



GTTSi

Serving the Nuclear and Energy Industry
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Georgia-Carolinas PCI Group

November 2018

November 2018 Newsletter



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In this season of thankfulness, we are especially grateful to YOU; our employees and clients.

It has been a challenging year for ALL - our clients, the utilities we serve, and YOU.

But together, we continue our goal of being the BEST by doing the job right the first time, every time!

Alone ... each of YOUR accomplishments are impressive but TOGETHER, they are a record of achievement, few if any, companies can match!



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2019 DOE Budget - Strong Support for Nation's Nuclear Programs



“NuScale Power is developing a new modular light water reactor nuclear power plant to supply energy for electrical generation, district heating, desalination, and process heat applications. The design is a fully factory-fabricated module capable of generating 60 MW of electricity using a safer, smaller, and scalable version of the pressurized water reactor technology – providing the benefit of carbon-free energy, at reduced costs associated with gigawatt-sized nuclear facilities. Pictured above – simulator or replica of the control room where all 12 power modules can be controlled.”

The 2019 fiscal year for the Department of Energy (DOE) is fully funded, which by itself is quite an accomplishment.

However, appropriations show some strong support for our nation's nuclear programs – providing budget increases for the Office of Nuclear Energy, Reactor Concepts R&D, Versatile Fast Test Reactor, with \$122 million set aside for advanced reactor technologies and \$22 million for completing the federal share of two performance-based advanced reactor concepts.

Congress (*the Senate in March and the House in September*) passed, and President Trump signed (*October*) the Nuclear Energy Innovation Capabilities Act (**NEICA**), which directs the DOE to evaluate the need for a fast test reactor, complete work on the facility by 2025, and open its research infrastructure to national laboratories, academia, and the private sector.

The NEICA also creates a program where the DOE

and national laboratories will support the testing and demonstration of reactor concepts that are proposed and funded by private companies. In addition, it sets planning goals for the DOE designed to speed up the development of advanced reactors, giving the Energy Secretary, Rick Perry, 180 days to submit a report assessing his department's ability to host and operate advanced reactors at national labs and other sites. It also calls on him to submit two 10-year budget plans for nuclear research and development.

“The bill has been the result of years of bipartisan collaboration and work to remove barriers to the development of technologies that allow for advanced and more efficient use of nuclear energy,” according to Idaho Senator, Mike Crapo.

“This bill provides the women and men at INL (*Idaho National Laboratory*) and our other national labs additional capabilities for critical testing and collaboration with the private sector to maintain U.S. eminence in the future of nuclear energy,” he wrote. “NEICA also sends a clear message to investors and innovators to continue to pursue and invest in advanced nuclear technology in the U.S.”

Currently, the Nuclear

Regulatory Commission (NRC) is reviewing a proposal to build 12 small modular reactors (*SMR's*) at INL's desert site - west of Idaho Falls - to provide power to Idaho Falls and parts of Utah through the Utah Associated Municipal Power Systems. NuScale Power, the company behind this project, recently awarded BWX Technologies (BWXT) the contract to begin refining its design for manufacturing, assembling, and transporting their SMR design. 83 companies - 10 countries - submitted proposals, but NuScale picked BWXT.

The NuScale SMR design is the first and only SMR design to undergo Design Certification review by the NRC and it is considered the United States' front-runner in the SMR race, which the Nuclear Energy Agency believes will be a \$100 billion market by 2035.

That market is very competitive; NuScale is competing with countries, including China, Russia, and Canada in the global commercialization of SMR technology. The sale of SMR's could have a significant impact to both the American economy and manufacturing jobs market.

The U.S. Nuclear Regulatory Commission is scheduled to approve NuScale's Design Certification application in September 2020.

Liquid-Air Energy Storage System – Have YOU Ever Heard of It?



“The LAES process allows easy storage of liquid-air in a cryogenic form; when the liquid is pumped and heated it undergoes a 700-fold volumetric expansion, as it changes from a liquid to a gas, releasing stored energy used to power a turbine to generate electricity. With LAES - energy storage is in increments of days - rather than hours, at half the cost of lithium-ion batteries when deployed at scale, with no siting constraints, and zero-carbon emissions.”

LAES (Liquid-air energy storage) stores energy in an unusual way but somewhat similar to compressed-air energy storage.

The difference – air is cooled instead of air being compressed; filtered and cooled to 196°C (-320°F). This liquefaction process proves to be a HUGE advantage over compressed-air storage systems, because compressed-air storage requires large storage capacities that can withstand high pressures, while liquid-air systems requires much, much less storage capacity, and it is stored at low pressures.

The liquid-air energy storage system takes excess electricity being generated by renewables or other sources to cool and filter ambient air for liquid-air storage. The cooled liquid is then stored in an insulated, low-pressure container for future use. Later, when electricity is needed, this

liquid-air storage resource – is pumped through a heat exchanger, resulting in a pressurized gas that is then used to drive a turbine and produce electricity.

The LAES system has been compared to pump hydro or pump storage systems, where excess electricity is used to pump water to a reservoir that is located above a hydroelectric turbine. The water is released when needed to drive the hydro turbine to produce electricity. However, unlike pumped storage, LAES doesn't require a water system or an elevation difference to operate.

LAES systems cannot respond to minute grid frequency changes as fast as the Lithium-Ion batteries because their frequency response is dependent on the turbine control system, so the response time isn't as quick. When compared with Lithium-Ion batteries - lithium-ion batteries are 75-85% efficient while LAES systems are 60-75%

efficient, however, the LAES system makes up for it in COST. Liquid air energy storage provides a cheap, environmentally-friendly way to manage variable renewable power, relieve transmission congestion, and provide additional grid services.

A company here in the U.S. produces liquid-air storage systems - Highview Power Inc. They have already deployed two plants in the UK, the latest was a 5 MW / 15 MW-hour Pilsworth LAES plant that went operational in June.

According to Highview Power, their air liquefaction process allows easy storage of gases in a cryogenic liquid form; when the liquid is pumped and heated it undergoes a 700-fold volumetric expansion as it changes from a liquid to a gas, releasing stored energy used to power a turbine to generate electricity. This system stores energy in increments that are measured in days - rather than hours, and at half the cost of lithium-ion batteries when deployed at scale, with no siting constraints, and zero-carbon emissions. In addition, they claim their system has an economic useful lifetime of over 30 years. Highview Power Inc. has already deployed two plants in the UK; the latest a 5 MW/15 MW-hour Pilsworth LAES plant that went online in June.

Bernard McNamee Nominated for the Vacant FERC Position



“If confirmed, Bernard McNamee will complete the remainder of a 5-year FERC term slated to end June 30, 2020.”

President Donald Trump has nominated Bernard McNamee, currently director of the policy officer at the Department of Energy (DOE), to fill a vacancy at the Federal Energy Regulatory Commission (FERC).

The nomination is subject to Senate approval, and if

he is confirmed, McNamee will complete the remainder of a 5-year term slated to end June 30, 2020.

At the DOE, McNamee served as deputy general counsel for energy policy, as well as practicing energy law at McGuire Woods LLP in Richmond, Virginia.

Before his time at the DOE, McNamee headed up the Tenth Amendment center at the Texas Public Policy Foundation, a conservative think tank, and he was legal counsel to former Virginia Governor George Allen from 1995 to 1998.

Most recently, he was instrumental in designing Energy Secretary Rick Perry’s plan for a Notice of Proposed Rulemaking (NOPR) which would have provided cost recovery to plants able to provide 90 days of onsite fuel – specifically coal and nuclear plant. The NOPR was originally proposed in October 2017 but rejected by FERC in January 2018. If confirmed to the Commission, McNamee may now be able to support similar proposals from within the Commission, rather than just working to convince them from the outside.

Renewables Increase – Set Records - Yet CO2 Emissions Increased?



“Renewables reached 13% of total electrical production yet CO2 emissions increased by 3.28%. This trend will continue if our nuclear power plants continue to be shuttered.”

Hydropower is still “king of the mountain” for U.S. renewable electrical production but non-hydro renewables set new records during the first half of 2018; increasing by 7.04%. Solar accounted for the largest part of the increase, followed by wind, then biofuels and biomass, and geothermal. Hydropower is still the leading renewable source accounting for 24.85% of all renewable energy production, followed

closely by wind at 23.37%, which has now moved ahead of biomass at 22.73% and biofuels at 19.44%; solar and geothermal provided 7.86% and 1.76% respectively.

If hydropower is included, total renewables reached 13% of the total domestic energy production during the first half of 2018.

However, production from fossil fuels (**coal, oil, and natural gas**) accounted for 77.83% of the total domestic energy production during the first half of 2018; increasing by 8.8% from last year with electrical generation from our nation’s nuclear power plants increasing by 4.05%.

As a result, the U.S. CO2 emissions increased by

3.28% during the first half of 2018.

CO2 emissions from coal decreased by 4.79%, but that decline was more than offset by a 12.67% increase from natural gas, a 1.91% increase from oil, and a 1.76% increase from biomass. Oil still remains the highest source of energy-related CO2 emissions (42.40%), followed by natural gas (29.84%), coal (21.51%), and biomass (6.24%).

CO2 emissions will continue to increase if our nuclear power plants continue to be shuttered, because the loss of their electrical production must be made up from other power sources and for now the only reliable sources are fossil fueled power plants!

World Water Crisis - Water Scarcity is a GLOBAL Problem!



“Countries facing the most acute water shortages are India and China, but almost every continent is affected – Mexico and the western US, northern and southern Africa, southern Europe, Australia, and the Middle East. Did you know that 80% of untreated waste water is dumped into water supplies worldwide, 50% of the world population is dependent on groundwater for drinking water, 2/3 of the world’s population will face water stress by 2025, 70% of the global water supply is being used for agriculture and energy, but by 2035 the demand for water is expected to rise to 85% for food and energy?”

Water Scarcity is a GLOBAL problem; the World Economic Forum has placed the world water crisis in the top three of global problems, alongside climate change and terrorism. Did you know that more than half the planet suffers from acute water scarcity for at least one month out of the year?

Groundwater levels are falling, lakes are drying up, less water is flowing in rivers, and water supplies for industry and farmers is being threatened.

In some cases, the situation has worsened - in areas already facing severe scarcity issues - they are resorting to pumping water from groundwater sources; resulting in permanent reduction of the groundwater supply.

Countries facing the most acute water shortages are India and China, which would be expected, but countries in almost every continent are being affected – Mexico and the western US, northern and southern Africa, southern Europe, Australia, and the Middle East.

Scarcity not only affects areas where the natural availability of water is low, but also in areas of dense population, such as the Arabian desert, or where agriculture severely depletes the water table, such as California, are also affected - California has been in a state of drought for several years.

Water shortage and

pollution also affects company operations and their supply chains. In the future, companies will face stricter regulations, which will result in one or more of the following; higher costs for water, reduced rations, stricter emission permits, or obligatory water-saving technology.

The company brands face a reputational risk, as the public and the media becoming aware of the companies behind these brands, that contribute to unsustainable water use. Even companies that operate in water-abundant regions can be vulnerable, because their supply chains stretch across the globe - they might be fine in one area but face water scarcity issues in another area.

It is estimated that 22% of global water consumption and pollution relates to the production of export commodities - the USA, Brazil, Argentina, Australia, India, and China are all water exporters; using domestic water resources for producing their export commodities. But other countries in contrast, Europe, Japan, North Africa, Mexico, and the Middle East all rely on imported goods that are produced with water resources elsewhere. And the water use behind those imported goods is often non-sustainable, because many of the export regions overexploit their resources.

Many companies have started to assess their

water risk and are beginning to develop response strategies, but mitigation strategies are what is needed, such as; nullifying evaporation losses, full water recycling and recapturing the chemicals and heat from the used water flows.

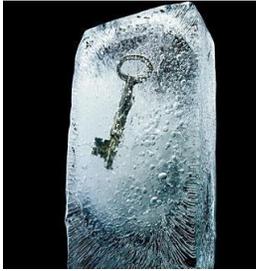
The problem is not that water is being used, but that it is not being returned back to the environment as “clean”, but, to achieve a zero-water footprint will require more energy! Therefore, our challenge will be to find a balance between our water and carbon footprints.

To achieve this, we have to begin setting water footprint targets – moving toward a zero-water footprint, particularly in areas of great water scarcity and/or low water productivity. Although, a zero-water footprint is impossible to attain in the agricultural and mining industries, water consumption and pollution per unit of production can be greatly diminished.

Below are a few water-related facts:

- **15 seconds:** gap between children’s deaths from preventable water-borne diseases
- **38:** number of workers who die from water-related diseases every hour
- **33.3%:** percentage of schools worldwide that lack access to safe water and sanitation facilities

Did You Know?



“Today many households use natural gas as their main source for heat, cooking, and hot water. Natural gas is not dangerous when its sealed up tight inside pipes and used properly. However, if you smell gas, hear hissing, or suspect a leak, ACT FAST.

- **OPEN** windows and doors to ventilate the area.
- **LEAVE** your home or apt. as quickly as possible and take others with you.
- **MOVE** far away from the building - at least as far as you can no longer smell gas.
- **CALL 911** and your local provider **IMMEDIATELY!**



<p>680-MW Valley Energy Center is operational read to supply power to ~600,000 homes, reduce electricity costs NY consumers by a forecasted \$700 million, while reducing carbon emissions</p>	<p>That Competitive Power Ventures (CPV) announced that their 680-MW Valley Energy Center is now operational in eastern New York (Wawayanda, New York)? This facility will provide power to about 600,000 homes and was built as a joint venture effort with Skanska USA Civil Northeast Inc., Burns & McDonnell Engineering Co. and ECCO II Enterprises, Inc. The Valley Energy Center uses two Siemens SGT6-5000F gas turbines, one SST-5000 steam turbine, and three SGen-1000A generators. After nearly 10 years of development and construction, the facility will enhance the reliability of the Lower Hudson Valley electric system, reduce annual electricity costs to New York consumers by a forecasted \$700 million while reducing carbon emissions by an estimated 500,000 tons a year. The gas turbines and generators were manufactured at Siemens’ Charlotte Energy Hub, their global base for 60 Hz power generating equipment</p>
<p>Dominion Energy selling three power stations - PA, RI, & LA</p>	<p>That Dominion Energy is selling its interests in three power stations to two different buyers for a total of \$1.3B; 1,240 MW Fairless Combined-cycle Gas Plant in Pennsylvania, 468 MW Manchester Street Power Station in Rhode Island, and its 25% stake in the 125 MW Catalyst Old River Hydroelectric Station in Louisiana?</p>
<p>2/3 of their time with CAP</p>	<p>That at many of the nation’s nuclear power plants, the lead engineers and senior managers spend two-thirds of their time in service with their corrective action program (CAP)?</p>
<p>NextEra Energy Inc. to reduce CO2 emissions by 65% by 2021</p>	<p>That NextEra Energy Inc., already one of the nation’s largest renewable energy producer, announced plans to reduce CO2 emissions 65% by 2021? Part of the plan is to bring online 4,300 MW of wind energy in the next two years. They already have >14,000 MW of wind and their subsidiary Florida Power & Light has 930 MW (14 plants) of utility scale solar with plans to add an additional 12 new plants over the next year. Just last year, Florida-based NextEra, achieved its lowest-ever emission rates for CO₂, sulfur dioxide and nitrogen oxide from its power plants; 96% (SO₂), 76% (NO_x) and 55% (DO₂) lower than the average U.S. utility sector.</p>
<p>Nuclear Development LLC. Can supply power to Memphis Light, Gas and Water (MLGW) cheaper than TVA; saving MLGW \$400 million annually</p>	<p>That the Nuclear Development LLC. and its CEO, Bill McCollum, came before the Memphis City Council Committee to sell the idea that they should consider using them to supply power for Memphis Light, Gas and Water (MLGW) rather than the Tennessee Valley Authority (TVA)? They claim that once Bellefonte is up and operating they can save MLGW \$400 million annually by purchasing their power from Bellefonte Nuclear Generating Station. Nuclear Development is facing a mid-November deadline to lock in a \$8.6 billion loan from the U.S. Department of Energy needed to complete the plant. Without this financing, the project most likely will fall apart. Nuclear Development LLC. won the bid to purchase Bellefonte from TVA for \$114M but only have until the end of November 2018 to close the deal.</p>

Beacon Battery Energy Storage System - Cost \$19M – More to Follow



“LADWP (Los Angeles Department of Water & Power) installed its Beacon BESS (battery energy storage system). The first of several energy storage projects that LADWP is undertaking to meet the CA legislature mandated requirement of 178 MW’s of energy storage by 2021. Pictured above - the Beacon BESS – located in one of the most inhospitable places on earth, where summertime temperatures can exceed 120°F. Utility-scale battery energy storage is not cheap. This project cost was \$19M. To meet the 178 MW’s by 2021 it is estimated to cost \$338M.”

In 2015, Los Angeles Department of Water & Power (LADWP), one of the nation’s largest publicly owned utilities, was forced to curtail its natural gas-fired operations after problems surfaced at their Aliso Canyon natural gas storage facility. You will recall that one of their 115 natural gas storage wells started leaking methane, an extremely potent greenhouse gas, and was not discovered and sealed for months. It was classified as the 2nd largest methane leak in US history but likely the most environmentally damaging because the methane was not combusted before it was released into the atmosphere.

The curtailment of Aliso Canyon and gas-fired turbine operations limited the availability of cost-effective alternatives, threatening LADWP’s electrical grid operations. So, they turned to more renewables and began planning their move into energy storage.

They decided on a battery energy storage system

(BESS) as a cost effective and rapidly deployable means of supporting their variety of renewable applications; solar, wind and geothermal power.

The Beacon BESS is the first of several energy storage projects that LADWP is undertaking to meet its requirement to install 178 MW of new storage by 2021, as mandated by the CA legislature.

In mid-2017, LADWP exceeded 2,500 MW’s of renewable generating capacity, putting it just short of its 33% goal by 2020.

Fortunately for LADWP, there is an abundance of solar power in California, but continuing to meet expectations associated with renewable energy does not always mean construction of additional renewable generation, because the wind does not always blow, and the sun does not always shine.

So, a move to battery energy storage offers LADWP the opportunity to continue meeting renewable energy expectation, while taking steps to ensure current and future renewable generation does not contribute to the state’s “duck” curve.

The 20 MW/25 MVA/10 MWh lithium-ion Beacon BESS connects to a dedicated 34.5-kV breaker in the Beacon Collector Station. This direct connection to the

substation allows LADWP’s grid operators to manage the BESS in accordance with daily needs of the transmission grid; providing frequency control, voltage support, power smoothing, and line stability.

Doosan (a South Korean company) is LADWP’s engineering, procurement & construction partner and software systems integrator for the Beacon BESS project. Nameplate capacity of the thirteen-power conversion system and battery container pairs totals 35.75 MVA and over 20 MWh to deliver a consistent 25 MVA and 10 MWh in extreme temperatures with 99.9% availability over 10 years. Extreme temperature considerations were needed, as the Beacon BESS is located in one of the most inhospitable places on earth, where summertime temperatures can exceed 120°F.

Utility-scale battery energy storage is not cheap. This project cost was \$19M and to meet the 178 MW requirement by 2021 it is estimated to cost \$338M.

Southern Californian’s already pay one of the highest electrical rates in the nation - 27¢ / kwh in the summer and 23¢ / kwh in the winter, while the national average is 13.51¢ / kwh. As energy storage increases, so too, will the electrical rates for Californians.



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Dave Walker – AP 1000 Startup Test Director



Dave Walker is finishing up an assignment in China with his work there on the AP1000 Units at Haiyang in the Shandong Province.

As a Startup Test Director (STD), he gained valuable knowledge and experience that should be of great value here in the U.S.

Dave lead plant commissioning activities and worked directly with the Operations Shift Manager and Test Engineers - providing knowledge and support during decision making activities – and helped in the development of teamwork by monitoring their operational control and providing feedback.

As a Startup Test Director, Dave had direct control and responsibility for commission test administration and he performed these duties and responsibilities in accordance with all project approved work processes. In addition, he was responsible for writing, reviewing, and approving the testing procedures, as well as, their safe implementation.

Dave performed many complex pre-operational tasks, including Reactor Coolant System cold hydro-static testing, hot functional testing, initial fuel load, pre-critical testing, initial criticality, and power ascension testing (PAT).

Prior to this assignment, Dave represented GTTSi as a Major Project Test Director at the Harris Nuclear Plant, located in New Hill, NC. At Harris, Dave developed and conducted acceptance testing in support of new plant system commissioning and system modifications, which included electrical distribution, UPS, fire suppression, fire detection, HVAC, normal and emergency lighting, and motor control center breaker controls.

Although Dave has been an Operations Manager, a licensed SRO (13 yrs), has a BS in Nuclear Technology, and an Operations Instructor he wants to continue working in a Test Director role for the future.

GTTSi

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COMPANY OR PERSON'S NAME

STREET ADDRESS

CITY, STATE, ZIP