Fifty years of hopes and fears

Atomic energy was cutting edge when the Windscale fire showed the world the effects of a nuclear accident. Fifty years on, we have more innovative ways to generate electricity.

Walt Patterson

On the edge of the Lake District, scenic heart of northwestern England, lies a vast, ugly industrial scar. Part is Calder Hall. The rest was once Windscale. Half a century ago both became famous worldwide.

On 17 October 1956, Queen Elizabeth II switched on the electricity from Calder Hall, called the world's first nuclear power station. On 8 October 1957, the physicist in charge of the Windscale Number 1 plutonium production reactor, a few hundred metres from Calder Hall, threw a switch too soon. The reactor caught fire. By the time the fire was extinguished three days later, a plume of radioactivity had drifted far across northern Europe. The world found out what a nuclear accident could do.

Last month, wreckers demolished the cooling towers of Calder Hall, on the site now known as Sellafield. The hopes — and fears — that those towers came to represent still loom over global energy.

In the 1950s, politicians, media and the public were keen on 'atomic power', as they called it. They felt it was cutting edge, a cleaner, more modern replacement for coal. Those keeping the lights on were less keen. In the United States, Britain and elsewhere, electricity managers viewed nuclear power, untried and unfamiliar, with scepticism. Their wariness deepened after the Windscale fire left a radioactive mess, still being cleaned up half a century later.

Nuclear promoters, backed by their governments, prevailed. Electricity demand and supply expanded dramatically. Nuclear plants, scaling up at breakneck speed, reached record size. They also had record cost and timetable overruns, sometimes tripling initial estimates and taking more than a decade to build. A brief flurry of orders followed the first oil crisis in 1973, then petered out, amid many cancellations. The last US plant completed was ordered in 1974.

On 28 March 1979, Three Mile Island 2 in Pennsylvania came scarily close to meltdown — the first major accident at a civil nuclear power plant. Soon nuclear order books were almost empty. On 26 April 1986, the Chernobyl 4 reactor exploded, the worst nuclear accident in history. By then, however, nuclear power was already falling out of favour, not for the oft-cited reasons of safety or waste management, but because of its cost and complexity.

SELLAFIELD

The cooling towers of Calder Hall at Sellafield being demolished last month.

For three decades after Calder Hall, nuclear power plants fitted the traditional electricity system, in which a better power plant was always a bigger one farther away. Then, at the end of the 1980s, governments began selling electricity assets to private operators and introducing competition. That transferred risk from the captive customers of traditional electricity monopolies to the shareholders and bankers of the new competitive systems. Private investors lost interest in nuclear plants. Instead they bought gas-turbine power stations that could be ordered, built, operating and earning revenue in less than two years. Suddenly a better power station might be a smaller power station closer to users — a fundamental break with tradition.

From 1990 onwards, gas-turbine generation has taken the lead. It is cheap, clean and easy to site. It needs no fuel store, uses less water than coal-fired or nuclear generation, and produces no waste. Gas turbines have also paved the way for other smaller-scale generators. Traditional water and steam power kept scaling up because a bigger unit made cheaper electricity. For microturbines, gas engines, Stirling engines, flow batteries, fuel cells, wind turbines, microhydro and marine energy, biomass power, solar thermal and photovoltaics, what counts is scaling up the number of units: the more you make, the cheaper their output, with rapid learning curves. Some also deliver both electricity and heat from the same fuel, boosting efficiency and reducing emissions. Generation from wind, water and sunlight uses no fuel and produces no emissions.

Traditional electricity networks are radial and one-way. They deliver large flows of electricity over long distances from huge power plants in remote locations. Such networks are inherently vulnerable to disruption, as widespread blackouts attest. Smaller-scale generation closer to users prefers two-way networks, linking loads and generation in optimized local systems. Such decentralized electricity offers higher performance and reliability, and lower environmental impact. It is gaining ground rapidly.

As climate and fuel security dominate the energy agenda, the battle between traditional and innovative electricity intensifies around the world, notably in fast-growing economies such as China. After half a century, nuclear power is the ultimate in tradition. It needs climate more than climate needs it. To avert catastrophic global warming, why pick the slowest, most expensive, most limited, most inflexible and riskiest option? In 1957, despite the Windscale fire, nuclear power was worth trying. We tried it: its weakness proved to be economics, not safety. Now nuclear generation is just an impediment to sustainable electricity. ■

Walt Patterson is associate fellow at Chatham House, London SW1Y 4LE, UK and author of *Nuclear Power* (Penguin), available free at www.waltpatterson.org. His new book is *Keeping The Lights On: Towards Sustainable Electricity*.