Labour National Policy Forum Consultation 2023: A green and digital future response

About the Institution of Engineering and Technology (IET)

The IET is a trusted adviser of independent, impartial evidence-based engineering and technology expertise. We are a registered charity and one of the world's leading professional societies for the engineering and technology community with over 155,000 members worldwide in 148 countries. We work collaboratively with government, industry and academia to engineer solutions to society's greatest societal challenges, including tackling climate change and building a better digital world.

Introduction

The IET welcomes the opportunity to contribute to Labour's National Policy Forum Consultation 2023. A green and digital future can make the UK the fastest growing economy in the G7. To achieve this however, the next government must provide businesses with the stability of a long-term strategy, with systems-thinking ingrained at the household, community, and national levels.

The IET is well-placed to offer guidance on the industrial strategy missions of ***Clean Power by 2030*** and ***Harnessing Data for the Public Good.*** These missions are massive engineering and technology challenges, and the UK's policy approach to both should be informed by the most relevant professional expertise available.

Our response below outlines how sustainable and digital technologies can deliver growth as part of a broader science and technology strategy that focuses on skills, infrastructure, and local policies. We also introduce our policy response to the above industrial strategy missions:

1. How can science and technology policy support growth in all regions and nations of the UK?
2. What role does the digital economy have in enabling the UK's growth?
4. What policies can help deliver Labour's existing pledges on green growth, particularly the Green Prosperity Plan?
5. What policies can help contribute to the four missions outlined in Labour's industrial strategy?

Summary: our five priorities for a Green and Digital Future:

- **We need a paradigm shift towards lifelong upskilling and reskilling underpinned by flexible government support.** For example, allowing employers to repurpose unspent Apprenticeship Levy funds for upskilling and reskilling.
- **The transition to *Clean Power by 2030* must be managed through a whole system approach,** which considers generation and transmission infrastructure, energy demand, regulation, skills, and the future effects of climate change.
- **Retrofitting the UK's homes should be a national priority. We should be targeting an EPC-A rating for as many homes as possible** – this requires a long-term policy commitment to deep ('whole-house') retrofit millions of homes.
- **A National Institute for artificial intelligence (AI) and ageing research** would boost innovation and help propel the UK to the forefront of this emerging sector.
- **A prosperous Digital Future is a safe one.** New legislation is required that balances a pro-innovation approach to emerging digital technologies, like AI and virtual reality, with appropriate safeguards.

The Institution of Engineering and Technology

Delivering Growth with Engineering and Technology

The next government's science and technology strategy should focus on translating science into a 'product' – this can deliver growth to all corners of the United Kingdom.[1] The UK possesses a strong science base, but it is not a technological superpower. Often, UK-based businesses develop successful prototypes, but struggle to take it to the next step and scale. These companies then look beyond the UK when they should be supported to build business here. The translational funding gap is a factor preventing the UK from reaching technological superpower status. **Greater support is needed at the translational stage of science and technology development, alongside stronger links with industry and academic partners in our key trading markets.**

While a commitment to increasing R&D spending to 3% of GDP by 2027 is welcome, a functioning 'whole system' will be required to take advantage of this. This is exemplified by the fact that BEIS recently returned £1.6bn earmarked for science and innovation programmes to the Treasury.[2] The next government must embrace 'systems-thinking' – at a minimum, this means joining-up science and technology policy with three priority areas: 1) skills, 2) infrastructure, and 3) local policies.

Skills

It is important that we have the engineering skills to translate scientific and technological innovations into viable businesses. Engineers do this by –

- Innovating to provide better solutions to specific technological challenges
- Reducing the economic and environmental cost of technology
- Improving buyer confidence with better performance evidence and information

However, the UK faces a chronic technical skills shortage in the engineering sectors. The IET's Skills for a Digital Future survey shows that 47% of engineering employers report a skills gap in their technical workforce, costing employers billions every year in hiring expenses and productivity losses. For example, 49% of engineering employers with a digital skills gap report that it reduces their productivity.

A skills gap in emerging digital technologies risks leaving UK industry even further behind by the end of this decade. Although one third of engineering employers recognise artificial intelligence (AI) as important to future growth, half of these employers do not have the AI skills they need.[3] As the pace of technological change increases ever more, **we need a paradigm shift towards lifelong upskilling and reskilling underpinned by flexible government support.** While the modular approach to higher education funding introduced in the Lifelong Learning bill is a step in the right direction, it is not practical for most workers to borrow more to return to university for upskilling.

Flexibility should be a guiding principle of skills / training funding. For example, repurposing unspent Apprenticeship Levy funds could cover the annual training costs of around 200,000 additional employees, generating an estimated £858m in productivity gains alone.[4] Addressing the UK's engineering skills shortage is an excellent opportunity to drive economic growth and level-up our nations and regions.

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[1] IET, Delivering a Science and Technology Strategy for the UK response, 2022
[2] E&T, BEIS returns £1.6bn allocated to Horizon Europe, 2023
[3] IET, Skills for a Digital Future survey, 2023
[4] IET, Spring budget representation 2023, 2023

Infrastructure

Hypothecated funding is needed to ensure that the UK's infrastructure and facilities meet the required standards to support science and technology development.

Digital infrastructure is also important – the next government can make a world-leading offer to businesses by making a long-term policy commitment to rolling-out the sixth generation (6G) of wireless technology nationally. Our *policymakers guide to 6g* sets out how the next government can play a constructive role in shaping a 6G initiative – one that can deliver the advanced services and upgraded infrastructures needed to meet the great societal challenges of 2030 and beyond.

Local policies

Local policies also have an impact. Areas of relative strength, for example Cambridge, Dundee, or Oxford, are a combination of having relevant businesses and consultancies in an area of a strong academic scientific base, so that products can quickly be translated to market. Councils and investment in local infrastructure also have a role to play in these areas to ensure that they are as successful as they can be.

Green Growth

Renewable Energy

UK consumers and business are paying among the highest energy prices in the world, with bills exacerbated by recent geopolitical events. Reducing our dependence on fossil fuel imports will drive down energy costs and increase the reliability of supply. This will encourage inward investment and help grow the economy.

The transition to ***clean power*** is needed both to meet the UK's climate commitments and reduce our dependence on imported energy. We believe that a decarbonised electricity system is feasible – however, **the transition must be managed through a whole system approach that considers generation and transmission infrastructure, energy demand, regulation, skills, and the future effects of climate change.**

The UK's current sustainable generation output is 133 TWh. We estimate that power demand in 2050 will be 4+ times this figure – at around 600 TWh – as heat, transport, and industry 'go electric' as they decarbonise. The IET's report, *UK renewables – limitless energy or precious resource?*, shows that there is an urgent need to scale-up clean energy capacity. The planning and delivery of such systems often takes decades, and must be strategically planned before the need arises. The delivery of renewables infrastructure must be accelerated. This requires substantial changes to planning, consent, and regulatory approval processes. Our case study of *the challenges of offshore energy networks in the Humber region* goes into detail about the regulatory barriers which renewables infrastructure projects face.

Another challenge is that of climate change itself, which will increase the frequency of extreme high and low temperature events, posing challenges to both the generation / demand-side of the electricity system. Consecutive, multi-day anticyclone weather conditions will make periods of extremely low renewables output inevitable – government policy must address the intermittency of renewable power generation. A combination of nuclear, tidal power, biofuels, hydrogen storage, and demand-side flexibility will be needed to make up for these shortfalls. The IET's collaborative *Future Power System Architecture* programme outlines in detail the changes our electricity grid needs by 2030.

Decarbonisation of the Built Environment

It is vital that the UK's energy strategy focuses not just on capacity, but also energy efficiency. Our *Precious Renewables survey* highlighted that 85% of respondents believe that there isn't enough attention being paid to the demand side of Net Zero.

The UK is said to have some of the least energy efficient buildings in the developed world. 59% of the UK's 27 million homes have an Energy Performance Certificate rating of D or lower. On average, these households are paying an 'efficiency penalty' of £900 per year.[5] Moreover, the operational carbon cost of buildings accounts for 23% of UK emissions.[6] Improving the energy efficiency of homes is critical to reducing the UK's energy bills and reaching Net Zero, as increasing capacity through renewables alone will not be sufficient.

Since 80% of the buildings standing today will still be in use in 2050[7], retrofitting existing buildings to the required standard is essential**. Retrofitting the UK's homes should be a national priority. To reduce energy bills and reach Net Zero, we should be targeting an EPC-A rating for as many homes as possible – this requires a focus on deep ('whole-house') retrofit.[8]**

It is estimated that 11 million UK homes are suitable for deep retrofit. Deep retrofit of these homes this would remove 41% of the carbon cost of housing, shave billions from the UK's energy bills, and provide great social and welfare benefits to homeowners and tenants.[9]

We need to move beyond the piecemeal approach of previous policy interventions. Deep retrofitting millions of homes requires a clear, long-term policy commitment that will incentivise industry investment and support for skills.

Our report, *Scaling Up Retrofit 2050,* explains the Energiesprong deep retrofit financial model. This was initially trialled in Nottingham, and several other projects have adopted this methodology. The most significant is the launch of a ground-breaking Innovation Partnership that will unlock up to £10bn to kickstart large-scale, whole-house retrofits for the country's social housing stock. Half of this is designated for London. This continues to:

1. Build the evidence base on the adoption of large scale retrofit
2. Rapidly increase the scale of deep retrofit
3. Bring new solutions and suppliers to the market
4. Enable the sector to build capacity

Deep retrofit requires initial funding, but this could be tapered down as the volume of deep retrofit grows. The report estimates that 25,000 homes would need direct support to reduce the cost of deep retrofit to affordable efficiencies of scale.

Digital Growth

AI, digital twins, and extended reality will each boost innovation and productivity, and play a role in ***harnessing data for the public good***. There is ample opportunity to reap the economic and societal benefits of these technologies across a range of sectors, from healthcare to the built environment.

However, the success of ***harnessing data for the public good*** is not predestined. Developing technologies which collect and process evermore data is not enough. For

[5] Environmental Audit Committee, Accelerating the transition from fossil fuels and securing energy supplies, 2023
[6] IET, Decarbonising the Built Environment, 2023
[7] IET, Scaling Up Retrofit 2050, 2020
[8] IET, Decarbonising the Built Environment, 2023
[9] Green Alliance, Reinventing Retrofit, 2021

example, the construction sector is typically seen as risk-averse in the uptake of new technologies, and consequently, productivity in this sector has been stagnant since the 1960s. **Government and industry collaboration is required to spur the adoption of the technology, good practices and shared frameworks that will unlock data-driven economic growth.** Our report *Good Data for the Public Good* makes a series of recommendations about how this could be achieved. For example, a digital standard of record-keeping in construction could be legally mandated as it is in Nordic European countries – this would open-up the whole lifecycle data of buildings for scrutiny by regulators and others. In addition, data should be mutually intelligible between sources and accessible in the long-term where appropriate.

AI in Healthcare

As outlined in our *report on AI and ageing*, healthcare engineers are creating devices which non-intrusively collect unprecedented quantities of health data about patients. Machine learning then processes this data to diagnose disease at an earlier stage or, in conjunction with robotics, deliver medication. Not only will these applications of AI give us longer, healthier lives, but it is estimated to reduce NHS expenditure by £12.5bn per annum.[10] **We recommend that the next government set-up a National Institute for AI and ageing research to boost innovation and help propel the UK to the forefront of this emerging sector.**

Digital twins in the Built Environment and Manufacturing sectors

Digital twins have the potential to drive-up productivity across a range of sectors.[11] A digital twin is a virtual representation of a physical system. Unlike a conventional model, a digital twin updates and responds intelligently to data collected by its physical counterpart. An ideal digital twin of a building would act as a one-stop repository for documentation / lifetime operational data about the building and its elements. Machine learning could then use this data to optimise the building's performance – for example, its energy use. This type of performance optimisation is already being used on production lines and in renewable energy generation.

Cross-sector interoperability is essential for integrating the digital twins of individual elements (such as, the construction materials) into a ready-to-optimise whole system (the building). The IET's *Apollo Protocol* project is enabling this by developing a common language for digital twins on a cross-sectoral basis.

Safeguarding the Digital Future

Finally, for emerging digital technologies to spur economic growth, **it is vital that regulation keeps pace to give businesses and the public the confidence to develop and use them. A prosperous Digital Future is a safe one.** New legislation is required that balances a pro-innovation approach to emerging digital technologies, like AI and virtual reality, with appropriate guardrails.

Forthcoming legislation on AI regulation should seek to clarify the legal use of open-source data for the development of AI systems – the present ambiguity is stifling both innovation and trust. Regulation must also ensure the safety of AI systems. The IET has published a *policymakers guide* which outlines ten pillars of good practice for AI in functional safety applications.

Immersive technologies, such as virtual reality (VR), also require attention. The IET's *Safeguarding the Metaverse* report shows that users of these online platforms, including

[10] Institute for Public Policy Research, The Lord Darzi Review of Healthcare, 2018
[11] IET, Digital twins for the built environment, 2019

children, are exposed to abusive content every seven minutes. Currently, the law does not include sufficient penalties for perpetrators of this abuse, nor the platforms on which it occurs.

Conclusion

In conclusion, there are a range of policy measures that can ensure the UK has a sustainable and digital future, whilst also supporting economic growth and societal benefit. Technologies should be safe, and the workforce should be agile to harness the opportunities quickly. Businesses and government cannot work alone but can support each other through forward-thinking strategies, supportive legislation, and a stable long term policy environment.