

# Eliminating fossil fuels can avoid climate change and save lives

The consequences of letting climate change continue on its current trajectory are severe, as set out by the Intergovernmental Panel on Climate Change (IPCC) in their recent Special Report on Global Warming of 1.5°C. Economic costs and weather-related hazards to both human and natural systems are much more serious at 2°C of warming than at 1.5°C. The burdens are projected to be experienced first, and hardest, by developing countries and those who are least responsible for climate change, but ultimately, by all of us. It is therefore imperative that we try to limit peak global temperature change to as low a level as possible.

To put the world on a 1.5°C-consistent pathway, renewable energy is required to provide at least 70% of global energy supply in 2050. This would imply very little new construction of fossil fuel power plants. Avoiding lock-in is crucial as every coal plant built today will emit carbon dioxide for about the next 40 years.

At the University of Leeds Priestley International Centre for Climate, we recently investigated the global temperature impact of replacing all fossil fuel energy, transport and industrial infrastructure in existence today at the end of its life with a zero-carbon alternative. We show that it is possible to limit peak warming below 1.5°C this way. If new fossil plants are built, we risk stranding assets by retiring them before their design lifetime, or relying on unproven and controversial negative emissions technologies. Every year of procrastination in emissions reductions brings forward the date in which we must reach net zero emissions by two years. Delaying action is expensive and makes the required rate of emissions reductions more difficult to achieve.

It is well-known that reducing fossil fuel consumption also reduces air pollution. Despite European air quality legislation which has been in force since the 1970s, air

pollution is still responsible for tens of thousands of premature deaths in Europe every year. Globally, the numbers are in the millions and are rising. One unfounded concern is that reducing air pollution would lead to a sudden climate warming, because pollutant particles reduce incoming sunlight, cooling the Earth and masking some of the greenhouse-gas driven warming that humans have caused to date. However, because air pollution would be reduced at the same rate as carbon dioxide there would be no climate trade-off of a gradual phase-out of fossil fuels. We reached these conclusions using a simple climate model that is co-developed at Leeds and used extensively in the IPCC's Special Report.

Some will argue that climate change mitigation is too expensive, with 2.5% of global GDP investment in the energy system needed in order to put the world on a 1.5°C-consistent pathway. The energy system requires investment regardless of whether climate change is occurring as power plants retire and need to be replaced. We have choices about where to put our money, and overhauling the energy system should be seen as an opportunity rather than a cost. Factoring in avoided climate change damages at different levels of warming, and the monetised public health benefits of avoided mortality and morbidity from air-pollution related illnesses, consigning fossil fuels to the annals of history starts to look a very attractive option indeed.

Unprecedented, but not infeasible, infrastructural shifts in energy, transport, industry and land use are needed to put us on a pathway that will avoid severe climate change. Such a future is possible, and Germany has already showed - on occasion - that the entire country's energy demand can be powered by renewables. Making this shift will not be easy. In some sectors, for example aviation and industrial processes, zero-carbon alternatives do not currently exist or are very difficult to scale up. Emissions from agriculture are significant but mostly unrelated to fossil fuel combustion and are mainly the potent greenhouse gases nitrous oxide and methane. Storage and interconnection of renewables are required at a pan-European level to deal with resource variability and mismatch between supply and demand. And we must be careful that we do not simply outsource emissions to other countries in our

consumption imports while claiming credit for emissions reductions within our borders. Research, much of it led and conducted in Europe, will be essential to meet these challenges head on.

Europe has historically benefitted from fossil-fuel powered development and must take responsibility, along with other developed countries, for the majority of emissions reductions in the coming years. Unlike many regions of the world, Europe has the economic capability, the political will, and the public support for meaningful action. Starting the transition to a zero fossil future is good for the climate, good for our health, and good for our economy. We must take this opportunity while we still can.