



GTTSi
 Minority Woman-Owned Business

Serving the Nuclear Energy Industry since 1980

July 2021

**July 2021
 Newsletter**



Individual Highlights:

- Airborne LiDAR - Power Transmission Line Inspection pg#2
- NHEC / ENGIE BESS Project – Largest Battery in New Hampshire pg#3
- Could this Hydrogen Engine Eliminate Fuel Cells and Fossil Fuels? pg#4
- International Space Station Upgrades Power Source – Solar Arrays pg#5
- Did You Know? pg#6
- Vogtle Expansion Project Braces for More Delay & Increased Costs pg#7
- Texas Overhauls ERCOT's Power Grid Governance pg#8

Global Technical Training Services, Inc.

807 Bypass 123 – Suite 31
 Seneca, South Carolina 29678

Telephone: 864.882.3111

Email: ginfo@gttsi.com



🌐 Clay Schile, Vice-President

🌐 Kaye Browder, Technical Staffing Manager

🌐 Chrissy Mulay, Technical Staffing Specialist

🌐 Jackie Pate, Administration

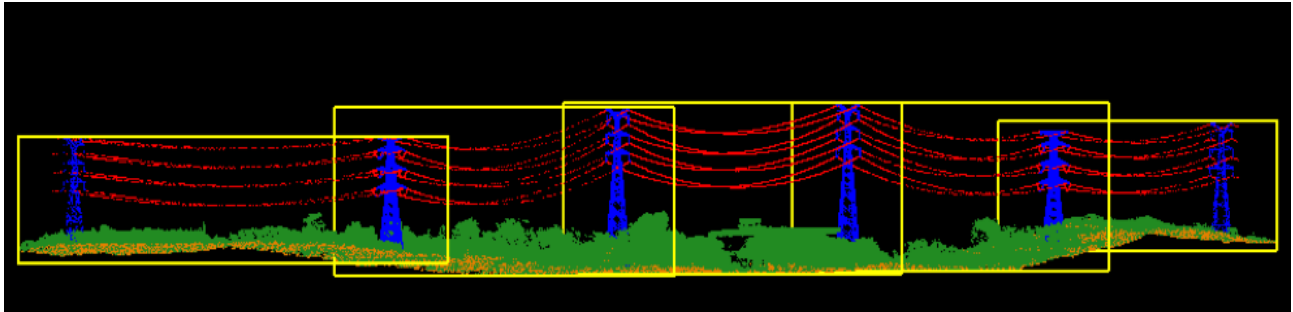
🌐 Sid Crouch, Chief Technical Consultant

🌐 Ken Schaaf, NRC Exam Developer



We the people of these United States, in order to form a more perfect Union, establish Justice, ensure domestic Tranquility, provide for the common Defense, promote general Welfare, and secure the Blessing of Liberty to ourselves and our Prosperity, do ordain and establish this Constitution for the United States of America.

Airborne LiDAR – Power Transmission Line Inspection



“Routine inspection of power transmission lines is critical for securing uninterrupted distribution of electricity. Traditionally, this has been accomplished with ground-based inspection teams and methods that are very labor-intensive and time-consuming. In addition, calculating the distance between the sag of the transmission line and its proximity with some other object, such as a tree, often involves heavy equipment such as height measuring rods and/or theodolites. But today, utilities are using Airborne LiDAR for power transmission line inspection.”

Recently, utilities are using Airborne LiDAR for power transmission line inspection. LiDAR is an abbreviation for Light Detection and Ranging – a remote sensing method used to examine the surface of the Earth by using light in the form of a pulsed laser to measure variable distances to the Earth.

Airborne LiDAR is a dynamic, polar, and active multi-sensor system. Like radar, LiDAR is an active remote sensing technology but instead of using radio or microwaves it uses light. The LiDAR sensors work by emitting numerous narrow beams of near-infrared light with circular/elliptical cross sections, these beams reflect off the objects in their trajectories and return to the detector of the LiDAR sensor (*pictured below*).



Airborne LiDAR sensors are installed on a helicopter or drone for collecting data. Once

activated, the Airborne LiDAR sensor emits light towards the ground surface, which returns to the sensor immediately after hitting an object, giving an exact measurement of its distance.

Routine inspection of power transmission lines is critical for securing uninterrupted distribution of electricity. Traditionally, this has been accomplished with ground-based inspection teams and methods that are very labor-intensive and time-consuming. In addition, calculating the distance between the sag of the transmission line and its proximity with some other object, such as a tree, often involves heavy equipment such as height measuring rods and/or theodolites (*pictured below*).



This is a huge workload for the personnel who may be located in dense wilderness and/or hazardous terrain.

Today, many energy service providers are turning to the sky in order to conduct their surveying and analysis. Using automated UAV (*unmanned aerial vehicle*) or drone technology (*pictured below*) that is equipped with LiDAR hardware has emerged as an effective alternative method for inspecting energy corridors and acquiring the data (*point cloud data*).



Acquiring the point cloud data is only a small fraction of the full solution. Generating meaningful geospatial outputs requires post-processing and analysis of the point cloud data, as hundreds of gigabytes of point cloud information is typically gathered. Once finalized, current clearance issues and projected imminent risks can be provided, allowing field teams to clear the hazardous areas more efficiently and effectively.

NHEC / ENGIE BESS Project – Largest Battery in New Hampshire



“The largest battery in NH will bring a more flexible, resilient grid to New Hampshire Electric Cooperative (NHEC). NHEC working in partnership with ENGIE North America have completed their first utility-scale BESS project – 2.45 MW Battery located at NHEC’s 2 MW Solar Farm (pictured above) in Moultonborough, NH. NHEC is a member-owned electric distribution cooperative serving 85,000 homes and businesses in 118 New Hampshire communities.”

New Hampshire Electric Cooperative (**NHEC**) working in partnership with ENGIE North America (**Houston, TX based company**) have completed their first utility-scale battery energy storage system (**BESS**) project.

ENGIE will own and operate the 2.45 MW battery, located at NHEC’s 2-MW Solar Farm in Moultonborough, NH (**pictured above**).

The battery unit charges during times of low demand and discharges during periods of peak demand. NHEC said using BESS to support the grid during peak demand will save NHEC members money and help reduce the strain on their power suppliers.

Part of the co-op’s agreement with ENGIE is that NHEC can use BESS to supply power to its members, up to 70 times per year. In addition, NHEC believes this BESS project will provide insight and experience on how this technology interacts

with their electrical system, how it can be used to respond to price signals and reduce NHEC’s transmission charges and regional capacity payments. NHEC estimates it will save their members \$2.3 million over the next 12 years.

“Energy storage is a rapidly evolving technology that has a key place in our strategic vision for our business model of the future. It’s important for NHEC to gain firsthand experience with batteries so we can better understand the benefits they have to offer our members and the operation of our system,” said Steve Camerino, President and CEO of NHEC. “As more Co-op members install their own batteries, NHEC needs to be ready to support them with a flexible, responsive grid,” he added.

Laura Beane, Chief Renewables Officer of ENGIE North America said, “We are delighted to have completed this

leading-edge storage project alongside NHEC. The addition of battery storage systems such as these are not only delivering real value to customers today, but also helping to accelerate the energy transition. NHEC’s leadership in commissioning this project reflects their commitment to innovation in supporting cost effective, clean energy for their members”.

This battery energy storage unit is the largest in New Hampshire and can fully charge or discharge within two hours. It is housed in a prefabricated 40-foot container located within the fence line of NHEC’s 2-MW Solar Farm in Moultonborough, NH (**pictured above**).

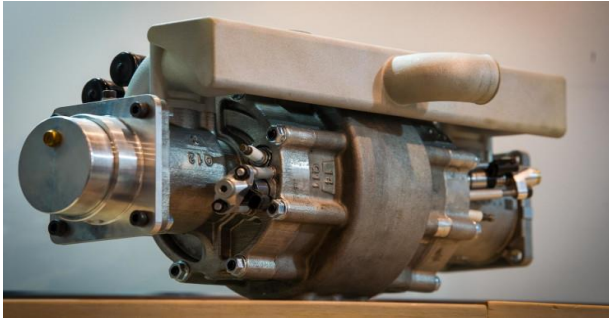
The BESS unit has on-site fire suppression equipment and it will be monitored 24 hours a day, year-round.

NHEC is a member-owned electric distribution cooperative serving 85,000 homes and businesses in 118 New Hampshire communities.

ENGIE North America is an electrical management services company with a mission to shape a sustainable future built on clean, affordable, resilient energy and the infrastructure that supports it.



Could this Hydrogen Engine Eliminate Fuel Cells and Fossil Fuels?



“This 22-lb engine runs exclusively on 100% hydrogen and it could do away with the global reliance on hydrogen fuel cells and fossil fuels. It is a single-piston-linear-engine with only 20 components, one moving part, and requires no lubrication. Therefore, it is much cheaper to produce and maintain than traditional engines. Aquarius Engines, a company in Israel, welcomes debate over electric versus hydrogen, and claim that their lightweight design and unique internal-gas-exchange-method will greatly reduce emissions and lower the global carbon footprint.”

The debate continues on electric versus hydrogen. We are told that whether we eventually drive hydrogen cars or electric cars at a mass scale is primarily dependent upon the financial incentive behind them.

The current trend seems to be focused on electric vehicles, and it might take a lot more publicity for the current trend to veer away from electric to hydrogen vehicles. For example, Volkswagen Auto Group (VAG) CEO Herbert Diess, recently criticized hydrogen cars on Twitter and stated that VAG is backing electrification. Elon Musk followed suit by quickly responding that "Diess is right. Hydrogen is a staggeringly dumb form of energy storage for cars. Barely worth considering it for a rocket upper stage, which is its most compelling use."

However, many companies are still exploring hydrogen fuel as a sustainable method for transportation. One such company is Aquarius Engines. This Israeli company first unveiled a hydrogen engine in 2014, but it did not run entirely on 100% hydrogen. It was

designed to be used as an onboard power generator in vehicles or as a stationary electric generator. However, their newest hydrogen engine – runs exclusively on hydrogen (***pictured above***) and they believe, this 22-lb engine could do away with the global reliance on hydrogen fuel cells and fossil fuels. It is a single- piston-linear-engine with only 20 components and one moving part. Based on this, it is much cheaper to produce and maintain than traditional engines. For example, it requires no lubrication.

Although Aquarius Engines has released very little information on the engine specifications, they claim that the "lightweight design and unique internal-gas-exchange-method will greatly reduce emissions and lower the global carbon footprint."

Gal Fridman, Chairman of Aquarius Engines, said, "From initial tests it appears that our hydrogen engine, that doesn't require costly hydrogen fuel-cells, could be the affordable, green and sustainable answer to the challenges faced by global transport and remote energy production. As the world moves away from fossil fuel, our new hydrogen engine could spark the dawning of the age of Aquarius."

Aquarius Engines recently announced their partnership with auto-

parts manufacturers TPR and Japan's Honda-affiliate - Musashi Seimitsu.

Japan is one of several countries planning to utilize hydrogen as part of their Green Growth Strategy.

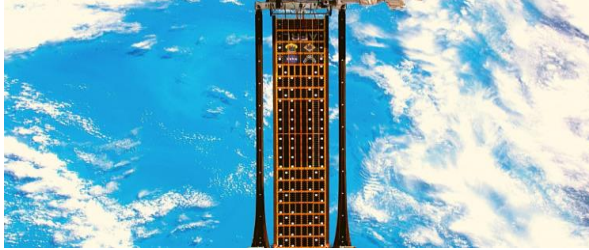
Another company pursuing hydrogen – Segway - acquired by Chinese startup Ninebot, in 2015, recently announced their Tron-inspired hydrogen fueled motorcycle – Apex H2 (***pictured below***).



The Apex H2 is scheduled for production and sale in 2023. It will run on a hybrid hydrogen-electric powertrain - a battery with hydrogen fuel cells – and provide better mileage than all-electric or gasoline fueled bikes.

The Apex H2 will be able to accelerate from 0 - 60 mph in under 4 seconds but will only have a maximum speed of 94 mph. Although this is slower than most motorcycles, Segway argues that it makes up for it with its environmental benefit - only emitting water vapor from its exhaust pipe - and its relatively low cost, at around \$10,700.

International Space Station Upgrades Power Source - Solar Arrays



“The International Space Station (ISS) is getting its first pair of six state-of-the-art solar arrays to upgrade its power generative abilities. Redwire, a new leader in mission critical space solutions, partnered with Boeing to move forward with space operations for NASA, and will execute the design, manufacturing, design, testing, and eventual delivery of the solar arrays. The new solar cells come from Boeing's Spectrolab, and will enable every iROSA solar array to generate >20 kW of power, for a total of >120 kW, increasing the station's power capability by 20% to 30%.”

The International Space Station (ISS) is getting its first pair of six state-of-the-art solar arrays to upgrade its power generative abilities, with the goal of enhancing its ability to perform science experiments and commercial endeavors in a near-zero gravity environment. These solar arrays are being called the International Space Station Roll-Out Solar Arrays (*iROSAs*).

Redwire, a new leader in mission critical space solutions and high reliability component for the next generation space economy, partnered with Boeing to move forward with space operations for NASA, and will execute the design, manufacturing, design, testing, and eventual delivery of the six novel solar arrays, which will boost the power available on the ISS.

Redwire was created in June 2020 when AE Industrial Partners combined two space technology companies that they had acquired - Adcole Space and Deep Space System. Jacksonville, Florida was selected for its corporate headquarters location.

"Redwire's innovative ROSA technology will

provide efficient power augmentation for the space station to enable critical research as well as utilization and commercialization. This mission underscores the importance of station's modularity to accommodate future upgrades and the critical role commercial infrastructure plays in enabling sustainable human spaceflight". said Redwire President and COO Andrew Rush, in a press release.

The new solar cells come from Boeing's Spectrolab, and will enable every iROSA solar array to generate >20 kW of power, for a total of >120 kW, increasing the station's power capability by 20% to 30%.

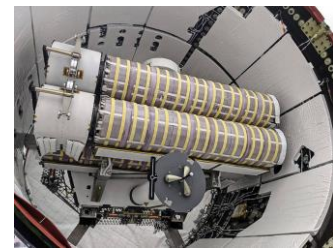
The initial pair of solar arrays will be installed during a series of planned spacewalks, and the final four arrays are planned to reach the station no earlier than 2023.

In addition to its compact, modular, and lightweight design, the ROSA also features a scalable solar array structure that was developed by Deployable Space Systems (*DSS*), a subsidiary of Redwire.

DSS has worked on next-gen solar array technology for more than a decade, working to balance performance with affordability for a multitude of mission objectives. The technology for ROSA was first demonstrated aboard the ISS in June 2017.

In addition, a number of modular versions of ROSA are under development for NASA's DART mission, the Ovzon 3 GEO spacecraft for Maxar's Legion-class satellites, Maxar's Power and Propulsion Element for NASA's Gateway program, along with plenty of other civilian, proprietary, and military projects. These are only a handful of the new solar-powered proposals and projects making waves in the budding next generation space economy.

NASA is also taking solar power to new heights in space. In March, they announced plans to install colossal solar arrays, 32 ft (9.7 m) tall, on the moon. Solar power will become part of the backbone for generating power in space, since it is literally renewable and endless (until the sun burns out), and far cheaper than other, more potent forms of energy production currently used in space missions. And with Redwire's iROSA solar arrays' installation on the ISS, we are taking the first sustainable step into the future of power generation in space.



Did You Know?



“That <20% of women make up the nuclear workforce, and with >23,000 new jobs expected over the next five years, this statistic needs to change. The opportunity to bring their skill sets into the industry are needed. Here is one example of someone already making her significant contribution - Ciara Sivels (pictured below) - she is the first black woman to earn a PhD in nuclear engineering from the University of Michigan (nation’s top nuclear engineering program). Today, she is a senior staffer at John Hopkins Applied Physic Laboratory.”



EDF warns U.S. leak at Taishan-1 poses an “imminent radiological threat”

That EDF (Electricite de France), as a minority owner of the Chinese 1,750 MW Taishan-1 EPR (Evolutionary Power Reactor), warned the US that a leak at the plant posed an “imminent radiological threat”? The warning included an accusation that the Chinese safety authority was raising the acceptable limits for radiation detection outside the Taishan Nuclear Power Plant in Guangdong province in order to avoid having to shut it down. US officials said the current situation poses no severe safety threat to workers or the Chinese public. However, it is unusual that a foreign company reached out to the U.S. government for help.



NRC approves the production of HALEU fuel (5–20% enriched) at the Centrus Piketon, Ohio plant

That the NRC (Nuclear Regulatory Commission) has approved production of fuel with an enrichment of 5-20% U-235? The fuel, called HALEU (high-assay, low-enriched uranium), offers advantages for both existing and next-generation reactors - greater power density, improved reactor performance, fewer refueling outages, improved proliferation resistance, and smaller volumes of waste. However, nonproliferation experts are concerned as this fuel is easier to convert into a fissile material (key component of nuclear weapons), than the current conventional reactor fuel (3-5% enriched). Centrus Energy Corporation said the NRC has approved their request to produce HALEU fuel at their Piketon, Ohio plant. They expect to have production of the fuel in early 2022.



**Coal produces 2,257 pounds CO₂ / MW-hour
Natural gas produces 976 pounds of CO₂ / MW-hour**

That according to the EIA (Energy Information Administration), coal-fired generation produces 2,257 pounds of CO₂ per MW-hour of electricity, while natural gas-fired generation produces less than half that amount at 976 pounds of CO₂ per MW-hour. In relationship to BTU’s (British Thermal Units), coal consumption for electricity generation produces 209 pounds of CO₂ per million British thermal units (MMBtu), compared with 117 pounds of CO₂/MMBtu for natural gas. Natural gas-fired generators, especially those that operate in a combined-cycle configuration, are also more efficient than coal-fired generators, as well as natural gas-fired generators without a combined-cycle configuration.



Taishan-1 was the first EPR in operation – a third generation PWR

That the EPR (Evolutionary Power Reactor) is a third generation PWR (Pressurized Water Reactor) developed by Framatome (part of Areva between 2001 and 2017) EDF (Electricite de France), and Siemens? This European design has several active and passive protection measures against accidents: 1) Four independent emergency cooling systems, each providing the required cooling of the decay heat that continues after reactor shutdown. 2) Leak-tight containment around the reactor. 3) An extra container and cooling area in the event of a molten core escaping the reactor vessel. 4) A two-layer concrete wall (2.6 m thickness) - designed to withstand internal pressure and the impact of airplanes.

Vogtle Expansion Project Braces for More Delay & Increased Costs



“Monitors, charged with oversight of the Vogtle Expansion Project, do not expect the 1st of 2 Westinghouse AP-1000 design reactors, to be operational until at least next summer. One of the monitors, reported that after the review of several estimates the total project cost comes out roughly \$2 billion more than the approved cost of 17.1 billion. This delay and cost overrun could cost Georgia Power customers an additional \$13.20 a month for 10 years. The average customer has already paid \$854 towards the project.”

Recall, that just last month, Georgia Power Company officials warned its regulator, Georgia Public Service Commission (**PSC**), that during their latest testing of the two Westinghouse AP-1000 design reactors, several problems were uncovered, and as a result the project would be delayed until the first quarter of 2022.

But now, monitors - charged with oversight of the project - said they believe it is further behind than was stated last month, and they don't expect Unit 3, the first of the two reactors, to be operational until at least next summer.

One monitor reported that review of several estimates, results in the total project cost at \$17.1 billion, roughly \$2 billion more than was previously approved.

Independent monitors and PSC staff members cited project issues, including work that didn't meet design plans, construction that wasn't completed before testing began, known problems that

were not addressed in a timely fashion - such as failure to upgrade software, components that failed to operate as designed or they were installed incorrectly, leaks in a canal, intended to carry new and spent nuclear fuel, high voltage cables lacking proper separation to prevent electrical arcing and fire, and concrete that contained voids.

In their defense, the project has suffered many unexpected issues contributing to the delays and increased costs – (1) Westinghouse Electric Company, once the prime contractor, filed for bankruptcy protection putting more financial risk on the project's owners, resulting in a string of contractors and ultimately requiring Southern Company to take over control of every aspect of the project, including construction, (2) work was dramatically affected by the Covid-19 pandemic, (3) construction remediation work was needed prior to systems testing, (4) an “astounding 80%” failure rate for new components installed at the site – meaning that when they were tested they did not function properly and required corrective action to function as designed, (5) during the testing activities, numerous start-up and operational-type issues arose, which included refinements to control system logic(s) and plant chemistry -

and plant chemistry - these types of issues are not expected during testing.

Lessons learned from Unit 3 are being applied to Unit 4. Just earlier this year, Unit 4 began its integrated flush testing - a critical step in the construction process - water is pushed through the permanent plant system piping that feeds into the reactor vessel and reactor coolant loops. And recently they reached a new milestone – initial energization – providing the permanent power needed to begin systems and equipment testing.

Georgia Power customers (**2.6 million**) have been paying in advance for the project's “financing costs” - a measure allowed by the state legislature. The PSC estimates by the time construction is completed; the average residential customer will have paid \$854 towards financing the project.

Construction costs, however, have yet to be rolled into the monthly bills. Georgia Power estimates that residential rates will increase 6.6% once Unit 3's construction costs are added in, but they will not take effect until one month after Unit 3 begins operation.





GTTSi

Minority Woman-Owned
Small Business



807 Bypass 123-Suite 31
Seneca, SC 29678

Clay Schile

Vice-President

Phone: 864.882.3111

Fax: 864.882.1026

clay.schile@gttsi.com

Kaye Browder

Technical Staffing
Manager

Phone: 864.631.9325

Fax: 864.882.1026

kaye.browder@gttsi.com

Chrissy Mulay

Technical Staffing
Specialist

Phone: 864.506.4647

Fax: 864.882.1026

chrissy.mulay@gttsi.com

Jackie Pate

Administration

Phone: 864.882.3111

Fax: 864.882.1026

jackie.pate@gttsi.com

Sid Crouch

Chief Technical
Consultant

Phone: 843.339.9874

Fax: 843.339.9528

sid.crouch@gttsi.com

Ken Schaaf

NRC Exam Developer

Phone: 864.882.3111

kenneth.schaaf@gttsi.com

Texas Overhauls ERCOT's Power Grid Governance



Texas Governor Greg Abbott recently signed into law - Texas Senate Bills 2&3 - meant to improve the state's main power grid and change the governance of ERCOT, the agency charged with operating the grid.

These sweeping changes were in response to the catastrophic winter storm that left more than 4.8 million homes and businesses without power for days and resulted in 151 deaths.

Areas being addressed include the "weatherization" of power generators and upgrading power generators and transmission lines - to handle extreme weather conditions. ERCOT oversees the state's main power grid, but the railroad commission regulates the state's oil and gas industry. According to Governor Abbott, the Texas Railroad Commission and the Electric Reliability Council of Texas (**ERCOT**) will conduct inspections of the facilities, and failure to weatherize may result in penalties of up to \$1 million.

The state will not require companies to weatherize until 2022 - at the earliest and plans to help them pay for these upgrades were negotiated during legislation between members of the Senate and House.

The new legislation attempts to stabilize the state's energy market by allowing \$6.5 billion in ratepayer-backed bonds for natural gas utilities and electric cooperatives – this means that companies can seek state-approved bonds, backed by the state's assurance that an extra charge on customers' utility bills can be applied to pay back the bonds. This will result in increased charges on most Texans' power bills for years to come — a few dollars each month for the next two decades.

The new legislation may not be perfect but according to Governor Abbot, "Everything that needed to be done was done to fix the power grid in Texas".

GTTSi

P.O, Box 307

Hartsville, SC 29550-0307

COMPANY OR PERSON'S NAME

STREET ADDRESS

CITY, STATE, ZIP

Disclaimer: The views expressed in any article or advertisement appearing on this website or newsletter do not necessarily represent those of GTTSi and GTTSi accepts no responsibility for them.