



Global Technical Training Services, Inc. Newsletter



The State of the Industry

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According to the Grid Deployment Office, 70% of our nation's transmission lines are more than 25 years old, and many are at the end of their 50 to 80-year lifecycle. Upgrades are needed, and in some areas, are way behind.

Investor-owned utilities have been working on this for years. Since 2019 they have invested over \$70 billion. The Biden Administration has also contributed - \$80 billion with the ***Inflation Reduction Act*** and ***Department of Energy's Grid Resilience & Innovation Partnerships*** program. In fact, capital spending in 2023 for North America's electric, gas, and water utilities was \$205 billion and expected to increase to \$210 billion and \$215 billion in 2024 and 2025, respectively.

These investments will bring changes to the grid, its architecture, and how it operates, gradually decentralizing the power systems, with self-healing components that do not depend on a central communication system to operate. A new architecture doesn't mean a new control room, with more monitoring, and/or more metering. Instead, the grid will have smart devices that perform the work. They will work independently to keep the power on, with the goal of minimizing the duration of, or even eliminating, outages.

In my community, I have already seen some changes with what is called "*the last mile of distribution*" - new cables with higher capacity have been installed, along with stronger, more resilient infrastructure, to support them. Perhaps you have seen this occur in your own area?

I welcome your comments or questions - sid.crouch@gttsi.com

Highlights

Electrical Update for 2024

Virtual Power Plants

Is the NRC A Stumbling Block for a Nuclear Renaissance

Conditions Favorable for a Palisades Restart

Did You Know?

GTTSi Job Board Update



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ELECTRICAL ENERGY UPDATE FOR 2024

According to the U.S. Energy Information Administration, U.S. power consumption will rise to record highs both this year and next, to 4,112 billion kilowatt-hours (*KWh*) in 2024 and 4,123 billion kWh in 2025. Therefore, the question arises: Where and how will this new power be produced? The answer is mainly a combination of solar, wind, and battery storage.

An estimated 470 new solar projects are expected in 2024. This means that new solar generation capacity is expected to double from that built in 2023 and will account for 58% of all new capacity, 36 GW (*gigawatts*) of the overall 62.8 GW expected to be added in 2024.

BESS, or battery energy storage system installations, accounting for 14.3 GW, is second only to the capacity additions in the solar sector. In 2024, 220 new BESS installations are expected. German energy company, RWE added three BESS projects for operation this year, in support of their respective solar operations – Big Star Solar (200 MW) and Bright Arrow Solar (300 MW) in Texas and Mesquite 4 (52.5 MW) in Arizona. Other BESS projects are expected to begin operation this year including the 200MW/400-MWh (megawatt hour) Peregrine Facility in San Diego, California, scheduled for a September start.


Wind generation capacity is expected to grow moderately with an additional 8.2 GW scheduled for 2024. Although the U.S. offshore wind industry has had its ups and downs, the 800-MW Vineyard Wind project, off the coast of

Massachusetts, produced its first power in January and is expected to come online later in 2024.

Other major electricity generation projects expected to enter commercial operation this year includes the second unit of a two-unit expansion project at the Vogtle Nuclear Station in Georgia. Unit 4, like Unit 3, is a 1,100-MW Westinghouse AP1000 reactor that reached initial criticality in February and is expected to begin commercial operation during the 2nd quarter of 2024.

Despite the power need, limited retirement of generation capacity will still occur this year, with 5.2 GW planned for retirement. Approximately 91% of this will be from coal (2.3 GW) and natural gas (2.4 GW).

Over the past two years, more than 22 GW of coal-fired generation has been retired, so 2024's coal retirement is a significant decrease. The 2.3 GW of coal-fired capacity scheduled for retirement is 1.3% of the current coal fleet, comprised of ~200 large-scale coal-fired units with 118 of them at least 40 years old. In 2025, coal retirements are expected to increase, with 10.9 GW expected. Approximately 40%, or about 80.6 gigawatts, of the remaining U.S. coal-fired power plants are scheduled for retirement by the end of 2030.

The 2.4 GW of natural gas fired generators scheduled for retirement in 2024 represent 46% of the expected U.S. capacity retirements in 2024, only 0.5% of the current operating natural gas-fired power plants. 



CAN VIRTUAL POWER PLANTS HELP KEEP THE LIGHTS ON?

With the complexity of energy grids, including concentrated power needs in large urban areas, transmission lines extending across remote rural areas and the rise in renewable energy sources creating the “duck curve,” grid operators are being challenged more and more to supply readily-available and consistent power.

Now the interest in Virtual Power Plants (**VPPs**) is on the rise to help companies understand ongoing and upcoming challenges on the energy grid and be able to resolve them quickly and efficiently.


At its core, a virtual power plant is a network of small-scale energy resources called distributed energy resources (**DERs**), such as rooftop solar, wind generating units, and battery storage systems, interconnected through a sophisticated software platform and coupled with customer usage. This digital infrastructure enables real-time monitoring, control, and optimization of diverse energy assets, effectively creating a “virtual” power plant that operates as a unified and dynamic entity. As published by MIT Technology Review, according to Rudy Shankar, director of Energy Systems Engineering at Lehigh University, “a VPP is a way of ‘stitching together’ a portfolio of resources that can help the grid respond to high energy demand while reducing the energy systems’ carbon footprint.”

One of the key advantages of VPPs is their ability to harness the flexibility and resilience inherent in distributed energy resources. By aggregating and orchestrating these resources,



VPP operators can respond to fluctuations in energy supply and demand, mitigate grid imbalances, and provide critical grid services, such as frequency regulation or voltage support.

The implementation of VPPs is not only transforming the technical aspects of energy management but also reshaping the business models and market dynamics within the energy sector. With VPPs, energy consumers are empowered to actively participate in the energy market by monetizing their DERs and contributing to grid stability through demand response programs and energy trading schemes.

Ruben Llanes is CEO of Silicon Valley VPP pioneer AutoGrid Systems Inc., a software solutions company that aims to “unlock the full potential of distributed energy resources.” Mr. Llanes said in a recent interview, “For a long time, we’ve been developing technology, infusing AI into it, machine learning into it, data science into it, and I feel there is finally this convergence between the capabilities that we’ve developed with the market need... Now is the time to be ambitious.” 

IS THE NRC A STUMBLING BLOCK TO THE NUCLEAR RENAISSANCE

The U.S Nuclear Regulatory Commission (NRC) was created in 1974 for the purpose of ensuring safe use of radioactive materials, while protecting people and the environment. With the cancellation of NuScale Power's small modular reactor project with Utah Associated Municipal Power Systems and a perception that the NRC is inefficient and a burden to nuclear plants today, the question arises: is the NRC a help or hardship for a Nuclear Renaissance?

Several Congress members have indicated that the U.S. NRC has become a stumbling block to the Nuclear Renaissance. The U.S. was the leader in this technology during the 1950s and 1960s, which ultimately resulted in 106 operating commercial nuclear power plants by the 1980s and the export of U.S. nuclear expertise throughout the world. Since that time, however, rising costs, regulatory barriers, and the support for renewable alternatives has contributed to a decline in nuclear power projects. The much-touted Southern Company's Vogtle units 3 and 4 were the first new nuclear construction and operation in 30 years.

The triggering event for the congress sentiment seems to have been when Utah Associated Municipal Power Systems terminated the NuScale project, which was to be the country's first commercial SMR (small modular reactor) project and planned to be fully operational by 2030. This abandonment was a shock to the industry and Congress because NuScale was perceived to be the company paving the way for SMR technology,



since their design was the only SMR certified by the NRC. NuScale was expected to be the most likely company to succeed commercially and instrumental in spreading the technology throughout the world. But this event has dampened the prospects for a nuclear renaissance in the US with the “advanced reactor” designs. Since the vision for a nuclear renaissance has dramatically slowed, combined with the decision to no longer purchase uranium products from Russia or China, and Congress’s belief that the NRC was too stringent in its safety concerns, which they perceived as delaying licensing of “advanced reactor” designs, Congress put together and passed the **ADVANCE (Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy)** Act of 2023.

- This bill sets forth provisions to develop and deploy advanced nuclear fuel for the United States and certain allied countries, restrict the possession or ownership of enriched uranium from Russia or China, clean up hazardous land, and establish related requirements.
- The bill provides incentives for developing and deploying new nuclear technologies, such as reduced licensing fees and prize awards for deploying such technologies. *(continued)*



*Plant Vogtle in Waynesboro, GA
Photo Credit: Southern Nuclear*

It also extends through 2045, the indemnification policy under the Price-Anderson Act that limits liability related to the nuclear industry.

- It requires the Nuclear Regulatory Commission (NRC) to (1) develop a process that enables timely licensing of nuclear production facilities or utilization facilities at brownfield sites, and (2) establish an initiative to enhance preparedness and coordination with respect to the qualification and licensing of advanced nuclear fuel. NRC may hire specialized staff without regard to civil service laws to address its critical licensing or regulatory oversight needs.
- The NRC must also coordinate certain international nuclear activities and may establish an International Nuclear Reactor Export and Innovation Branch within the Office of International Programs. The bill allows certain foreign entities to receive licenses under the Atomic Energy Act of 1954 for nuclear utilization facilities as specified by the bill.
- The bill also allows the Environmental Protection Agency to assist in cleaning up certain abandoned mining sites on tribal lands that are hazardous.

The bill legislation was led by Senate Environment and Public Works (EPW) Committee Ranking Member Shelley Moore Capito (R-W.Va.), Chairman Tom Carper (D-Del.), Sheldon Whitehouse (D-R.I.), and a bipartisan group of their colleagues that “reasserts America’s position as the undisputed international leader for nuclear energy technologies.”

The Atomic Energy Act of 1954 (**Sec. 182**) includes the wording “*adequate protection of the public health and safety*”, and this phrase was used by the AEC (**Atomic Energy Commission**) and the NRC (**Nuclear Regulatory Commission**) for decades as the source of its authority and the basis for all their actions. However, about 12 years ago, as evidenced in the Strategic Plan 2022-2026, the NRC began to use a modified version of this statement - “*reasonable assurance of adequate protection of public health and safety.*” Comparison of these two statements begs the question of does this change conform with the Atomic Energy Act, even today, as it has been modified or revised several times since 1954? Time will tell if the ADVANCE act plays well with the NRC to advance nuclear energy. 🌐



*A Rendering of NuScale Power’s SMR Plant
Photo Credit: NuScale Power*

PALISADES RESTART LOOKS PROMISING

It looks like the next Nuclear Power Plant to be started in the U.S. might just be Palisades Nuclear Plant in Michigan.

In September 2023, Holtec International, owner of Palisades, signed an agreement with Wolverine Power Cooperative, a not-for-profit energy provider, for the purchase of up to two-thirds of the power generated by Palisades should the plant be restarted. Just recently, it was announced that Holtec would receive a \$1.5 billion conditional loan from the Department of Energy's Loan Programs Office (**LPO**) in February for the purpose of restarting Palisades. Assuming the loan occurs, things are in place both politically and regulatorily to allow a Palisades restart. If so, it will be the first time a closed nuclear power plant has been allowed to restart.

The 800-megawatt Palisades Nuclear Power Plant, located just outside South Haven, Michigan, was permanently shut down on May 20, 2022, after more than 50 years of operation. The plant was operated by the Nuclear Management Company and owned by CMS Energy Corporation before it's sale to Entergy in 2007. After owning and operating the plant for 15 years, Entergy had already planned to permanently shut down the plant when their contract to supply power to Consumers Energy expired in May 2022.

Sentiment to restart the plant began with Governor Gretchen Whitmer as she pushed for support from her state lawmakers and the DOE. In May 2023, seventeen members of the state



Palisades Nuclear Plant
Photo Credit: Holtec International

lawmaker's nuclear energy caucus sent a letter to Governor Gretchen Whitmer, thanking her for championing the energy source and promising their "full support and partnership" to offer funding for the plant restart.

When President Biden's administration showed support for low-carbon electricity production from nuclear power plants, Holtec filed for restart with the Nuclear Regulatory Commission (**NRC**) in October 2023, along with their application for an LPO loan. (The LPO said it could not confirm or deny the existence of an applicant as the information is business confidential.)

Funding is only part of the equation. Holtec will need to refuel the plant, hire hundreds of workers as well as nuclear experts, obtain an operating license from the NRC, or find another company capable of obtaining it, and find more buyers for the electricity the plant will produce. But one more giant step has been taken to make the restart of Palisades a reality. 🌐

DID YOU KNOW?



North American Electric Reliability Corporation (**NERC**) recently issued their long-term reliability assessment. They anticipate 83 GW of fossil-fueled and nuclear power plants retiring by the end of 2033. In that same period, they expect 62 GW of solar, 29 GW of gas, 21 GW of BESS (battery energy storage systems), with 5 GW of wind to come online. Since the capacity factors for solar and wind are 25% at best and gas turbines are 57%, the net result would be a loss of greater than 50 GWs. As an example of the vulnerability of renewables, one day in September 2023, Germany's 60 GW wind fleet only produced 2 GW.

Caterpillar, working in collaboration with Microsoft and Ballard Power Systems, demonstrated at a Microsoft Data Center in Cheyenne, Wyoming that hydrogen fuel cells could be used to provide backup power. The demonstration simulated a 48-hour backup power event and validated the system's performance at high elevation, 6,086 feet above sea level, and in below-freezing temperatures. The hydrogen fuel cell was integrated into the data center's electrical system to support critical load. A microgrid controller from Caterpillar was used to operate a pair of Cat Power Grid Stabilization (**PGS**) 1260 battery energy storage systems and a 1.5-MW hydrogen fuel cell.



*Caterpillar Hydrogen Fuel Cell
Photo Credit: Digitalization World*



*LNG Import Vessel
Photo Credit: CeenergyNews*

Germany officials have announced a new plan for meeting the country's electrical needs without nuclear power. Their new strategy is building at least 10 GW of new gas-fired power plants with plans for these plants to eventually burn hydrogen between 2035-2040. Despite the loss of natural gas imports from Russia after that country's invasion of Ukraine, they have managed to offset this loss with imported LNG from other sources, with most of it coming from the U.S. They have also built new terminals and infrastructure to support the import of LNG for the future.

MARCH 2024

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GTTSi Job Board

GTTSi has been providing professional services to the energy and nuclear industry since 1980. We are an MWBE (*minority woman-owned business enterprise*) and have served over 80% of the US commercial nuclear facilities, 8 Federal agencies and prime contractors, and one foreign government. If you are qualified and interested in any of the job opportunities listed below, please contact us at ginfo@gttsi.com or call **864.882.3111**.



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