according to Sono's COO Thomas Hausch. Financing has been secured for "a long time", according to the interview as well, to which three major investors have contributed since back in 2017, one of which is the Bollinger Group. The expenses are further kept low as Sono will not be investing in their own production facilities, operating direct sales to customers, and limiting the customization options to more essential features.

Sono SEV's solar panels are made from a polymer-based solar technology that is still under development. Sono CEO Laurin Hahn explains, "We have several patents, over 30 patents on that. And it's a big difference because all other companies who try to integrate solar are using mostly glass. Glass is heavy, slow in production, and very cost expensive."

Tech Startups
http://techstartups.com/

3 November 2022

Europe needs to take immediate action to avoid risk of natural gas shortage next year

Europe could face a gap of as much as 30 billion cubic metres (bcm) of natural gas during the key summer period for refilling its gas storage sites in 2023, the IEA said in new analysis published today, highlighting the need for urgent action by governments to reduce gas consumption amid the global energy crisis.

The new report – Never too early to prepare for next winter: Europe's gas balance for 2023-2024 – shows that gas storage sites in the European Union are now 95% full – putting them 5% above the 5-year average fill level. But the report cautions that the cushion provided by current storage levels, as well as recent lower gas prices and unusually mild temperatures, should not lead to overly optimistic conclusions about the future.

The process of filling EU gas storage sites this year benefitted from key factors that may well not be repeated in 2023. These include Russian pipeline gas deliveries that, although they were cut sharply during 2022, were close to 'normal' levels for much of the first half of the year. Total pipeline supply from Russia to the EU in 2022 is likely to amount to around 60 bcm, but it is highly unlikely that Russia will deliver another 60 bcm of pipeline gas in 2023 – and Russian deliveries to Europe could halt completely.

On top of this, China's lower liquefied natural gas (LNG) imports in the first ten months of this year have been a key enabler of higher LNG availability for Europe to compensate for the drop in gas deliveries from Russia. If China's LNG imports recover next year to their 2021 levels, this would capture over 85% of the expected increase in global LNG supply. And global LNG supply is expected to increase by only 20 bcm in 2023, with about one-third of the growth coming from the United States. The expected rise in global LNG supply next year is about half the average increase during the 2016-2019 period and much less than the likely decline in Russian pipeline deliveries to the EU next year.

In the event of a full cessation of Russian pipeline gas supplies to the EU and a recovery of Chinese LNG imports to 2021 levels, the new IEA analysis shows that Europe could face a challenging supply-demand gap of 30 bcm during the key period for refilling gas storage in the summer of 2023. This gap could represent almost half the gas required to fill storage sites to 95% capacity by the start of the 2023-24 heating season.

"With the recent mild weather and lower gas prices, there is a danger of complacency creeping into the conversation around Europe's gas supplies, but we are by no means out of the woods yet," said IEA Executive Director Fatih Birol. "When we look at the latest trends and likely developments in global and European gas markets, we see that Europe is set to face an even sterner challenge next winter. This is why governments need to be taking immediate action to speed up improvements in energy efficiency and accelerate the deployment of renewables and heat pumps – and other steps to structurally reduce gas demand. This is essential for Europe's energy security, the wellbeing of its citizens and industries, and its clean energy transition. The IEA will continue to work closely with the European Commission and governments across Europe and beyond to help tackle these challenges."

Following on from the IEA's 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas that was published last March, the IEA will in due course present a plan to secure Europe's gas balance for next winter, showing the concrete policy actions needed to ensure storage sites are filled to 95% capacity by the beginning of the 2023-24 heating season and to structurally reduce gas consumption during the winter.

EIA
http://www.iea.org/

3 November 2022

Germany's Cabinet Approves Accelerated Coal Exit by 2030 in Western State

Germany's cabinet on Wednesday approved a draft law to phase out coal-fired power plants in the western state of North Rhine-Westphalia by 2030 instead of a previous date of 2038, part of Berlin's efforts to speed up the cutting of greenhouse emissions. At the same time, the cabinet approved extending the lifespan of two coal-fired plants in the same state as a way of shoring up the country's energy security. Last month, Chancellor Olaf Scholz requested that the economy, finance and environment ministries write into law an agreement to phase out coal by 2030. The planned phase-out will take place despite Germany's July decision to reactivate coal-fired power plants and to extend the lifespans of those already operating. Under Wednesday's plan, the Neurath D and E lignite-fired plants, which were supposed to go offline by the end of this year, can run until March 2024 and a decision to extend their lifespan by another year should be made in September 2023.

The two plants, run by RWE, have a combined output of 1.2 gigawatts hours (Gwh), equivalent to one nuclear power plant. RWE, Germany's largest power producer, said last month it was bringing forward its own coal phase-out by eight years and was ready to end lignite-based electricity generation in 2030. The company said it would not request additional compensation for moving the phase-out date forward beyond the 2.6 billion euros ($2.57

billion) it was promised under a previous plan. It was not clear whether the 2038 phase-out date for coal plants in eastern Germany will still apply. Berlin's coalition government had agreed to "ideally" bring forward the overall coal exit in the country to 2030.

World-Energy
http://www.world-energy.org/

3 November 2022

Greece to tax power firms on windfall profits from higher gas prices

Greece will impose supplementary tax bills on energy firms, its energy minister said on Thursday, after a regulator identified windfall profits stemming from elevated energy prices. European gas prices have soared since Russia, Europe's top supplier, invaded Ukraine in February, raising fears of supply disruptions. With Greek households under pressure from inflation at a near 30-year high, the government had tasked the country's energy regulator RAE with identifying windfall profits based on firms' gross profit margins stemming from the higher gas prices.

The government plans to tax the profits at 90% and use those proceeds to offset consumers' higher energy bills. That amounts to 375 million euros for the period between October 2021 and June this year, based on the regulator's estimate of the profit, the energy minister said. "From the beginning of this great test for Europe, the government and Prime Minister Kyriakos Mitsotakis pledged that he would not allow any kind of profiteering," Energy Minister Kostas Skrekas said. "Our primary concern is to maintain affordable prices on consumer bills until the end of this major, pan-European energy crisis." So far, Greece has allotted more than 9 billion euros to power subsidies and other measures since last September to help people and businesses pay utility bills.

Reuters
http://www.reuters.com/

3 November 2022

Baltic Sea Transmission System Operators prepare to manage risks on electricity adequacy

The leaders of the Baltic Sea electricity transmission system operators met in Helsinki on 2nd of November to discuss the energy crisis in Europe and the electricity adequacy of the region. The transmission system operators of the Baltic Sea region actively cooperate and share information on the security and the electricity supply situation in the region. Should there be concrete restrictions on the availability of electricity, the transmission system operators will cooperate to minimize effects for electricity users. A joint expert group analyzes the adequacy situation in the Baltic Sea region, especially in order to identify cross-border impacts and dependencies.

As pointed out in the early insights for the 2022/2023 Winter Outlook recently published by the European Network of Transmission System Operators for Electricity, ENTSO-E, the energy market faces higher adequacy risk and overall lower security margins compared to recent winter periods, especially in January and February. In the Baltic Sea region, under dry scenarios adequacy risks emerge in Southern Sweden, Southern Norway and East Denmark. In low nuclear scenario adequacy risks substantially increase in Southern Sweden and in Finland, which is relying on imports.

The leaders of Baltic Sea transmission system operators jointly express their common understanding of the risks on electricity adequacy of the region. The transmission system operators are ready to work in cooperation to facilitate electricity adequacy and provide each other the necessary information as well as system services to reduce risks. Despite the already declining demand for electricity in the region, the leaders advise electricity users to

continue energy saving. Saving target of 10% gross electricity consumption has been agreed by the Council of the EU as the most appropriate tool to lower energy price and to avoid restrictions on the availability of electricity.

Litgrid
http://www.litgrid.eu/

4 November 2022

Crown Prince Mohammed bin Salman launches Saudi Arabia's first EV brand

Saudi Arabia's crown prince Mohammed bin Salman has launched the country's first EV brand, Saudi news agency SPA said on Thursday. The new brand of EVs, Ceer, a JV between Saudi Public Investment Fund (PIF) and Hon Hai Precision (Foxconn) is expected to add $8 billion to the country's GDP by 2034, and is expected to bring in $150 million in foreign direct investment.

Headquartered in Taiwan, Foxconn provides electronic manufacturing services for computers, communications, and consumer electronic products — it is the world's largest contract electronics manufacturer, with revenues of $215 billion last year. The PIF is Saudi Arabia's sovereign wealth fund—one of the largest sovereign wealth funds in the world. The EV JV from PIF is in line with the SWF's 2021-2025 strategy to tap into "promising sectors locally" to aid in diversifying the country's economy away from relying almost solely on crude oil. The PIF announced plans in late October to invest $24 billion in Middle Eastern and North African countries, including Bahrain, Oman, Jordan, Iraq, and Sudan in the areas of infrastructure, health care, real estate, and telecom.

"Saudi Arabia is not just building a new automotive brand, we are igniting a new industry and an ecosystem that attracts international and local investments, creates job opportunities for local talent, enables the private sector, and contributes to increasing Saudi Arabia's GDP over the next decade, as part of PIF's strategy to drive the economic growth in line with Vision 2030," HRH said. Ceer will design, manufacture, and sell a range of EVs for the local market as well as the broader MENA region. Its lineup will include SUVs as well. The vehicles will be completely designed and manufactured within Saudi Arabia. The vehicles will be available starting in 2025.

Oil Price
http://oilprice.com/

4 November 2022

Canadian government recognizes nuclear as clean energy

The 2022 Fall Economic Statement was released on 3 November by Deputy Prime Minister and Minister of Finance Chrystia Freeland, who said it focused on "building an economy that works for everyone … even as we face global headwinds, the investments we are making today will make Canada more sustainable and more prosperous for generations to come".

The federal government, in its April 2022 budget, promised to establish an investment tax credit for investments in clean technologies, with a focus on net-zero technologies, battery storage solutions, and clean hydrogen. "Following the adoption of the Inflation Reduction Act in the United States, the need for a competitive clean technology tax credit in Canada is more important than ever," the statement notes, before going on to propose a refundable tax credit equal to 30% of the capital cost of investments in electricity generation systems including solar photovoltaic, small modular nuclear reactors, concentrated solar, wind, and water (small hydro, run-of-river, wave, and tidal). The credits are also available for stationary electricity storage systems (provided they do not use fossil fuels), low-carbon

heat equipment, and industrial zero-emission vehicles, such as hydrogen or electric heavy-duty equipment used in mining or construction.

The government also indicates in the statement that it will consult on "additional eligible technologies (eg large scale-nuclear and large-scale hydroelectric)". It will announce the specific details on what those technologies will be in its 2023 budget. As proposed, the investment tax credit is expected to cost CAD6.7 billion (USD5 billion) over five years, starting in 2023-24. The update also includes up to CAD1.28 billion over six years for the Impact Assessment Agency of Canada and the Canadian Nuclear Safety Commission to increase their capacity and improve the efficiency of assessments.

"Including nuclear in the investment tax credit for clean energy technologies is a major step forward for the industry and great news for our climate and economy," said John Gorman, President and CEO of the Canadian Nuclear Association (CNA). "It confirms what we at the CNA have been saying for years: that nuclear is clean energy, and must be a key part of Canada's strategy to maintain energy security while reducing emissions on the path to net zero."

The fiscal update comes in the same week that Ontario Power Generation (OPG) submitted an application for a construction license to build Canada's first commercial, grid-scale SMR at Darlington in Ontario, which is targeted to begin operation by 2028. OPG President and CEO Ken Hartwick said the "powerful" combination of federal and provincial government support sent a "resounding message" on clean energy development. "These measures will help ensure this critical infrastructure is successfully completed, while reducing costs for ratepayers," he said.

Earlier this week, Ontario's Minister of Energy Todd Smith led a trade mission to the Czech Republic, Poland and Estonia, which included discussions on SMRs. He also highlighted export opportunities for Ontario's nuclear supply chain at the International Atomic Energy Association's ministerial conference, held in Washington DC. "We applaud the new tax incentives for clean energy included in the federal government's Fall Economic Statement," he said. "We encourage the federal government to continue to pursue measures that complement our approach, including expanding these measures to include all nuclear technologies and hydroelectric power generation, in recognition of the role they are already playing in helping to meet our growing energy needs," he added.

World Nuclear News
http://www.world-nuclear-news.org/

4 November 2022

France headed for winter blackouts as EDF cuts nuclear output forecast

France is staring down a serious risk of blackouts this winter, with French utility EDF lowering its nuclear power output forecast for this year to 275-285 terawatt hours. The shift in power forecast is a sizeable one, down from its previous 280-300 TWh, which EDF attributes to strikes on maintenance schedules, and extended maintenance outages to address stress corrosion issues. Its previous forecast was already a significant revision—not to mention the third revision--and represented a 30-year low due in part to a string of backlogged maintenance during Covid.

For next year, EDF kept its estimated nuclear power output at 300-330 TWF. And for 2024, EDF is targeting between 315 TWh and 345 TWh. Refinitiv analyst Nathalie Gerl referred to EDF's change in nuclear outlook as "massive". Just a month ago, however, French grid operator RTE and gas network operator GRTgaz said that energy cuts were "improbable" even in the colder months. However, their forecasts did suggest that reduced energy consumption during the winter would be necessary, even if more nuclear energy became available. Europe's benchmark natural gas prices at the Dutch TTF hub are on track

to end the week higher, in part due to France's outlook for reduced nuclear power, and in part due to weather forecasts that are now predicting a colder-than-normal spell that will sweep across Europe next month, after a cozy October that was unseasonably warm.

France said earlier this month that it was considering increasing its uranium enrichment capacity as Europe looks to insulate itself against the sanctions on Russia, which would impact Russian nuclear power plant fuel, on top of natural gas imports from the pariah country. Nuclear power generation accounts for 70% of the electricity mix in France.

Bloomberg
http://www.bloomberg.com/

5 November 2022

Moldova: Construction of 600 MW Vulcănești station no longer technically, economically justified

The construction of the 600 MW back-to-back Vulcănești station is no longer technically and economically justified, concludes a study by the World Bank, presented yesterday at a round table at the Ministry of Infrastructure and Regional Development (MIDR).

The study evaluates the technical and economic feasibility of the investment in the construction of the back-to-back (BtB) station from Vulcănești of 600 MW, given that its major benefit, of integration into the single European electricity market, has disappeared, along with emergency synchronization of the power systems of Ukraine and Moldova with the European Continental Energy System ENTSO-E. According to the authors, the analyzes show a negative net present value of at least 272 million euros, which indicates that the potential benefits of the project do not exceed the costs, a fact that no longer justifies its implementation.

At the same time, the authors argue that the alternative investment in the construction of the new 400 KW Balti-Suceava overhead power line (LEA), which, in addition to showing a positive net value of at least 29 million euros, will also have a significant role in ensuring the security of electricity supply. At the same time, the analysis of the study confirmed the necessity and importance of the construction, in the future, of the LEA of 400 KW, Chisinau-Vulcănești, regardless of the existence or non-existence of the BtB station.

According to Constantin Borosan, secretary of state at MIDR, the circumstances created at the regional level accelerated the synchronization of the European energy system and, in this context, it was necessary to identify a technical alternative for the back-to-back station from Vulcănești, the construction of which is no longer economically justified. "This will allow us to reallocate the investment to carry out other important energy security projects", Constantin Borosan summarized.

Moldpres
http://www.moldpres.md

6 November 2022

"Telescoping can" wave energy device beats test predictions by 20%

Scotland's AWS Energy has reported results some 20% better than predicted for its Archimedes Waveswing, a prototype wave energy generator that's been undergoing ocean-based testing at the European Marine Energy Centre (EMEC) in Orkney for the last six months. French government submits bill to accelerate building of new nuclear reactors; ESO's Demand Flexibility Service Launches;

The Waveswing is a cylindrical metal buoy that's tethered to a single point on the ocean floor. In operation, it stays beneath the surface and responds to water pressure changes. As a wave passes overhead, the pressure increase pushes down on the top

"floater" section of the device, sliding it downward relative to the lower "silo" section, with a rolling seal ensuring no water gets in. This linear motion in this "telescoping can" compresses the air in the Waveswing device, creating an air spring to push the floater section back up as the wave rolls onward. As the floater moves up and down, it drives a hydraulic motor, which converts the linear motion into rotation, and a regular electrical generator draws power from both the upward and downward strokes.

The device can be raised and lowered on its tether for maintenance and deployment, and there's also a facility to regulate the air pressure inside the cylinder, effectively tuning the air spring to take maximal advantage of the wave conditions.

AWS reports that "during a period of moderate wave conditions" at the EMEC installation, the prototype machine captured an average of 10 kW, with peaks up to 80 kW, against its rated capacity of 16 kW. The test has also demonstrated that the Waveswing can be fully deployed from sitting quayside to fully operational in less than 12 hours, and that it can survive Force-10 gale conditions. The power output frankly looks surprisingly low to us given the size of this machine. It stands a towering 7 m (23.0 ft) tall fully extended, with a diameter of 4 m (13.1 ft), and it weighs 50 tons; it makes a pretty impressive sight as it's driven down the road on a trailer.

But this is not the commercial device. AWS says these units will be configurable for power ratings between 15 kW and 500 kW – although it's unclear whether these half-megawatt versions will need to be physically bigger, or if so, by how much. The company sees commercial deployments taking the shape of multi-absorber structures, which could see 20 of the most powerful units arrayed together into a 10-MW platform.

According to IRENA, there's enough energy in the motion of the ocean – specifically, in wave energy as opposed to tidal energy – to meet the world's entire energy demand. But the technology here is in its infancy; there are plenty of pilots and prototypes, but precious few commercial installations. And since nothing has proven itself yet, there's a fascinating proliferation of different designs all duking it out in search of a solution that's cheap, easy to deploy and maintain, eco-friendly, and capable of producing power in all sorts of conditions for decades despite the brutal corrosive assault of salty seawater and sludgy biofouling.

Effectively harnessing wave energy could radically lower prices of renewable energy grids; these things won't shut down at night like solar, or when the wind drops, so they can reduce the need for long- and short-term energy storage that a grid needs to guarantee a reliable electricity supply. This, as CSIRO modeling for Wave Swell Energy's UniWave generation systems suggests, could slash up-front CAPEX (Capital expenditure) on multi-mode renewable energy systems by as much as two thirds.

New Atlas
http://newatlas.com/

7 November 2022

Enel and Brenmiller inaugurate 24MWh thermal energy storage system in Italy

Utility and power generation company Enel Group and Brenmiller Energy have inaugurated a thermal energy storage system in Italy using the latter’s proprietary bGen technology.

Israel-based Brenmiller’s energy storage unit has been deployed at a power plant in Santa Barbara, Tuscany, and will help the plant to use renewable energy, by enabling reduced start-up times and greater speed in load variations. The system charges by heating rocks using steam from the facility, and discharges by releasing the accumulated heat to heat pressurised water and generate steam for electricity. It can store up to 24MWh of heat energy at 550°C for five hours. “Our TES (thermal energy storage) system at Enel’s Santa Barbara power plant in Tuscany is the first-ever system of its kind to provide utility-scale

thermal energy storage and offers commercial and industrial users a viable path towards decarbonisation," said Avi Brenmiller, Chairman and CEO of Brenmiller Energy.

The partnership between Enel and Brenmiller was first announced in 2018, when the pair announced they were exploring the possibility of deploying a 60MWh system at an Enel site. Enel also announced at the time it was exploring a deployment with another thermal energy storage firm, EnergyNest, but no concrete project has been revealed since then. Since then, EnergyNest raised €110 million to commercialise its thermal battery technology.

The Israeli Innovation Authority provided €1 million in financing to Brenmiller for the project with Enel. The unit deloyed is much larger in scale than the last project that Brenmiller announced, a 1MWh system in Brazil for water infrastructure firm Fortlev which it revealed in August. The firm expects to have an annual production capacity of 4,000MWh by the end of 2023 from its facility in Dimona, Israel. Brenmiller is one of several firms to have made progress in launching grid-scale energy storage systems using heat-based technologies. Others include EnergyNest, MGA Thermal, Malta Inc and Kyoto Group. Click here to read more about developments in the thermal energy storage sector.

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

7 November 2022

Drought Forces One of Spain's Largest Hydro Plants to Halt

Spanish utility Endesa SA is set to shut down output at the country's fifth-largest hydropower plant after drought-like conditions caused reservoir levels to fall below the minimum needed to keep it running. The Mequinenza facility, located in the north-eastern region of Aragon, will stop operating in mid-November after water levels subsided to below 23% of capacity, the company said in a statement. It'll be the first time the plant has stopped functioning since it was opened in 1966. Mild temperatures are delaying the need for heating, prompting a decline in European natural gas prices and giving the continent some respite from an unprecedented energy crisis. In Spain, that weather has resulted in Fall being drier than usual, according to national meteorological agency Aemet.

The capacity to generate power using water stood at 6,221 gigawatt-hours in the week through Nov. 1, or 27% of the total. In October, water reservoirs overall hit the lowest level since 1995, according to Bloomberg calculations based on Environmental Transition Ministry data. That has led to a steep decline in Spain's hydropower generation, which plunged 53% in the year through October, according to grid operator Red Electrica Corporacion SA. That drop, along with reduced output from other renewable sources such as wind, has boosted generation using more polluting fuels. Output from gas-fired combined-cycle plants rose by 41% over the same period. If the drought-like conditions persist, the decision to halt production could extend to plants in the neighboring region of Catalonia, where hydropower output through September was a third lower than the 10-year average, according to Endesa. The Mequinenza plant produced 360 gigawatt-hours through September, about 67% of its average output.

Bloomberg
http://www.bloomberg.com/

9 November 2022

Cracks found in feedwater pumps at Finland's OL3 nuclear plant

Cracks of a few centimeters have been identified in all four of the feedwater pumps of the Olkiluoto 3 EPR nuclear power plant in Finland, less than a year after the facility attained first criticality.

Owned and operated by TVO, the Olkiluoto plant consists of two boiling water reactors, each producing 890 MW of electricity, and a third EPR (Evolutionary Power Reactor), dubbed Unit 3 or OL3. The EPR is a "Generation III+" nuclear reactor, "that benefits from significant technological advances in nuclear and occupational safety", said Framatome (formerly known as Avera NP), the plant's main contractor.

Unit 3 started construction in 2005, however it only began generating electricity in March 2022 after construction was repeatedly delayed. It was expected to begin commercial operation in September, but after the unit's boron pumps started unexpectedly during a routine shutdown in April, and following the discovery of material in the turbine's steam reheater that had detached from the steam guide plates in May, the firm pushed back the start date to December. Now though, the further damage that has been observed in the inner parts of the feedwater pumps of the OL3 turbine plant, could delay progress further.

The large feedwater pumps are used to pump water from the feedwater tank into the steam generators. TVO said the cracks detected in the impellers of the pumps have no impact on nuclear safety, but so far the cause of the damage, which is currently being investigated in several different laboratories, has yet to be determined. "The feedwater pumps were delivered for the turbine island by a proven pump supplier that has supplied pumps to several nuclear power plants," TVO said.

Located on Olkiluoto Island, about 20 kms from the town of Rauma and about 50 kms from the city of Pori, TVO say its OL3 plant is "the third most efficient nuclear power unit in the world" and that once up and running it is capable of producing approximately 1,600 MW to provide about 14% of Finland's electricity. One of Finland's two nuclear power plants, the other being the VVER Loviisa plant, the Olkiluoto facility has been plagued by issues for years. Built by Areva NP for a fixed price of €3bn (US$3bn), the firm estimated in 2012 that the full cost of building the OL3 reactor would amount to around €8.5bn due to the frequent setbacks encountered during its construction. The delays led to a bitter dispute between Areva and TVO, with each seeking compensation from the other through the International Court of Arbitration - a scenario which resulted in Areva paying hundreds of millions of euros in compensation to TVO.

Meanwhile the facility's other reactors have also experienced problems. In July, OL1 was also temporarily shut down due to damaged fuel elements, and in December 2020, the OL2 reactor automatically shut down when a valve failure caused hot water to reach filters in the reactor's cleaning system. "The plant's safety systems functioned as planned, and the disturbance did not pose a danger to people or the environment," TVO said in a statement at the time. TVO did have plans to build a fourth unit at the Olkiluoto facility, and in 2008 submitted an environmental impact assessment in preparation of applying for a construction license. However, delays to OL3 has led the company to put its plans on hold.

The Chemical Engineer
http://www.thechemicalengineer.com/

10 November 2022

Kenya-Ethiopia Power Line Set to go Live in November

Ethiopia on Tuesday conducted a successful test run of electricity supply to neighboring Kenya, the Ethiopian Electric Power utility (EEP) announced. Mr. Tewodros Ayalew, the project manager, said that the testing of transferring power to the Ethiopia-Kenya high voltage direct current converter station and transmission line project was successfully completed. The trial was carried out via the 500 KV cross-border transmission power line which links the two neighbors.

According to EEP, various electro-mechanical devices and equipment installed on the project, as well as the communication data signal, were being checked and tested ahead

of Tuesday's test trial. Tewodros pointed out that it was able to connect the signal to the Kenyan network by sending a communication signal a few days ago. The successful connection to the power grids of the two countries will now enable Nairobi to venture into power trade business with Addis Ababa.

Last month, Kenya signed a 25-year deal with the east African country to start importing electricity in a bid to edge out the expensive power from the national grid and ensure buffers to meet peak demand.

The Kenyan Wall Street
http://kenyanwallstreet.com/

11 November 2022

Finland: Voluntary support for power system aims to prevent electricity shortages

Fingrid is introducing a new voluntary power system support procedure for companies and the public sector to prevent electricity shortages. The objective is to harness the full flexibility potential in the event of an possible electricity shortage so that consumers do not need to endure rolling power cuts. The procedure is intended to cover applications such as industrial demand-side management and on-site reserve power generators. We will hold a webinar on this topic on 17 November in Finnish.

Finnish companies and public-sector actors have shown an interest in supporting the power system in the event of possible electricity shortages this winter. Accordingly, Fingrid has developed a new voluntary power system support procedure with the aim of tapping the potential flexibility available outside the balancing power market to avoid power cuts. "In the best-case scenario, voluntary flexibility could stop the situation from developing into a nationwide electricity shortage. Organizations can get involved and play a part in supporting the power system and Finnish society through this challenging period," says Laura Ihamäki, Specialist at Fingrid.

The power system support procedure will be activated when Fingrid's three-step electricity shortage scale reaches "High risk of electricity shortage". There is considered to be a high risk of an electricity shortage when all the up-regulation bids available in the Finnish balancing power market are in use and no more electricity can be imported from neighbouring countries. In such a case, the power system support procedure will be used alongside Fingrid's reserve power plants to safeguard the adequacy of electricity. Fingrid's messaging system sends support requests by text message to the sites that have registered for the procedure. Fingrid sends also a text message when support is no longer needed.

Fingrid
http://www.fingrid.fi/