

## Nuclear Briefing

# Can the world meet its climate change targets without nuclear?

Some experts argue renewable energy is too intermittent to meet ambitious goals alone



Nuclear power is, for some, the black sheep of the low-carbon energy family.

On the one hand you've got the 'greens': wind, solar and hydro. All of them are exceedingly clean, or at least, they seem so. As clean as a cool breeze, as a sunny day, as a rushing river.

Then you've got nuclear. That cold-war harkening cousin of the low-carbon family.

People cling to horror stories, which is why the disasters at Chernobyl and more recently at Fukushima are so compelling. Several environmental groups, such as Friends of the Earth and Greenpeace, have spoken out loudly against the use of nuclear power.

But for all of that, there is a large scientific stance claiming that without embracing nuclear, we don't stand a chance of meeting the targets we've set ourselves to avoid cataclysmic climate change.

## What are the arguments in favour of nuclear power?

It is 100 per cent 'clean' in that it produces no climate-change contributing by-products – and it is also very predictable.

The nuclear reactions used to create electricity do not produce harmful carbon dioxide because the process does not involve the same kind of simple burning of fuel. Instead, uranium atoms are split in a process called nuclear fission.

That process produces significant heat, which boils water and produces steam that in turn spins a turbine, generating electricity.

## Why not just use the other clean power sources?

In 2015, four scientists writing for *The Guardian*, James Hansen, Kerry Emanuel, Ken Caldeira and Tom Wigley, said nuclear power is necessary to plug an otherwise yawning gap in energy generation.

At the Paris climate change conference in December 2015, the world agreed to limit post-industrial temperature rises to two degrees or even less. To have any chance of achieving

that, most fossil fuel reserves like oil and coal must be left unmined and unburned.

So how do we keep the lights on while undertaking such a radical shift?

Advocates point to the low installation cost of the likes of solar, wind and hydro power, but the four scientists argued that renewable-only models ignore the intermittency problem, place too much hope in future technological breakthroughs in areas such as battery storage and aren't even truly sustainable.

"Indeed, cutting down forests for bioenergy and damming rivers for hydropower... can have terrible environmental consequences," they wrote.

The quartet instead pointed out that modern nuclear reactor processes re-use spent fuel – and that nuclear energy over the last 50 years has already avoided emitting 60 billion tonnes of carbon dioxide. They calculated that building 61 nuclear reactors per year could completely replace fossil fuels by mid-century.

## What are the arguments against nuclear power?

There isn't nearly so much scientific material online outlining the case against nuclear power. However, one outspoken opponent of nuclear power is Greenpeace. On its site it decries nuclear power as expensive, dangerous and dirty.

"Nuclear energy is both expensive and dangerous," it says on its website, "and just because nuclear pollution is invisible doesn't mean it's clean."

It cites the disasters at Chernobyl and Fukushima, and argues that there is still no safe, reliable way of dealing with nuclear waste. The charity also makes a connection between the proliferation of nuclear power technology and the ability to produce nuclear weapons.

## Who is building new nuclear?

There are currently 65 new reactors already under construction around the world. India and China are two of the most ambitious countries when it comes to plans for nuclear power infrastructure. The latter especially is not known to do things by halves.

In December 2016, two US senators from opposing parties – Republican senator Lamar Alexander and Democrat senator Sheldon Whitehouse – came together to write in *The New York Times* that by 2038, about half of the 99 nuclear reactors operating in the USA will be more than 60 years old.

They called for a levelling of the playing field when it comes to nuclear energy, including more federal support to build new plants.

Closer to home in Britain, where the first full-service nuclear power station was opened in 1956, the government has ambitious plans to build a whole fleet of new nuclear power plants, which could eventually provide 35 per cent of the country's electricity.

## What makes nuclear power go?

Unlike other renewable energies, nuclear still relies on mining, in this case to extract uranium. Where are we going to get the uranium to fuel the nascent demand for nuclear power?

At the moment the largest producer is Kazakhstan, which produces more than a third of the total used to generate nuclear power around the world. Australia, Canada and the United States have sizeable uranium deposits, but countries with questionable safety standards like Niger, Namibia and Uzbekistan also remain prominent.

In the EU, around 60 per cent of the uranium demand is met by imports from Kazakhstan, Russia and Niger. By the end of next year however, a new mine will be rapidly building production of uranium within the EU, in Salamanca in north-western Spain. Berkeley Energia's facility is the only one currently under construction in the world and the biggest ever in Europe.

It will eventually produce enough uranium to meet 10 per cent of Europe's nuclear energy needs – and could alone power the UK for four-and-a-half years.