

## Time for a New Generation of Nuclear

In the past several years, nuclear power in the United States has meant large plants with large price tags representing huge financial risks. Recently three companies, NuScale, Westinghouse and Babcock & Wilcox, have decided that achieving economies of scale may not be worth those risks, and have begun developing smaller and much simpler systems.

Where a huge megaproject like Plant Vogtle in Georgia will produce about 1100 Mw per unit, these newer systems will generate between 45 Mw to 335 Mw per unit. Called integrated pressurized water reactors (iPWRs), all three of these systems put the entire primary plant into a single pressurized vessel. This design choice eliminates the possibility of a large water pipe break causing a loss of coolant accident. The design also uses a high ratio of water as fuel, which means much more time is available to the operator of the plant if needed to respond to an emergency. Passive safety systems dominate these designs which do not require external power to function, so they don't need redundant power systems. The NuScale design uses natural water circulation in operation as well as in shutdown, so it doesn't use any coolant pumps at all. Fuel assemblies will be similar to those in existing nuclear power plants, except they will be shorter; and fewer of them will be needed in each core. Another huge advantage is that everything will be installed underground to maximize security and anti-terrorism threats. In all respects, these units are far less complex than the currently used reactors.

Of the three, the Babcock & Wilcox design is creating the most excitement in the industry. Three big utilities, Tennessee Valley Authority, First Energy Corp. and Oglethorpe Power Corp., signed an agreement with Babcock & Wilcox last year, committing to help get the new reactor named mPower™ approved for commercial use in the U.S. Standardized designs can be approved, simplifying the approval process for a site-specific installation. The reactors, which would be small enough to ship by rail or barge, would also be factory built, further decreasing the cost.

These smaller reactors would probably be installed much like natural gas power plants are, as modules. Ten mPower™ reactors would supply more power than a Plant Vogtle unit with considerably more flexibility and less financial risk, plus the project could be scaled. Many existing nuclear sites have been permitted for up to four reactors, but cost and approval hurdles have often resulted in fewer being built. As a result, there is a backlog of sites with reactor approvals but no reactors.

In the future, nuclear modules could be used to refit coal-fired plants that become obsolete, or are unable to comply with clear air standards. Nuclear modules would preserve the infrastructure assets of these coal fired plants, making conversions cheaper than new construction. Babcock & Wilcox has informed the NRC that it will be submitting a design certification application by the end of 2012 for its mPower™ reactor, and that the application might be filed at the same time as a construction and operating license. NuScale has told the NRC that it will be filing its license application in the first half of 2012. Westinghouse plans to submit a license application by the end of 2014 because so much of its attention is focused on the revised application for the AP1000 that it needs for the Plant Vogtle installation.