The Guardian

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Britain must nurture its scientific expertise to help save the world from climate crisis

Martin Rees

Clean energy and sustainable food supplies will be the planet's most pressing issues over the next 30 years

Fri 9 Oct 2020 13.00 BST

"Experts" have had a raised profile during the Covid-19 pandemic, standing - albeit somewhat embarrassed - alongside Boris Johnson during his press conferences. In coping with health-related matters, scientific advice is crucial. We will also need optimally applied science in meeting other global challenges: developing affordable clean energy, feeding the world and preserving the environment.

The UK has for centuries punched above its weight in science and invention. It's crucial to sustain our standing in a more competitive world: if we don't get smarter, we'll get poorer. Enough of our brightest and best must opt for science, engineering and technology, as millions do each year in east Asia.

It's crucial that young people - savvy about trends and anxiously choosing a career - should perceive the UK as a place where a culture of innovation flourishes. Our schools, universities

and hi-tech businesses must all perform well if we are to prosper. Indeed, it will be challenging to even achieve the goals that we've set ourselves already.

For instance, Britain's target of cutting net carbon emissions to zero by 2050, proclaimed in the 2019 Climate Change Act, is a daunting one. It means not just decarbonising existing electricity generation from coal and gas, but more than doubling the amount of electricity generated. This extra is required not only for electric cars and trucks, but for electrolytic production of the liquid and gas fuels - hydrogen, methane and kerosene - needed for aviation.

We need innovative techniques to extract energy more efficiently from sunlight, wind and tides; for cheaper energy storage; and for smart grids and other infrastructure. It's surely worthwhile, given our historical expertise in nuclear energy, to investigate safer and more flexible designs for nuclear reactors, especially small modular reactors. These will be needed if we choose to replace the nuclear power stations based on 1960s designs that are scheduled for decommissioning in the 2030s. The potential longer-term payoff from nuclear fusion is so great that it is worth a sustained programme to develop prototypes: decades of work at the Culham Centre for Fusion Energy have given us a head start. The new Faraday Institution to develop improved batteries is a welcome step, and could be the nucleus of a larger venture - meshing public and private funds - encompassing other energy technologies, especially those where the UK might lead.

Meeting our UK net zero target, challenging though it will be, would cut global emissions by less than 2%. But its potential global leverage, especially in the developing world, offers a more compelling incentive for accelerating our clean energy innovations.

The nations of Asia and Africa can't reach what we'd consider acceptable living standards without generating more power. Not only will their per capita energy needs rise - but they will be home to two billion more people by 2050. It's the trajectory of CO_2 emissions from these countries that matters more to the world.

We must hope that their growth will be far greener than Europe's has been - that they'll learn from our mistakes. But we in the UK produce almost 10% of the world's high-impact scientific research so they can hopefully also benefit from innovations made here. If a scaled-up and wisely prioritised programme gives the UK a lead in some sectors of more efficient and cheaper carbon-free generation, then our collaboration can help India and other vast developing markets to leapfrog directly to clean energy rather than building coal-fired power stations. We could thereby add substantial leverage to the global push towards zero carbon emissions.

Clean energy is not the only global challenge that needs scientific advances. Another is to provide a secure food supply for the world's nine billion people in 2050 without degrading natural habitats or threatening biodiversity. This will require better agriculture - low-till, water-conserving, intensive and genetically modified - and better engineering to reduce waste, improve irrigation and so forth. The buzz phrase is "sustainable intensification". Dietary innovations are also needed, such as converting insects - highly nutritious and rich in proteins - into palatable food and making artificial meat.

Our universities and government laboratories house world-leading experts in plant science and genetics. If this expertise is expanded and deployed, we can help to enhance the life chances of the world's rising population without destroying the wonders and beauty of the natural world. And our pharmaceutical strength can improve health services.

Unconstrained climate change, with the risk of "tipping points" leading to genuine catastrophe, is a threat to global security; so is the risk of massive food shortages and

irreversible degradation of biodiversity. Minimising these threats deserves the scale of sustained effort that we commit to our national defences - and the focus appropriate to a national emergency.

But unlike defence research and development, we're here confronting shared global challenges, so we should forge co-operation and alliance with other nations - especially the developing countries for whom the threat is most severe and most intractable. How best this can be done deserves wide discussion.

It would be hard to think of a more inspiring challenge for the UK's young scientists and engineers than accelerating the provision of clean energy and secure food supplies for ourselves and the developing world, nor a better investment in the UK's future.

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