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Alternative fuels

Is nuclear power the answer to rising energy demands?

By Melinda Copp

Population booms and increasing signs of global warming have brought nuclear power to the forefront as an alternative to fossil fuel energy, especially in South Carolina.

Currently, more than 50% of the state's electricity is supplied by nuclear reactors. With the Southeast attracting growing numbers of new residents and businesses, energy companies recognize the need for more power. And the low levels of greenhouse emissions make nuclear power an attractive option.

"We're facing more and more environmental issues with fossil fuels," said Mitch Singer, spokesman for the Nuclear Energy Institute in Washington, D.C. "Because of the growth, demand from the population and public support, you have good reason to look at nuclear power."

"To the experts, nuclear power is safe, with little to no environmental consequences," said Kenneth D. Lewis, dean of the College of Science, Mathematics and Engineering Technology at South Carolina State University in Orangeburg. "Since the time of the Three Mile Island accident in 1979, the industry has become more regulated, creating a multitude of redundant safeguards."

The largest nuclear engineering program in the country, according to Lewis, is at the Massachusetts Institute of Technology, and there are also programs at the University of Illinois-Urbana, the University of Michigan, Idaho State University, the University of Missouri and the University of Tennessee.

One of the oldest programs in the country is at North Carolina State University, while two of the newest are at the University of South Carolina and South Carolina State University.

"We are the only program at a historically black college," Lewis said, noting that the first two graduates of the program received their degrees in December. Those two graduate engineers, Aundrie Blanchard and Patricia Glenn, are already working, one at the Savannah River Site and the other at Oak Ridge National Laboratory.

"When I arrived two years ago, (SCSU) had 10 students in the nuclear program," Lewis said. "As a result of our recruiting program, we brought in an additional 11, and we may pick up another 10 in the fall of 2007. Of those 11 freshmen, only two are from out of state; the rest are from South Carolina. We have to start home-growing these folks. We have seven operating plants in state and another one on the drawing board."

The outstanding question involves the problem of nuclear waste, Lewis said.

"The mass of that waste is small in relation to the amount of energy created, but the isotopes left over are long-lived. A study group has been formed to look at the feasibility of building a reactor to burn the wastes and is looking at possible locations in Idaho, Oakridge, Tenn., and the Savannah River Site.

"The good news for today's students," Lewis said, "is that there is an increasing need for nuclear engineers at defense facilities and with the Department of Energy. Nearly 50 percent of the present engineering force will become eligible for retirement in the next few years."

Adding to the economic viability of nuclear fuel as an energy source is the prospect of a carbon-emission tax, which would make burning fossil fuels more expensive.



PHOTO COURTESY OF DUKE ENERGY

Energy suppliers, recognizing the increasing need for power in a growing state economy, are continue to explore nuclear power as an attractive option because of its low levels of greenhouse gas emissions.

"Nuclear power is currently slightly less economical than coal," said Jim Finucane, a nuclear and uranium data specialist with the Energy Information Administration. "With an emission tax, that may diminish."

The U.S. nuclear power industry has been at a virtual standstill for decades. No new reactors have been built in 30 years and the 1979 accident at Three Mile Island, near Harrisburg, Pa., remains fresh in the minds of many Americans. But with the downside of coal and other fossil fuels becoming more evident, nuclear power has become a big part of the nation's energy conversation.

The Energy Policy Act of 2005 gave the industry tax credits worth \$3.1 billion, liability protection and compensation for legislative delays. That same year, the U.S. Nuclear Regulatory Commission approved the design of the new Westinghouse AP 1000 reactor. For the nuclear power industry, this support is opening up opportunities for growth.

South Carolina's nuclear profile

According to a January 2005 EIA report, South Carolina is ranked third among 31 states with nuclear capabilities, and South Carolina has the most nuclear capacity in the Southeast.

Duke Energy operates two reactors at its Catawba plant

on Lake Wylie and three at its Oconee facility near Seneca. Carolina Power & Light operates the H.B. Robinson reactor near Hartsville, and South Carolina Electric & Gas Co. operates the Virgil C. Summer plant in Fairfield County. These seven reactors generate a total of 53,136 million kilowatt hours of electricity annually, according to the EIA.

South Carolina is also home to the Chem-Nuclear Systems Barnwell Waste Management Facility, one of two low-level, waste-storage facilities in the country. The Barnwell facility has been in operation since 1971 and houses more than 28 million cubic feet of low-level nuclear waste. Low-level nuclear waste is essentially clothing, tools, rags and any refuse that has become radioactive through exposure.

The Barnwell site is licensed federally by the Nuclear Regulatory Commission and by the S.C. Department of Health and Environmental Control.

Nuclear concerns

Nuclear power still carries a heavy load of radioactive baggage. Environmentalists argue that without a viable long-term storage plan, nuclear waste will put communities at risk of exposure.

The national solution to long-term nuclear waste storage appears to be Yucca Mountain. Located about 100 miles

Nuclear Power

South Carolina's Nuclear State

Catawba Nuclear Power Plant, Duke Power

The two light-water reactors at the Catawba plant are the largest in the state. Oconee, however, with three reactors, has the highest nuclear capacity in the southeastern United States. The Catawba plant is located on a peninsula which extends into Lake Wylie, north of Rock Hill.

H.B. Robinson Nuclear Plant, Carolina Power & Light

The H.B. Robinson power plant includes a coal-fired generator as well as a nuclear power unit. The 5,000-acre site near Hartsville is the source of cooling water for the reactor.

Oconee Nuclear Station, Duke Power

The Oconee station is located near Seneca and is only the second nuclear power plant in the United States to have its license extended by the U.S. Nuclear Regulatory Commission.

Virgil C. Summer Nuclear Station, S.C. Energy & Gas (67.7%) and S.C. Public Service Authority (33.3%)

The Virgil C. Summer station is located near Jenkinsville in Fairfield County. In 2001, the Summer unit operated at 79.9% of capacity, producing 6.76 billion kilowatt-hours of electricity.

By the numbers

- 54.5% of the electricity generated in South Carolina is supplied by nuclear energy.
- In 2004, South Carolina's nuclear power plants avoided approximately 239,100 tons of sulfur dioxide emissions, 81,500 tons of nitrogen oxide emissions and 47.2 million metric tons of carbon dioxide emissions, as compared to emissions from other energy sources.
- More than 3,000 metric tons of nuclear waste is in temporary storage in South Carolina.

Source: Nuclear Energy Institute

northwest of Las Vegas, the U.S. Department of Energy began looking at Yucca Mountain as a spent-fuel, high-level radioactive waste repository in 1978, based on suggestions that the best and safest way to store the material would be deep underground.

Long-term nuclear waste storage became a national issue when Congress passed the Nuclear Waste Policy Act in 1982. In 1983, the DOE selected nine sites in six states as possible repositories. President Ronald Reagan eventually narrowed this list to three locations: Hanford, Wash.; Deaf Smith County, Texas; and Yucca Mountain in Nye County, Nev. In 1987, Congress settled on Yucca Mountain and the facility was scheduled to open in 1998. However, political opposition delayed the project.

In 2002, President George W. Bush signed a House-Senate joint resolution that allowed the DOE to move forward on the Yucca Mountain facility. According to the EIA, the DOE is working on the license application and plans to submit the materials to the Nuclear Regulatory Commission in 2008.

But that doesn't mean the controversial project is settled. When the Democrats took control of the Senate in the November 2006 elections and Sen. Harry Reid of Nevada became Senate Majority Leader, opposition to the Yucca Mountain plan grew stronger.

Without the Yucca Mountain facility, the pressure would increase for local waste storage facilities in South Carolina and the rest of the country.

Waste stored in these temporary facilities can potentially leak into water sources and expose communities to harmful radioactive waste. Nuclear defense waste stored at the Savannah River Site near Aiken is a prime example. The storage containers could become compromised, causing tritium, the radioactive form of hydrogen used in weapons, to leak into the Savannah River, which supplies drinking water to thousands of people in Beaufort and Jasper counties.

"This stuff is so deadly that citizens need to be concerned," said Joe Whetstone, a Bluffton resident and member of the Sierra Club's S.C. Chapter Conservation Committee.

Other concerns with increasing nuclear power capabilities include the proliferation of nuclear weapons beyond U.S. borders and the potential for a repeat of the partial core meltdown on Three Mile Island. And, because nuclear power relies on uranium, which is not a renewable resource, environmentalists argue that conservation and renewable energy are safer options.

"We haven't even tried to conserve," said Whetstone. "Energy efficiency has declined rather than improved, and as a society we seem to be excusing ourselves and saying we need more energy."

South Carolina's nuclear future

Finucane expects that between five and 20 new nuclear reactors will be ordered in the next 20 years in the United States because of technological advances that make the energy source more viable.

Duke Energy, the state's largest nuclear power producer, is currently working on an application for licensing of a new Westinghouse AP 1000 reactor in Cherokee County, and expects to complete the paperwork late this year. If it decides to submit the application, the review process will take two or three years, said Duke Energy spokeswoman Rita Sipe.

"We're evaluating many things, and it's about meeting our customers' needs now and in the future," said Sipe. Duke Energy estimates that power demand increases by 40,000 to 60,000 customers annually in its North and South Carolina markets combined. "A

