In 2005, the Nuclear Regulatory Commission (NRC) certified the AP1000 design, clearing the way for its sale and installation at these three sites more than a decade later. Last year, Dan Brouillette, the U.S. secretary of energy, wrote in a blog post: "The U.S. Department of Energy (DOE) is all in on new nuclear energy."

NuScale's modular design—with 12 smaller reactors, each operating at a projected 60 MW—met NRC Phase 4 approval at the end of last year. According to Diane Hughes, vice president of marketing and communications for NuScale, "This means that the technical review by the NRC is essentially complete and that the final design approval is expected on schedule by September 2020."

NuScale's first customer, the Utah Associated Municipal Power Systems, plans to install a power plant with NuScale reactors at the Idaho National Laboratory site in Idaho Falls. The plant, Hughes said, is "slated for operation by the mid-2020s based on the NRC's approved design."

The idea of harnessing multiple smaller reactors in a single design is not new, dating back as far as the 1940s. At the time, the economics of the smaller, modular design could not compete with bigger, individual reactors, says M.V. Ramana, a nuclear physicist and professor at the University of British Columbia's School of Public Policy and Global Affairs.

"Nuclear power is unlike almost any other energy technology, in that it's the one tech where the costs have gone up, not down, with experience," he said. "The way to think about it is that the more experience we have with nuclear power, the more we learn about potential vulnerabilities that can lead to catastrophic accidents."

However, Hughes of NuScale counters that, unlike the 54 competing small modular reactor designs that the IAEA has records of, NuScale is "the first ever small modular reactor technology to undergo…NRC design certification review."

And in 2018, an interdisciplinary MIT report on nuclear energy found that NuScale's reactor is "quite innovative in its design. It has virtually eliminated the need for active systems to accomplish safety functions, relying instead on a combination of passive systems and the inherent features of its geometry and materials."

Of course, while the number of catastrophic nuclear accidents (such as Three Mile Island, Chernobyl, and Fukushima) is small for the amount of energy that nuclear power has generated over the past 70 years, Ramana adds, the cost of each accident is astronomical—sacrificing human lives and uprooting untold many more from disaster zones as well as requiring cleanups that cost hundreds of billions of dollars. "One every other decade is not good enough," Ramana said.

—MARK ANDERSON

POST YOUR COMMENTS AT
spectrum.ieee.org/nuclear-jun2020

JOURNAL WATCH

Messages From a MicroLED

Wireless communications most often travel via radio waves. But some scientists see potential in using light to transmit data.

Mohamed Sufyan Islim, a researcher at the University of Edinburgh, explains why: "The radio-frequency spectrum is becoming extremely crowded," he says. Visible and infrared light waves offer 2,000 times as much bandwidth as radio waves. And radio waves are easy to intercept, whereas light can be shielded.

To show what light can do, researchers at the University of Strathclyde, in Scotland, created a custom microLED array with nine lights placed in series. Each light (or pixel) measured just 20 micrometers in diameter. Then, the group at the University of Edinburgh used advanced techniques to modulate the array at extremely high speeds.

Together, the universities built a system that achieved record rates of data transmission using LED lights, with 11.74 gigabits per second at 0.3 meter and 1.61 Gb/s at 20 meters. They recently described their work in *IEEE Photonics Technology Letters*.

In previous research, Islim says, his group showed that "the small dimensions of the microLEDs mean that they can be modulated at much higher frequencies than standard LEDs—several hundreds of megahertz compared with a few tens of megahertz." Being able to modulate at higher frequencies allowed them to transmit more data.

However, most microLEDs manufactured today are made for visual displays, and not designed to transmit data. That's one thing that would have to change for this technique to be used more widely. **—MICHELLE HAMPSON**

An extended version of this article appears on our website in the Journal Watch section.