

NUSCALE POWER

NUKE-IN-A-BOX? IT'S HERE NOW

By **BENNETT HALL**
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OSU spinoff takes small-is-better approach to nuclear power

A mid-valley company with a novel reactor design is hoping to cash in on a budding nuclear renaissance.

Almost 30 years ago, the partial meltdown of a reactor at the Three Mile Island Nuclear Generating Station raised the alarm about nuclear safety in this country. But now fears of global warming are driving a revival in an industry that generates electricity without producing greenhouse-gas emissions, unlike the coal and natural gas used in most U.S. power plants.

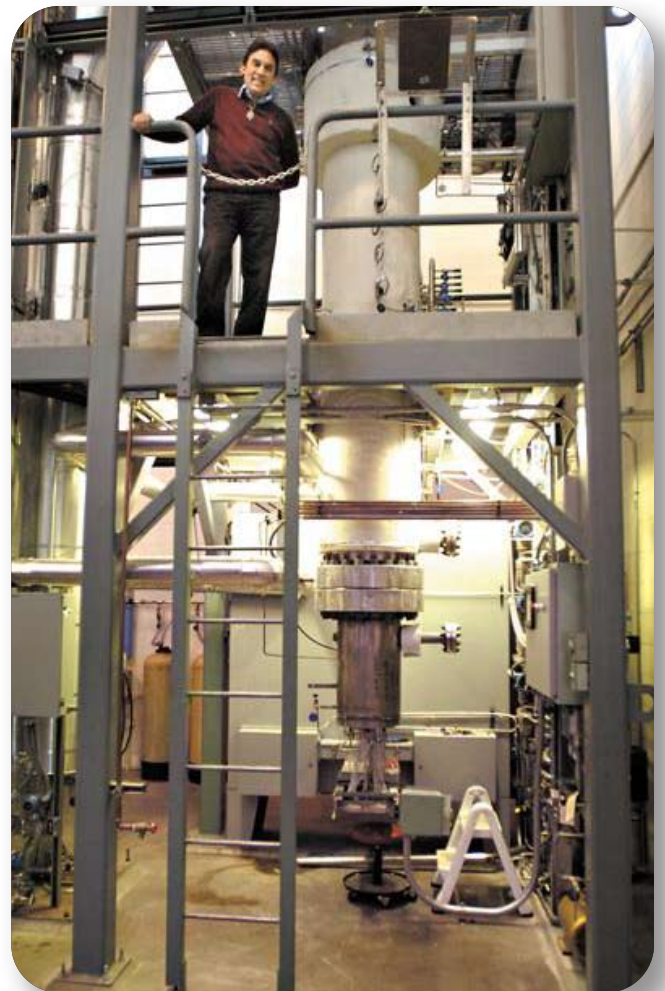
Spurred by billions of dollars in federal loan guarantees, applications for new reactors are once again rolling into the Nuclear Regulatory Commission. One of the latest entrants in that race is Corvallis-based NuScale Power.

With about 65 employees and an undisclosed amount of venture capital behind it, the privately held company was formed in mid-2007 to commercialize new-generation reactor technology developed at Oregon State University. The university gets an equity stake in the company through a technology-transfer agreement.

The firm is gearing up to test its design at an OSU facility and plans to submit an application for certification to the Nuclear Regulatory Commission late next year. If all goes well, the first NuScale reactors could come online as early as 2017.

While the NuScale design operates much like a conventional reactor — using enriched uranium fuel rods to heat water, producing steam that turns a turbine to generate electricity — there are several key differences.

First off, it's much smaller than a conventional reactor — about 60 feet tall by 15 feet in diameter. In contrast, a standard reactor might be 120 feet in diameter. It would generate 40 megawatts of electricity — enough to power about 40,000 homes — as opposed to 1,000 megawatts or more for many of the 104 nuclear power plants operating in the United States today.



CASEY CAMPBELL / GAZETTE-TIMES

Jose Reyes, head of the nuclear engineering department at Oregon State University and the chief technology officer of NuScale Power, stands by a scale model of the company's nuclear reactor design, set up for testing at the OSU Radiation Center. There is no radioactive material in the model, which is electrically heated.

But the design also is modular and scalable, meaning a NuScale reactor could operate alone or in arrays of up to 24 units joined together.

That approach offers a number of competitive advantages, said company CEO Paul Lorenzini, a former PacifiCorp executive who came out of retirement to lead the venture.

“The industry has become ingrained with the idea that the way to make nuclear economic is to make bigger and bigger plants,” said Lorenzini, who has a Ph.D. in nuclear engineering from OSU. “We’ve come at it a different way: How do you capture the economy of small?”

The company won’t say how much it expects to sell the reactors for, but Lorenzini claims the cost to purchase and install a full 24-reactor array would be significantly lower than the \$10 billion to \$15 billion price tag for a 1,000-megawatt nuke plant built on-site.

NuScale’s smaller reactor and containment vessels could be manufactured at any of a number of factories in the United States and could be shipped fully assembled, as opposed to the mammoth steel vessels used in conventional nuclear plants. Those can only be forged in sections at a single plant in Japan, which has a big backlog of orders from around the world. From there the components must be shipped and assembled on-site.

The company’s design also is much simpler than conventional reactors, eliminating the welter of piping needed to keep water circulating through the reactor core, said Jose Reyes, NuScale’s chief technology officer and head of the nuclear engineering department at OSU.

“This design uses natural circulation,” Reyes said, “so there’s no pumps driving water around the loop.”

That means there are no pumps to fail, which was one of the factors in the 1979 accident at Three Mile Island. Even though no one was injured in that accident, the public-relations fallout was enough to slam the brakes on virtually all new nuclear plants in this country.

In the meantime, however, other nations have moved ahead with their nuclear programs. And in the United States, bolstered by the well-publicized defections of such prominent anti-nuke activists as Stewart Brand, public acceptance of nuclear as a carbon-neutral source of electricity appears to be on the rise.

“Attitudes toward nuclear power have changed dramatically,” Lorenzini said. “The poll numbers show the public is really ready to embrace nuclear power in a way they haven’t been for 30 years.”

Not everyone is convinced that a nuclear renaissance is a good thing, even in the age of global warming.

“We put in 5,000 megawatts of wind power in the United States last year. We’re going to put in another 7½ this year,” said Jim Riccio, who tracks nuclear issues for Greenpeace. “We have sounder, simpler, safer and more deployable alternatives that are available now.”

While there are several “baby nuke” designs being touted as safer and more economical than existing technologies, Riccio noted that none of those — including NuScale — have so far been certified by the Nuclear Regulatory Commission, a process that can take years.

“Those aren’t really ready for prime time, and we really don’t have the time to screw around if we’re going to do something about climate change,” Riccio said.

And, of course, Riccio added, that still leaves one critical question unanswered: “What are they going to do with the waste they create?”

Maurice Gunderson of CMEA Capital, the Bay Area venture capital firm that’s bankrolling NuScale, brushes those criticisms aside.

“It has been clear for many, many years in the electric utility industry, though not in the general public, that the only way to eliminate carbon from electric power generation on a commercial scale is nuclear power,” said Gunderson, another OSU engineering grad. “Coal is a terrible mess. Natural gas is better, but not much.”

He considers nuclear waste more a political issue than a safety concern, and one that will ultimately be resolved by the federal government.

“NuScale will do exactly what everyone else is doing, which is on-site storage,” he said.

Like Lorenzini, he’s convinced that public opposition to nuclear is waning in the face of climate-change concerns. He’s equally sure that industry demand for new reactors is solid and that NuScale’s competitive advantages will bring in plenty of orders.

Nuclear Renaissance

- Nuclear reactors in U.S.: 104
- Percentage of U.S. electricity from nuclear: 19.4
- New U.S. reactors seeking certification: 26
- Nuclear reactors worldwide: 436
- Percentage of world electricity from nuclear: 16.6
- Reactors under construction: 43
- Reactors planned: 108
- Reactors proposed: 266

Sources: U.S. Nuclear Regulatory Commission, World Nuclear Association