

The White Heat of Recovery

Unlocking the potential of physics to respond to COVID-19 and build back better

Physics is fundamental to our health, wealth, security and social advancement. It has played a crucial role in the awe-inspiring scientific response to the COVID-19 pandemic – from x-ray imaging of the virus, leading to the astonishing vaccination programme, and GPS technology enabling the tracing of exposure, to the semiconductors powering the systems to let us work from home, keep in touch with family, and deliver essential services remotely.

Physics can also help us overcome the global climate crisis, by improving net zero technologies to revolutionise renewable generation, capture emissions, store energy efficiently and make transport and heating cleaner. Physics creates tomorrow's problem solvers and innovators and has a vital role to play in helping make Wales fit for a new industrial era of science, technology and engineering.

Decisions taken by the Senedd in the next five years will shape our society for decades. We call on all parties to commit to the following priorities to support and grow our physics community, and so put Wales in the strongest position to boost economic growth, create skilled jobs, and improve our quality of life.

Developing the next generation of discovery

We will need to develop a whole new generation of discoverers equipped with STEM knowledge and skills. We must:



1. Ensure that every secondary school pupil has access to a specialist physics teacher and that incentives to train as a physics teacher in Wales are competitive.

A healthy education system needs well-qualified, enthusiastic teachers to share their love of learning with the next generation.

Unfortunately, Wales is training less than 60% of the secondary school teachers it needs: and only around 20 physics teachers every year. The bursary for physics teacher training is up to £20,000 less in Wales compared with England – more competitive financial support might help address the balance.



2. Support teachers to deliver science and technology in the new curriculum with confidence, based on the fundamental building blocks of each science.

The new Curriculum for Wales presents a once-in-a-lifetime chance to revolutionise our education system, opening the doors to a brighter future for our children.

As we build a knowledge-based economy for the future, it is vital that teachers have access to the latest scientific knowledge and share it with their pupils through the new curriculum. Evidence shows that subject-specific CPD not only has a direct impact on teaching quality, but can further contribute to improved educational outcomes by keeping experienced teachers in the profession for longer.



3. Create an inclusive learning environment today to build a representative STEM workforce for tomorrow.

We cannot unlock the benefits of science for our society if its opportunities are not available equally to all.

At present girls, those living in poverty, those with disabilities, LGBT+ people and certain ethnic minority groups are under-represented in the sciences at school, leading them to be under-represented in the STEM workforce too. In addition to supporting gender balance programmes, a whole-school approach to equity is needed to tackle unhelpful stereotypes and ensure that our young people can follow the path of their choosing, regardless of their sex, gender, race, age, socio-economic group, sexual orientation or disability.

Readying ourselves for the fourth industrial revolution

To realise the full societal and economic benefits of the new industrial era we must:



4. Work with the UK government and other bodies to increase R&D funding and locate science, technology and innovation jobs in Wales.

Wales receives less than half the R&D spend per head of population than either England or Scotland.

With the loss of EU structural funds affecting research in academic and business circles alike, strengthening links with UK research bodies and creating a healthier funding ecosystem within Wales should be priorities. Locating research, science and innovation opportunities in Wales as part of the UK Government's levelling-up agenda could also help redress imbalances and enhance engagement with government, academia and industry.



5. Campaign to ensure that funding bodies for science and technology are more representative of the communities they serve.

Appropriate representation across the UK's funding bodies is essential if the decisions they make are to reflect the needs of all of our society.

Representation should include geographic considerations, to ensure that each of the UK's nations and regions are present within UK-wide research and funding organisations. There is currently no Welsh representation on the UK science and innovation funding councils which oversee a budget of £9 billion.



6. Drive economic ambition in Wales by developing a comprehensive science and innovation strategy.

If Wales is to take its place at the heart of the next industrial revolution, it must understand the value of innovation as a driver for economic growth.

As Wales's Compound Semiconductor cluster has shown, physics-led technology has the ability to create high value, long-lasting jobs for Wales. The next Welsh Government should capitalise on this, bringing together science and economic policy, making the most of the opportunity for technology transfer and innovation.

About us

The Institute of Physics (IOP) is the professional body and learned society for physics in the UK and Ireland. Our mission is to inspire people to develop their knowledge, understanding and enjoyment of physics, support the development of a diverse and inclusive physics community, and raise public awareness and understanding of physics. We seek to ensure that physics delivers on its exceptional potential to benefit society. Find out more at www.iop.org