MAY 2023

GTTSi

Global Technical Training Services, Inc. Newsletter

The State of the Industry

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Have you heard about the ADVANCE (Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy) Act? It's a bipartisan measure that would hasten the rollout of America's newest fleet of nuclear power reactors. Dare we say, "Nuclear Renaissance"? You remember the 2000's when construction began for two dual-unit AP 1000 plants (***Westinghouse design***) at Vogtle 3 & 4 and V.C. Summer 2 & 3. More orders were expected, but construction delays, cost increases, Westinghouse's bankruptcy declaration, abandonment of the V.C. Summer project, and low natural gas prices brought the U.S. "nuclear renaissance" to a halt. Southern Company, under the visionary leadership of their CEO, Thomas Fanning, continued, and today Unit 3 is operating at 50% and Unit 4 is in "hot functional testing". Many experts see the demand for nuclear in the U.S. increasing, not only from the utilities, but also from industrial companies. Senator Shelley Capito, along with her colleagues John Barrasso and Cory Booker, are promoting the *Advance Act* for passage through the Senate. Whether or not advanced nuclear reactors will be built in large numbers remains to be seen, but the federal government is working to support such an eventuality. Two small modular reactor (***SMR***) designs are at the forefront - NuScale Power's VOYGR SMR and GE Hitachi's BWRX-300 SMR. In fact, the NRC just approved the NuScale design in January. Finding a way for nuclear projects to obtain cost and schedule certainty is critical. Unless that happens, this "nuclear renaissance" is likely to fail…just like the past one.

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

Highlights

As Coal-Fired Plants Shutdown, What Happens to the Jobs?

Climate Goals Jeopardized by China's Coal-Fired Increases

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Did You Know?

GTTSi Job Board Update

Minority and Woman-Owned MWBE Business Enterprise

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AS COAL-FIRED PLANTS SHUTDOWN, WHAT HAPPENS TO THE JOBS?

Hunter Plant is a coal-fired power plant in Emery County, Utah. Built by Utah Power & Light (now Rocky Mountain Power), it was named for former company President E. Allan Hunter. The first unit began operation in 1978 and the next two within 5 years. The three units have a combined generating capacity of 1,320 megawatts.

The big question for many local communities is what happens to the jobs that our coal-fired power plants provide when they are shut down and terminated? Most of the communities where these plants are located have a long relationship with the power plant and the companies that own and operate them.

In Utah we have one example of how Rocky Mountain Power has tackled this issue. Rocky Mountain Power has two coal-fired stations scheduled for closure by 2032 – Huntington (***Unit 1-542 MW; Unit 2 – 496 MW***) and Hunter (***Unit 1- 525 MW; Unit 2 – 525 MW; Unit 3 – 527 MW***). Both are located in Emery County and account for more than 300 jobs.

Talk of decommissioning these plants began in 2018, when the markets began to shift from fossil fuels. However, acceleration of plans bumped up their expected closure by as much as 10 years in the case of the Hunter plant.

Rocky Mountain Power said it doesn't plan on leaving those employees out in the cold. They plan to make arrangements for employees who want to stay with the company, to retrain and redeploy at other facilities in their service area. They will be releasing a "community action plan" next year and expect to be training employees on new technologies by 2027.

Hunter Plant
Photo Credit: PacifiCorp

Rocky Mountain Power's long-range plans anticipate a need for two new nuclear-powered facilities within the next 10 years and the two coal-fired plant sites have been identified as possible locations since transmission interconnections are already there. The nuclear plans hinge on the success of the Terra Power plant planned in Wyoming scheduled to come online in 2029.

Local leaders are cautiously optimistic about the future. "We're a small community that's very close and we like to have our kids be able to retain jobs here and stay here in the area. Family and community is very important to us and so it concerns us when there's going to be such a big change," said Ferron City Mayor Adele Justice. Other local leaders see the impending closures and transition to nuclear power as a massive opportunity for the region to continue to supply jobs for years to come.

The first phase of closures at the Hunter plant is expected in 2031. Rocky Mountain Power said it will engage with local communities before selecting the final sites for Utah's future nuclear facilities.

CLIMATE GOALS JEOPARDIZED BY CHINA'S COAL-FIRED INCREASES

In September of 2021 China suffered a wave of blackouts due to coal supply shortages, cutting off electricity to thousands of homes and factories. In 2022, a long drought caused a dramatic drop in hydropower production resulting in rationing of electricity in China. And now in 2023 they have rescinded their "zero-COVID" policy and are trying to rejuvenate their economy, alleviate their electricity shortages by bringing on a surge of coal-fired power plants along with renewables. They are permitting two new coal-fired power plants every week.

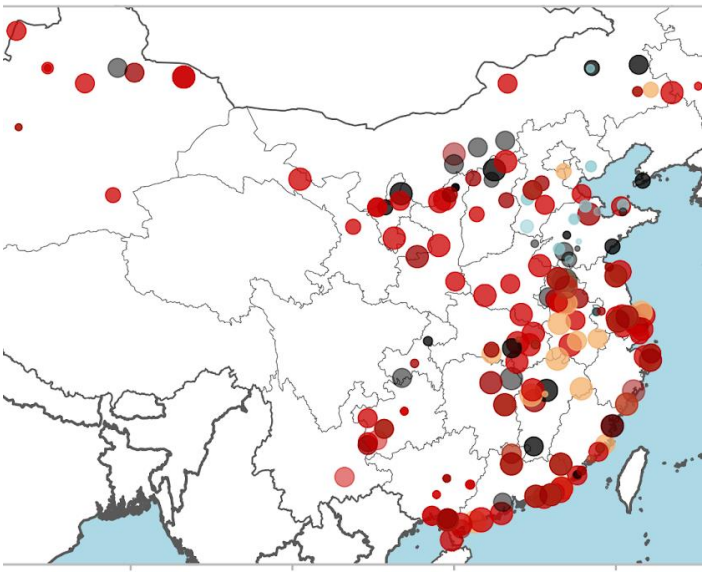
Late 2022, China approved the construction of an additional 168 coal-fired plants to provide 106 GW (gigawatts) of coal-fired capacity - six times more than all of the rest of the world combined.

Despite global promises to phase down coal-fired capacity the global coal fleet grew by 19.5 GW or 1% in 2022, and China was a major contributor. Meanwhile, the U.S. is retiring coal-fired capacity - nearly 12 GW in 2022 alone, with another 10 GW to be phased out by 2028. Between 2011 to 2020, 68% of the total U.S. coal-fired capacity was retired.

While we race toward an energy transition policy that follows in the footsteps of Europe, where heavy industries and manufacturing are shutting down as energy costs become too much for the businesses to bear, there is a growing concern that the U.S. will become uncompetitive with the Chinese industrial might.

President Xi has pledged that China will reduce its coal consumption in the 2026–30 period. But since China's power system remains dependent on coal power capacity and they continue to increase their coal-fired capacity, this seems doubtful.

Environmentalists fear the pressure for China to make use of their newly built coal power plants will lead to moderation or even abandonment of China's clean energy buildout, and result in a major increase in China's CO_2 emissions over this decade, undermining the global climate efforts. This belief is reinforced by China's coal-fired retirement slow down – only 4.1 GW of coal-fired capacity closed down in 2022, compared with 5.2 GW in 2021. In fact, their policies have been revised to keep the small and inefficient plants operating – justified as either back-up or in some cases as normal operation, due to their retrofit.



The map above shows new and retired coal power projects in China. Gray is commissioned. The plentiful reds are new projects or where construction has started. Yellow is permitted, while the few light blue show retired plants.

Photo Credit: Centre for Research on Energy and Clean Air

THE IMPACT OF SOLAR AND WIND ON GRID RELIABILITY

NERC (*North American Reliability Council*) and major interconnection electrical companies recently met to discuss issues being faced with connecting solar and wind power plants to the grid and operating them reliably.

The rapid deployment of these inverter-based resources has exposed several shortcomings in the standards and processes that our electrical industry has relied upon for decades. The most prominent of these operational shortfalls occur during grid disturbances, which have increased in occurrence and magnitude since 2015.

The challenges surrounding inverter-based resources are not due to technology shortcomings, but rather the "shortcomings of processes and the lack of harmonized comprehensive standards" that can be applied during the interconnection process and then throughout the project's lifecycle.

"The lack of uniformity, clarity, consistency, enforcement, and detail in interconnection requirements and processes has led to unreliable operation of inverter-based resources that are connected to the bulk power system and the widespread abnormal performance of these resources during grid disturbances," as reported by PowerGrid International. The rapid integration of bulk power system-connected inverter-based resources ranks as the most significant grid transformation driver across North America.

A few years ago, when inverter-based resources made up a relatively small share of the generation mix, the approach was that those resources should generate energy during normal operation and then get out of the way during grid disturbances. This strategy is no longer acceptable under rapidly increasing penetrations of inverter-based resources on the North American grid. "It is imperative that these controls be configured in a way that supports grid reliability."

Also intertwined with this control is cyber security. An increasing amount of generation is slipping through the cracks as they are not subject to NERC Critical Infrastructure Protection (*CIP*) standards.

One specific area of concern is DERs (*Distributed Energy Resources are small-scale energy resources usually situated near sites of electricity use, such as rooftop solar panels and battery storage. Their rapid expansion is transforming not only the way electricity is generated, but also how it is traded, delivered, and consumed*). The growing level of DERs and DER Aggregators (*Aggregators bundle DERs to engage as a single entity – a virtual power plant – in power or service markets*) are often connected directly to the internet and the grid, and as unregistered inverter-based resources they are not subject to the NERC CIP Standards.

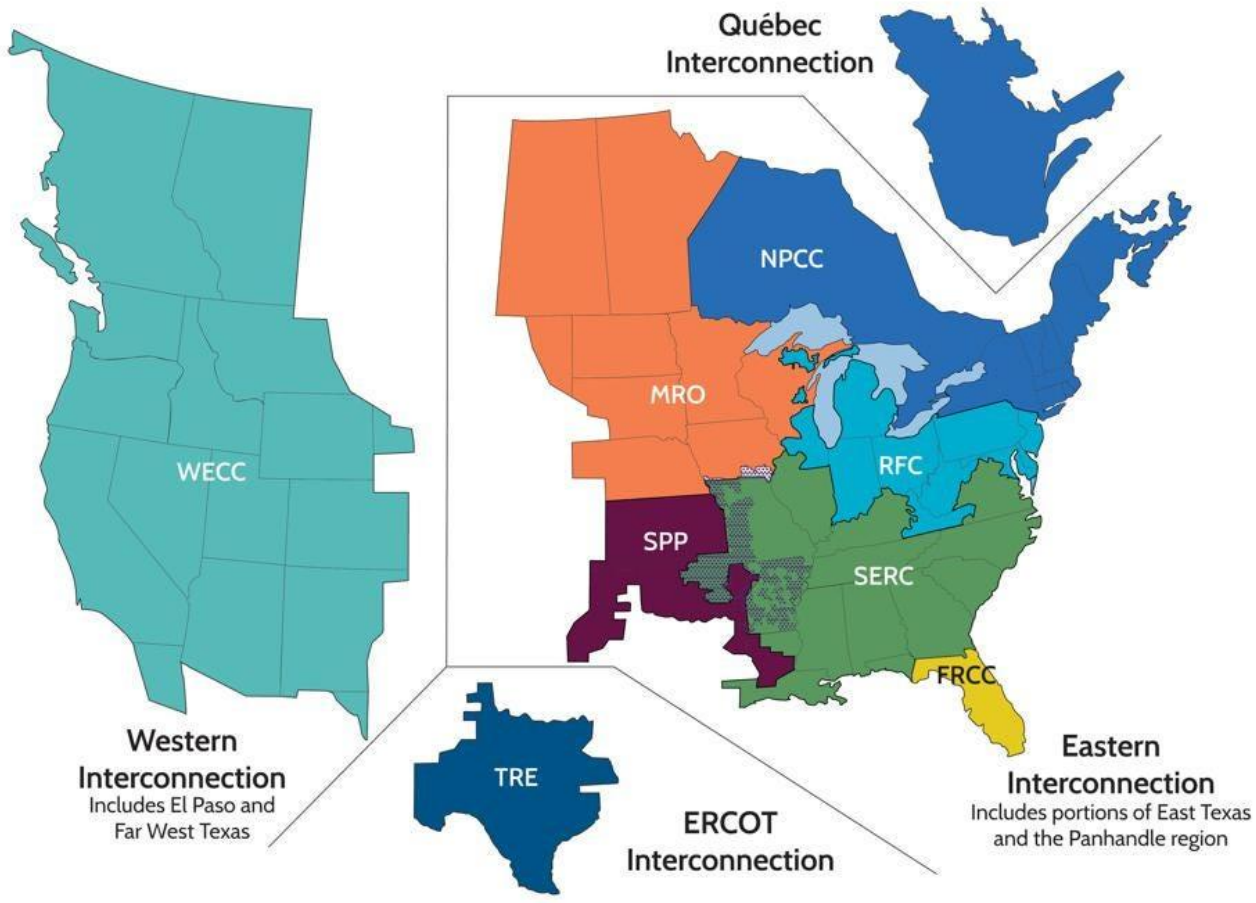
Non-compliance is generally only identified after a major reportable event occurs rather than proactively through auditing and study practices. NERC said that the current interconnection process limits their ability to assure grid reliability to a date no earlier than the facility's commercial in-service date. Therefore, requirements must be updated to ensure that the interconnection customer complies with performance and modeling requirements throughout the process, or else face "explicit corrective actions."

We also have a lack of equipment standards. While IEEE 2800-2022 outlines minimum performance specifications based on inverter-based resource capabilities, the standard by itself is not sufficient to address ongoing reliability risks. We can no longer “grandfather” existing facilities but as a minimum require everyone to implement the IEEE standard to reduce systemic risks posed to grid reliability. No commissioning requirements currently exist within NERC’s reliability standards for newly interconnection resources, and a number of situations have arisen in which the facility as commissioned did not match the model that was used during the interconnection process. These discrepancies leave the system subject to unexpected or abnormal performance issues and have been illustrated “numerous times” in NERC disturbance reports.

Requirements must be updated to ensure that the interconnection customer complies with performance and modeling requirements throughout the process, or else face “explicit corrective actions”.

As a result, NERC plans to strengthen its advocacy on this issue, particularly with state regulators and the National Association of Regulatory Utility Commissioners. NERC also submitted a work plan to FERC (*Federal Energy Reliability Commission*) in a bid to “more comprehensively” address registration of inverter-based resources.

Let’s hope they act swiftly as the surge of solar and wind power plants continues and our grid reliability is vital to not only homes and businesses, but most importantly to our national security.



Map OF NERC Reliability Regions within the Four North American Interconnections

Photo Credit: NERC.com

GERMANY'S NUCLEAR PHASE-OUT PASSES THE BALL TO RENEWABLES

Following the loss of Russia as a trade partner, Germany along with Europe had an energy crisis on their hands due to the loss of natural gas supply from Russia. However, Germany was able to restructure their gas supply and have moved forward with their phase-out plans for nuclear.

The era of nuclear power in Germany ended on April 15th, despite 57% of the population wanting nuclear to still be part of their energy mix. Minister Steffi Lamke stressed that the nuclear phase-out will not endanger the power supply security in Germany or other neighboring countries, arguing that ending nuclear power will ultimately make Germany a safer place.

The three remaining nuclear plants in Germany, Isar 2 and Neckarwestheim 2 in southern Germany and Emsland in the north, were shut down for good, following the three-month extension that was granted due to the European energy crisis.

Germany's nuclear exit was originally planned for the end of 2022, but the war in Ukraine and its repercussions led parliament and chancellor Olaf Scholz to extend operation of the three remaining nuclear units for a limited 3-month runtime to support the power system and allow Germany and its neighboring countries to ensure supply security.

Minister Steffi Lamke expects it will take several decades to fully dismantle their 30+ nuclear plants and determine a long-term nuclear waste storage solution. She said nuclear power has been used in Germany for 60 years and it's now clear that it is "a high-risk technology that ultimately cannot be fully controlled". She added that three generations have benefitted from nuclear power, but about 30,000 generations will be affected by the ongoing presence of nuclear waste, and finding a final repository, especially for highly radioactive waste, will now be "a very difficult but unavoidable" task.

The German Renewable Energy Federation (***BEE***) commented that the nuclear exit's completion is a step that is both "feasible and necessary" from the energy industry's perspective. Beyond the immediate risk of nuclear accidents, new plants simply could not compete economically with renewable power and are too inflexible in their use to serve as a capacity backup to iron out fluctuations in renewable power generation. BEE head Simone Peter said, "Nuclear power has become expendable and that's good news. Renewable power will take it from here."

DID YOU KNOW?

Photo Credit: Last Energy

Last Energy, a U.S.-based commercial developer of nuclear power plants, recently secured power purchase agreements for 34 PWR-20 small modular reactor units with four industrial partners in the UK and Poland. The deal is estimated to be worth $18.9B in power sales and will mark “the largest pipeline of new nuclear power plants under development in the world”. The PWR-20 is a 20 MWe (***60 MWt***) single-loop pressurized water reactor (***PWR)*** with modular design. The reactor uses standard full-length PWR fuel enriched to 4.95% and closed-cycle air cooling. The power plant modules will be built off-site and assembled in modules onsite. Last Energy says their reactor could be assembled within 24 months of the final investment decision and has a lifetime of 42 years.

Electric, gas, and water smart meters have revolutionized today’s utility operations. Smart electric meters can provide reliable indication of the power consumption at a specific time interval which enables energy companies to match the electrical demand and adjust the supply sources to give customer’s the best bang for the buck. The smart electric meters use a web-based monitoring system that creates two-way communication between the customer’s meter and the utility. They take automatic readings of residential, commercial, or industrial electricity usage and relay that information wirelessly to the energy supplier. In some cases, these meters can help analyze for energy usage trends during peak and off-peak hours, which can be used to help predict future usage. The expansion and development of commercial facilities are the main driver of the growth of the smart meter market for the commercial sector. Since smart meters can provide detailed, real-time data on energy usage, businesses can track consumption and identify patterns and areas for improvement. By managing energy usage more effectively, businesses can reduce their energy costs and improve their bottom line.

Photo Credit: NS Energy

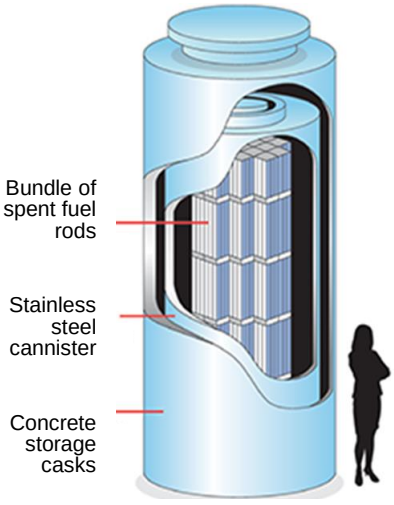


Photo Credit: Sprott.com

The United States has over 85,000 metric tons of nuclear waste in the form of spent nuclear fuel from commercial nuclear power plants. While most people think of Yucca Mountain as the storage facility, Yucca Mountain is not yet active; most of the waste for which the Yucca Mountain repository was designed, is safely and securely stored at 76 reactor sites across the nation. After spending a year or more in a cooling pond, spent fuel rods are moved to storage casks. The casks are then sealed in steel cylinders and embedded in concrete or more steel for long term storage. Casks are designed to withstand accidents, water immersion, impact, punctures, and fires. Over the last 60 years, more than 2500 cask shipments of spent fuel have been transported with no radiation releases and with no harm to the public.

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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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- Electrical Engineer – Turbine Experience – Vogtle 3 & 4
- Mechanical Engineer – Turbine Experience – Vogtle # & 4
- GIS Professional – Juno Beach, FL
- Engineer / Project Manager – Solar Farm – Hybrid/Remote - Florida

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