

## August 2019 NuScale Power Business Update

### **NuScale Leading the Way in Advanced, Scalable SMR Nuclear Energy**

NuScale Power is developing game-changing nuclear technology to produce electricity and process heat for a variety of industrial applications, including desalination for the production of clean water, to improve the quality of life for people around the world. With over 480 patents granted or pending in 20 countries, NuScale innovators are leading the way in advanced scalable SMR technology. At the heart of this technology is NuScale's small modular reactor (SMR). The factory-fabricated advanced nuclear technology brings together traditional components – the reactor vessel, steam generator, and containment – into a single, simplified module. When coupled to its factory-fabricated power generation equipment, each module can produce 60 megawatts of electricity. A NuScale power plant can house up to 12 of these modules for a total output of 720 MWe (gross). The scalability of the modular design allows customers to increase facility output to match demand. NuScale's SMR builds on proven nuclear technology with a focus on integration and simplification. The end result is an economic, on-demand, carbon-free power solution offering unparalleled safety, flexibility, reliability and resiliency. NuScale has successfully completed more than \$100M in system and component testing to verify the safety and functionality of its groundbreaking design.

### **U.S. NRC Progresses into Phase 4 of Design Certification Review**

NuScale's is the first and only SMR to ever undergo NRC design certification review. In April 2018, the U.S. Nuclear Regulatory Commission (NRC) completed the first and most intensive phase of review for NuScale Power's design certification application (DCA). On July 12, 2019, NuScale completed the second and third phases of review six weeks ahead of schedule, progress which Utility Dive called a "significant step forward for advanced nuclear technology in the U.S." and which maintains the NRC's timeline for completing its review by September 2020. With the exception of at least one Chapter of the DCA that is in Phase 5, the rest of the DCA review is now in Phase 4. The NuScale DCA review is on pace to be the NRC's fastest review ever, demonstrating the simplicity of the design and quality of the application. As the only SMR technology under review by the NRC, we are well ahead of all other companies who may seek NRC approval.

In 2018, the NRC approved NuScale's design approach demonstrating how no AC or DC electrical power would be needed to ensure safety. Because it's a requirement of all operating U.S. nuclear plants, this finding is a first for the nuclear industry. As Forbes reported, "This is a big deal. It means the reactor just won't melt down or otherwise cause any of the nightmares people think about when imagining the worse for nuclear power... It just shuts down and cools off."

From a licensing perspective, NuScale signed a service agreement with the Canadian Nuclear Safety Commission (CNSC) to submit an application under the CNSC's pre-licensing vendor design review process in 2019. NuScale expects to make its first submittal to the CNSC by the end of 2019. NuScale has also been highly engaged in the British Government's SMR assessments and regulatory process review activities over the past few years. The company is well-positioned to see its technology deployed in the UK.

## Making Good on Federal Commitments and Establishing a Track Record

In April 2018, in continued support, the DOE's Office of Nuclear Energy awarded NuScale \$40 million in cost-sharing financial assistance under its "U.S. Industry Opportunities for Advanced Nuclear Technology Development" funding opportunity. The federal award supports early-stage research and development and the industry's acceleration of these technologies to promote U.S. energy independence, energy dominance, electricity grid resiliency, national security, and clean baseload power. NuScale received a second award in July 2018 under the First-of-a-Kind (FOAK) Nuclear Demonstration Readiness Project pathway to support the next phase of the U.S. product realization effort required to bring the NuScale design to market. In [July] 2019, NuScale was selected to receive a third award under the FOAK Nuclear Demonstration Readiness Project pathway and is pursuing additional DOE funding for 2020. NuScale has met its obligations under these awards and completed its work on or ahead of schedule.

## Our First Customer is Moving Forward on the Carbon Free Power Project

Utah Associated Municipal Power Systems (UAMPS) is planning to deploy a NuScale 12-module reference plant in Idaho with commercial operation of the first module in 2026. UAMPS has selected a preferred site at the Idaho National Laboratory, which is being developed through a site-use agreement with the DOE. On July 17, 2019, UAMPS announced that participating members had executed power sales contracts totaling more than 150 megawatts of subscription in the project, marking a significant milestone for the initiative, which maintains its current schedule to begin nuclear construction in 2023.

UAMPS is a political subdivision of the State of Utah that provides comprehensive wholesale electric energy, transmission, and other energy services, on a non-profit basis, to community-owned power systems throughout the Intermountain West. Its 46 members include public power utilities in six states: Utah, California, Idaho, Nevada, New Mexico, and Wyoming.

The CFPP plant will offer immediate advantages to UAMPS members through safe, carbon-free energy, which will replace retiring coal-burning assets. The project will provide high-quality jobs and economic



development to the region and serve as a catalyst for subsequent SMR projects throughout the West. In January 2019, the Idaho State Journal reported NuScale's "project during the construction phase would have a fiscal impact of over \$36 million and employ about 2,000 people."

## Unprecedented Research Opportunities

In December 2018, UAMPS, the U.S. Department of Energy (DOE) and the Battelle Energy Alliance (BEA), the contractor managing DOE Idaho National Laboratory, (INL-DOE) signed a Memorandum of Understanding to lease the first two NuScale Power Modules for DOE use. Through the Joint Use Modular Plant Program (JUMP), INL-DOE would lease one of the NuScale Power Modules (NPMs) in the 12-module nuclear reactor, giving them an unprecedented opportunity to conduct research within an operating commercial reactor environment. A second NPM will also be used under a long-term power purchase agreement to meet INL-DOE's electricity demand.

## Readying the Facility for Deployment

### *Supporting Project Development and Building the Supply Chain*

NuScale continues to support the Tennessee Valley

Authority's (TVA) Early Site Permit Application, which seeks NRC approval to deploy an SMR at the Clinch River Site in Tennessee. In a major milestone for NuScale, a July 2018 NRC staff audit report found that an SMR plant at the Clinch River site based on the NuScale SMR design would meet the conditions for a site boundary-sized Emergency Protection Zone (EPZ). In late 2018, the Advisory Committee on Reactor Safeguards also recommended Early Site Permit approval with site boundary EPZ. And in April 2019, NRC staff concluded based on the final environmental impact statement that there would be no reason that would preclude issuing an early site permit for the Clinch River Nuclear Site. These findings further demonstrate NuScale's exceptionally safe SMR design, its ability to reduce overall plant risk including being able to be sited closer to process heat off-takers, for district heating, or as a repowering option for retiring coal or natural gas fueled generation located in more densely populated areas.

In September 2018, NuScale entered the manufacturing phase for the country's first SMR by selecting Virginia-based BWX Technologies, Inc. (BWXT) to start the engineering work to manufacture the NuScale Power Module™, marking the transition from design to reality. BWXT has started work on this first manufacturing phase of NuScale's SMR, which we expect will continue through June 2020. BWXT expects to use Pennsylvania-based Precision Custom Components as a component manufacturing contractor on this project.

In November 2018, NuScale announced the selection of Minnesota-based PaR Systems, LLC to begin engineering work for the manufacturing of its Reactor Building Crane (RBC), an important element of NuScale's innovative nuclear plant design. In January 2019, NuScale and Ultra Electronics unveiled a new safety display and indication system using field programmable gate array (FPGA) technology that represents the first application of FPGA technology for real time display and monitoring in the U.S. commercial nuclear industry. The display system shows critical safety plant data in high resolution, high fidelity graphics for each of a NuScale plant's 12 power modules, with dedicated displays for each reactor.

To further expand our growing supply chain, in April 2019, NuScale announced it had entered into an agreement with Doosan Heavy Industries and

Construction (DHIC), a division of the Doosan Group. Under the agreement, which closed on July 31, DHIC – a world-renowned nuclear pressure vessel manufacturer – will build a portion of the most critical and complex NPM sub assemblies for the forthcoming UAMPS plant, which is expected to begin operation in 2026. DHIC will also make a cash investment in NuScale. Ed McGinnis, DOE's principal deputy assistant secretary for nuclear energy, called the announcement a "recognition that the U.S. nuclear reactor community is really taking its



position in the global market." In May 2019, NuScale unveiled a strategic relationship with Sargent & Lundy, a global leader in power engineering, which will become an investor in NuScale and will contribute to development of NuScale's standard plant design in addition to providing architect engineer support as needed.

### *Ensuring Cost-Effective Resiliency*

In June 2018, NuScale Power announced its SMR can generate 20 percent more power than originally planned. Advanced testing and modeling tools helped NuScale identify optimization opportunities which increases the power generating capacity of a 12-module NuScale plant by 20 percent with very minimal change in capital costs and lower first-of-a-kind facility costs for deployment in the U.S. on a per kilowatt basis to approximately \$4,300 (\$3,600/KW for Nth-of-a-kind). It also lowers NuScale's levelized cost of electricity by up to 18 percent, making it more competitive with other electricity generation sources.

In December 2018, Renewable and Sustainable Energy Reviews published a new study that found "strong evidence" that SMRs can be economically competitive while yielding significant benefits in terms of reducing

carbon emissions, which continued to highlight NuScale's cost-effective resiliency. The study found that total capitalized cost of a 12-module NuScale plant brings savings of nearly \$4 billion over the reference plant, and that NuScale's SMR design yields lower costs per kW with increased safety features, reduced construction times and lower associated financing costs.

## Supporting Climate Goals

NuScale's power plants emit little to no greenhouse gas during operation and life cycle. Given recent legislative developments, like various state laws requiring 100% zero-carbon electricity within the coming decades, SMRs will have a key role to play in achieving these goals. This view is supported by a Nuclear Energy Agency study released in 2019, which shows that combatting climate change will be difficult and expensive if nuclear energy is not included in the energy mix, and that without nuclear energy, deep decarbonization goals will be significantly more expensive to achieve. The MIT study lauds the importance of advanced nuclear technology and notes that "the SMR design being offered by NuScale Power is the most mature concept in this technology space."

## Meeting the Needs of an Emerging Global Market

NuScale estimates the global SMR market to be more than \$100 billion by 2035, based on best-case estimates by the Nuclear Energy Agency. In addition to focusing on other business development in the U.S., there are promising opportunities internationally. NuScale is exploring opportunities in the United Kingdom, Canada, Eastern Europe, Southeast Asia, Africa and the Middle East.

In November 2018, NuScale announced a memorandum of understanding (MOU) with Ontario Power Generation Inc., Ontario's public electricity generator, which has agreed to support NuScale in its vendor design review (VDR) with the Canadian Nuclear Safety Commission. Later that month, NuScale also announced an MOU with Bruce Power L.P., Canada's first private nuclear generator, to develop a business case to introduce NuScale's SMR to the Canadian market.



Throughout 2019, NuScale has reached a number of similar agreements with leading energy companies around the world, which recognize the vast potential of the NPM in addressing clean energy needs. These include:

- In January 2019, NuScale announced that it had signed an MOU with the Jordan Atomic Energy Commission (JAEC) to evaluate NuScale's SMR nuclear power plant for use in Jordan. "NuScale is at the forefront of U.S. SMR Technology," said H.E. Dr. Khaled Toukan, JAEC Chairman. "We look forward to this collaboration to assess the viability and potential for deployment of NuScale SMR Technology in Jordan."
- In March 2019, NuScale announced a similar agreement with Societatea Nationala Nuclearelectrica SA - Romania's leading nuclear energy provider - to explore applications for NuScale's SMR technology in Romania. Energy Secretary Rick Perry lauded the agreement, saying DOE was "enthusiastic about the possibilities for the future and being on the cutting edge of nuclear generation technology."



NuScale expects to announce additional MOUs with other power generation companies in the coming weeks, and is also continuing to develop new private sector partnerships to leverage emerging technologies and accelerate innovation in our own products. To that end, in May 2019, NuScale signed an

MOU with Enfission, LLC, a joint venture of Lightbridge Corp. and Framatome, to explore the use of next-generation nuclear fuel technology in NuScale's reactors. While NuScale's design is already the most resilient nuclear reactor in the world, Lightbridge's fuel could spur improvements in core design, performance and leveled costs of electricity.

## Continued U.S. Government Support

The combination of the economic benefits of export job creation and support for advancing national security objectives meets the Administration's policy of maintaining U.S. commercial nuclear energy dominance. NuScale has strong bipartisan and bicameral support in the U.S. Congress demonstrated by a range of legislative actions. Most recently, in March 2019, Sens. Lisa Murkowski (R-AK) and Joe Manchin (D-WV) introduced the Nuclear Energy Leadership Act (NELA), legislation that will ensure that the United States remains a global leader in clean, advanced nuclear technology and will foster closer collaboration between the federal government, our national labs and private industry to accelerate innovation. NELA was introduced by Reps. Elaine Luria (D-VA) and Denver Riggleman (R-VA) in the House. NuScale continues to work to secure the benefits of this legislation to help achieve our objectives.

## NuScale's Work Benefitting the Industry

NuScale's pioneering work creates benefits beyond the company's bottom line, so investments in NuScale are already helping to advance the industry as a whole. Benefits to multiple industries as a result of NuScale's efforts include:

- *In July of 2019, The U.S. DOE announced its sponsorship of a pilot program to deploy a cloud based NuScale Control Room Simulator at three U.S. universities; Texas A&M, the Center for Advanced Energy Studies (CAES) in Idaho Falls, and Oregon State University. Given a successful pilot study, this approach would also enable subsequent deployments at other locations.*
- *Other companies are already reaping the benefits of NuScale's Highly Integrated Protection System (HIPS) Platform. NuScale co-developed HIPS, an*

instrumentation and control protection system platform, with technology company Rock Creek Innovations. Rock Creek has been selected by Wisconsin-based Shine Medical Technologies to implement HIPS technology at its medical isotope production facility. For NuScale, HIPS was developed as part of the technology submitted in our DCA for our advanced nuclear reactor.

- *NuScale advises the Nuclear Energy Institute's advanced reactors working group (ARWG) and the WNA's CORDEL SMR Task Force (chaired by NuScale) by sharing lessons learned from the DCA licensing status. Both these organizations help streamline the design review processes of other advanced technologies. NuScale's Regulatory Affairs team shares its experience with 50 members of the ARWG, including advanced reactor vendors, NEI, DOE, national labs, Platts, and the NRC.*
- *NuScale is also working with TVA in a joint effort to support NRC rulemaking in site security. A consequence-based approach that takes advantage of the inherent safety of the NuScale design has the potential to significantly reduce security staffing and related requirements as compared to existing plant designs.*