



Global Technical Training Services, Inc. Newsletter



The State of the Industry

Sid Crouch, GTTSi Chief Technical Consultant

Today, the biggest risk for the nation's transition to renewables is our electric grid. Due to the age of our grid's transmission infrastructure, bringing on renewables is not as easy as one might think. It requires evaluation – what will be the effect of this new power source to grid congestion and the transmission line's capacity? Therefore, its interconnection queue must be examined and studied by the grid operator, to determine the specific transmission infrastructure upgrade(s) needed. This takes time. In addition, cost for the upgrade(s) must be paid by the developer – often resulting in delay or abandonment, unless it was factored into the project costs from the get-go. But based on past results - it hasn't. Today, there is a backlog for new projects, due to the number of interconnection applications "in the queue". This backlog has delayed the application process by years - the average timeframe is over 2 years. This delay often results in additional costs, due to changes in material costs, shipping costs, labor costs, codes and/or regulations. Passage of the IRA (**Inflation Reduction Act**) didn't help. The incentives provided by its passage resulted in an onslaught of interconnection queue applications. Despite the favorable actions directed to increase our transition to renewables, we will most likely see ~80% of these renewable projects suspended.

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

Highlights

Saltwater Intrusion in the Mississippi River

GTTSi Team Member Highlight: Earl Hamil

A 400-Year Battery in our Future?

EPA's New Standards Threaten Grid Stability

Did You Know?

GTTSi Job Board Update

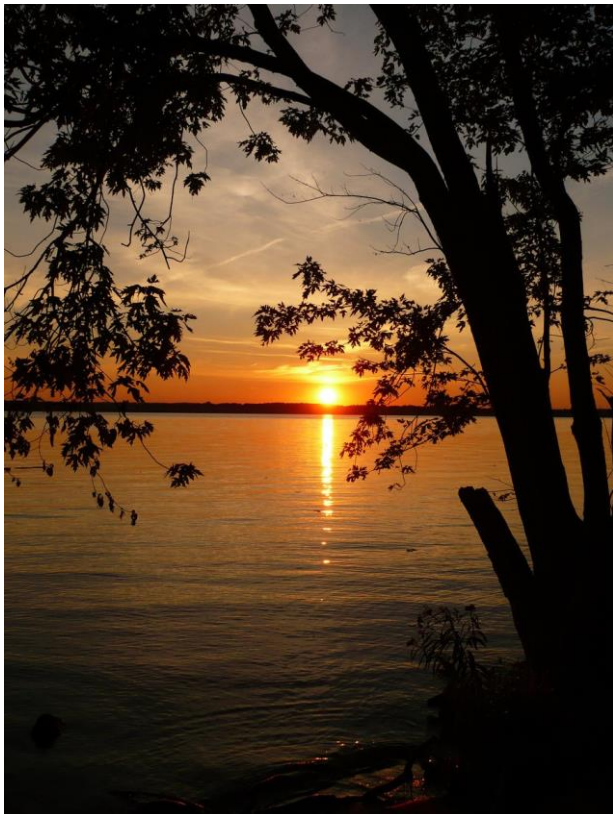


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SALTWATER INTRUSION PUTS THE MIGHTY MISSISSIPPI IN DISTRESS

The Mississippi River is a U.S. treasure with everyone from nature enthusiasts to Mark Twain's Tom Sawyer and Huckleberry Finn enjoying its scenic beauty. In addition, over eighteen million people use the Mississippi River Watershed for their water supply. Only Africa's Nile, South America's Amazon, and Asia's Yangtze Rivers are longer than the Mississippi-Missouri River combination. Now the Mighty Mississippi is facing its biggest challenges as salt water contaminates the freshwater supply.

The nation's water system has always been able to supply our needs...providing safe, reliable, cheap drinking water to hundreds of millions of people, cooling water for most of our electrical generation plants, and



Sunset on the Mississippi



The I40 Bridge Across the Mississippi River

contributing to our nation's hydropower, agricultural needs, wastewater management, flood control, and many other industries such as oil, gas, and mining. But today that complex system is in distress due to many factors - a growing population, aging infrastructure, extreme weather patterns, and regulatory failures. One of these problems is affecting the Mississippi River as salt water from the Gulf of Mexico is migrating into the Mississippi River due to the river's low water levels and flow rate. This was triggered by two years of summer's blistering heat and low rainfall over major parts of the central U.S.

In July, the U.S. Army Corps of Engineers constructed an underwater barrier to create an artificial basin for the purpose of delaying the intrusion. This involved dredging sediment from the bottom of the river and piling it up to create what is known as a sill, which acts like a dam for the denser saltwater in the lower levels of the river. *(continued)*

Since then, flow of water from the Gulf has topped the sill's elevation necessitating additional work. Plaquemines Parish, a parish in Louisiana with a population of over 20,000, is already feeling the impact. A look at their government website, plaqueminesparish.com reveals a header starting with "SALTWATER INTRUSION UPDATES..." The parish has a drinking water advisory in place from Empire Bridge to Venice on the west bank and Phoenix to Bohemia on the river's east bank because of the high salt levels in the drinking water at their Boothville Water Treatment Plant.

If salt water continues to move upstream, additional communities along the river will be impacted including New Orleans. This could also affect several power plants located on the Mississippi in Louisiana: Big Cajun 1&2, Waterford Nuclear Plant, and River Bend Nuclear Plant.


Based on current estimates of the saltwater migration by the U.S. Army Corps of Engineers the saltwater is not likely to affect parishes upriver until mid-to late October, including St. Bernard, Orleans, and Jefferson Parishes. By late October, the salt water could reach West Jefferson.

According to Louisiana Governor, John Bel Edwards, the Mississippi River is expected to reach "historic lows over the next several weeks." The governor requested a federal emergency declaration for four parishes already affected or expected to be impacted over the next month. The declaration allows city agencies to prepare and respond to any impacts and allows the state and federal agencies to deploy resources as needed for a more streamlined process.



A Barge In the Mississippi River

The U.S. Army Corps of Engineers is shipping in millions of gallons of fresh water daily to the lower Mississippi River near New Orleans to keep the New Orleans water supply salt free. In addition, to help mitigate the intrusion, the state and the Army Corps of Engineers are working to add twenty-five feet of height to the 1,500-foot-wide underwater sill created earlier in the year.

Typically, enough rainfall upstream keeps saltwater at bay, but conditions over the past two summers and the current forecast do not show relief any time soon. 

GTTSi HIGHLIGHT: EARL HAMIL AND THE LAKE CONESTEE DAM RESTORATION PROJECT

Meet GTTSi's Principal Consultant Earl Hamil, the first member of the Independent Design Review Board working with the Lake Conestee Dam Restoration Project (**LCDRP**).

Lake Conestee Dam impounds the Reedy River to form Lake Conestee near Greenville, South Carolina. Constructed in 1892, this stone-masonry dam had a 50-year life expectancy to provide power for the Reedy River Factory, later called Conestee Mill. The reservoir created by this dam, originally ~135 acres, is now filled with 2.5-3.25 million cubic yards of contaminated sediment. Contaminants originated from industries upstream from the time the dam was built until the passage of the Clean Water Act in 1972. Sediment has since capped the contaminants in place.

The SCDHEC Dam Safety Program rated the Lake Conestee Dam in "Poor" condition in 2016 per definitions used for reporting to the U.S. Army Corps of Engineers. The Lake Conestee Dam Restoration Project, LLC, owner of the dam, recognizes the dam is vulnerable based upon its construction, age, and condition. A dam breach would result in a release of contaminants with potentially grave environmental impacts such as degradation of recreation and natural resources, impact to public and private economic resources, and elevated ecological and human health risks.



*Lake Conestee Dam in South Carolina
Photo Credit: Earl Hamil*




*Lake Conestee
Dam Restoration
Project
Independent
Design Review
Board Member
Earl Hamil*

Today, a 3-year plan, funded by the state and local stakeholders for >\$45 million, is underway to prevent the 130-year-old Conestee Dam from breach. This plan includes a new dam to be built downstream of the original dam, designed to meet modern engineering standards and expected to last well into the next century. The schedule has the new dam in place by fall of 2026.

As a member of the LCDRP Independent Design Review Board, Earl Hamil brings 50 years of engineering, procurement, and construction experience in the energy sector to the project. He has contributed to >150 capital projects on 4 continents, including CC and SC gas generation plants, aeroderivative gas turbines, hydroelectric power, pumped storage, LNG, chemicals and refineries, and desalination projects. His experience includes 20 years with contractors including Bechtel, Stone & Webster, and Fluor, 14 years with GE, 9 years as an owner (**Dominion Resources**), and 7 years as a Senior Consultant.

Earl holds a BS in Mechanical Engineering from RIT, is a Registered Engineer, and holds US Patent 7861532 for HRSG hot purging.

GTTSi is proud to be a part of this historic project, and our participation is made possible by working with technical experts like Earl Hamil.

Check us out at www.gttsi.com or on LinkedIn at www.linkedin.com/company/gttsi. 

CAN A 400-YEAR BATTERY BE IN OUR FUTURE?

Seven years ago, a doctoral student at the University of California at Irvine, Mya Le Thai, accidentally discovered that if she used a gold nanowire in an electrolyte gel, rather than lithium, she could extend the nano-battery life increasing its charging cycles.

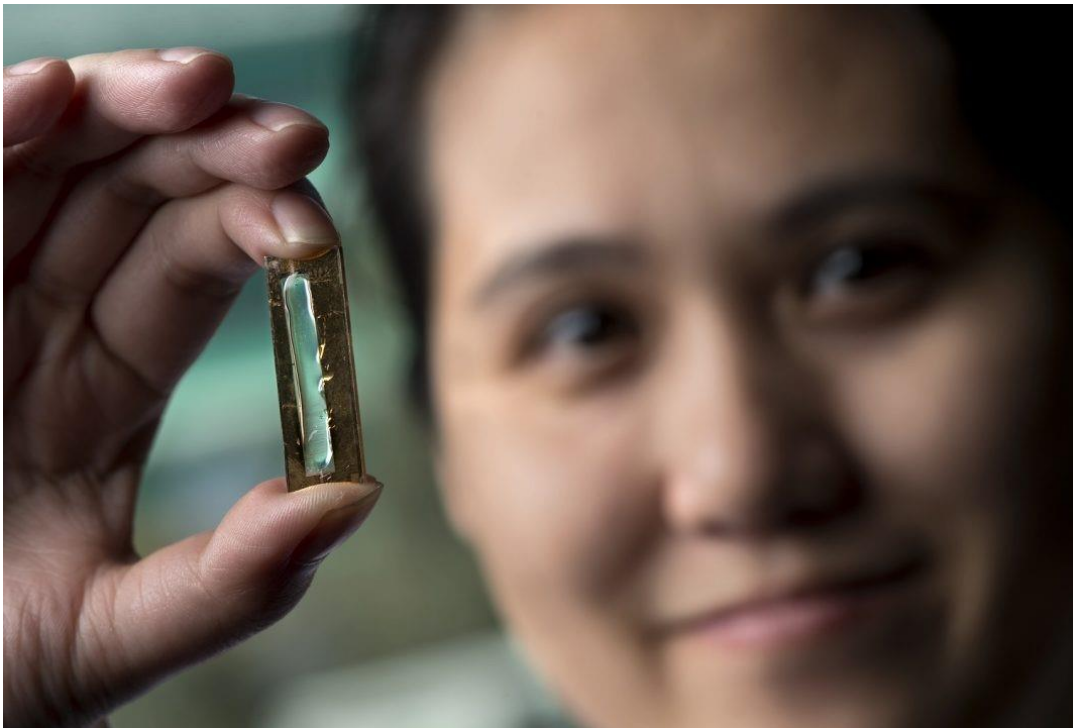
Note: A battery charging cycle is when the battery goes from fully charged to entirely depleted and back to fully charged.

As time, patience, and perseverance can accomplish all things, UCI researchers continued with their nanowire experimentation, but it seemed to result in a common problem - the delicate nanowires would gradually deteriorate and fracture after numerous charging cycles.

But Mya Le Thai, on a hunch, decided to coat

the nanowires with manganese dioxide and an electrolyte gel reminiscent of Plexiglas. The result was absolutely amazing. When she started cycling these gel capacitors, they surpassed all previous charging cycles. Withing a month it had gone past 30,000 charging cycles.

Now, after three months this nanobattery has made it through 200,000 charging cycles. That would extend the life of the average laptop computer by ~400 years, well past its usefulness assuming technology continues its progression at its ever-increasing acceleration rate. The revelation is simply astonishing since the average laptop computer can endure only several hundred charging cycles. This could result in our laptops and smartphones lasting longer and maybe fewer lithium-ion batteries piling up in landfills.



Researcher Mya Le Thai
Photo Credit: Electronic Products

EPA'S NEW STANDARDS THREATEN GRID STABILITY

Texas has struggled this summer to keep the lights on due to the deepening of the Duck Curve (**September 13, 2023, Blog Article**), because after 8pm, solar and wind generation are near zero, if not at zero.


Although those challenges were overcome, Texas, as well as everyone else, is going to have to tackle further challenges brought about by the EPA's proposed New Source Performance Standards. These standards include the Coal Combustion Residuals (**CCR**) Rule, the Greenhouse Gas Rule, the Good Neighbor Rule, the Mercury & Air Toxics Standard Rule, and the Texas Regional Haze Federal Implementation Plan.

- The Coal Combustion Residuals Rule regulates CCR disposal at inactive generating units and establishes groundwater monitoring, corrective action, closure, and post-closure care requirements.
- The Greenhouse Gas Rule proposes significantly lower CO₂ emissions for coal and gas units.
- The Good Neighbor Rule lowers state-level NO_x emissions for coal and gas units to mitigate pollutants to downwind states.
- The Mercury and Air Toxics Standard Rule proposes particulate matter emissions standards for coal-fired generators and mercury emissions standards for lignite-fired generators.
- The Texas Regional Haze Federal Implementation Plan proposes new limits on SO₂ and particulate matter emissions to meet air visibility requirements at national parks and wilderness areas.

These new standards are designed to eliminate coal-fired power plant generation and limit natural-gas fired power plant generation by 2040. With the deadline just 7 years away, compliance would require no new coal-fired plant construction and limit gas-fired construction.

The EPA is not just proposing new regulations designed to meet more stringent clean air standards with fines if the criteria are not met. Instead, they are imposing emission targets that are not achievable and will result in the shutdown of coal-fired power plants and many natural gas-fired power plants. All this threatens the reliability and resilience of our national grid. Implementation of these rules starts in 2024. Therefore, it will have immediate impact on baseload generation and result in blackouts and brownouts in the near term.

Bringing online enough renewables and energy storage systems to offset the losses of the coal and natural gas fired power plants that will be impacted is not possible (**See *interconnection queues – State of the Industry-November & June. June Newsletter Article “Renewable Power Available but Nowhere to Go”***) So ERCOT, the Texas PUC, and a coalition of grid operators are planning to sue the EPA to stop these regulations from destabilizing every power grid in the United States.

This fight will most likely go to the Supreme Court. Hopefully, as has been done in the past, the Supreme Court will rule that the EPA has overreached its authority. In the meantime, these pending rules threaten the viability of our power grids. If baseload is dramatically affected before this issue gets resolved, and when wind and solar can no longer support the demand, the U.S. may be in the dark. 

DID YOU KNOW?



Grand River Energy Center in Oklahoma
Photo Credit: GRDA

The Grand River Energy Center in Chouteau, Oklahoma is installing its 2nd Mitsubishi advanced-class gas turbine for the Grand River Dam Authority (**GRDA**). This 500 MW turbine will be the 1st M501JAC gas turbine to operate simple cycle in the U.S., meeting the needs of GRDA's evolving electricity grid and replacing the last remaining coal-fired unit at the Grand River Energy Center. In 2017 Mitsubishi Power Americas replaced one of GRDA's coal-fired units with a 500-MW combined-cycle turbine. The new turbine will operate on blends of hydrogen and natural gas and Mitsubishi said the testing with a hydrogen blend has provided a 10% reduction in greenhouse gas emissions. Construction is slated to begin in January 2024 with expectations of it being operational by April 2026.

The first new reactor to be fabricated and constructed at the Idaho National Laboratory (**INL**) in over 40 years will be the MARVEL microreactor. Since the project has reached 90% of its final design, the DOE indicated that INL can move forward with its fabrication and construction. The MARVEL microreactor is a sodium-potassium cooled reactor that will generate 85 kilowatts of thermal energy. A full-scale electric powered prototype is being tested in Pennsylvania to verify the performance of its sodium-potassium cooling system. The microreactor will be located inside the Transient Reactor Test Facility at INL. One-hundred percent of the design is needed for it to be cleared for operation, expected by the end of 2024, but with the achievement of 90% design, INL can award contracts and proceed forward. Later this year, INL will work to purchase fuel for the microreactor, which will use a version of TRIGA fuel that is similar to that used in university research reactors across the country. *Photo Credit: Department of Energy*



MARVEL



Photo Credit: Jongho Shin

Seven regional hubs (**Appalachia, California, Midwest, Gulf Coast, Heartland, Mid-Atlantic, and Pacific Northwest**) will be vying for a part of a \$7 billion award from the DOE planned to kickstart a national clean hydrogen network. The awards will be based on technical merit, financial and market viability, proposed speed of deployment, project management, and community benefits. These seven hubs could produce more than 3 million metric tons of "clean hydrogen" per year, achieving nearly a third of the U.S.'s 2030 clean hydrogen production goal. The DOE said "clean hydrogen" refers to "hydrogen produced through electrolysis—separating liquid water into hydrogen—using renewable or low-carbon emissions energy sources, such as wind, solar, or nuclear. Clean hydrogen can also refer to hydrogen produced using steam methane reforming with carbon capture and permanent storage (**CCS**) technologies that reduce greenhouse gas emissions."

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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, or other positions in the Energy sector, please visit our website or contact us at ginfo@gttsi.com or call **864.882.3111**.



- **Mechanical Engineer -Hot Harsh Environments / CFD -Remote**
- **Transmission Line Principal Engineer -Juno Beach, FL**
- **Interconnection Electrical Support Engineer -Remote**
- **Senior Substation Engineer -Remote**
- **Nuclear Reactor Engineering Team Lead -Midwest**
- **Battery Storage Engineer**
- **Electrical/I&C Engineer -Baxley, GA**
- **Digital Design Engineer -Baxley, GA**
- **PWR SRO Instructor -Simulator Floor Qualified -Southeast**

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