Why energy needs are so predictably unpredictable

While GDP has almost tripled in 45 years, energy demand has fallen away. **Bill Hedley** chronicles changing times and some tricky forecasting

For those of us brought up believing that energy usage is bound to double as the economy's sparks fly upward, recent British trends may seem surprising.

According to the government report *Energy Consumption in the UK*, published in November, the country used less energy in 2015 than in almost any year since 1970 (although 2014 was lower still, but had been exceptionally warm while 2015 was particularly cold).

Only transport uses significantly more energy since the year Ted Heath replaced Harold Wilson as prime minister. It became the biggest single energy user in the late 1980s and has risen steadily to about 40pc now. Industry is a big beast dying – at a mere 17pc of UK energy, it has fallen by about two-thirds. In total, the country is using 18pc less energy today than 45 years ago – a period during which gross domestic product has almost tripled.

The onus is on policymakers to decide what energy mix will best suit the nation's future needs but, with such a radically different relationship between energy and economy, that is far from easy.

Stored electricity is going to significantly replace hydrocarbons in many power sources, for instance. Most transport energy is used by cars and vans, so changes to driving will be paramount if a demand spike in available electricity is to be avoided. Indeed, electrical vehicles take a tiny percentage of transport energy (it was around 0.01 per cent in 2014) but the Government predicts that all cars and vans sold in 2040 will be electric.

Whether future demands rise or fall, old power plants must be replaced with new, but not at the expense of environmental factors, economics or energy security – where the supplies come from and how stable they are. As such, the existing UK power generation infrastructure was built in waves, each responding to perceived future needs. Many of the large coal-fired generators from the late 1960s and early 1970s continue to operate today.

Groundbreaking The Berkeley Energia uranium mine near Salamanca will open in 2019

The nuclear fleet was built in the quarter-century after 1971, the "dash for gas" brought the proliferation of gas-fired power stations in the 1990s, and solar and wind generation started slowly around 2000 but accelerated rapidly after 2010. So what will the next wave look like?

Taking the figures for the first quarter of 2016, coal accounted for 15.8pc – a record low. Gas was 37.8pc, and nuclear 18.7pc. Renewables beat coal and nuclear at 25.1pc, an increase of more than six percentage points year on year. But the same figures for Q2 did not glow as green, with a year-on-year fall of 0.5pc, despite an increase in capacity. The reason, say government statisticians, is the weather; wind speeds and rainfall were down, so wind turbines and hydroelectric generators simply ran out of puff.

Given that the British weather is unlikely to become any more predictable, and that coal and gas will never be carbon-neutral, future energy policy needs finesse. Some existing plants can be converted to renewables – the Drax power station in North Yorkshire, the biggest coal-fired generator in the UK and providing 7pc of the nation's electricity – is converting to biomass fuels of wood and elephant grass, reducing its carbon footprint by 86pc. It is one of several such projects, although they will largely depend on imported wood pellets from the US, and need state support that must be agreed nationally and at European level.

That leaves nuclear power. The last UK nuclear power station to be built, Sizewell B, came online in 1995, but the subsequent privatisation of the nuclear power industry made it uneconomic to build its three planned sisters. But increasingly rigorous climate change targets and the need for a reliable, secure component to balance what will become a renewables-dominated system led to the Government's nuclear industrial strategy paper in 2013. This showed plans to build about a dozen new plants by 2030 at five sites across England and Wales, with Scotland remaining resolutely opposed.

It also promised to establish bodies to co-ordinate research and industry needs. Last September, the Government approved the first new

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UK nuclear power station of the 21st century, at Hinkley Point in Somerset. It is due to come online in 2025, with a working life of 60 years.

As for nuclear fuel, traditionally sourced from mines in Kazakhstan, Canada, Australia and Niger, Europe has its own untapped reserves waiting for the right combination of political will and economics to release them. There is also movement here. The world's only new uranium mine is under construction in Spain. The Berkeley Energia facility in the north west, near Salamanca, opens in 2019, with enough reserves to fuel the UK's reactor fleet for four years.

And if you are waiting for most of the UK's electricity to come from low-emission sources, it is happening right now. According to the company running the Drax power station, in the third quarter of 2016 nuclear and renewables peaked at 50.2pc, including six days when no coal was used at all. With coal due to be off for good by 2025, the question of the major players in the UK's energy supply mix may not be such a burning one after all.