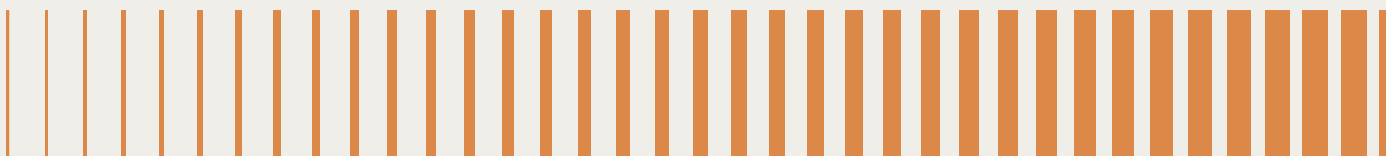


JUNE 2024

Engineering a resilient and prosperous future

Policy priorities for the
next UK parliament



The UK is tackling increasingly complex and interconnected challenges. Our persistently low economic growth needs to be reversed and we must combat and adapt to climate change. Our infrastructure and services need to be upgraded and made more resilient. Technologies need to be leveraged to address these challenges in a way where no one is excluded and benefits are felt across the UK.

Engineering plays a vital role in informing and shaping policy issues of national and global importance. The National Engineering Policy Centre (NEPC) marshals the nation's leading engineering expertise to provide practical policy advice on national and global challenges.

The start of a new parliament presents the opportunity to take a bold, long-term, and holistic approach to tackling these complex challenges. It also presents an opportunity to shape the role the UK plays in the responsible development of emerging and rapidly evolving technologies such as artificial

intelligence (AI), using engineering approaches to ensure that they are designed rigorously and sustainably, and adopted where they have the maximum benefit.

Systems approaches and resilient, sustainable, and long-term solutions are themes threaded throughout this NEPC manifesto. These reflect not only the scale of the challenges the UK faces, but also the scale of opportunity for people across the UK if we can produce better, more impactful, and more efficient solutions. Here we set out priorities for UK policymakers:



© Technicians Make it Happen



Commit to a long-term Industrial Strategy

Grow the economy by setting out an ambitious vision that draws on the country's strengths in engineering, innovation, research, and manufacturing underpinned by sustained policies that align actions across regulation, procurement, funding, infrastructure, technology adoption, and the National Engineering and Technology Workforce Strategy.



Redouble the commitment to net zero and accelerate the development and adoption of green technologies

Drive action and instil confidence through fixed targets to cut carbon emissions, incentivise demand reduction, and technology development and adoption; prioritising a just transition through meaningful engagement with diverse communities; and accelerating green growth.



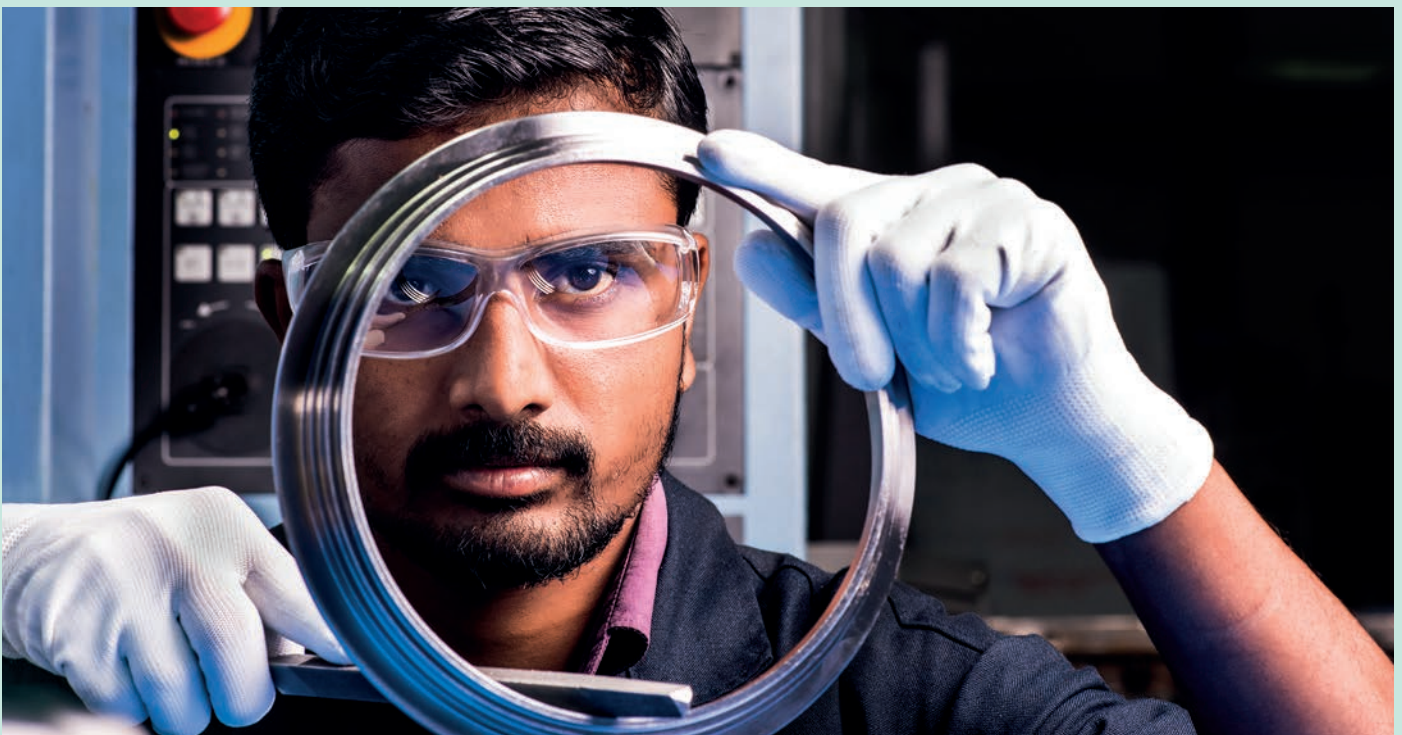
Deliver a National Engineering and Technology Workforce Strategy

Equip the UK with the skilled workforce needed to meet the challenges of sustainability and technological advancement by delivering a long-term holistic plan encompassing all education stages, reskilling and upskilling, to deliver a diverse engineering and technology profession equipped with the skills needed for the future.

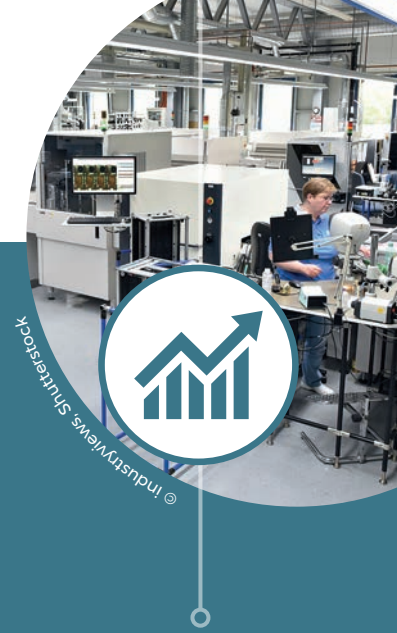


Futureproof UK infrastructure to deliver sustainable, resilient and healthy spaces

Build on the National Infrastructure Assessment recommendations and join up existing sub-national strategies to ensure infrastructure continues to deliver economic and societal benefits across the UK.



Commit to a long-term Industrial Strategy



Grow the economy by setting out an ambitious vision that draws on the country's strengths in engineering, innovation, research, and manufacturing underpinned by sustained policies that align actions across regulation, procurement, funding, infrastructure, technology adoption and the National Engineering and Technology Workforce Strategy.

- **Set a strategic direction**, developed in partnership with industry, making informed choices about the outcomes and advantages the UK wishes to achieve by harnessing engineering, both established and disruptive technologies, supported by a plan for development, delivery, and adoption; and the resources to realise that plan¹.
- **Make innovation a central component of the public procurement process** by identifying a Ministerial Champion for procurement reform and setting clear targets for an associated change programme.
- **Aim to lead the G7 in R&D intensity**, supporting and capitalising on our exceptional research base and leveraging private R&D investment.
- **Boost support for late-stage R&D and demonstration** with new government and industry co-designed programmes, to accelerate R&D in internationally competitive sectors and technologies that are vital to the delivery of national priorities such as net zero and infrastructure².
- **Invest in skills and align with the National Engineering and Technology Workforce Strategy** to ensure the pipeline of talent is available to deliver on the ambitions of the Industrial Strategy.

With engineers comprising 19% of jobs nationally³, and the engineering economy representing 32% of total national economic output⁴, the sector is crucial to UK economic growth. Globally, nations are pursuing clear industrial strategies underpinned by large-scale, targeted support. For the UK to leverage its impressive engineering and technology strengths, it must become a more attractive environment for businesses to invest in. There is a clear choice to be made – enable companies to take bold risks here, or they will go elsewhere⁵.

Given the limited resources available, it is crucial that the industrial strategy assimilates and builds on existing successful initiatives, institutions, and infrastructures. Coordinate and align with other interconnected strategies and government objectives. The Industrial Strategy must also be linked to the plan for achieving net zero, creating practical pathways for the sustainable supply of the materials and skills needed for the transition. Alignment with the National Engineering and Technology Workforce Strategy will be critical to ensure the pipeline of talent is available to deliver on the ambitions of the Industrial Strategy.

Redouble the commitment to net zero and accelerate the development and adoption of green technologies



Drive action and instil confidence through fixed targets to cut carbon emissions, incentivise demand reduction, and technology development and adoption; prioritising a just transition through meaningful engagement with diverse communities; and accelerating green growth.

- **Incentivise the rapid scaling of low carbon infrastructure** such as energy storage capabilities, electric charging infrastructure, hydrogen, sustainable fuels, and carbon capture and storage, using the full suite of policy levers including grant funding, land use planning, fiscal incentives, and public procurement⁶.
- **Reduce embodied carbon emissions in building construction** within two years of the next parliament by mandating the measurement and reporting of whole-life carbon emissions for all projects over a certain size⁷.
- **Deliver the mass retrofitting of inefficient housing stock** to create safe, healthy, and sustainable indoor environments for millions of households, where air and noise pollution is well-managed, heating and ventilation is affordable, and overall carbon emissions from heating are reduced⁸.
- **Implement the engineering-led delivery plan to decarbonise the electricity grid** where, building on [recent NEPC work](#)⁹, the Gatsby funded [NEPC Delivery of rapid electricity system decarbonisation](#) major policy project will shortly produce guidance¹⁰.

Climate change is an existential threat to humanity and engineers are on the front line of meeting its challenges. The UK must do all it can to combat and adapt to climate change, seeking to achieve wider environmental benefits of the net zero transition, including protecting biodiversity and improving air quality. This requires an adequate supply of engineers and bringing engineers

into the heart of government to coordinate delivery of net zero¹¹.

While achieving net zero by 2050 is a massive undertaking, global economies and individual businesses risk material failure if decarbonisation is not delivered. There is no trade-off between economic growth and decarbonisation and, provided appropriate choices are made, decarbonisation can lead directly to new high-quality jobs and markets, revitalised and high-value supply chains, new economic models, the commercialisation of new technologies and services, and a range of co-benefits, including improved health outcomes, and greater economic and infrastructure resilience.

Concurrent, coordinated transformation of multiple vital and interconnected infrastructure systems, including transport, heating, agriculture, land use, energy, manufacturing, and construction, will be required. Actions are required over multiple timelines, from immediate investment in low-regrets measures, through securing just and sustainable supplies of materials, to redesigning planning systems. The new and retrofitted infrastructure that is needed to decarbonise must also be treated as an opportunity to embed climate adaptation and resilience. A systems approach is also necessary to account for all the different regions, communities, cultures, and socio-economic conditions which climate change and actions to reach net zero will impact.

Deliver a National Engineering and Technology Workforce Strategy



Equip the UK with the skilled workforce needed to meet the challenges of sustainability and technological advancement by delivering a long-term holistic plan encompassing all education stages, including reskilling and upskilling, to deliver a diverse engineering profession equipped for the future.

The National Engineering and Technology Workforce Strategy should:

- **Reverse the shortage of STEM teachers in schools and further education providers**, especially educators in physics, computer and data sciences, maths and design technology as a priority, by implementing strategic recruitment and retention initiatives and improving training programmes.
- **Increase business participation with apprenticeships, especially among SMEs**, by expanding support, reducing bureaucracy, and trialling targeted financial mechanisms such as grants and fiscal measures.
- **Promote engineering as an attractive career choice** for people from all backgrounds and at all career stages, and improve STEM careers provision in schools and colleges, including through investment.

In addition, the **government should engage with forthcoming findings from the NEPC Engineers 2030 major policy project**, which will identify how engineering knowledge, skills, and behaviours are changing and what is needed to attract, recruit, educate, and support the engineers and technicians of the future¹².

The demands on engineers are greater than ever – with the world facing both challenges and opportunities that depend upon substantial engineering input, chief

amongst these being the climate emergency and the rapid progress in AI and related digital technologies. More engineers with a broader range of expertise, from environmental awareness to greater data skills, are needed.

Yet the UK already faces an engineering skills shortage and demand is expected to rise over the next decade. With a quarter of all job postings in engineering roles¹³, a holistic plan that covers all routes into engineering and lifelong learning is required. Skills shortages will continue to evolve, and it is crucial to have an education and careers system that responds to changing labour-market needs.

As people, education and skills policies impact the whole of the economy and society, a collaborative approach is paramount, both across government and with external stakeholders. A cross-government approach will be needed. At a minimum, it must encompass immigration policy in the Home Office, education policy in the Department for Education, funding sustainability in HM Treasury, and technology needs in the Department for Science, Innovation and Technology. Close constructive relationships between the UK's devolved administrations, businesses, education providers, and the UK government will be required to align policy levers and maximise the effectiveness of the strategy.

Futureproof UK infrastructure to deliver sustainable, resilient, and healthy spaces



Build on the National Infrastructure Assessment recommendations¹⁴, and join-up existing sub-national strategies to ensure infrastructure continues to deliver economic and societal benefits across the UK.

- **Embed maintenance in the design of major government infrastructure projects with maintenance standards integrated into operational contracts for infrastructure's lifetime**, with clear responsibilities and accountability to ensure maintenance is prioritised and the risks to health and safety are reduced
- **Enable better use of secure, well-governed digital infrastructure**, underpinned by data sharing capabilities and common standards, to enable greater resilience of our infrastructure, more effective use of our assets, and predictive maintenance so that our built environment can be managed and maintained more proactively.
- **Agree outcome-based resilience standards for energy, water, digital and transport services**, that acknowledge interdependencies, as recommended by the National Infrastructure Commission¹⁵.
- **Modernise the UK's sewerage and water networks**, investing in Sustainable Drainage Systems (SuDS)¹⁶ to increase capacity, build climate resilience, and better protect natural waterways for recreational use.

The built environment, covering economic infrastructure such as public utilities or transport systems, social infrastructure such as hospitals and schools, along with agricultural infrastructure that supports our food supply, underpins the UK's health and prosperity. Its stability over the coming decades is therefore critical. With the changing climate and increasing interconnectivity, the resilience of our ageing infrastructure becomes ever more important. It also presents opportunities.

The need to decarbonise our built environment offers the opportunity to create safer, healthier, and more sustainable spaces. The lessons from net zero building methods and materials should be integrated into future construction projects and those projects must be built with human health and comfort squarely in mind. To futureproof investment in new economic and social infrastructure, we must take into account an understanding of how demand for these systems will change in future.

How engineering can help

The NEPC brings engineering thinking to the heart of policymaking, creating positive impacts for society. We take a practical, systems approach to complex problems. Led by the Royal Academy of Engineering, our collaborative approach puts robust insights in front of policymakers. By bringing together engineers from industry and academia, we provide valuable depth of expertise. This helps the government navigate increasingly interconnected and complex challenges.

The engineering profession reflects the rich variety of roles engineering plays in our lives, with a wide range of expertise, perspectives, and specialisms across this broad field. Policymakers need access to this breadth and depth of expertise to support decision making in both current and emerging issues, in a timely, relevant, innovative, practical, and valued manner.

Engineers tackle complex challenges, including through examining whole systems and how their elements interact with one another in order to optimise outcomes that take into account a diversity



© This is Engineering

Engineers and policymakers working together have the opportunity to employ systems approaches to better understand and intervene to solve challenging policy problems, through collaboration and knowledge sharing across sectors

of stakeholder approaches. When these principles are applied outside the world of engineering to tackle the societal challenges, they can have transformational effects, as already recognised in the health and care sector¹⁷.

Engineers and policymakers working together have the opportunity to employ systems approaches to better understand and intervene to solve challenging policy problems, through collaboration and knowledge sharing across sectors. This understanding can be used to align the actions taken across government, private, and civil sectors

to achieve sustainable positive change for complex interconnecting challenges: delivering net zero, developing and benefitting from disruptive technologies, and streamlining the healthcare system. This strategic thinking will result in holistic change, rather than treat symptoms of broader, interconnected challenges.

Further embedding systems expertise and engineering insights into the policy process is essential. We encourage the next government to increase access to external engineering expertise, including through the NEPC and its partners.



References

- 1 [Strategic advantage through science and technology](#), Royal Academy of Engineering, 2023
- 2 [Late-stage R&D: business perspectives](#); National Engineering Policy Centre, 2021
- 3 [Engineering Footprint, Update March 2024](#), Engineering UK, Engineering Council, Royal Academy of Engineering, 2024
- 4 [Engineering Economy and Place](#), Royal Academy of Engineering, 2023
- 5 [Late-stage R&D: business perspectives](#); National Engineering Policy Centre, 2021
- 6 [Net Zero Review Submission from the National Engineering Policy Centre](#), 2022
- 7 [Policy Position Paper, Embodied carbon regulation](#) – alignment of industry policy recommendations, UKGBC, The Institution of Structural Engineers, Part Z, RIBA, ICE, RICs, ACE, CIC, CIBSE, CIOB, UK Built Environment Declares Climate and Biodiversity Emergency, 2024
- 8 [Scaling Up Retrofit](#), the Institution of Engineering and Technology, 2020
- 9 [Enabling a decarbonised electricity system](#), NEPC, 2024
- 10 [Gatsby project on decarbonised GB electricity system](#), National Engineering Policy Centre, 2024
- 11 [Achieving net zero carbon emissions through a whole systems approach: CST report](#), Prime Minister's Council for Science and Technology, 2020
- 12 [Engineers 2030](#), National Engineering Policy Centre, 2023
- 13 [Engineering Skills Needs – Now and into the Future](#), Engineering UK, 2023
- 14 [Second National Infrastructure Assessment](#), National Infrastructure Committee, 2023
- 15 [Second National Infrastructure Assessment](#), National Infrastructure Committee, 2023
- 16 [A Place for SuDS?](#), Chartered Institution of Water and Environmental Management; 2024
- 17 [Engineering better care](#), Royal Academy of Engineering, The Academy of Medical Sciences, Royal College of Physicians, 2017



NATIONAL ENGINEERING POLICY CENTRE

The National Engineering Policy Centre brings engineering thinking to the heart of policymaking, creating positive impacts for society.

We are a partnership of 42 professional engineering organisations that cover the breadth and depth of our profession, led by the Royal Academy of Engineering. Together we provide insights, advice, and practical policy recommendations on complex national and global challenges.

Partner Institutions of the National Engineering Policy Centre

