

WORLD POWER SYSTEMS REVIEW

1 August 2022

15 July 2022

Japan Wants Up to Nine Nuclear Reactors Online This Winter

Japanese Prime Minister Fumio Kishida said he asked for as many as nine nuclear reactors to be online this winter to help with an expected power crunch. "There are concerns about a power shortage this winter," Kishida told a news conference Thursday. "We must prevent this situation."

The Ministry of Economy, Trade and Industry will do what they can to push for nine reactors operating in winter, which can cover roughly 10% of Japan's power consumption, said Kishida. That falls in line with plans from regional utilities, which aim to have that many reactors producing electricity when colder weather hits. Japan is struggling with tight electricity supplies due to extreme weather, the retirement of older power plants, and delays to restarting nuclear reactors that were shut following the Fukushima nuclear disaster in 2011. It is also cutting its use of energy sources from Russia following its invasion of Ukraine.

While Japan is already facing tight power supplies through the rest of the summer, the upcoming winter is expected to be razor thin. Kishida has been ratcheting up rhetoric around nuclear power, requesting faster restarts for facilities that have cleared safety reviews. However, Japan's central government has little ability to actually order a plant to resume operations, since there is a rigorous regulatory process. Ten of Japan's 33 operable nuclear reactors had been restarted under post-Fukushima safety rules, though some are offline for maintenance. A further seven units have been cleared by the nation's nuclear regulator to resume operations but haven't yet restarted due to required upgrades or lack of local support.

Bloomberg

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

15 July 2022

Warming rivers threaten France's already tight power supply

High water temperatures threaten to reduce France's already unusually low nuclear output, piling more pressure on operator EDF (EDF.PA) at a time when half its reactors are offline due to maintenance and corrosion issues. The valley between the Rhone and Garrone rivers has reached sweltering temperatures in recent days which are expected to hit around 40 degrees Celsius on Friday and remain above seasonal levels through early next week.

That is a problem because river water is often used to cool reactors before being returned at a higher temperature. Reactor production is limited during times of high heat to prevent the hot water re-entering rivers from damaging wildlife. EDF has announced production restrictions at the Tricastin plant on the Rhone from July 16, the Blayais plant at the mouth of the Garrone from July 17, the Saint Alban plant on the Rhone from July 17, and the Bugey plant on the Rhone from July 19.

An extension of a recent output cut at the Golfech plant on the Garrone is also possible, Refinitiv analyst Nathalie Gerl said, adding data showed restrictions continued for several weeks during a similar powerful heatwave in 2018. On Friday, French energy regulator ASN announced some modifications at the plants to guarantee a minimum power production level. EDF has already been forced to cut planned output several times this year because of a host of problems at its reactors - and expects an 18.5 billion euros (\$18.6 billion) hit to its 2022 core earnings because of production losses. The French government is due to announce details of its plan to nationalise the indebted group, in which the state already owns 84%, by Tuesday.

The maximum river temperature before restrictions kick in at the Bugey plant is 26 degrees Celsius, while that at the Golfech, Tricastin and St. Alban plants is 28C, and Blayais

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is 30C. Current nuclear availability is the lowest for at least four years because of corrosion problems and extended maintenance schedules at half of EDF's 56 reactors. That means France is importing power at a time it would normally be exporting it and EDF is buying electricity at high market prices, just as Europe is scrambling to find alternative energy supplies to Russia. Things could get worse in the winter, unless EDF can restore full production - though Refinitiv forecasts at this stage point to a rebound to more normal output levels in coming months.

The current rising temperatures are also causing demand for air conditioning to increase, which could add to the stress on the grid. "Supply will get particularly tight next week with demand about 6 GWh/h above normal on Monday and Tuesday," Gerl said. France is already importing quite heavily, from countries such as Spain, Switzerland, Germany and Britain. But exports to Italy could drop as a result, she added. The power mix in France is diverse, with around 32% of production from wind, solar and hydro, grid operator RTE data show, so power production depends more on sun intensity and wind speeds than moderate temperatures.

However, rising river temperatures can have a knock-on effect as some coal-to-power stations also need cooling water from rivers and rely on rainfall or snowmelt to support river levels and allow unhindered coal barge transport. If the amount of river water that can be used is limited to protect wildlife that can also curb vital water supply to coal stations and reduce production times and capacities. The same goes for run-of-river hydroelectric power plants. Low water levels after recent dry weather continue to prevent cargo vessels from sailing fully loaded on the Rhine in Germany, traders said. EDF said on Friday high temperatures were unlikely to affect the performance of its British reactors.

Reuters

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

15 July 2022

Japan's JERA to start new coal-fired power plant to ease electricity crunch

Japan's biggest power generator JERA is set to start a new 1.07 gigawatt (GW) coal-fired power plant in Taketoyo in central Japan early next month, which could help to alleviate an electricity crunch in the summer and winter. It is a rare new coal power plant being built in developed countries as many industrialised countries have been shutting down coal plants for years to reduce carbon dioxide (CO₂) emissions.

Even in Japan, the world's fifth-biggest CO₂ emitter, the plan to construct the No.5 unit in Taketoyo thermal power station to replace three old oil-fired units was unpopular when the utility sought government approval. The environment minister called for the plan to be reconsidered, or even scrapped, amid growing concerns Japan may miss emissions reductions targets, though the industry minister eventually approved it.

Any additional capacity is welcomed now as Japan is suffering tight power supply and a historic energy security risk as tensions with Russia intensify, heightening the threat of gas supply disruptions. "We are making final trials to be able to start the unit on August 5," Masato Ishimura, general manager at Taketoyo power station, told reporters. "We want to ensure a stable operation to steadily contribute to the tight power market in the summer and winter," he said during a media tour of the facilities. The unit has achieved a generation efficiency of 46%, among the highest for coal power in the world, and it co-fires biomass to slash emissions, Ishimura said.

For trial runs, JERA uses thermal coals from Australia and Indonesia and pellets from the United States, but it plans to use many other types of coal and import pellets from Southeast Asia. To meet JERA's goal of achieving carbon neutrality by 2050, the utility plans to consider various options to further cut emissions of the unit in the future, including co-

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firing ammonia and adding carbon capture storage, he added. Japan is stepping up efforts to extend the lifespan of its coal power plants in an ambitious project to add low-carbon ammonia to its fuel mix, targeting both stable energy supply and lower emissions in one stroke.

Reuters

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

16 July 2022

French nuclear plants temporarily allowed to discharge overheated water

Three French nuclear plants have been temporarily exempted from heat regulations to allow them to run “at minimum power” during the current heat wave. This was announced by the EDF energy utility, the RTE power grid operator, nuclear watchdog ASN and the French Ministry of Energy and Ecology.

Nuclear plants pump in water from waterways to cool their reactors, then discharge it again. Since 2006, limits have been set to the maximum temperature the water given off by each nuclear plant in France may have. This is aimed at preventing flora and fauna from being damaged by excessively hot water. France’s Golfech, Blayais and Saint-Alban nuclear plants are now allowed to discharge hot water without heat limitations, at least until 24 July. The heat wave currently plaguing France had prompted network operator RTE to apply on Tuesday for the exemptions from the ASN and from the Energy Ministry, which granted the application on Friday.

This is only the second time that an exception has been made to the heat standard. The first time was in 2018, when the water discharged from the Golfech power station was allowed to exceed the maximum temperature for 36 hours. According to the ASN, Friday’s decision was necessary to maintain the three plants “at minimum power” and “guarantee the safety of the electricity grid.” Grid operator RTE stressed that there was “no risk to the French people’s power supply”. However, nothing was said about possible consequences for biodiversity. France has no fewer than 56 nuclear reactors, of which more than half (29) have been shut down.

Brussels Times

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

18 July 2022

Navigating to a Net Zero British energy system for all

National Grid ESO explored four different, credible pathways for the future of energy between now and 2050 in the Future Energy Scenarios 2022. The scenarios range from a less ambitious plan to decarbonising the energy system, to a much more ambitious approach. Researchers found that strategically investing in infrastructure to onboard clean energy, making the system smarter and more flexible and reforming the wholesale electricity market would unlock benefits. It could also reduce dependence on foreign energy to insulate economy from geopolitical shocks, such as Ukraine, and enable Government’s Net Zero 2050 target to be reached three years early.

The report explores how different parts of the energy system can help lower emissions across the economy – whether through smart and digital technologies, electrification, deploying new hydrogen opportunities, or incorporating carbon capture usage and storage into industrial clusters, amongst others. Each scenario considers how much energy we might need and where it could come from to try to build a picture of the different solutions that may be required. The four ‘Future Energy Scenarios’ (FES) stretch across various degrees of decarbonisation:

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System Transformation and Consumer Transformation both reach Net Zero by 2050, albeit in different ways. System Transformation focuses on the utilisation of more hydrogen, including for heating, alongside supply side flexibility. Consumer Transformation focuses on electrified heating and a quicker transition to energy efficient homes, supported by demand side flexibility. There are also different levels of societal change, with 'Consumer Transformation' assuming higher levels of such change, although it is required to some extent in both scenarios.

Leading the Way, the most ambitious pathway reaching Net Zero before 2050, includes ramping up investment in renewable technologies, building more storage for excess electricity and creating a smarter and more flexible energy system. This includes electrification and hydrogen to decarbonise demand, and sees hydrogen produced mainly from electrolysis. This scenario also assumes a direct air carbon capture and storage (DACCS) contribution, as well as the highest levels of societal lifestyle change. Falling Short has the slowest credible level of decarbonisation. The energy sector doesn't meet Net Zero by 2050, but almost meets the previous UK target of an 80% reduction in greenhouse gas emissions from 1990 levels.

Published annually since 2011, the detailed document is designed to help Government and the industry take decisions to decarbonise the electricity system by 2035, as well as contribute to the Net Zero target. It considers a number of factors, including changes in energy demand, consumer behaviour, the electricity market, the country's overall energy mix and the flexibility of the system to adapt to fluctuations in supply and demand. Government has introduced the Energy Security Bill, which is designed to diversify Britain's energy supply to end dependence on foreign energy by transitioning to a cleaner, affordable, home grown energy system. Measures outlined by the more ambitious pathways in the FES report would help the Energy Security Bill meet its objectives.

The Bill also includes the establishment of an independent Future Systems Operator, which will take a whole system approach, working across gas, electricity and emerging markets like hydrogen and carbon capture utilisation and storage (CCUS). The ESO will fill this role as the system's 'guiding mind' and has already published a series of insights this summer including the Pathway to 2030: incorporating the Holistic Network Design report, an overview of the infrastructure needed to connect future renewable energy sources which could save consumers £5 billion, and Net Zero Market Reform CCUS report which makes the case for market reform, moving to a locational pricing system to deliver Net Zero at significantly lower cost to industry and consumers.

NGESO

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

19 July 2022

US and Kazakhstan to Minimize Highly Enriched Uranium in Kurchatov

The United States National Nuclear Security Administration (NNSA) representatives visited the National Nuclear Center in Kurchatov, a city in the East Kazakhstan Region, and addressed the processes of minimizing highly enriched uranium on July 15, reported the Kazakh Ministry of Energy press service.

One of the major accomplishments of the cooperation between the two countries was the conversion of research reactors from highly enriched uranium fuel into low enriched uranium fuel and the utilization of highly enriched uranium in Kazakhstan. The operation of the reactor falls within the purview of the center in Kurchatov, built on the territory of the military-industrial complex of the former Semipalatinsk nuclear test site. The U.S. delegation visited the center's technical facilities.

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Kazakhstan has been carrying out work on the conversion of research reactors since 2010 to reduce the enrichment of research reactor fuel to 20 percent, as well as to process and dispose of highly enriched uranium. The US also invited Kazakhstan to participate in the program on small modular reactors. On July 17, Kazakh Minister of Energy Bolat Akchulakov met with the U.S. Charge d'Affaires in Kazakhstan Judy Kuo and representatives of the US State Department's Cooperative Threat Reduction program's Bureau for International Nuclear Nonproliferation Security. The sides discussed the Foundational Infrastructure for Responsible Use of Small Modular Reactor Technology (FIRST) program.

FIRST is a capacity-building program designed to deepen strategic ties, support clean energy innovation, and advance technical collaboration with partner nations on secure, safe and responsible use of nuclear energy infrastructure. The program presents Kazakhstan with an opportunity to learn about the advanced nuclear technologies of the world's top nuclear power plants. Earlier this week, Kazakh Prime Minister Alikhan Smailov said Kazakhstan plans to use best international practices and advanced technologies in the construction of a new nuclear power plant.

Astana Times
<http://astanatimes.com/>

20 July 2022

RWE, SolarDuck to launch offshore floating solar pilot as they eye tech commercialization

RWE and floating solar company SolarDuck have partnered to explore the commercialisation of SolarDuck's offshore floating solar PV (FPV) technology by trailing its potential in harsh environments in the North Sea. German utility giant RWE has committed to investing in a first offshore 'Merganser' pilot project in the North Sea in order to "accelerate the learnings" of SolarDuck's FPV technology. SolarDuck's technology is made up of triangular-shaped platforms that are designed to float several meters above the water, keeping critical electrical components dry as well as safeguarding the integrity of the 'semi-submersible' structure, RWE said.

Merganser will have a nameplate capacity of 500kW by 2023 and is expected to be installed off the coast of Ostend in the Belgian North Sea. The location will provide the companies with important information regarding "one of the most challenging offshore environments in the world", potentially facilitating faster commercialisation from 2023, RWE said. "Showcasing SolarDuck's robust technology in rough North Sea conditions will enable us to deploy the technology practically anywhere in the world," said SolarDuck's CEO, Koen Burgers. The pilot scheme will then set up a potential larger demonstration project at the Dutch offshore wind farm Hollandse Kust West (HKW). RWE is bidding for the project and said it had included SolarDuck into its application "with a highly innovative combination of offshore floating solar with integrated storage solutions."

Describing FPV as a "new frontier", RWE said its integration with offshore wind parks enabled a "a more efficient use of ocean space for energy generation" by using the space between turbines and allowed for "synergies with regards to the construction and maintenance of the multi-source renewable energy plant." RWE said SolarDuck's technology opens "a new door for solar energy" and the companies will "explore new opportunities with the objective to develop commercial offshore floating solar parks, both stand-alone and hybrid."

"The combination of RWE's leading global market position and SolarDuck's technological and commercial ingenuity sets the perfect base for accelerating the deployment of this high-potential technology," RWE said in a media statement. "For countries with lower mean wind speeds but high solar irradiation, this opens up attractive

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opportunities,” said RWE CEO for Offshore Wind. “With the SolarDuck pilot we are gaining experience with a highly innovative offshore floating solar technology.” Many companies have been exploring FPV technology, especially in countries with small available land space, as a means to increase solar deployment. Yesterday, Keppel Energy Nexus bagged a contract to pilot a membrane-based nearshore FPV system at Jurong Island, Singapore using FPV company Ocean Sun’s technology.

PVTECH

<http://www.pv-tech.org/>

20 July 2022

Unmanned drones deployed to inspect power lines in east China

Nearly 2,000 unmanned drones have been deployed in east China's Jiangsu Province for automatic transmission line inspections, according to State Grid Jiangsu Electric Power Co., Ltd. With an average of 2.5 drones covering every 100 km of power lines, currently the economic powerhouse has all of its key transmission lines being inspected by the drones, the company said.

"Based on the holographic power grid statistics, the drones can fulfill functions such as automatic route planning and real-time monitoring," said Wang Hongxing of the company, noting that Jiangsu's holographic power grid has now included 32,000 km of transmission lines. The drones are equipped with centimeter-level high-precision positioning and millimeter-level image recognition capabilities, with efficiency about six times that of traditional manual inspection, Wang added. Jiangsu has completed automatic inspection of 250,000 transmission towers in the first half of this year, and the province is planning to carry out more drone inspections.

XINHUANET

<http://news.cn/>

25 July 2022

South Africa to open up power generation to tackle energy crisis

The South African government has enlisted the private sector in an emergency plan to tackle the worst-ever rolling blackouts in Africa’s most industrialised economy, by scrapping controls on companies generating their own power outside the broken Eskom monopoly. President Cyril Ramaphosa said on Monday that a wave of new private generation was needed to rescue the country’s grid after recent power cuts of unprecedented intensity “disrupted all of our lives and caused immense damage to our economy”.

A cascade of breakdowns and illegal strike action at Eskom’s fleet of ageing coal stations have plunged South Africans into darkness for up to 12 hours a day this winter, accelerating the utility’s long decline and adding to pressure on the ruling African National Congress. South Africa will also double its procurement of renewable energy this year to more than 5,000 megawatts and create incentives for those with rooftop solar panels to sell power to Eskom, under expedited policies to alleviate so-called load-shedding.

After a decade of unstable power supplies, “South Africans are justifiably frustrated, and they are also angry,” Ramaphosa said. “The shortage of electricity is a huge constraint on economic growth and job creation.” Removal of limits for generation licences will ease the process for mines and other businesses to set up their own projects, such as solar farms, and sell the excess power to Eskom.

The licence threshold was already raised from 1MW to 100MW last year, a barometer of Ramaphosa’s increasing resort to private sector supplies as Eskom’s decline has accelerated. “South Africa has not even begun to exhaust its renewable energy potential,

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and this is a big step towards that end,” Greenpeace Africa said. But even without the need for licensing, investors have warned that the paperwork for setting up generation is still too wrapped in red tape and they say projects will take years to come online.

Ramaphosa is dealing with the legacy of years of failure to invest in new supply, forcing Eskom to keep decades-old plants running without proper maintenance in order to keep the lights on. That has left Eskom with as little as 26,000MW of capacity to meet national demand that peaks at 32,000MW in winter — forcing it to cut off up to 6,000MW from the grid at a time. Despite the crisis the ANC, whose heartlands include the coal-producing regions that supply Eskom, has been internally divided over taking power generation out of state hands. South Africa’s last complete procurement of independent renewable power was in 2016. South African cities under opposition control such as Cape Town are already racing to procure their own power away from Eskom. The government will also develop a plan by October to deal with Eskom’s debt of nearly R400bn (\$24bn), Ramaphosa said. “These actions are directed at fundamentally transforming the electricity sector and positioning it for future sustainability,” he added.

Financial Times
<http://www.ft.com/>

25 July 2022

Biden executive order on power system cybersecurity leaves critical operations vulnerable, experts say

Ukraine war-provoked Russian cyberattack on the U.S. power system has not happened, but experts agree the threat is real because of a key shortcoming in cybersecurity preparations. The 2021 Colonial Pipeline shutdown that disrupted Eastern U.S. gasoline deliveries hinted at the danger of cyberattacks on the energy sector. A May 12, 2021, Biden executive order, requiring major power system cybersecurity actions, implicitly acknowledged that Russia’s 2015 attack on Ukraine’s power system can happen here. But current and planned responses to the Biden order may not be enough to protect electricity delivery, cyber specialists said.

Russia may have so far withheld cyber warfare against the U.S. and its allies because of “a balance of power issue,” OPSWAT operations technology and industrial cybersecurity expert Oren Dvoskin said. “If a cyberattack is stopped, whoever stopped it knows the adversary, which is why nation-states are careful about if and when to deploy cyber weapons,” he said. But the cyber threat to the energy sector goes beyond attacks to communications networks like the recent headlined ransomware attacks, analysts said. Using the growing internet access of power system operations that allow companies to monitor and control engineering processes online, attackers could disrupt critical infrastructure to create environmental devastation, losses of life, and severe economic impacts, they said.

Power system “security and safety” depends on “the reliability and accuracy of sensor data that informs operations,” Applied Control Solutions Managing Partner and Cybersecurity Analyst Joe Weiss told Utility Dive. And “Russia, China, and Iran are aware of the lack of cybersecurity in process sensors and have access to them” in critical electric system operations, he said. The recent discovery of cryptocurrency’s vulnerability is a reminder that cybersecurity requires constant attention. But threats can be minimized by first recognizing protections to internet technology networks are inadequate to protect operational technology hardware, and then putting the best people, processes and technologies in place to protect electricity delivery, cyber analysts said.

The Biden executive order recognized “persistent and increasingly sophisticated malicious cyber campaigns” and the need “to identify, deter, protect against, detect, and

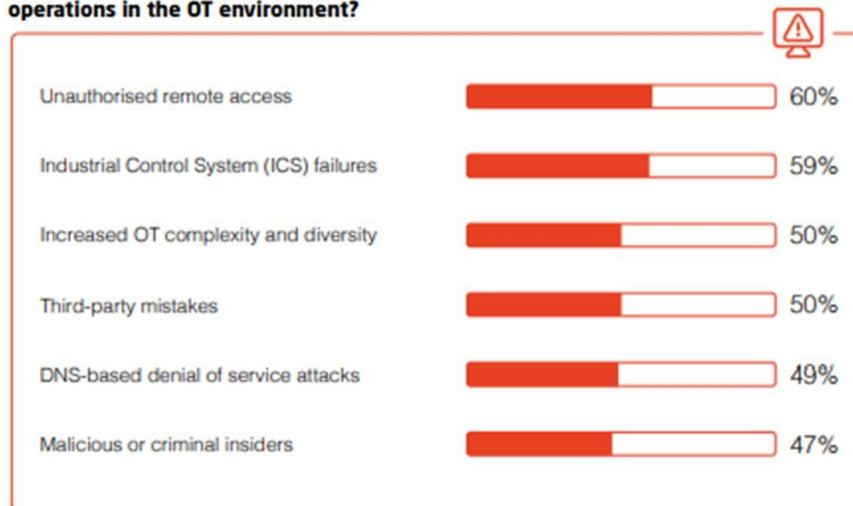
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respond” to them. And protections must include systems “that run the vital machinery that ensures our safety (operational technology (OT)),” along with “systems that process data (information technology (IT)),” it said. Threats to energy sector networks were apparent before the executive order. But vulnerability expanded with the “convergence of IT and OT systems” and the use of “common software and security systems” in monitoring and control, a November 2021 Congressional Research Service report said. Shields Up, the Department of Homeland Security’s Cybersecurity and Infrastructure Security Agency, or CISA, was launched in February by the Biden administration as a response to the Ukraine war’s increased cyber threat.

The May 2021 executive order required federal agencies, including CISA, to develop “Zero Trust Architecture.” A zero trust system design assumes that “anomalous or malicious activity” is “inevitable or has likely already occurred.” It eliminates “implicit trust in any one element” and allows online access only with “real-time” and “multiple sources” verifications, the order said. But that leaves a shortcoming in cybersecurity, analysts said.

What are the top six cyber security threats that may affect critical operations in the OT environment?



The federal approaches assume IT attacks are the concern, control systems engineer and cyberanalyst Weiss said. They overlook OT-focused cyberattacks, which “are not always easily identifiable or recognized at all,” and “can be mistaken for accidents or malfunctions,” he warned. Former Federal Energy Regulatory Commission Chair Jon Wellinghoff, now CEO of power system consultant GridPolicy, agreed. “The executive order was a great step forward in coordinating federal agencies’ cybersecurity efforts under Homeland Security,” he told Utility Dive. “But there has not been enough progress on securing operations technology.”

The still unexplained August 2019 federal seizure of a Chinese transformer on its way to installation on the Western Area Power Administration system demonstrates the complexity of the OT threat, both Wellinghoff and Weiss said. It was diverted to Sandia National Laboratory for study when it was discovered to have unexplained electronics built into it, they said. Transformer manufacturer JiangSu HuaPeng denied allegations of an effort to create a hidden backdoor to the U.S. power system, but there is no public report of Sandia findings confirming that, a September 2020 investigation by Motherboard reported. “There are probably thousands of China-originated control devices in our electric and natural gas infrastructure that we can’t be sure of,” Wellinghoff said. “The core of the problem is that the bulk of cybersecurity focuses on IT networks and not industrial control operations technologies.”

Even sensors in smart operations systems may have no capability for passwords, authentication or encryption, but nevertheless remain “the 100% trusted input to OT

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networks,” Weiss added. Sensors without security capabilities make malicious and unintentional operational disruptions difficult to distinguish and could allow power system cyberattacks to go unnoticed, Weiss said. Inadequate sensor protections contribute to continued uncertainties about the specific cause of the 2005 Stuxnet attack on an Iranian nuclear facility and a 2008 Florida nuclear plant shutdown resulting from a substation disruption that left no proof of its supposedly accidental cause, he added.

Even where internet communications are secure, if OT sensors “are compromised or defective, it will not be possible to have a safe, secure, reliable, or optimized process,” Weiss wrote in March 2021. These vulnerabilities are “a real plague in OT environments,” OPSWAT’s Dvoskin agreed. The malware that attacked the Colonial pipeline in 2021 compromised so many of Colonial’s IT components that it forced a preemptive shutdown of operations, he said. The current alternative is “unidirectional security gateways” that “segment the OT network” to limit malware access between the IT network and OT devices, he said. But “attack patterns are always one step ahead,” and even the zero trust concept is compromised when OT networks “not architected for cybersecurity leave the entire network vulnerable,” he said.

To date, most attacks have been through ransomware and companies have paid the attackers, he said. Unfortunately, that has created “an incentive for attackers to pursue bigger returns by targeting operations, like the Colonial incident,” Dvoskin said. As a result, cybersecurity has become a high electric system priority, many stakeholders agreed. Major U.S. utilities and power system operators are using the CISA and Biden order guidance to prepare for attacks, they told Utility Dive. They are also participating in public agency and industry protective exercises, including the North American Electric Reliability Corporation GridEx and the Department of Energy Clear Path simulations.

As early as 2020, cybersecurity attacks and vulnerabilities to “ransomware and supply chain compromises” were “a significant concern,” according to NERC’s 2021 State of Reliability report. And in December 2020, there was a complicated attack “that leveraged SolarWinds’ Orion software and Microsoft’s Azure cloud environment.” The attack on software provider SolarWinds allowed Russian attackers to access power sector networks, NERC reported. Though it caused no loss of system load, it “highlighted the extraordinary capability and persistence” of “the Russian Foreign Intelligence Service,” CISA added. A post-incident investigation revealed “25% of electric utilities had downloaded malicious software,” NERC said.

While energy industry leaders have limited “expertise” about cybersecurity threats, the “shock of recent incidents” has driven “major changes,” a February-March 2022 international survey by global consultants DNV found. Electric utilities are working on cybersecurity from a “defense-in-depth” perspective, with simultaneous planning for prevention of and remediation from attacks, both Edison Electric Institute Senior VP of Security and Preparedness Scott Aronson and American Public Power Association Senior Director, Cybersecurity, Bridgette Bourge emailed Utility Dive.

As part of the defense-in-depth approach, an Essence 2.0 Cybersecurity Technology is now being developed that integrates the monitoring of IT and OT systems and “continuously assesses the electric grid for anything out of the ordinary,” according to the National Rural Electric Cooperative Association. Individual utilities reported unhesitating seriousness about cybersecurity. “We can never be too safe or prepared,” Duke Energy spokesperson Caroline McMillan Portillo said. “As the scale and sophistication of potential cyber events grow, so do our defensive capabilities for all of our IT and OT assets, and for both the bulk system and the distribution system.” Arizona Public Service spokesperson Yessica del Rincon and Entergy spokesperson Neal Kirby concurred.

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American Electric Power, which provides regulated, unregulated, and transmission service across a 12-state, 200,000 square mile territory, “has about 200 cyber people focused on security,” AEP VP of Cyber and Physical Security Steve Swick said. “We are reluctant to speak in specifics,” but “we hire top cyber security experts,” and “hold regular drills,” Consolidated Edison spokesperson Allan Drury emailed. “Threats are increasing in sophistication, magnitude and frequency,” and “would-be attackers are inventive and relentless,” he added. The California and Midcontinent independent system operators declined to comment in detail. The New York Independent System Operator “relies on the NERC Critical Infrastructure Protection standards and other cybersecurity frameworks, guidelines, and best practices,” its Power Trends 2022 reported. And better practices are emerging, cybersecurity analysts reported.

The Biden executive order, CISA’s Shields Up protections, and the NERC guidelines are the most frequently mentioned cybersecurity standards, stakeholders agreed. But most of the Biden order and CISA guidance only explicitly address IT intrusions and ransomware, Weiss and others stressed. And while securing IT systems from attacks can prevent financial consequences, losing control of OT systems could lead to significant economic or environmental impacts or cost lives, a recent DNV “insights” paper warned. Historically, OT networks were not online, which allowed use of less secure equipment and practices, DNV Cyber Security Managing Director Trond Solberg told Utility Dive. And the IT and OT departments were often organizationally siloed, “exchanging risk reports that were frequently forgotten or building firewalls that people weren’t trained to use.” Many energy industry executives acknowledge “OT security is now getting attention,” he said. But because many have not realized the extent to which OT requires new practices, “too few executives are willing to invest significant time and money, and OT cybersecurity problems remain.”

Better practices in OT security will depend on how “people, processes, and technologies” move from “prevailing practices” to meet “current conditions” and take advantage of foreseeable “future directions,” a DNV December 2021 white paper on new OT security practices summarized. Prevailing practices have too few people engaged in OT security, inadequate plans to define responsibilities, and do not focus on developing dedicated OT security teams, DNV said. OT-specific, risk-based standards are being adopted, but policy enforcement is needed, it added. These prevailing practices do not effectively address current nation-state attacks and the lack of industry-wide governance, the paper said. Investments are needed to close gaps in incident response, asset identification, and, especially, in management of currently emerging attacker accesses through IT-OT interfaces, it said.

In the next two to four years, the pool of personnel dedicated to OT security should be doubled, DNV said. Because attacks through supply chains are accelerating, a converged IT and OT team and a wider view of where threats can come from will also be needed in auditing vendor security. Converged IT and OT systems can drive adoption of more zero trust measures and advanced and enabling technologies, DNV concluded. The result could be the optimization of today’s isolated and fragmented security practices. A “radical shift” can be driven by safeguarding OT if energy company leaders recognize that protecting sensors and communications systems will transform a “non-security” cost into “a security win,” DNV said.

With that shift, zero trust and access management programs can become bigger priorities, which will lead to better security practices in both the IT and OT domains, it added. Skilled OT security specialists, managers, engineers operators, and others must be developed, the paper stressed. That kind of team will have the organizational and technical skills to develop critical “cyber readiness” by planning for and responding to “security

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compromises and data breaches” on both OT and IT systems, and also ensuring supply chain and third-party security, it added. Cyberanalyst Weiss was more succinct than DNV. Close the “culture gap” between the Chief Information Security Officer who “owns no hardware” and the vice president for power delivery who “owns everything but isn’t part of cybersecurity,” he said. “Engineers care about reliability and safety and network people care about cybersecurity and they currently are not talking to each other.”

Utility Dive

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

28 July 2022

Goldwind Recycles Turbine Blades into 3D Printing Materials

At Goldwind headquarters, China’s first renewable energy carbon neutral business park, a set of flower beds have been built using 3D printing technology, printed from recycled solid waste. The application of this cutting-edge technology has injected more green power into the park while forging a new path for the solid waste recycling. Different from traditional 3D printing materials, the materials used in the flower beds come from retired turbine blades from a wind farm in Inner Mongolia. With the help of 3D printing robots, the materials containing crushed blade particles can be pre-formed, promising a solid waste recycling rate of over 30%.

Essentially, 3D printing is a kind of additive manufacturing process, where designers input digital design models into 3D printers and convert them into printing instructions. After that, the printer follows the instructions and processes layers of materials into parts of specific shapes. The technical difficulty of adding the crushed blade particles into the printing materials lies in maximizing the ratio of blade solid waste while ensuring a specific strength for the printed product. During our experiments into blade solid waste-based 3D printing, the researchers repeated a number of experiments and demonstrations, constantly adjusting the ratio of various raw materials, as well as the particle size and gradation of the crushed blade particles. They finally landed on a golden ratio that met the strength requirements of the printed products while consuming blade solid wastes, resulting in a series of material systems suitable for 3D printing. The mechanical properties, durability and working performance of the finished product made from this new printing materials are equal to that of conventional building concrete.

Blade solid waste-based 3D printing is a breakthrough in terms of solid waste-based 3D printing and blade recycling. Data estimates show that China’s retired turbine blades will generate 5,800 tons of composite solid waste by 2025, and 74,000 tons by 2028. The solid waste from wind turbines remains a long-lasting problem for many companies in the industry. As a smart, environmentally-friendly and efficient construction method, solid waste-based 3D printing, when compared with traditional construction technologies, features no mold, lower labor costs, more efficient consumption of materials, increased freedom of design, greater construction efficiency, and a lower risk of personnel security, especially in the construction of uniquely shaped structures.

On the other hand, as wind power projects are mostly scattered throughout China’s most remote areas, the cost of transporting recyclable materials to various locations accounts for a large part of recycling costs. Another advantage of solid waste-based 3D printing is that it enables integration into other construction projects around the wind farm thanks to its applicability. With the help of mobile 3D printing robots, blade solid waste can be used for local production and consumption, thus lowering long-distance transportation costs.

“Garbage is simply resources handled improperly. The original intention behind our decision to develop such technology was to change our position as a blade solid waste

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producer into a raw material supplier for solid waste-based 3D printing, making use of the vast construction market to enable more consumption of materials after blade recycling and giving full play to the decisive role of the market in resource allocation, so that environmental protection can be more valuable,” said the person in charge of the project. In China Wind Power 2021, Goldwind released a white paper titled, Goldwind towards Carbon Neutrality: Action and Vision, pointing out that “by 2040, the recycling ratio of Goldwind products will reach 100%.” The application of blade solid waste-based 3D printing is a crucial step in such a program. By continuing to invest in wind power recycling, Goldwind will explore more innovative low-carbon technologies and the systematic application of solutions to accelerate a carbon-neutral ecosystem, thus promising a zero-carbon, renewable future.

Goldwind

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

28 July 2022

National Grid asks UK coal power plants to be on standby this winter

Coal power plants could be paid to generate more electricity, with consumers and businesses paid to use less, as the UK hunkers down for a winter of gas shortfalls across Europe caused by the standoff with Russia over the war in Ukraine. In its early outlook forecasting Britain’s ability to keep the lights on over winter, the National Grid admitted there could be “tight periods” in early December, which would trigger a call for power plants to ramp up generation. While the grid expects to be able to maintain the buffer that prevents blackouts, it issued a warning about the potential impact of a shortfall in Russian gas supply into Europe.

It came as Moscow reduced flows through the Nord Stream 1 pipeline, sending wholesale gas prices soaring and leading to predictions that household energy bills could hit £3,850 next year and remain above £3,500 into 2024. The UK is much less dependent on Russian gas than European countries such as Germany but National Grid said shortfalls across Europe were likely to lead to “very high” prices for the gas that heats homes on cold days and generates electricity. In preparation for turmoil in the energy markets, it has asked five coal power units to be available to supply power to the grid but not to the wider electricity market. It said EDF and Drax, which own four of the five, have already agreed to do so, but did not disclose the fifth. The agreement follows government negotiations with French state-owned energy firm EDF, over its West Burton A plant in Nottinghamshire, as well as with Drax over its plant in Yorkshire. National Grid is also looking at how to reduce demand, which could involve industrial users being paid to reduce their power usage.

It could also trigger a scheme trialled earlier this year under which customers of household energy supplier Octopus Energy would be paid to put off using the dishwasher or delay a laundry cycle until after peak demand times. In addition, the electricity system operator will work with the owners of transmission networks to reduce maintenance outages, or time them to cause less disruption. Jess Ralston, senior analyst at the Energy and Climate Intelligence Unit (ECIU) thinktank, said: “We may well get through the winter without major incident but the gas bill at the end will likely be extortionate. “With calls for the £15bn winter energy package [to support domestic billpayers] to be expanded, the government will be kicking itself for not having invested more in energy efficiency over the years. “The high cost of gas will be adding £2,000 to bills from October, but this could rise with Putin already turning down the flow to Germany.”

The Guardian

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

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29 July 2022

Transmission System Operators for Electricity of Continental Europe agree to increase the trade capacity with the Ukraine/Moldova power system

On 28 July, the Transmission System Operators (TSOs) of Continental Europe agreed to increase the trade capacity with Ukraine/Moldova to 250 MW which is more than double the capacity that was set in the initial phase (100 MW). The possibility of further increasing trade capacity will be assessed in September based on power system stability and security considerations.

Commercial electricity exchanges with the Ukraine/Moldova power system started on 30 June on the interconnection between Ukraine and Romania, followed by the Ukraine-Slovakia interconnection on 7 July. Electricity trading on the other interconnections (Ukraine-Hungary and Moldova-Romania) is expected to follow later.

The opening of trade capacity with Ukraine/Moldova was made possible after the TSOs of Continental Europe confirmed on 28 June 2022 that the technical pre-conditions had been fulfilled to allow commercial exchanges of electricity between Ukraine and the neighbouring countries. The start of commercial exchanges of electricity followed the successful synchronization of the Continental Europe power system and the Ukraine/Moldova power system on 16 March 2022 and the welcoming of Ukrenergo as observer member of ENTSO-E on 26 April 2022.

ENTSO-E

<http://www.entsoe.eu/>