



US nuclear programme inches forward

While 17 nuclear plant applications await licensing, opening dates remain uncertain. **Laurie Wiegler** reports

A FLURRY of nuclear reactor applications hit the US Nuclear Regulatory Commission (NRC) in the autumn of 2007. By early 2009, the number reached 26 new reactors for 17 plants, with an additional application pending by summer. If built, US nuclear plants would grow from the current 104 operational plants to nearly 125 in the next decade or so.

Scott Burnell, a spokesperson for the NRC, says that the last plant to come online was Tennessee Valley Authority's (TVA's) Watts Bar 1 in 1996. The last plant to become reactivated was TVA's Alabama Browns Ferry Unit 1, in 2007, which had closed along with units 2 and 3 in 1985 to "correct a number of issues" including non-compliance with federal safety standards.

Opening dates for the wave of new plants remain obfuscated for various reasons, in no small part due to the country's current political climate. US president Barack Obama is a keen supporter of clean energy, and did not rule out new nuclear in his campaign, but so far he hasn't proven to be a fan. For example, his decision to stop funding the Yucca Mountain repository in Nevada means that the debate of what to do with the US nuclear waste stockpiles has to start again from scratch.

It's a waiting game: currently, all 104 plants maintain radioactive waste on-site. Even when the new plants come online, they aren't expected to accumulate radioactive waste for some time – and possibly, a waste repository could be built in that indeterminate point in time.

how many, how quickly?

The US Department of Energy (DoE) told *tce* it remains committed to nuclear power, and funds a \$18.5b loan guarantee to support the construction of nuclear plants. The DoE is "conducting research and development on advanced nuclear energy systems and supporting the development of the next generation

of nuclear engineers and scientists," it says.

To prove the point, the DoE's Nuclear Energy University Programs (NEUPs) fund research at US universities, providing scholarships and fellowships to nuclear science and engineering students. Its objectives include maintaining the US knowledge base in nuclear R&D.

By way of example, the NEUP sponsors nuclear energy research programmes such as the Advanced Fuel Cycle Initiative, which is being employed at schools such as the University of Idaho's Nuclear Engineering programme.

Further, the DoE says it is keen to promote nuclear engineering to undergraduate students, especially as according to DoE statistics, "about half of the nuclear industry's workforce will be eligible to retire in the next ten years."

Yet, it's hard to say whether or not the plants will actually come online, especially on time.

Michael Johnson, director at the Office of New Reactors at the Nuclear Regulatory Commission, says the agency expects five of the applicants to build as soon as they receive their licenses. However, there is no regulatory requirement for any plant to start building right away. A combined license – or 'COL' – is good as long as nothing has changed on the site and the design hasn't been altered.

Tony Pietrangelo, vice-president of regulatory affairs for the Nuclear Energy Institute, expects construction work on four to eight units to start "in the next eight years or so." He admits, though, that with "many variables" over which the agency has no control, it's hard to pinpoint exact opening dates. "We're working very hard to ensure that the loan guarantee programme functions quickly. We're working very hard to try to get the volume of the programme [to support nuclear power generation] raised."

politics, money and the environment

Reasons for the hold-up include politics

and finances, even though by most accounts running a nuclear plant in the US is a cheaper way to provide electricity.

Robert Yanita, a spokesperson for the new South Carolina Electric Gas (SCEG) nuclear plant in Fairfield County, South Carolina says: "We estimate that the busbar costs (the cost to bring the electricity to the grid) will be approximately \$75/MWh. That is cheaper than all other forms of baseload generation we have analysed."

According to NRC white paper *Cost of new generating capacity in perspective*, the "relevant metric" when measuring the cost of running a plant is "the cost of the electricity produced by the nuclear project relative to alternative sources of electricity and relative to the market price of electricity at the time the nuclear plant comes into service."

Even so, US activists still aren't buying it. Resistance to the nuclear industry continues among environmentalists, even in the face of evidence that the new plants offer a clean energy solution.

Greenpeace's nuclear analyst Jim Riccio says that there is no way Greenpeace will ever support nuclear power. "Its clean energy model simply does not outweigh the negatives associated with the same energy source responsible for the 1979 Three Mile Island, Pennsylvania disaster," says Riccio.

changes post Three Mile Island

The NRC has implemented changes to its procedures and policies since the Three Mile Island disaster. Namely, a new combined licensing process means that it's tougher for new plants to go online.

"The first thing to do is to get a license to operate a plant, even before it's built: that's different from how the first 104 were licensed, where you got a construction permit, built the plant, and then got your operating license," says Pietrangelo.

Further, the industry is using only five new reactor technologies which mean a



Laurie Wiegler is a US-based freelance journalist

more standardised approach and, hopefully, far less risk to the type of leakage and human failure caused by Three Mile Island. This is "opposed to customised reactor technology on each plant that was done in the first wave of building from the late 60s through the 80s," says Pietrangelo.

The NRC's Burnell adds that "the standard [for reactor safety] has evolved over time, and the applicants have to meet the current standard, not the standard as it existed in 1979 [when the Three Mile Island accident occurred]."

Pietrangelo continues: "The nuclear industry in the US is making use of a lot of the sophisticated analytical computers, tools and things we have at our disposal now. We're doing modular construction, which we weren't doing before [this most recent wave of new plants], which will also make [each plant/reactor] more efficient."

all staffed up with nowhere to go

Yet, all the reactor technology is well and good – if it is used. If the current hiring trend and student enrollments are any indication, the US nuclear industry is indeed primed for a renaissance.

Unlike most areas of the US economy, the nuclear industry is recruiting – and in droves. After Three Mile Island, the industry experienced a serious decline in recruits. An estimated 50% of universities nationwide dropped nuclear engineering and related programmes, according to a white paper issued by the Korn-Ferry Institute. Nuclear engineering programmes remained unpopular through much of the 80s and 90s, but are now seeing resurgence in the US as well as India and China, for example.

Keith Parker, chief executive with the UK's Nuclear Industry Association, says that the UK also experienced a long period of disinterest in nuclear programmes. He says that like the US, the UK is reintroducing nuclear-related courses – see page 58 for more details.

"Most of the university courses in nuclear technology closed from the 90s through to the early 2000s, but with the revival of interest in nuclear they are being re-introduced and students are taking them up. Clearly there's a lag there that you can't build up these things as fast as you can close them."

Fred Gunnerson of the University of Idaho's Nuclear Engineering programme says that his department experienced such a serious decline in interest after the 1979 Three Mile Island disaster and Chernobyl a few years later that he shuttled the programme for many years.

"The number of nuclear engineering programmes in the country between about 1980 to 2000 went from about 26 down to about 13, about half as many," says Gunnerson.

When Gunnerson began working for the University of Idaho in the early 1990s, enrollments in his department were very low, there were just one or two students every year that even indicated an interest in nuclear power.

"So in 1995 I took the University of Idaho's nuclear power programme and I pretended it was a desert flower – to close up until it rained. I accepted no new students from 1995 until about 2005, when it started to rain again, and I went ahead and opened up the flower," Gunnerson says. "We had students waiting at our door."

By 2007 they had about 30 students, and today boast 50–60 at the graduate level. The department's current robustness is largely due to the DoE's 2004 designation of Idaho National Laboratory (INL) as the lead nuclear laboratory in the US, says Gunnerson. He adds that the university works very closely with INL, one of a dozen or so major nuclear laboratories in the US.

Gunnerson points to programmes such as the aforementioned Advanced Fuel Cycle Initiative, part of the so-called Generation IV International Forum to find new reactor technologies that could help reduce cost while accessing a geologic repository for waste – as an example of why courses such as his are now thriving. **tce**

Totally transforming...



...your control products and systems



SattControl and Alfa Laval Automation* control products and systems continue to be supported through ABB's lifecycle support programme called *Evolution for Life*.

The programme tracks your existing control products and systems and offers timely upgrades: whether it be technology, programming languages or connectivity.

If you are a user of SattLine or SattCon, or any other PLC or control system, and want to make sure it performs for the next 20 years and beyond,

call +44 (0) 1480 488080 to arrange a free introduction and site audit™ or visit www.abb.com/controlsystems

*Satt formerly traded as Alfa Laval Automation and SattControl including SattLine and SattCon

**limited to first 20 people to call from UK



Power and productivity
for a better world™