



**January 2022
Newsletter**



Individual Highlights:

- EU Considers Natural Gas & Nuclear as “Green” Investments ! pg#2
- Artificial Intelligence – Here to Stay and the Future for “Smart Grid” pg#3
- ‘Riverside Recharge’ the 1st Anode Manufacturing Facility in the U.S. pg#4
- FERC Back to Full Complement with Commissioner Willie L. Phillips pg#4
- NASA has relied on Nuclear for Spaceflight – 60 yrs & Counting pg#5
- Did You Know? pg#6
- Don’t be Fooled - Battery Energy Storage – It is not Cheap! pg#7
- South Carolina Get Ready for Higher Electricity Rates 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**

📍 **Pat McHale, Consultant**

**Are you standing on the level of time or
are you standing still, while TIME passes you buy?**



Time is now. It is not the past nor the future, for one has already endeavored to exist for us, and the other may never be!

The only TIME we really have is now and

NOW... is forever!

**Although its FREE.. it’s PRICELESS-
once you lose it ... you can never get it back!**

EU Considers Natural Gas & Nuclear as “Green” Investments !



“Although the environmentalist will be upset, the European Union is considering, as a “temporary measure” labeling some natural-gas and nuclear energy projects as “green” investments. They feel this is necessary to shift to net zero emission (NZE) by 2050. Gas plants that replace coal would have to be finalized by 2030. The inclusion of some nuclear energy projects in the taxonomy would help attract private finance in nations from France to the Czech Republic, which plan to rely on atomic power in their transition to net-zero emissions.”

It may be hard to believe, but even the European Union is considering, as a “temporary measure” labeling some natural-gas and nuclear energy projects as “green” investments. They feel this is necessary to shift to net zero emission (NZE) by 2050.

Although the environmentalist will be upset, they see an investment in gas plants that replace coal and emit no more than 270 grams of carbon dioxide equivalent per kilowatt-hour as a “green” investment. However, they are adding a caveat, the projects will have to be finalized by 2030.

The design of the EU investment classification system, known as taxonomy, is closely watched by investors worldwide and could potentially attract billions of euros in private finance to help the green transition. The challenge is to ensure the decision on nuclear and gas gets political support, while avoiding the risk of greenwashing, or overstating the

significance of emissions cuts.

The commission, the EU’s executive arm, plans to unveil the rules “in the near future,” said their spokesman but declined to elaborate on the details of the proposal.

Covering almost every sector of the economy, the taxonomy aims to guide investors to clean projects. The decision on whether it should include gas and nuclear power was delayed in April following warnings by some investors, governments, and environmental activists that such an addition could undermine the credibility of the system.

Giving a temporary green label to gas projects with emissions not exceeding 270 grams of CO₂ equivalent could facilitate investments in cleaning up coal-based district heating systems in countries such as Poland (**as pictured below**). That’s an argument often raised by East European politicians.



The inclusion of some nuclear energy projects in the taxonomy would help attract private finance in nations from France to the Czech Republic, which plan to rely on atomic power in their transition to

net-zero emissions.

Europe wants to become the world’s first continent to reach carbon neutrality by the middle of the century under the Green Deal, a sweeping overhaul that aims to accelerate pollution cuts in all areas from energy production to transport.

After a meeting of the bloc’s leaders last month, European Commission President Ursula von der Leyen said that while the EU needs more renewable and clean energy, it also requires “a stable source, nuclear energy, and during the transition, also natural gas.”

Yet for some investors and environmental lobbies, classifying gas or nuclear projects as green would harm the entire sustainable investment rulebook.

“While these sectors may be needed in the short term to secure energy supply, their inclusion would alter the nature of the EU Taxonomy from a list of sustainable activities to a list of transitional activities,” Eurosif, a Brussels-based association that advocates for sustainable investment in Europe, said in a statement.



Artificial Intelligence – Here to Stay and the Future for “Smart Grid”



Did you know artificial intelligence is already part of your life?

When you see a recommendation for a product or a movie you might like to watch, artificial intelligence (AI) is behind this matchmaking.

“Intelligent robotic process automation will emerge as business critical, as companies will require the high automation level necessary to become intelligent enterprises for the future. Although it is currently touted as a great asset for repetitive and laborious tasks, like payroll processing, it often brings a high price tag, threat of job disruption and the potential for misalignment of machine goals versus human goals. But people like Elon Musk and Stephen Hawking say to proceed with caution.”

Whenever you give Siri or Alexa a command, AI is providing the language processing – it not only deciphers but generates speech back to you. It’s everywhere and most likely being used by your utility, but if it’s not, it will be soon!

To understand it, we need to look back to 1956 when a team of researchers and scholars, from Dartmouth, Harvard, IBM and Bell Labs, teamed up at Dartmouth College to get it all started. They believed that a “truly intelligent machine” would be able to carry out activities described as self-improvement.

Merriam-Webster defines AI as “a branch of computer science dealing with the simulation of intelligent behavior,”

Now, 50 years later, AI is touted as a great asset for repetitive and laborious tasks, like payroll processing; it doesn’t tire and won’t complain about late-night shifts. When put to the right use, machines make fewer errors than people. But, along with the feared robot take-overs, AI

often brings a high price tag, threat of job disruption and the potential for misalignment of machine goals versus human goals.

Ultimately, proponents want it to simulate intelligent behavior, but to accomplish this, processes such as, reasoning, learning and self-correction must be developed, and they are still in the making.

Narrow artificial intelligence is AI designed to do ONLY one thing – thus the name. It draws on pattern recognition based on its ability to correlate data, such as, weather forecasting, recommending other items to an online shopper or a movie watcher. It can only do the one thing – if designed to predict the weather it could not recommend a TV show, for example.

Artificial general intelligence (called AGI) would ultimately be able to perform any intellectual task a human being can do, but just as a human learns to walk - through trial and error - an AGI machine will have to learn through the process of attempting various tasks. When this occurs, the goal of self-improvement will be reached, however, it will likely be another two decades before artificial intelligence reaches this level of sophistication.

Artificial superintelligence (called ASI) would ultimately surpass human reasoning, intellect, and cognition, and is what makes people like

Elon Musk and Stephen Hawking say to proceed with caution, as it could potentially pose an existential threat to humanity if the machines develop an independent streak.

Machine learning (ML) is a subset of AI. It enables a machine to utilize algorithms and statistical models to identify patterns, make inferences, and make decisions or predictions without specific prior programming for these tasks – the beginning of self-improvement.

Neural network is a loosely modeled version of the human brain and explained as - each connection, like the synapses in a biological brain, transmits a signal from one artificial neuron to another - the artificial neuron receiving the signal, processes it, and then signals additional artificial neurons connected to it, to perform the appropriate task. We currently see artificial neural networks being used with self-driving cars, earthquake predictions, image (face) recognition and more.

Artificial intelligence is currently used to help the utilities plan operations and investments more efficiently and effectively. It’s utilization with the “smart grid” is critical for operations in the future.

'Riverside Recharge' is the 1st Anode Manufacturing Facility in U.S.



“Secretary Granholm (pictured above) joined NOVONIX in making the announcement of the ‘Riverside Recharged’ facility in Chattanooga.”

In Chattanooga, Tennessee, NOVONIX unveiled its 'Riverside Recharged' facility - U.S.'s first anode manufacturing facility. This is seen as a monumental step in enhancing the domestic battery supply chain in the U.S., as the demand for batteries continues to

increase for electric vehicles.

The 'Riverside Recharged' facility is a \$20 million, 400,000 sq. ft. retrofit of a former GE nuclear turbine manufacturing facility that will soon produce premium synthetic graphite – with the aim to produce 10,000 metric tons per year by 2023 and 40,000 metric tons per year by 2025.

U.S. Energy Secretary Jennifer Granholm joined NOVONIX and local state, and federal officials in making the announcement, which included the creation of 290 jobs.

To date, China has dominated the battery supply chain but the U.S., and other countries, are gaining ground. The U.S. moved into second place globally in 2021 and will remain in that position through 2026, based on current projections.

NOVONIX is an integrated developer and supplier of high-performance materials, equipment, and services for the global lithium-ion battery industry with operations in the U.S. and Canada and sales in more than 14 countries.

FERC is Back to Full Complement with Commissioner Willie L. Phillips



“Willie L. Phillips joins FERC as they seek to determine how to assess the climate impacts of natural gas projects. Based on his confirmation hearing, he believes in a balanced approach.”

The Federal Energy Regulatory Commission (**FERC**) is now back to full complement with the confirmation of Willie L. Phillips.

His previous service was with the Public Service Commission of the District of Columbia (**DCPSC**) since 2014 but has served as Chairman since 2018.

He has a *Juris Doctor*

from Howard University School of Law, and a Bachelor of Science from the University of Montevallo.

Commissioner Phillips is an experienced regulator attorney combining nearly 20 years of legal expertise in public and private utility regulation, bulk power system reliability, and corporate governance.

Prior to being appointed to the DCPSC, Mr. Phillips served as Assistant General Counsel for the North American Electric Reliability Corporation (**NERC**), in Washington, D.C. regulatory compliance and policy matters.

Commissioner Phillips has also served on the boards

of several organizations, including the board of directors for the National Association of Regulatory Utility Commissioners (**NARUC**) and the Organization of PJM States (**OPSI**). He also has served as president of the Mid-Atlantic Conference of Regulatory Utility Commissioners (**MACRUC**), and he has held leadership roles on several advisory councils, including the Electric Power Research Institute (**EPRI**) Advisory Council.

It remains to be seen whether Commissioner Phillips' role as chairman of the DCPSC will pose any recusal issues, particularly in the PJM MOPR proceeding where DCPSC filed comments in support of PJM's proposal.

NASA has relied on Nuclear for Spaceflight – 60 yrs & Counting



“Aurora is an advanced fission reactor design developed to power communities with affordable, reliable, clean power. The sloped roof serves to support the solar panels, which also serve as a canvas for local art. Solar panels are included as part of the Aurora design to illustrate how an advanced fission reactor and renewables can work together in a high reliability, clean energy microgrid.”

NASA has relied on nuclear energy to power spaceflight for 60 years - the first was an experimental navigational satellite, Transit IV-A (*pictured below*). This satellite was powered by a radioisotope-powered generator – launched from Cape Canaveral on June 29, 1961.



Since that time, NASA has flown more than 25 missions utilizing a nuclear-powered system.

They typically use thermocouples to convert heat from the decay of Pu-238 and other radionuclides into electricity. Pictured below is a Pu-238 fuel pellet, shown here glowing with the heat it produces.



The following is a picture depicting the actual size of the Pu-238 fuel pellet – it is actually the fuel pellet used with the Saturn probe – Cassini.



Solar panels are also used to supply their electricity needs but they become less efficient as spacecraft travel farther from the sun.

Chemical sources don't work for very long, as their energy density is too low and their weight would be prohibitive on long missions.

Unfortunately, radioisotope thermoelectric generators don't supply enough power to support people on another planet.

Larger systems will be needed for this purpose or for missions that reach far into space like travel to Mars. It takes quite a bit of energy to produce oxygen, water, heat, food, charge rover batteries, manufacture tools and special materials, and smelt ore for metals.

Therefore, the best and most practical energy source is a small nuclear reactor. Nuclear fuel offers the most energy density – 80,000,000 Mj/kg (***mega joules per kilogram***) versus about 50 Mj/kg for petroleum,

30 Mj/kg for coal, and less than 1 Mj/kg for batteries of any type. The later would have to be charged anyway.

And in space travel, mass is critical, and the best practical solution is a small nuclear reactor. So, NASA is moving in this direction and teamed up with the Department of Energy (***DOE***), they have awarded three teams one-year \$5 million contracts to carry out nuclear thermal space propulsion concept studies.

NASA believes that a small nuclear reactor that could be used for space travel could be ready by the end of 2022. Their hopes lie with the Kilopower Project, which is a NASA-DOE collaboration.

This reactor has completed ground tests and is now set for flight tests. The prototype uses a solid-cast U-235 core the size of a paper-towel roll and utilizes Stirling engines to produce about 10 Kw of electricity.

The Kilopower system has undergone several non-nuclear tests using an electrical heat source, while the nuclear testing is ongoing at the Nevada Test Site. In Nevada, the reactor will be fueled with a high-enriched uranium core and the Kilopower system will be completely retested using the nuclear heat source.

Did You Know?

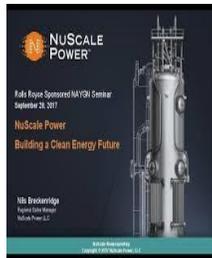


“That 40% of the women who receive an engineering degree either never enter the profession or quit. In 2019, only about 22% of women earned a bachelor’s degree in engineering. According to the Society of Women Engineers, 30% of women who have left their engineering profession say it was because of the “organizational climate.” Of the women that earn bachelor’s degrees in engineering, only 30% remain in the profession for at least 20 years. It’s time for a change.”



Duke Energy is giving South Carolina State University \$150,000 in scholarships for nuclear engineers.

That **Duke Energy is giving South Carolina State University \$150,000 in scholarships to help train and educate new nuclear engineers?** The university said the money will provide about 15 scholarships over three years in its nuclear engineering program, which is the only undergraduate one of its kind in South Carolina. The money from the Duke Energy Foundation is intended to strengthen the utility’s relationships with historically Black colleges and universities and bring more diverse talent into the company. **“South Carolina State University has a significant reputation as a leader in building the high-quality workforce our state and nation need today and in years to come,”** said Mike Callahan, Duke Energy’s South Carolina state president.



The global small modular reactor (SMR) market is projected to grow and reach \$18.8 billion by 2030. The U.S. accounted for the highest SMR market share in 2020 and is also the fastest expanding market worldwide.

That the **global small modular reactor (SMR) market is projected to grow** at a Compound Annual Growth Rate of 15.8% **and reach \$18.8 billion by 2030**, up from \$3.5 billion in 2020. **The U.S. accounted for the highest SMR market share in 2020 and is also the fastest expanding market worldwide.** However, governments across the world want to see SMRs fully deployed in order to lessen their reliance on fossil fuels. COVID-19 has increased the pace of market advancements by focusing more on nuclear energy technology, which in turn is expected to drive the growth of the SMR market. The report claims the market will increase due to the comparably cheap cost and time required for building SMRs, the increasing need for flexible power generation, along with the world’s transition from a fossil-fuel-based energy system to a net-zero-emissions based system. In addition, **SMRs are seen as a very promising alternative for providing both baseload and flexible operations together with renewables.** They can run at high capacity while also satisfying the demand for production rate flexibility and creating energy services, ancillary services, and low-carbon co-products when SMRs and renewable energy are combined into a single energy system and connected through smart grids. The report also noted that **compared to a wind or solar farm, SMR facilities take up a relatively smaller area, resulting in a smaller footprint.**



The recent infrastructure law contains \$2.5 billion for a HALEU Program

That the **\$1 trillion infrastructure law President Joe Biden signed in November contains \$2.5 billion for the Energy Department to establish the HALEU (high-assay low-enriched uranium) Availability Program.** The goal is to produce enough HALEU fuel for civilian domestic research and commercial use in the next wave of advanced reactors currently in development. Therefore, the U.S. Department of Energy (DOE) has requested companies to send ideas concerning their plans to establish a HALEU fuel program. **The current fuel being manufactured for U.S. commercial plants is enriched to a maximum of 5%. But advanced reactors will need fuel that is enriched between 5% and 20%, thus the need for HALEU.**

Don't be Fooled - Battery Energy Storage – It Is Not Cheap !



“Do you know what you currently pay for a kilowatt-hour (kWh) of electricity? Battery energy storage is on the rise – but it is not cheap! Battery prices, which were above \$1,100 per kWh in 2010, have fallen 87% in real terms to \$156/kWh in 2019. By 2023, the average price is expected to be close to \$100/kWh. Since you own the battery, you need to consider all the costs involved, which includes maintenance and disposal costs – overall - it will cost you well over \$0.40 per kWh. My latest bill was \$147.29 including taxes, etc. for 1031 kWh – about \$0.14 per kWh.”

Battery Energy Storage is on the rise, but it is not cheap. Batteries for a Battery Energy Storage System (BESS) were above \$1,100 per kilowatt-hour (kWh) in 2010, but they have dramatically fallen since then - down 87% to \$156/kWh in 2019. It is expected that by 2023 the average price will be close to \$100/kWh. This may sound pretty cheap, but if you look at it over the life of the battery (about 2-3 years or 300-500 charge cycles) and add to it, cost for maintenance and disposal of the batteries - this battery storage capability will cost you well over \$0.40 per kWh.

Do you know what you currently pay for a kWh from your electric utility? My latest bill was \$147.29 including taxes, etc. for 1031 kWh – about \$0.14 per kWh.

Despite the costs. battery energy storage is still increasing; residential energy storage has steadily grown since the slump experienced - late last year - due to supply challenges. More growth

is projected, especially from California due to the power safety shutdowns they have experienced due to fires, over the past few years. Although the commercial sector has seen two straight months of pull back, the wild card in all of this is the utility sector – their peaks historically set the records.

Front of the meter is a term used by the electrical industry - it is the electricity, including the system needed to deliver it to your electric meter – hence the term “front of the meter”. If we look at battery energy storage from a state-wide and “front of the meter” deployment, Massachusetts is the clear leader. Their SMART program deployed 58 megawatt-hour (MWh) in the last quarter of 2019. Vermont and Arkansas tied for second at 24 MWh each.

California and Hawaii led the residential and commercial energy storage markets with roughly similar volumes, but when you consider the size of California's energy spectrum, it's obvious that Hawaii is making serious moves in battery energy

storage – which makes sense based on their physical location and their plans to become energy independent with zero carbon-emissions.

However, the BIG story is going forward, although battery energy storage has been growing as fast as factories can be built - from 2019 into 2020, the market is expected to triple, and from 2020 into 2021 it is projected to more than double, and by the end of 2024, they predict another doubling will occur.

According to economic analyst, the battery energy storage system (BESS) market will continue to grow. They estimate it will reach \$2 billion by 2020, \$4.2 billion by 2021, and \$5.4 billion by 2024. This will result in increased costs for electricity, whether you have your own system, or you are utility supplied. If you decide to go on your own, you should consider maintenance – batteries require it, trickle charge along with test discharge and programed recharge if you want these batteries to provide power when your solar or wind is unavailable.





South Carolina – Get Ready for Higher Electricity Rates



If you live in South Carolina and you are an electric customer of Dominion Energy or Duke Energy you are likely to see an increase in your utility bill.

Why? Because in South Carolina the electric power providers estimate their fuel costs each year, and then settle up the differences between the estimate and the actual cost – the fuel costs are passed directly through to the customers on a dollar-for-dollar basis.

If the utilities collected too much, they issue refunds, but if they have collected too little, the rates go up. In 2020, the actual costs most likely are greater than the estimate, since the demand for natural gas and its cost have nearly doubled from March to November, rising to about \$5.50 per million British thermal units — the standard industry measurement.

However, if you are a customer of the state-owned utility, Santee Cooper, you don't have to worry about this issue for at least the next three years. As they are under a court-issued order that locked in the rates through 2024. This freeze was part of the 2020 lawsuit settlement stemming from the Moncks Corner-based utility's role in the failed expansion of the V.C. Summer Nuclear Station.

Data shows the average monthly electric bill in SC is \$144.73, the average price per kWh in 2020 for Duke Energy customers was 11.4961 cents and Dominion was 12.99 cents -- both below the national average.

GTTSi

Minority & Woman Business Enterprise



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

Pat McHale

Consultant

Phone: 864.882.3111

pat.mchale@gttsi.com

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.