Why Japan can't (or won't) stop using fossil fuels any time soon

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Hands up if you like geothermal energy. Credit: spDuchamp, CC BY

The G7 leaders' pledge to eliminate the use of fossil fuels as an energy

source by century's end could be the most significant outcome of the most recent meeting. It also reinforces German host Angela Merkel's claim to be the "climate chancellor".

As is customary with such pledges, however, the announcement was short on specifics and it's really not clear how reductions in fossil fuel usage can be achieved. After all, disasters at Chernobyl in 1986 and Fukushima in 2011 have made key G7 members considerably less enthusiastic about nuclear power, one obvious alternative.

Both Germany and Japan have crucial roles to play over the coming decades in facing up to these challenges. It was Merkel's Germany that decided in the wake of Fukushima to abandon nuclear power by 2020. Under an aggressive 50% expansion in renewables since then, in 2014 German fossil fuel consumption had fallen to an historic 35 year low. But what about Japan?

After Fukushima the country initially shut down all its nuclear plants. However, since then successive pro-nuclear governments have tried to restart its reactors, in part to reduce the spiralling financial and environmental costs of the resulting sharp increase in oil, gas and coal imports. Japan is now the world's second biggest importer of fossil fuels after China and the world's fifth largest emitter of CO_2.

Despite efforts to restart the nuclear programme, all 43 operable reactors remain in shut-down mode due to public unease. Even the scheduled restart for Sendai No. 1 plant in Kyushu has been delayed until August due to technical difficulties. Hence the question the country faces is not whether it should restart its nuclear plants, but whether it can do so in the face of public fears of another earthquake or tsunami.

Those fears are real. Evidence suggests that Japan may have experienced at least 22 tsunamis higher than 10m. Moreover, Japan has experienced

the highest density of 8+ magnitude earthquakes in the world since modern records began in 1900. Within the coming decades seismologists expect powerful undersea earthquakes of the type that occurred off northeastern Japan in 2011 along the Nankai trough to the south of Honshu, Shikoku, and Kyushu. This would threaten the huge Hamaoka nuclear power plant, located roughly equidistant between the population centres of Nagoya and Tokyo-Yokohama.

As recently as the 1970s just 3% of Japan's electricity came from nuclear power. Since then, however, governments have nurtured nuclear under the assumption that the country lacks domestic energy resources and is vulnerable to overseas political volatility. In the intervening period Japan, like many other countries, has become addicted to oil.

While Japan might not sit on huge oilfields, the idea it lacks domestic energy potential is false. It has abundant geothermal energy, for instance, as the local macaque monkeys know well. Japan mostly receives 1,800 – 2,100 hours of sunshine per year, more than solar-friendly Germany, and at a similar latitude to sunny Spain. The country also has some of the most plentiful wind, tidal, and wave energy resources in Asia due to its mountainous island and marine geography.

Despite this the state has invested huge sums in developing nuclear power while, according to former prime minister Naoto Kan, the electric power companies have treated renewables as a "nuisance".

This treatment appears to be continuing, even as local small-scale, or distributed, solar energy is catching on thanks to new feed-in tariffs which reward renewable generation. At first regional energy companies integrated this energy into the main grid but this has slowed; one provider, Kyushu Electric Power, has stopped accepting applications from renewable suppliers, stating that the company can't cope with the destabilisation to their systems.

Japan had intended to reduce fossil fuel dependence by building 14 new nuclear reactors, under the then-government's 2010 Basic Energy Plan. These new reactors would have raised the nuclear share of electricity from 29% in 2011 to 50% by 2030, and its share of Japan's primary energy mix from 10% to 24%.

But Fukushima consigned that plan to the dustbin, and the country has yet to develop a credible alternative that will satisfy the country's energy demand while simultaneously matching pledges to reduce and, now, eliminate fossil fuel usage.

In the near-term Japan faces huge obstacles in meeting its G7 targets for reducing fossil fuel usage. Over the longer term, the situation looks less bleak. Fertility levels far below the replacement rate means the country's population is shrinking and some local authorities are developing smart compact cities in response, which should accelerate as depopulation deepens. Japan also possesses deep technological and economic resources to draw on in delivering solutions to the big questions of the 21st century. Once regional energy providers are able to absorb local solar and geothermal energy, the potential for renewables will rapidly expand.

Japan faces perhaps the toughest 21st century energy challenges of the G7 states. Can it simultaneously address safety and environmental concerns by replacing nuclear and fossil fuel energy usage with renewables? It is in the resolution of this problem that Germany may be able to lend a hand.

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