Nuclear renaissance

A third of the UK’s generating capacity will come offline within the next 20 years. Nuclear power is central to replacing it, believes Government. An opportunity for manufacturers? Andy Sandford reports

Many see nuclear power as the only currently available technology to meet the objectives of low carbon emissions, competitive cost and energy security.

Government certainly thinks so. Prior to his move to defence, Business Environment Regulation and Reform (BERR) Secretary of State John Hutton declared that he was “determined to press all the buttons” to get nuclear built in this country at the earliest opportunity, and introduced a series of measures designed to ease the way for new installations. (Lord Peter Mandelson is now in the BERR hot seat, of course.)

Mr Hutton said that British manufacturers should position themselves to take advantage of an expected £20 billion private sector investment in new nuclear power, highlighting it would also mean the creation of 100,000 new jobs. But, stiff competition will come from countries such as China, he warned.

The “facilitative actions” set out in the Government’s energy White Paper are intended to enable companies to: make planning applications from 2010; begin building new nuclear power stations from 2013 – 2014; and bring them into operation from 2017-2020. Up to 10 new nuclear powers stations could be built by 2020, it is suggested, and Mr Hutton added: “I know many manufacturers across the country already have the skills and expertise needed to build power stations – but more needs to be done to create and support a globally competitive UK supply chain, focusing on high value added activities to take advantage of the UK and global nuclear renaissance.” The newly created Office for Nuclear Development will support such supply chain growth, he offered.

It was against this background that the Manufacturing Technologies Association organised a special sustainable energy seminar in October, inviting the nuclear industry to explain its case and the benefits for UK manufacturing.

Opening the session, Lord O’Neill of Clackmannan, chairman of the Nuclear Industries Association, declared that we were in the process of what might be called a nuclear renaissance, and explained why a new fleet of nuclear power stations is needed in the UK.

In the 1950s and 60s we built coal-fired power stations and a lot of these need to be replaced, he said. Environmental concerns mean we can’t burn coal in the way we did in the past, and even at an optimistic estimate we won’t have clean coal technology ready to install before 2020. What’s more, carbon capture systems not only ramp up the capital cost of the plant, they also consume energy during generation, making the plants less efficient.

In the 1990s we had what became known as the ‘dash for gas’, as combined cycle technology offered the opportunity...
to produce power efficiently from what then appeared to be an abundant supply of a comparatively cheap source. It was an attractive prospect at the time, but around 50 per cent of generation cost is for the gas and, although it is a relatively clean process, that cost, linked to the cost of oil, has become very volatile.

The history of nuclear has been somewhat chequered. The UK got off to a head start with Calder Hall, the world’s first commercial power station, but the philosophy at the time was that each new nuclear power station should be an improvement on its predecessor, so each one was different – making them expensive to maintain as there was little commonality.

Over time, nuclear power has become comparatively less expensive and today we still produce around 16 to 17 per cent of our power from nuclear, with a further 6 per cent being imported from France – France produces most of its electricity via nuclear power.

But as with the older coal-fired stations, some of our nuclear power stations are reaching the end of their life and that generating capacity needs replacing, leaving the UK facing an energy gap dependent on environmentally unacceptable coal stations, expensive gas-fired generation and a reduced fleet of nuclear power stations. To fill this energy gap the UK will require at least six to eight new power stations over a period of up to 10 years, said Lord O’Neill.

He added that alternative sources of power such as wind and tidal are not in a position to fill this gap. Tidal power is still at a development stage, he said, and wind power is intermittent and, because the sites with suitable levels of wind are often remote, there are problems and costs associated with transmitting that power to where it is needed.

WIND WOBBLIES

“Although wind has its attraction, it cannot provide the base load 24/7, 365 days-a-year generation. The kind of thing that keeps the railways running, keeps the hospitals open and keeps the big industrial plants working,” he said. “There is now a political consensus between the two main parties that there needs to be a reconsideration of nuclear power.”

The Government has acted by passing legislation that will make planning procedures less time consuming and pave the way for privately owned nuclear power stations.

Over the next two to four years a lot of the groundwork will be done – the legislation, the planning and the generic design assessment process for new reactors. An awful lot has been going on in a relatively short period, said Lord O’Neill, and even more still has to be done. And, even if the reactors themselves are supplied by French or US companies, a lot of sourcing will largely have to be done very quickly within the UK, he underlined.

Amplifying this, David Powell, regional vice president UK
of Westinghouse, explained how his company was aiming to localise as much as possible in the delivery of its new AP 1000 nuclear power stations.

So far, eight AP 1000 plants have been contracted – four in China and four in the USA – with the first one operational in 2013. Westinghouse expects 10 more to be ordered in the USA and sees a need for maybe 100 new nuclear plants in China.

The key objective is to ‘design once and build many’ using a less complicated modular design that can be replicated all over the world. The emphasis is on standardisation – once the design has been finalised, it is fixed. This gives a huge benefit in sharing knowledge and means that Westinghouse can license the design around the world.

As well as having global supply chain partners for certain aspects of the plant, Westinghouse will also seek to localise a lot of the supply chain. In China, for example, it has set up a module production facility that will supply complete modules to all the sites. There are around 300 modules required for each plant and parallel module production in one facility reduces the amount of onsite work required and overall construction times.

Bill Bryce, a director of Doosan Babcock, said that his company estimated that about 230 new nuclear power plants will be ordered by 2020 and the UK can be key to developing a supply chain for Western Europe.

He said that offsite construction methods using modular designs opened the supply chain up to many more businesses as fewer components need the ASME nuclear approval stamp – which is expensive to acquire and maintain. He added that 80 per cent of the parts that go into a nuclear power station have nothing to do with the nuclear side of it – they simply provide the infrastructure for the plant. Quoting a recent NAMTEC study (see box item), he estimated that the UK nuclear supply chain could currently supply 70 per cent of everything that goes into a new nuclear plant, and with investment in the sector this could go up to 80 per cent – with significant involvement from Tier 3 and 4 suppliers.

Lord O’Neill said that precision engineering companies should not be shy in going after these opportunities. “If you are currently meeting aerospace requirements you are already working to the standard you need for nuclear,” the noble Lord added.

He also pointed up opportunities for decommissioning, an area where we already have a lead over other countries.

And he concluded: “We can be self-sufficient and sustainable in our energy if we marry decommissioning and reprocessing to new build. Apart from the French, we are the first to embark on a programme of decommissioning and rebuilding, so there are opportunities for British manufacturing and engineers. Most of our ducks are in a row – but has the message got through about the potential that is out there?”

Bill Bryce – 230 new nuclear power plants will be ordered before 2020; the UK can benefit.

NAMTEC supply chain analysis reveals manufacturing opportunities


The report interestingly notes: “There are several UK-based companies with manufacturing facilities and experience capable of supplying a large number of the components (plant and equipment) required for a nuclear power plant.”

But it also notes: “There are a number of supply chain issues (‘pinch-points’), related to global capacity, as in the case of ultra-large forgings for the manufacture of Nuclear Steam Supply System (NSSS) equipment and turbine generator rotors, and the fabrication of NSSS equipment itself. This relates to both new build projects and to nuclear fleet lifetime extension programmes which require replacement parts.”

And in offering recommendations, it says: “Supply chain development activities should be initiated which make potential supply chain companies aware of the opportunities of a nuclear new build programme, and help companies develop capability and capacity to relieve supply chain ‘pinch-points’.”

Another recommendation is that: “Additional supply chain ‘mapping’ should be carried out, including to lower tiers of the supply chain, to understand where the UK has expertise and/or the potential to compete for UK nuclear new build and in overseas nuclear builds.”