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August 2021 Newsletter



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Bitcoin Mining – It's Heating Up and Its Impact May Affect YOU!



“Bitcoin Mining and its electric consumption has become a real issue worldwide. Nearby residents of Seneca Lake, one of the five finger lakes of upstate New York, say the ~8,000 bitcoin mining computers (similar to those pictured below) housed at the nearby power plant, Greenidge (pictured above), is heating up Seneca Lake. They claim the lake water has become so warm that you feel like you’re in a hot tub. However, Greenidge disputes this premise, they say bitcoin mining has zero impact on Seneca Lake, and have no intentions of downsizing its Bitcoin mining operations.”

The largest of the Finger Lakes, in upstate New York, is Seneca Lake, and nearby residents are saying that the lake water has become so warm you feel like you’re in a hot tub.

Why? Some believe it's due to the heat generated by ~8,000 bitcoin-mining computers housed inside the Greenidge Power Plant (**pictured above**) – it uses Seneca Lake for the plant's coolant.

However, Greenidge disputes this premise, they say bitcoin mining has zero impact on Seneca Lake, because the lake contains 3.81 cubic miles of water, which is 4.2 trillion gallons, and 135 million gallons of lake water pass through the plant per day, which is only 0.003% of the total lake's volume. In addition, publicly available data clearly demonstrates the lake temps have been stable for years.

Recall from our March 2020 article on “Bitcoin Mining” that its electric consumption has become a real issue. It is now consuming more electricity, in a year, than the entire country of Argentina -121 TerraWatt-hours (**TWh**), the Netherlands - 108.8 TWh,

and the United Arab Emirates - 113.2 TWh – it is close to reaching the consumption level of Norway - 122.2 TWh – according to the University of Cambridge.

As a counterpoint, there are other energy consumers that can also rank alongside entire countries - for example, inactive home devices that remain plugged-in in the U.S. could power the entire bitcoin network for a year. Overall, it is estimated that “bitcoin mining” accounts for only 0.56% of the world's energy consumption.

“Bitcoin “mining” involves specialized servers connected to cryptocurrency blockchain networks. These servers are tasked with verifying transactions for both buying and selling and must process the information via intricate security puzzles, that act as a barrier, for anyone attempting to fraudulently edit the transaction history.

From an environmental perspective, a 2019 study revealed that “bitcoin mining” produces around 22 megatons of CO2

emissions per year, which is comparable to the total CO2 emissions of Las Vegas. While some bitcoin miners have used their servers to heat their homes, environmentalist worry that the cryptocurrency's CO2 emissions are already excessive, and they fear it is spiraling out of control as the currency rises in price.

However, Greenidge has no intentions of downsizing its “bitcoin mining” operations. According to company CEO Jeff Kirt, “the environmental impact of the plant has never been better than it is right now”. In addition, he added that Greenidge buys carbon offsets to negate its impact on the environment, but no public data supports this claim, and it seems the Bitcoin mining operations are having verifiable effects on the surrounding climate. In other words, the checks and balances of carbon offsets aren't mapping onto the real-world changes local residents have noticed happening to Seneca Lake.



Nuclear Regulatory Commission – No 40 Year License Renewals!



“The U.S. Nuclear Regulatory Commission staff has completed an activity to assess the feasibility of extending the time period for license renewal of nuclear power plants from the current 20-year maximum to a maximum period of 40 years, and to identify options to implement this change. With more than 90% of the operating reactors possessing renewed licenses for operation to 60 years, this activity included consideration of the technical issues that would be associated with plant operation to 100 years.”

The Nuclear Regulatory Commission (**NRC**) recently announced the following statement –

“The U.S. Nuclear Regulatory Commission staff has completed an activity to assess the feasibility of extending the time period for license renewal of nuclear power plants from the current 20-year maximum to a maximum period of 40 years, and to identify options to implement this change. With more than 90 percent of the operating reactors possessing renewed licenses for operation to 60 years, this activity included consideration of the technical issues that would be associated with plant operation to 100 years.”

Currently, the maximum

potential operating lifespan for a nuclear plant is 80 years, based on 40 years with their original license, 20 more years with an initial license renewal, and then another 20 years with a second renewal. To date, more than 90% of the U.S. operating reactors have renewed their licenses for up to 60 years of operation.

However, as of July 2, 2021, the NRC has halted all efforts for a U.S. nuclear power plant owner to request a 40-year license renewal for their facility, but they have provided the following five specific recommendations:

1. Discontinue the activity to consider regulatory and other changes to enable license renewal for 40 years. (***The memo noted that while implementation of a 40-year renewal could have benefits to both applicants and the NRC, this recommendation was based on the lack of interest from the industry and the strong adverse public response received at public meetings.***)
2. Consider an evaluation of possible changes to

oversight and inspection activities related to license renewal and subsequent license renewal.

3. Consider an evaluation to identify on-going research activities (***related to concrete, cables, reactor vessel internals, and reactor pressure vessels***) that could be extended to greater exposure levels to address the potential for reactor operations up to 100 years.
4. Periodically query the industry to determine its interest and timing to pursue operation to 100 years, so that the staff can identify the need, and time frame, to initiate the development of guidance documents that would support 100 years of operation.
5. Consider an evaluation of impacts on plant risk from the combined effects of multiple aged components.



Currently, there are only three members on the commission with Christopher T. Hanson as the chairman – appointed by President Biden to be chairman effective January 20, 2021. The other two commissioners are Jeff Baran and David. A. Wright.



**Chairman
Hanson**



**Commissioner
Baran**



**Commissioner
Wright**

TVA to Shutdown 3 of 5 Remaining Coal-Fired Plants for Natural Gas



“TVA, the nation’s largest public utility, is looking at shutting down three of its five remaining coal-fired power plants (Bull Run, Cumberland, and Kingston), and replacing them with natural gas. Natural gas can provide reliability and flexibility, while solar only generates energy about 25% of the time. In addition, natural gas is cheaper than solar, although prices are falling and solar could become cheaper towards the end of the decade. TVA President Jeff Lyash said earlier this year that the utility is on track to reduce greenhouse gas emissions by 80% by the year 2035, compared to 2005 levels.”

TVA (*Tennessee Valley Authority, an independent federal agency*), the nation’s largest public utility, is looking at shutting down three of its five remaining coal-fired power plants (*Bull Run, Cumberland, and Kingston*), and replacing the megawatts lost from coal-fired generation with natural gas.

A TVA senior manager relayed that gas provides reliability and flexibility as a fuel that can be called upon at any hour of any day, while solar only generates energy about 25% of the time. And, gas is cheaper than solar, although prices are falling and solar could become cheaper towards the end of the decade.

Reliability and flexibility are real considerations, but TVA already has lots of that with its current gas and hydroelectric plants. The addition of new gas plants will likely be around for decades, long past the current administration’s goal of decarbonization by 2035.

TVA’s Kingston and Cumberland plants together produce around 3,900 megawatts of

electricity. The utility is not looking to replace electricity lost from the shutdown of its smaller Bull Run plant, but for the other two, the utility is studying three replacement alternatives. Two of them are different types of gas plants. The third option is for renewables — most likely solar — plus storage.

The utility already has plans to add 10,000 megawatts of solar power to its system by 2035, but that won’t be a replacement for the coal plants. Utility spokesperson Scott Brooks said most of that will go to large industrial customers like Google that want to power their facilities with renewables.

Marilyn Brown is a professor of energy policy at the Georgia Institute of Technology, and she served on the TVA board of directors from 2010-2017. She says, TVA should decrease the need for new electrical generation altogether, with an investment in energy efficiency and demand response - which involves helping customers change their usage patterns to flatten the peak demand periods. She claims that demand response can drop a load just as quickly as firing up a gas turbine to meet that load - “Why not help people control their thermostats and appliances when generation is in short supply?” As an example, she said, studies have

found you can cycle off air conditioning for 17 minutes in an hour without any noticeable difference.

Critics of TVA say they have failed to accurately weigh the environmental impacts of a separate proposal to add new gas turbines at its Paradise plant in Kentucky and Colbert plant in Alabama. TVA’s draft environmental impact statement states these additions will not negatively affect greenhouse gas emissions or climate change because the utility is reducing emissions elsewhere in the system. However, seven environmental organizations have written to TVA, calling their analysis flawed and a violation of the National Environmental Policy Act.



TVA President Jeff Lyash (*pictured above*) said earlier this year that the utility is on track to reduce its greenhouse gas emissions by 80% by the year 2035, compared to 2005 levels. He said they will not be able to meet the 100% reduction goal without technological advances in energy storage, carbon capture and small modular nuclear reactors. The utility has its own aspirational goal of net zero emissions by 2050.

The “Bootleg” Fire Previews Times Ahead for Grid Operations in CA



“As the Bootleg fire spread through Oregon’s Fremont-Winema National Forest, near transmission lines that bring electricity from the Pacific Northwest into California, several teams of firefighters were dispatched to battle the blaze hoping to keep CAISO power lines in operation. But this event would bring the Golden State’s electric grid to its knees, as temperatures climbed to 110°F in Palmdale, 113°F in Redding, and 130°F in Death Valley. The CAISO and its market participants had pulled out all the stops.”

Pictured above is a Control Center for the California ISO (CAISO). The CAISO manages the flow of electricity across the high-voltage, long-distance transmission lines delivering power to the state’s three investor-owned utilities - Pacific Gas & Electric, San Diego Gas & Electric, and Southern California Edison.

The CAISO has a special protocol called “Flex Alert”.



It is a voluntary program utilized in the summer whenever extreme weather pushes the energy demand toward their available capacity. This usually happens in the evening hours when solar generation is going offline, and consumers are returning home - switching on their air conditioners, lights, and appliances.

During a “Flex Alert” the consumers are asked to do the following three things:

1. Set thermostat to 78°F or higher if health permits.
2. Avoid using major appliances.
3. Turn-off all unnecessary lights.

This summer, the CAISO has declared three Flex Alert’s already. However, the latest one, due to a wildfire in southern Oregon, was an example of how life in the 21st century for the American West will be, as power companies switch from fossil fuels to renewable energy. This event brought the Golden State’s electric grid to its knees as temperatures climbed to 110°F in Palmdale, 113°F in Redding, and 130°F in Death Valley.

As people cranked up their air conditioners late into the evening, right as the sun went down and solar farm generations began to dwindle. It was exactly the kind of situation that led to rolling blackouts, last August and resulted in a reliance on California’s one lone nuclear power plant, Diablo Canyon, and a few gas-fired power plants to get them through the heat wave. But the gas plants in Long Beach, Oxnard, and Redondo Beach - were supposed to shut down last year due to their environmental effects and nearly two-thirds of the power capacity at those coastal facilities was unavailable.

But the “Bootleg” fire continued to spread, burning through Oregon’s Fremont-Winema National Forest near transmission lines that bring electricity from the Pacific Northwest into California. Several teams of firefighters were

dispatched to battle the blaze hoping to keep the CAISO power lines in operation.

Eventually, Governor Gavin Newsom’s office delivered a proclamation, allowing the fossil-fueled power plants to produce more air pollution than would normally be allowed and suspending limits on portable generators, among other steps.

CAISO officials were glad they didn’t wait, because a few minutes after they asked for Newsom’s help, a power line that’s part of the California-Oregon Intertie was knocked out by the fire – due to the heavy smoke acting like a conductor and resulting in selective tripping. And later, just within a few more minutes, the second line went. And then later, the third line was lost, as well.

California suddenly found itself short ~4,000 MW’s - nearly 10% of the expected peak demand. Eventually, the CAISO had to limit the amount of power running north to south across the state line via the Pacific DC Intertie, to keep this critical infrastructure from going down – resulting in a 5,500 MW deficit.

Thankfully, peak demand came and went while solar power was still available but eventually solar would fall from 11,590 MW’s to zero – and to replace all that solar, CAISO and its market participants had to pull out all the stops.

Did You Know?



That just 14% of the energy workforce are women, but Sarah Merrick (pictured below), founder and CEO of Ripple Energy, says the energy sector is going through a seismic period of change, and by 2050 80% of the UK's electricity could come from wind and solar.



Merrick believes this is good news for women, "Having worked in renewables for more than 20 years, I would say there's a stark difference in gender equity between clean energy and fossil fuel companies".



Dominion & Berkshire terminate sale of Questar Pipeline

That Dominion Energy and Berkshire Hathaway Energy have decided to terminate their deal to sell the Questar Pipeline to an affiliate of Berkshire Hathaway Inc. due to the uncertainty of achieving clearance from the Federal Trade Commission under the Hart-Scott-Rodino Antitrust Improvement Act of 1976. The Questar system was originally included in their \$9.7 billion transaction, announced just one year ago, but this decision will have no impact on that sale. However, Dominion is looking for a new buyer.



Hanford is considered the most contaminated site of radioactive waste in the U.S.

That according to a recent report from the Department of Commerce's Hanford Healthy Energy Workers Board, found that 57% "of all current and former workers reported being in an exposure event," with 32% saying they experienced "long-term exposure to hazardous materials". Hanford is a 560-square-mile area in Washington State that was used by the federal government from 1944 to 1987 to produce plutonium for nuclear weapons and missile warheads. The site has come under increased scrutiny in recent years for its effect on health and the environment, with the Energy Department warning in April that it believed an underground tank at the facility was leaking waste produced by plutonium production. **Hanford is considered the most contaminated site of radioactive waste in the U.S.**



Utah Associated Municipal Power Systems (UAMPS) have reduced their Carbon-Free Power Project to only 6 NuScale design SMR's. The reduction in size has increased the project cost rate from \$55/MW-hr to \$58/MW-hr..

That Utah Associated Municipal Power Systems (UAMPS) have reduced their Carbon-Free Power Project from the initial twelve NuScale design SMR's (small modular reactors) down to six SMR's. The project between UAMPS and Oregon-based reactor producer NuScale received \$1.4 billion from the U.S. Department of Energy last year. The reactor is planned to be built on the DOE's 890-square mile desert site west of Idaho Falls at Idaho National Laboratory. **The plant is expected to be running by 2029. Downsizing the project reduces the project's costs. The NuScale design has been improved making the reactors more power efficient, increasing their output from 50 to 77 MW (megawatt). The reduction size is a reduction in total power output and that has raised the cost rate from \$55 per megawatt-hour (MW-hr) to \$58 per megawatt-hour.** However, NuScale claims the slightly higher cost "is still an exceptional price for carbon-free, dispatchable (always available) electric power. The (cost rate) of other advanced reactor projects, green hydrogen, storage, batteries, etc., are all projected to far exceed \$58 per megawatt-hour. The project is currently working toward submitting an application to the NRC in 2024 to build and operate the reactors.



Clean Energy Protection Action

That California congressman, Devin Nunes, has proposed a bill (HR 4394 – Clean Energy Protection Act) that would require Diablo Canyon nuclear power plant to stay open, but PG&E says its plans haven't changed from its announcement in June 2016 for decommissioning when their licenses expire – 2024 (Unit 1) and 2025 (Unit 2).

Oklo's Aurora Fast Reactor Design – An Answer for Nuclear Waste?



“Oklo's Aurora SMR design offers many attributes ... the ability to produce power for decades without needing to refuel, its small size, the placement of the fuel underground, the ability to operate without needing cooling water, the demonstrated natural shutdown behavior of the fuel, and the use of a fission spectrum which can recycle fuel and ultimately convert nuclear waste to clean energy. The sloped roof of its powerhouse serves as the support for solar photovoltaic panels, making it a self-sustainable plant, and also illustrates how advanced fission and renewables can work together to provide reliable clean energy.”

Could the smallest of all SMR (**small modular reactor**) designs be an answer to one of the nuclear industry's biggest problem - nuclear waste?

The idea of using nuclear plant waste for fuel is not very new. In fact, this idea has been around for many decades now, but Oklo's Aurora design seeks to demonstrate it is a definite possibility.

Although the Oklo Aurora design has been around since 2013, it took seven years for them to gain access to spent or used nuclear fuel assemblies - the nuclear waste they needed to demonstrate their technology.

In 2019, they revealed their design – a microreactor with integrated solar panels making it a 1.5 MW (**megawatt**) self-sustainable plant. The capacity of the plant is small compared to traditional power plants, but it is sufficient to power industrial sites, large companies, and/or college campuses. In addition, they claim this design can be built in a year's time paving the way for the

company's goal of having several of these plants operational by the mid-2020s.

The reactor uses HALEU fuel in combination with spent nuclear fuel assemblies that are earmarked for disposal. The spent nuclear fuel assemblies will undergo fission in this “fast reactor” design. Fast reactors rely on fast neutrons for their fission process. They do not use water or a moderator material to slow down the neutrons produced from fission. In addition, Oklo claims their design can operate without refueling for 20 years. HALEU fuel is “High-assay, low-enriched uranium”, which provides more power per volume than conventional reactors, allowing a smaller reactor core size. Using no moderator also reduces the size of the reactor, and to some extent its complexity. But its biggest attribute could be the use of spent nuclear fuel assemblies – reduction in nuclear waste - and the subsequent waste that is left, is far less radioactive than the spent nuclear fuel

assemblies that were used as fuel. In addition, the Oklo design plans to include vitrification of their waste – burying it underground, in line with current methods of nuclear waste management.

According to Oklo's co-founder Jacob DeWitte, “What we've done is take waste that you have to think about managing for 100,000 or a million years ... and now changed it into a form where you think about it for a few hundred, maybe thousands of years.”

In December 2019, Oklo received a permit to begin building their new Aurora plant in Idaho, which is the first and only permit ever issued in the U.S. to a nuclear plant that wasn't a light water reactor. There are big obstacles in Oklo's way, though. Their planned timeline of operation between 2022 and 2025 would be one of the shortest in U.S. nuclear power history and very optimistic. After all, it will be a “first-of-its-kind” commercial, HALEU-fueled fast breeder reactor.





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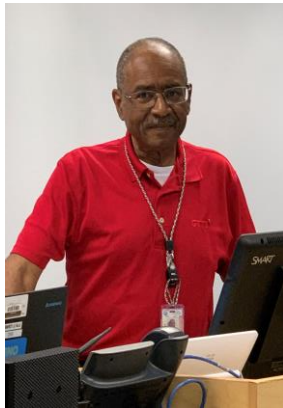
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GTTSi Employee – Mr. John Patterson



Meet GTTSi employee – Mr. John Patterson - a U.S. Navy veteran, retired as CWO-4 (**SS**) from the Navy Reserve as a Reserve Submarine Squadron Division & Training Officer. He has a BS degree in Nuclear Engineering, a master's degree in Business Administration, was previously licensed as an SRO (**Farley 1&2**), a registered Professional Engineer (**GA**), with a Six Sigma Green Belt, a DOE "Q" Clearance, a DOD "Secret" Clearance, and an INPO Certified Instructor.

As a nuclear professional, John has reached the semicentennial milestone of 50 years of nuclear experience in commercial, DOE, DOD, and Naval reactors, specializing in operations, training, procedure writing and management oversight.

As a Professional Engineer, John was vice president of an engineering services firm providing support to DOE and commercial nuclear facilities. He also developed an automated Lockout/Tagout System and trained Professional Engineers in Tagout. After the accident at Three Mile Island, John was on the Westinghouse Thermodynamics team that provided timely gap training to international utility customers in Europe and the Orient.

His extensive experience in all aspects of plant operations; operator, engineering, and technician training; training materials development; program development and administration; program evaluation and assessment; procedure writing/development and facility management oversight make him a perfect fit for operations, engineering, and/or technical support at our nuclear facility clients.

John is currently on assignment at Turkey Point, in Florida, providing operations instruction, developing training materials for the operations curriculum, and supporting NextEra's GFES/ACAD training - preparing future operators to take the NRC's Generic Fundamentals Exam. This exam is the first step for an operator to take in achieving a Reactor or Senior Reactor Operator License.

With over 20-years of service with GTTSi, we thank YOU for your service and we are so proud to recognize YOU as one of our valued employees!

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