

Government Response to House of Lords enquiry on Engineering Biology

1. The government welcomes the House of Lords Science & Technology Select Committee's report on engineering biology (HL paper 55) published on 14 January 2025. We agree with the Committee's view that engineering biology (EB) offers the potential for significant economic growth and impact across multiple industries. We also recognise the need for urgency to strengthen the UK's position.
2. Growth is the priority mission of this government. The Industrial Strategy will drive long-term, sustainable and secure growth in crucial sectors of the economy. It will support the government growth mission: to drive the highest sustained growth in the G7.
3. The UK is an excellent place to research, develop and apply EB and we are home to a significant number of strengths. The government is committed to continuing to build-up the EB sector in the UK, so that we can drive growth through the huge range of capabilities and applications it presents across the economy.
4. The government has made progress in delivering on these commitments. Fundamental and applied R&D is both a UK strength and is critical to the success of the sector. In February 2024 UKRI announced £100m of funding for EB Missions Hubs and Awards. The Hubs are now bolstering the UK's EB research capacity and capability and helping to drive forward technology development and innovation across the country.
5. In October DSIT announced the creation of the Regulatory Innovation Office (RIO), alongside the winners of the first round of the EB Sandbox Fund. Through this fund, we are supporting regulators to design, test and implement innovative regulatory behaviours, with the aim of accelerating regulatory reforms for EB-derived products. The Food Standards Agency (FSA) have now begun delivering a £1.6m sandbox on cell-cultivated products. The second round of the sandbox competition will open in April 2025, to help innovators understand and tackle regulatory barriers in transformative innovations. We will continue to forge close relationships between regulators, policy makers and the sector to ensure that any regulatory reform can be effective.
6. As the sector continues to grow, the government is ensuring that the UK has the right skills and talent in the sector. In March 2024, UKRI announced a new Centre for Doctoral Training for EB to train the next generation of researchers and innovators, to go with further funding from Innovate UK and the catapult network. In January 2025 UKRI opened a call for additional Doctoral Focal award centres on EB.
7. To fully capitalise on the economic growth impacts of the sector, an effective responsible innovation culture is critical. In October 2024 we launched gene synthesis screening guidance to ensure that the UK secures the economic, health and wider societal benefits from advances in biosciences and biotechnologies, whilst mitigating the risks.

8. Effective engagement with the sector remains a key part of government's toolkit to build-up the sector and tackle the challenges that lay ahead. The EB Advisory Panel (EBAP) has brought together both the current and next generation of academic, start-up and industry leaders in EB across the UK. This group is advising and assisting government on the delivery of our commitments. Additionally, the EB Responsible Innovation Advisory Panel (RIAP, formally the Biosecurity Leadership Council) has now met five times to discuss issues of responsible innovation and support development of relevant policy.

9. The government remains committed to ensuring that the UK remains and enhances its capability as a global leader in EB. Significant investment and resource have been dedicated to ensuring that the exciting, disruptive and transformative applications being developed now in the UK can be harnessed at scale.

Chapter 2: **Engineering biology: what and why?**

***Recommendation:** Government witnesses told us that engineering biology has historically been an area of strength in UK research and development, and it is a potential driver of growth. The new Government has indicated that it still views it as a priority sector. However, as our report explores, other countries are beginning to overtake the UK, and we are at severe risk of losing the prospective benefits of a world-leading engineering biology sector. (Paragraph 20)*

10. Government response: The UK is a global leader in EB and is home to a significant research and commercial base that is highly impactful. DSIT is committed to delivering the support required to protect and strengthen the UK's position over the long term, as demonstrated by our significant investments into applied EB research. The UK retains a leading position in global research rankings and our companies continue to attract more investment by some distance than those of other European countries.

Chapter 3: Government strategy for engineering biology

Industrial strategy and DSIT's National Vision for Engineering Biology

Recommendation: The Government's industrial strategy should set out a clear plan for developing engineering biology and other key technologies that can underpin industrial development across sectors. It should recommit to, and build on, the work from the Science and Technology Framework and National Vision for Engineering Biology, and set out how foundational technologies like engineering biology will be supported and pulled through into application across sectors. (Paragraph 33)

This will require coordinated action across a range of policy areas covered in this report, including:

- *public investment, including R&D, the roles of UKRI and the National Wealth Fund*
- *public policy, including procurement*
- *private investment to support scale-up*
- *skills and visas*
- *regulation and standards*
- *infrastructure*
- *incentives and mandates. (Paragraph 34)*

The strategy should set out a clear direction of travel in these policy areas, identifying areas where the UK has a potential to excel, with more specific metrics and outcomes, and the Government should provide regular updates on progress towards these targets. (Paragraph 35)

11. Government response: The government agrees on the importance of EB and that a range of measures to support the sector is needed. The government will introduce a new Industrial Strategy in Spring 2025 to drive long-term, sustainable and secure growth in crucial sectors of the economy. It will support the government's growth mission: to drive the highest sustained growth in the G7, aligned with our missions to increase opportunities for all and make Britain a clean energy superpower.

12. The Industrial Strategy will channel support to eight growth-driving sectors. DSIT is leading work to develop plans for two of the eight growth-driving sectors; Digital and Technologies, and Life Sciences (jointly with DHSC). The Industrial Strategy is being designed in partnership with business, devolved governments, regions, and other stakeholders, as well as building on previous work gathered under the Science and Technology Framework. DSIT will continue to champion the capability and impact of EB in Government activities and strategies.

Recommendation: The Government should, as a matter of urgency, recommit to the target set out in the National Vision for at least £2 billion of funding over the next decade. It should set out more details of how it intends to allocate this funding between R&D, skills, and infrastructure, as well as which areas of engineering biology the UK has potential to excel at and desirable outcomes it wishes to achieve from the funding.

Longer-term certainty around funding could form part of the new Government's commitment to provide ten-year R&D budgets to key research institutions. (Paragraph 44)

13. Government response: The Autumn Budget in October 2024 set out DSIT's overall R&D budget, of £13.9bn for 2025/26. Further details of how this funding will be allocated will be announced in due course, and before the start of the financial year. Phase 2 of the Spending Review 2025 is underway and will conclude in June. The Spending Review will take a mission-led, reform-driven, technology-enabled approach to funding public services while investing in long-term growth. The government will set out its spending plans in line with the Spending Review timelines set by HM Treasury, with departmental funding settlements being announced in June.
14. The government will set ten-year budgets for certain R&D activities, where giving certainty will better support the ability to form long-term partnerships with industry, build and develop skills and talent, and foster international collaborations to allow us to stay at the forefront of global innovation. Further details will be set out as part of the next phase of the Spending Review.

Recommendation: DSIT, and the Government more widely, must be able to hire individuals with appropriate technical and industrial expertise, being flexible about pay scales and seconding from industry where necessary. (Paragraph 50)

15. Government response: We agree that technical and industry expertise are important but note that a range of skills and talent is required in government. Diversity of experience, thought, perspectives, skills, and background makes the government a more innovative organisation, thus making better decisions and better delivering our objectives. We actively seek applications from every part of the community and particularly welcome applications from candidates of any age, background, disability, or from an ethnic minority background and any other protected characteristics. This will help us move to a workforce that reflects the people we serve to deliver better policies.
16. The Government Science and Engineering (GSE) Profession is developing the first overarching reward framework to support government organisations when implementing allowances for science and engineering staff. The GSE Profession oversees the STEM Futures interchange programme with 41 partners across academia, industry and public sector aimed at increasing knowledge, experience and capability exchange including through secondments.
17. The Government Office for Science is exploring further initiatives to bring the experience of a diverse range of experienced scientists and engineers who have gained academic and industrial research experience into the Civil Service. The team is developing options to increase the number of experienced scientists in various Civil Service roles.

***Recommendation:** The other departments implicated in the Science and Technology Framework, including departments with significant procurement budgets and the Treasury, should support engineering biology and the objectives of the Science and Technology Framework. Formal coordinating mechanisms, such as regular meetings at ministerial and senior staff level should be put in place. (Paragraph 56)*

18. **Government response:** The government agrees with this recommendation, noting that DSIT already works across government to communicate, engage and coordinate activity on EB policies. This activity is coordinated around the principles of the Science and Technology Framework, working with relevant public sector organisations to coordinate and drive outcomes.
19. We agree that a joined-up approach across government continues to be needed. DSIT works across departments at a range of seniorities to develop support for the EB ecosystem, including through the Science and Technology Council at Ministerial level.
20. Examples of wider government support for EB include:
- a. Future Farming: Defra’s Genetic Technology (Precision Breeding) Act 2023 has unlocked opportunities to apply EB for farmed plants and animals with greater resistance to pests, disease, and environmental challenges.
 - b. Low carbon fuels: DfT have invested £25 million into LanzaTech UK’s new facility in Port Talbot which will convert steel mill off-gases into ethanol, and then use alcohol-to-jet technology to produce sustainable aviation fuel. The Ministry of Defence supported C3 Biotech to establish a pilot facility in Stockport to produce aviation fuels.
21. The government will introduce a new Industrial Strategy in Spring 2025 to drive long-term, sustainable and secure growth in crucial sectors of the economy. It will support the government’s growth mission to drive the highest sustained growth in the G7, aligned with our missions to increase opportunities for all and make Britain a clean energy superpower. DSIT will work to develop and co-ordinate mechanisms for EB within that broader context.

***Recommendation:** Cross-governmental working efforts should include the appointment of a national sector champion for engineering biology. This should be a recognised, high-profile figure from industry or academia who can exercise convening power and lead on delivering the sectoral strategy for engineering biology. (Paragraph 57)*

22. **Government response:** We welcome the committee’s recommendation and agree that national champions have the capability to have a positive and galvanizing effect on sectors. The government will work internally and with the sector to explore the feasibility of a national EB champion.

Public procurement policy

Recommendation: The Government should seek to support engineering biology in the UK through its public procurement. It should learn from the example of the US's BioPreferred programme. The Government should consider setting aside a mandatory percentage of procurement budgets which will be used to support innovative, UK-based SMEs and new technologies. These budgets could be subject to broader considerations for value-for-money than are currently used and subjected to alternative targets for auditing. This will encourage the development of a healthier risk appetite: civil servants who work on procurement who are well-versed in the technologies that the Government wants to support and are empowered to authorise a range of potentially riskier but more rewarding contracts. (Paragraph 71)

Departments should work with UK agencies like the Advanced Research and Invention Agency and Innovate UK to identify opportunities for procurement to support novel technologies and achieve the Government's wider policy aims, such as on sustainability. This should be done in line with the UK's broader industrial strategy. The Government should set out how the Cabinet Office's cross-government plan mentioned in the Science and Technology Framework will support innovative procurement practice across departments. (Paragraph 72)

23. Government response: We agree with the importance of public procurement. At over £390bn in 2023 public procurement accounts for around a third of all public expenditure. Government departments create a demand for innovation that can catalyse their buying power into economic growth. There are plenty of examples where government is already procuring EB products and services, such as collaborating on mRNA vaccines and therapies, investing in facilities to convert steel mill off-gases into sustainable aviation fuels and funding feasibility studies examining the generation of hydrogen via biomass.
24. The government intends to simplify the procurement process to support innovation and reduce micromanagement with a mission-driven approach. DSIT is working with the Cabinet Office to explore how to leverage procurement to deliver innovation, for the benefit of public services and innovators. Through the Procurement Act, the government seeks to capitalise on its buying power to boost innovation and growth through public sector procurement. This will require being comfortable taking appropriate risks with innovation that might fail.
25. The government will continue to operate the Contracts for Innovation programme (previously Small Business Research Initiative) to provide departments with an effective pre-commercial procurement mechanism. The new flexibilities in the Procurement Act will enable Contracts for Innovation competitions to operate as the first stages in a streamlined procurement process, rather than having to re-tender. This will provide a better on-ramp for innovative businesses onto government contracts.

Chapter 4: Policy to support engineering biology

Skills for engineering biology

Recommendation: The Government, through UKRI, should urgently commit to fund more doctoral training centres for engineering biology. Links between these programmes and industry must be strengthened: the majority of these places should provide a funded year in industry as part of the programme to give students either experience of working at cutting-edge engineering biology start-up companies or SMEs, or the opportunity to transfer their skills, knowledge, and ways of working into larger companies. (Paragraph 84)

26. Government response: We agree on the need for increasing training opportunities for EB in the UK. UKRI have recently funded a Centre for Doctoral Training for EB (Universities of Oxford and Bristol) which will provide bespoke cohort-based training with a focus on how synthetic biology concepts and technologies can be translated into products with real-world impact. In January 2025, UKRI opened a call for additional Doctoral Focal award centres on EB. Engagement with industry is strongly encouraged and a minimum of 25% of the studentships must include ‘CASE’ (Collaborative Awards in Science and Engineering) studentships with industry. Furthermore, all students must undertake a 3-month placement, often in industry.
27. There are already many programmes designed to provide business and industrial training including through UKRI, such as:
- Flexible Talent Mobility Accounts supports placements and exchanges for bioscience research staff from and to universities, institutes, businesses, policy, or other settings, in the UK and overseas. It includes one partnership specifically focused on EB, led by the John Innes Centre.
 - ICURe (Innovation to Commercialisation of University Research) and the follow-on funding scheme Innovate UK ICURe are early-stage pre-accelerator programmes for researchers to support commercialisation.
 - BBSRC and Innovate UK funded National Alternative Protein Innovation Centre and National Biofilms Innovation Centre each include flexible talent development accounts to train researchers, technical staff, and innovators operating at the academia-industry interface.
 - Doctoral Training Partnerships (now Doctoral Landscape Awards) and Collaborative Training Partnerships (now Industrial Doctoral Landscape Awards) in bioscience disciplines also provide business and entrepreneurial training to their students. For example, all doctoral students undertake a 3-month placement, 25% of them do so in the biotechnology sector.
28. As part of the package of funding to support, drive and de-risk the commercialisation of EB research and the creation of new EB ventures, £2.8m of Seed Corn funding was deployed across the 6 recently funded 5-year EB Mission Hubs and the 22 Mission Awards. This funding included support for the

development of entrepreneurial skills and capabilities including the knowledge and skills necessary to develop businesses and attract private sector investment.

***Recommendation:** There is a need to expand the number of routes into the engineering biology sector, especially when it comes to developing technical and industrial experience. Skills England should work with industry, PSREs and universities to provide flexible funding for apprenticeships, including degree apprenticeships. This would provide more routes into the engineering biology sector and enable the training of the next generation of technicians. UKRI should support a Masters' level conversion course suitable for undergraduates to learn some of the practical, lab-based and industrial skills required for engineering biology and related techniques. (Paragraph 94)*

29. **Government response:** Once fully established, Skills England will bring together the data on skills gaps with the views and evidence from employers to understand the most pressing skills needs. Where new technical qualifications are found to be needed, Skills England will work with employers to develop the relevant standards and bring these to market, including in EB. Skills England will be underpinned by a £165 million Local Skills Improvement Fund to support our aim to make technical education and training more responsive to local labour market and employer needs.
30. This government is reforming the apprenticeships offer into a new growth and skills offer, which will offer greater flexibility to employers and learners and align with the industrial strategy. As a key first step, this will include shorter duration apprenticeships and new foundation apprenticeships for young people in targeted, growing sectors. These will help more people learn high-quality skills at work and fuel innovation in businesses across the country. We will set out our plans for further steps and detailed information on the levy-funded growth and skills offer in due course, building on the findings of Skills England's engagement with key partners, including employers and training providers, over the autumn.
31. The government is committed to supporting Public Sector Research Establishments (PSREs) workforce challenges, including on skills, talent and training. DSIT have been working closely with PSREs across government to better understand the current skills capability. Our intention is to identify lessons-learned, find best practice and identify solutions to skills challenges across the UK PSRE portfolio.
32. We welcome the recommendation to further explore options for Master's-level conversion courses focused on practical, lab-based, and industrial skills relevant to EB. We are implementing a range of initiatives to support training and strengthen career pathways for research technical professionals (RTPs) via UKRI programmes, including the Strategic Technical Platforms, Flexible Talent Mobility Accounts (including one partnership specifically focussed on EB) and piloting efforts to embed interdisciplinary and cross-sector mobility of staff for knowledge exchange and skills development into research investments. This

includes the BBSRC Prosperity Partnerships and the BBSRC and Innovate UK funded National Alternative Protein Innovation Centre and National Biofilms Innovation Centre, both of which offer RTPs opportunities for secondments and access to additional training.

Recommendation: The UK must rethink its attitude to immigration for skilled workers in scientific and technical sectors, as we are falling behind in the global race for talent. The Global Talent Visa should be expanded from a few thousand issued a year, with more routes for organisations to sponsor this visa beyond the relatively small number of primarily academic organisations who are currently listed as sponsors. Specifically, it should support applicants with entrepreneurial, manufacturing and industrial skills as well as scientific ones. Additional visa routes that allow for flexible hybrid working should be considered, as other countries have put in place. (Paragraph 104)

33. Government response: The UK is home to a world-leading science and technology base, supported by top universities and research institutions. We are open for business when it comes to science and technology, and we want the UK to be the destination of choice for globally mobile top talent. We are committed to maintaining an internationally competitive visa system for exceptional talent to come to the UK, with multiple visa routes attracting skilled individuals from around the world, at all career stages. Under our Plan for Change, the government will link our immigration, skills, and visa systems so we can grow our skills base, end the reliance on overseas labour and boost economic growth. This is alongside the work on the Immigration White Paper, which will set out government's approach to reducing net migration.
34. The Global Talent route has never been intended to be the mainstream economic route for the sectors it covers. It focuses on particular cohorts whose skills and experience fall under the remit of our Global Talent endorsing bodies, and who can demonstrate they are leaders, or potential leaders, in their field.
35. Access to the UK labour market for those within STEM is not limited to the Global Talent visa route. A variety of options are available to allow individuals at all career stages, both academic and practitioners, to bolster the UK's talent base, including Innovator Founder, for those seeking to establish innovative businesses, and Skilled Worker for those taking up a specific position.
36. The Skilled Worker route allows UK businesses to employ hybrid workers who split their time between the UK and other countries, providing they continuously meet their sponsor duties throughout the period of sponsorship. Exceptionally talented individuals in unsponsored routes such as Global Talent can enter the UK on an ad hoc basis for example to do consultancy work or fill permanent roles working across borders. There are no current plans to introduce a specific hybrid working visa.
37. The appointments fast-track pathway, which this recommendation suggests expanding, allows academics or researchers who have been offered a qualifying

position at an organisation approved by the National Academies (the Royal Academy of Engineering, the Royal Society, and the British Academy) to be endorsed on that basis, rather than going through the full peer review pathway. The position must meet a set of strictly defined criteria and be offered following a robust recruitment process.

38. The National Academies recommended this option as it acts as a proxy to a full peer review; it avoids individuals who had already successfully gone through a robust form of academic peer review to be offered a job by a trusted organisation, being subjected to an extremely similar academic peer review as part of the visa process. The organisations accepted include all HEIs, and a large number of independent research organisations, research council institutes, and public sector research establishments. The National Academies are content that these bodies have equivalent, robust, due diligence requirements for recruitment, which may not necessarily apply to other organisations who employ individuals in similar roles.
39. Those granted on the Global Talent route are not sponsored, nor are they tied to a specific employer or job. Those without a job offer, or with a job offer that would not allow them to access the appointments fast track pathway, may alternatively qualify through one of the other pathways offered by the route, if they demonstrate they are sufficiently highly talented or promising.

***Recommendation:** More must be done to reduce up front visa costs and resettlement costs for top talent in competitive scientific and technical fields. If the Immigration Health Surcharge is retained, the burden of payment must be reduced by allowing individuals to pay on an annual basis or a monthly basis by deduction from salary, rather than paying the full cost up-front. The Government should benchmark postdoctoral salaries against comparative salaries in Europe. Action must be taken urgently to ensure the UK remains an attractive destination for increasingly mobile global talent. (Paragraph 105)*

40. **Government response:** The government is not currently in a position to accept this recommendation. Regarding fees for immigration and nationality applications, these are kept under review in line with the principles set out under Section 68 (9) of the Immigration Act 2014 and are generally informed by the principle that those who use and benefit from the immigration system should contribute towards the cost of operating it, reducing the level of UK taxpayer funding that would otherwise be required.
41. UK visa fees are broadly competitive when compared with the fees charged by comparative countries globally. Visa products are, however, difficult to compare because visa offers, including benefits and entitlements gained and duration of stay, vary significantly between countries. Furthermore, UKRI allows researchers coming to the UK who are working at least 50% of their time on a UKRI grant to claim the cost of their visa, including the Immigration Health Surcharge, from

their grant. Many other research funders and R&D organisations operate a similar policy. Additionally, researchers in receipt of Horizon Europe grants are also allowed to claim the cost of their visa from their grant.

42. We know the UK is in a global competition for talent and high potential individuals in sectors that are important for growth and driving forward the UK economy. The Migration Advisory Committee has therefore been commissioned to review the reliance of key sectors on international recruitment. It is also being strengthened, ensuring it is able to work more strategically to forecast future trends, alongside continuing to review and provide independent, evidence-based recommendations on the immigration system.
43. Upfront payment of the Immigration Health Surcharge (IHS) ensures migrants make a financial contribution to the cost of NHS treatment available to them from the point of arrival in the UK and for the duration of their immigration permission in the UK. The IHS rates are set based on the Department of Health and Social Care analysis of the average annual cost to the NHS of treating IHS payers. An instalments approach would place an increased administrative burden on the Home Office to seek payment when instalments are due, chasing late or missed payments, and taking enforcement action if necessary.
44. Enforcement action could involve cancelling immigration permission if an applicant was not up to date with payments, and potentially the individual being unable to continue employment, being liable to detention and removal from the UK, ultimately creating additional cost burdens for employers.
45. Payment in instalments would also place a burden on the NHS, who would need to ensure patients are up to date with their payments and consider applying NHS charges if the IHS had not been paid and incurring further costs in pursuing unpaid debt. This could create uncertainty for migrants on whether they were eligible for treatment without charge.

Regulations and standards

Recommendation: The EBRN and RIO should be sufficiently resourced to have a public-facing offer that maps out which categories of engineering biology products map onto which regulators and sets out a streamlined regulatory pathway. The “coherent taxonomy” and roadmap to regulatory approval recommended by Dame Angela McLean should be published, and the Government should set out a clear timeline for this in its response. There should be a single resource or point of contact published by these bodies for companies in the sector seeking to understand the regulatory implications of any products or services they might develop. The “regulatory support service” for small science and technology companies mentioned in DSIT’s Science and Technology Framework should be pursued and could provide this interface. (Paragraph 114)

46. Government response: We agree that getting regulation right is a priority for EB; regulatory innovation is high in this government's priorities. The government is building on an area of strength in EB but we recognise that we need a regulatory system that allows products to reach the market and contribute to economic growth.
47. We launched the RIO in October 2024 to help position Britain as the best place in the world to innovate by ensuring safety, speeding up regulatory decisions and providing clear direction in line with the Industrial Strategy. EB has been identified as one of the RIO's four early priority areas. It has three core pillars of activity: knowledge, strategy and capability building. The knowledge pillar will enhance our understanding of regulatory barriers to innovation. The strategy pillar will set clear priorities for regulatory innovation, aligning with our missions and Industrial Strategy, whilst ensuring safety. Through the capability building pillar, the RIO will work with regulators to ensure they have the necessary tools to achieve our shared goals.
48. To streamline regulatory pathways for new technologies, DSIT are supporting regulators to design, test and implement innovative regulatory behaviours through our EB Sandbox Fund. The sandboxes aim to accelerate regulatory reforms for EB-derived products, improving the quality of decision-making when assessing these products and encouraging business innovation and investment. The winners of the first round of the sandbox fund were the FSA who were awarded £1.6m for a sandbox on cell-cultivated products. The second round of the sandbox competition will open in April 2025.
49. We recognise the challenges for innovators in navigating the regulatory ecosystem and are exploring options to make it more transparent. In support of this aim, the Engineering Biology Regulators Network (EBRN) was established in 2023 to share best practice on pro-innovation regulation, identify common challenges and collaborate on solutions.

The membership and activity of the Engineering Biology Regulators' Network should be made public as a necessary first step. There should be clear individuals or teams responsible for coordinating with the network within each regulator. (Paragraph 115)

50. Government response: We welcome the recommendation to make the EBRN membership public and confirm that we have now published this information on GOV.UK (<https://www.gov.uk/government/groups/engineering-biology-regulators-network>). We will continue to explore further options to increase the transparency of the regulatory ecosystem for EB.

***Recommendation:** The UK needs to develop a world-class regulatory approach for engineering biology, characterised by being swift, effective, and involving leading experts. Regulators need to be appropriately resourced to work with businesses to assess new technologies early and mitigate any unintended consequences from their use. They must be able to bring in the relevant expertise to regulate the sector*

appropriately, proactively, and swiftly, with timelines that are competitive with other nations. (Paragraph 123)

51. Government response: The government agrees with the recommendation and is taking a multifaceted approach to tackling the challenges, including through the development and publication of the Industrial Strategy later in 2025.
52. To support our ambitions for an innovative and proportionate regulatory system, the government commissioned the Regulatory Horizons Council (RHC) to produce an independent report on EB regulation. The RHC report, published on 16 January 2025, makes recommendations on a framework for future decisions on EB governance. The government will set out its response to this report in Spring 2025.
53. The Responsible Innovation Advisory Council (RIAP) was created in 2023 to support regulation in the industry without stifling business. The RIAP meets quarterly to discuss issues of responsible innovation and on their recommendation, DSIT recently published voluntary screening guidance for providers and users of synthetic nucleic acid. Promoting screening helps to deliver on the UK's commitment to fostering responsible innovation in EB technologies – it guides the use of synthetic nucleic acid for legitimate purposes, whilst also mitigating risks of accidental misuse.

Recommendation: The secondary legislation for the Genetic Technology (Precision Breeding) Act 2023 should be passed urgently to establish a regulatory framework that provides certainty, in accordance with the Act's provisions. (Paragraph 126)

54. Government response: We agree with the committee on the urgency; precision breeding offers huge potential to transform the plant breeding sector in England, enabling innovative products to be commercialised in years instead of decades. On February 25th, the government laid in parliament the secondary legislation necessary to implement the Genetic Technology (Precision Breeding) Act 2023 for plants in England. If passed, they will come into force in the Autumn.
55. The Genetic Technology (Precision Breeding) Act 2023 removes plants and animals from regulations that apply to genetically modified organisms (GMOs) when these organisms only contain genetic changes that could have occurred through traditional breeding methods. Implementing the Act will unlock the potential benefits for British farmers and consumers, enabling the development of crops that are more nutritious, resistant to pests and disease, resilient to climate change and more beneficial to the environment. The Act is for England only and replaces these existing regulations with more science-based and proportionate requirements. These apply to the use of precision bred plants and animals in field trials and to their marketing, including as use in food and animal feed.

Recommendation: The Government should work with the National Physical Laboratory, the British Standards Institution, industry partners, national laboratories like the Centre

for Process Innovation and ISO organisations to assist in the development of standards across the engineering biology industry. Data-sharing should be encouraged between different companies to enable standardisation of processes and products. Schemes that encourage and support start-up companies and SMEs to access national laboratories could assist in this data-sharing. (Paragraph 133)

56. **Government response:** The government agrees with the importance of, and its role in, setting standards in EB. DSIT funds the National Measurement System (NMS), including the National Physical Laboratory (NPL) and the National Measurement Laboratory at LGC (formerly the Laboratory of the Government Chemist), to develop and maintain the critical underpinning measurement science and core capabilities to deliver traceability, and support for development of new EB technologies.
57. The NMS builds confidence in EB innovation and provides the tools to drive translation and confidence for scale up of EB innovation. This work is delivered through engagement with innovators and industry organisations, providing access to infrastructure and expertise, and supporting regulatory compliance.
58. The NMS laboratories lead and participate in multiple national and international Standards committees, ensuring innovator-driven consistency, quality, safety and comparability of products, services, practices and supply chains. This work enables UK influence at an international level and supports growth in EB companies at all stages of development. The NMS will continue to develop the infrastructure, (pre-)standards and technical measurement tools, including skills development, to support the EB sector. In 2024, DSIT invested £2.3m in Metrology Biofoundry capabilities at NPL to enable trusted translation and commercialisation of early-stage EB products, services and technologies.
59. UKRI's BBSRC is currently investing just over £1m in standards and metrology training for researchers working in EB. This training, developed and delivered by the National Measurement Laboratory at LGC is critical to developing reliable EB products, increasing quality and de-risking innovation.

***Recommendation:** The UK should engage at the most senior, expert level with EU and international standards—through organisations like the International Organization for Standardization (ISO)—to ensure that the UK can influence these and are not disadvantaged by international standards and regulations. (Paragraph 135)*

60. **Government response:** The Government agrees this is important and acknowledges that the benefits and consequences of EB are not confined by borders. The UK is already working with partners both bilaterally and multilaterally to shape international norms and standards (as set out in our response to recommendation 260). We recognise that international collaboration is vital both to promoting and embedding a culture of responsible innovation, and to learning from and demonstrating best practice, and minimising divergence amongst partners where appropriate.

61. The NMS is leveraging its international influence in the development of new (written) standards for EB through several international committees, including the ISO 276 (Biotechnology) Technical Committee, where current work includes new standards to support gene expression analysis for engineered systems and gene delivery systems. By developing consensus methods, standardising best practice and improving confidence across the sector, the NMS maintains UK influence, credibility and leadership globally. The development of early-stage best practice guidance and tools, including reference materials, represent areas in which the NMS supports the UK's leadership position throughout the process of international consensus standards agreement, enabling industry to demonstrate the efficacy and suitability of their innovative products and technologies.
62. The UK government also plays a key role in several multilateral organisations including the Organisation for Economic Co-operation and Development (OECD) and G7 where it has a leading voice in the promotion of standards, regulations and responsible innovation.

Pilot-scale infrastructure

***Recommendation:** The Government should work with public sector research establishments and universities to make national and university laboratories accessible for the purpose of assembling the data required for start-up and spin-out companies to file patents. Innovate UK should consider providing additional funding to help small and early stage companies obtain the data needed for patents which can unlock additional private sector funding. National laboratories, public sector research establishments and related research infrastructure should add the number of patent applications they have supported to their key performance indicators. (Paragraph 141)*

63. Government response: The government broadly agrees with this finding. World-class national and international research and innovation infrastructure delivers both scientific and societal benefits. This government is exploring policy options to maximise the benefits of its investments across the whole life cycle of research and innovation infrastructure, alongside exploring how to deliver an overarching performance monitoring framework and wider evaluation needs. We will consider how best to develop geographical data on research and innovation infrastructure as we develop policy options. Government will consider the inclusion of an indicator on the number of patent applications.
64. It is noteworthy that there are several existing mechanisms to support patent applications. The Government Office for Technology Transfer (GOTT) provides support to public sector organisations to accelerate their innovations towards the market including data, know-how and Intellectual Property. This support includes providing expert advice to public sector organisations on how they can protect and commercialise their assets and grant funding to support the development of high potential innovations to impact growth and deliver new products and services for citizens. GOTT encourages public sector organisations to track both the numbers of patents they are supporting and licensing but does

not support targets being set as this can encourage prioritisation of quantity over quality.

65. Innovate UK provides grants for R&D projects, which can help provide data needed for patents. They also provide access to IP support services to help businesses plan their IP management approach. Innovate UK will continue to provide support to SMEs to develop their IP through a variety of funding instruments and offers advice on patents and IP management through Innovate UK Business Growth.

66. Research England provides funding to universities through Higher Education Innovation Funding to support and develop knowledge exchange activities including commercialisation and exploiting their physical assets such as equipment to help businesses do research and produce data. Universities are incentivised with additional funding to engage with SMEs in particular, with the amount of private income they receive from SMEs including from these activities being double weighted in the funding allocation approach.

Recommendation: The stop-start funding of research infrastructure must end. The Government should set a timeline for producing its long-term national plan for research infrastructure. In the Spending Review, it should use some of the new flexibility for infrastructure spending to fund R&D infrastructure. (Paragraph 157)

The Government should provide more funding to enable greater use of existing engineering biology research infrastructure, such as the biofoundries and the CPI. This could be in the form of block grants for those institutions to maintain their operations and reduce the cost recovery that they must charge users, or grants for using these facilities, as the EU offers for the Bio Base Europe Pilot Plant. The scale-up facilities should have an enhanced educational role to play with preparing researchers and start-ups to engage with the practicalities of scaling up their processes at an earlier stage. (Paragraph 158)

As part of its long-term national plan for research infrastructure, DSIT should map out the existing capabilities of innovation infrastructure in its key technology areas (including engineering biology) and the terms for using them. It should identify and address any barriers to accessing existing facilities in this area, such as the biofoundries, and Catapults, including the CPI. Interconnectivity of existing infrastructure should be encouraged to ensure that there are clearer pathways for scaling-up processes and production. AI and compute infrastructure should be made accessible for applications of machine learning, such as those in engineering biology. (Paragraph 160)

The Government should ensure that the UK has a competitive answer to the scale-up infrastructure provided by facilities like the Bio Base Europe Pilot Plant, responding to the work done by GO-Science and DSIT in this area. In particular, existing fermentation facilities and facilities like the CPI which focus on non-life sciences applications of engineering biology should be supported. The Government's proposed reforms to the

planning system should encourage the development of laboratory space around existing clusters for the life sciences. (Paragraph 170)

67. Government response: We support the committee's view on the important of scale-up infrastructure for the EB sector. Government has an increasingly in-depth understanding of the EB ecosystem blockers and the opportunities for public EB infrastructure, considering the loop between EB innovators, investors and industrial customers. If this loop can be unblocked, we expect EB innovations to be pulled through to application and EB firms to grow.
68. Infrastructure underpins all economic activity by connecting people, goods, services, energy, and ideas. Improvements in infrastructure and planning will be foundational to success across our growth-driving sectors and to addressing place-specific constraints to growth in city regions and sectoral clusters. DSIT has visited UK and international facilities to explore good practice assess what would work best for the UK ecosystem, and received expert advice including from the Government Office for Science. We are now working closely with the EB Advisory Panel alongside wider engagement with the sector to understand how different models for infrastructure, including co-ordinating existing infrastructure, have strengths and weaknesses in the UK's unique context.
69. The Industrial Strategy also recognises the importance of infrastructure and through the infrastructure and energy 'horizontal', we aim to address barriers that prevent growth of businesses such as energy prices, grid connections, infrastructure, and planning. The Digital and Technologies sector plan will specifically look at how we can take a cross-Government approach to overcome these barriers and unlock growth of technology businesses.

Chapter 5: Engineering biology for growth

Scaling up companies: economic issues

Recommendation: There are many factors behind this failure to scale and the Government needs to initiate coordinated policy initiatives on multiple fronts to turn it around, including the areas of public and private investment (such as the Mansion House reforms), infrastructure, skills, regulation, adoption by larger companies, and public procurement we address in this report. (Paragraph 177)

70. Government response: We agree with this recommendation and note that our call for evidence showed that scaling-up in EB was a global challenge and not one that was unique to the UK. Small and medium enterprises face several challenges in their scale-up journey which can disincentivise potential investors into SMEs.
71. Infrastructure is a vital part of being able to address scale-up issues and we are working with partners within and external to Government to develop a sustainable plan for any HMG action in this area. We are consulting carefully with the EBAP and others to understand how existing facilities must be supported, what new facilities would be most technically and commercially impactful, and how the resulting system can be sustainable.
72. We are already taking action to address some of these gaps. For example, recent public financing reforms include:
- Creating the National Wealth Fund (NWF) with £5.8 billion additional funding, raising its total capitalisation to £27.8 billion.
 - Announcing reforms to the British Business Bank (BBB) and launched 'British Growth Partnerships' to better mobilise the UK's deep pools of institutional capital.
 - Announcing the Mansion House Compact pension reforms to unlock around £80 billion of investment for infrastructure projects and future-focused businesses.
 - Delivering the Science and Technology Venture Capital Fellowship, launched in November 2024. In partnership with Imperial College and the Royal Academy of Engineering, it trains mid-career investors in deep tech and life sciences, strengthening the UK's science and technology investment base.

Public investment

Recommendation: The Government should urgently expand the scope and scale of its National Wealth Fund to ensure it can include investments in technologies such as engineering biology that support the aims of its industrial strategy. A specialist investment team for engineering biology as a part of the National Wealth Fund should be established to enable it to identify and make these investments. (Paragraph 188)

73. Government response: The government has created the NWF that will mobilise billions of pounds of investment into the UK's clean energy and growth industries. Following legislation, the NWF will have a broader mandate, extending

beyond infrastructure to support delivery of the wider industrial strategy in areas where an undersupply in private finance exists. We are engaging with HMT and the NWF to identify where opportunities to support EB are as part of this mandate.

74. NWF will have a total capitalisation of £27.8 billion and will have an additional £5.8bn, which will be committed over this Parliament. The NWF can deliver a broad range of products, which include equity investments, mezzanine debt, and guarantees. In the coming months, HMT will issue the NWF with a Statement of Strategic Priorities which will establish the NWF's strategic objectives for the duration of this Parliament.

Recommendation: There is a need for a clear, joined-up pipeline of funding to support companies to make the transition over the 'valley of death' from research, through pilot-scale and scaleup, to funding for larger companies with a commercial product.

This will require coordination between bodies like the National Wealth Fund and British Patient Capital, which could focus on de-risking larger-scale infrastructure investments and providing late-stage equity funding, and agencies like Innovate UK and research councils, which should focus on expanding existing programmes to support research and pilot-scale investments.

It will also require coordination with the Government's public procurement policy to pull through innovative technologies, discussed earlier.

The Government should also consider a capital grant scheme to support non-medical engineering biology in the same way as the Life Sciences Innovative Manufacturing Fund currently supports the medical applications. (Paragraph 190)

75. Government response: We accept this recommendation in principle; in our call for evidence EB firms consistently identified a gap around larger funding rounds. We are working with Innovate UK, the BBB and the NWF to ensure there is coordination and join-up between their offers, as well as how they interact with public procurement. This will support delivery of the Industrial Strategy and deliver on the Growth Mission. But government is also keen that industry and the private sector plays an equitable role in ensuring the success of sector through co-investment.
76. With regards to a specific capital scheme, DSIT will set out its spending plans in line with the Spending Review timelines set by HM Treasury, with departmental funding settlements being announced in June. Throughout the spending review all elements of public financing are considering how to best support innovative EB firms to help them grow, including how to support through the entire innovation journey.

Private investment

Recommendation: The UK should pursue reforms to the financial sector that encourage investment in UK companies, including the Mansion House reforms in the pension sector, which need to be more ambitious and faster. Maintaining a sophisticated investment ecosystem requires some large UK investors in the sector, and reform is needed to slow the decline of active investment. Pension reforms should consider ways of supporting consolidated pension funds to invest in small, innovative UK tech companies and provide scale-up capital for them, as part of their diversified portfolios, including by supporting the development of tech expertise among investors. (Paragraph 203)

77. Government response: We agree with the need to pursue financial sector reforms that encourage investment in the UK, in the context of ongoing government reform, including the Pensions Investment Review proposals announced at Mansion House.

78. The government published the Interim Report of the Pensions Investment Review alongside the Chancellor's Mansion House Speech on 14 November 2024. The proposed reforms in the Interim Report have the potential to unlock around £80 billion of productive investment, while boosting savers' pension pots.

79. The government will publish the Final Report in Spring 2025. This will further consider the opportunity for, and scope of, investment in the UK by pension funds. As a potential consequence of the reform, any increase in the amount of UK pension fund investment into UK firms, particularly UK equities, will likely benefit UK EB firms given their need for growth capital.

80. The government is also taking further proactive steps to increase investment in innovative businesses. Two UK pension funds, Aegon UK and NatWest Cushon, have agreed to work with the new British Growth Partnership with a view to making investments in the initial fund, where the investment mandate could cover EB firms. The British Growth Partnership prepares for launch in 2025, subject to regulatory approval.

Driving adoption across the economy

Recommendation: The UK needs a clearer direction of travel when it comes to which parts of the biomanufacturing supply chain it intends to have domestically. Any sectoral strategy must carefully consider which existing companies might ultimately invest in biomanufacturing in the UK. These should be linked to the priority areas and outcomes for engineering biology that the Government should identify and support. Broader infrastructure issues, such as ready access to cheap electricity, are holding the manufacturing sector back and should be addressed by the industrial strategy. (Paragraph 212)

81. **Government response:** We agree with the value of a detailed understanding and plan for the EB supply and value chain. The government is analysing the EB value chain with a view to this informing cross-government EB policy.
82. The Industrial Strategy White Paper identified planning and infrastructure as important for addressing place-specific constraints to growth in city regions and sectoral clusters. The Industrial Strategy infrastructure and energy horizontal aims to address barriers that prevent growth of businesses such as energy prices, grid connections, infrastructure, and planning. The Digital and Technologies sector plan will consider how we can take a cross-Government approach to overcome these barriers and unlock growth of technology businesses.

***Recommendation:** The Government should introduce incentives which encourage manufacturing companies, for example in the chemicals and fossil fuel industries, to fund research, development and production in biomanufacturing and engineering biology. For example: carbon taxes or other taxes on pollutants or raw material waste and mandates for processes that currently use fossil-fuel feedstocks, but where a viable alternative could be scaled-up. (Paragraph 219)*

The Government should initially mandate that a certain small percentage of the production was done using bio-based processes, with a view to increasing this percentage over time. (Paragraph 220)

83. **Government response:** The government will explore this recommendation in more detail. “Defossilising” feedstocks through the use of sustainable biomass, chemical recycling or captured carbon, is a particular challenge and priority for Government to help unlock for emission savings. Currently 90% of chemicals globally use fossil feedstocks. The Government will use a variety of levers to tackle this challenge, which is a part of the Government Missions and Plan for Change.
84. There has been substantial investment to support innovation in the chemicals sector, including the UKRI supported £30m National Interdisciplinary Circular Economy Research Programme and the £66m Transforming Foundation Industries innovation challenge fund. In November 2024, a Circular Economy Taskforce of experts has been convened from across government, industry, academia and relevant non-governmental organisations to help us develop a Circular Economy Strategy for England.
85. “Defossilisation” policies are already underway. HMT have confirmed that a mass balance approach will be applied to plastic packaging tax discounts. This will encourage plastic manufacturers to increase the amount of recycled plastics in their products, particularly those through the chemical recycling route, which is a nascent industry that the UK has an early lead in developing. Scaling chemical recycling, including through EB, will create a vital source of more sustainable carbon to help the chemical industry to “defossilise”.

Feedstocks and supply chain implications

Recommendation: Any engineering biology strategy for the UK must consider carefully which feedstocks are available domestically and which might have to be imported, as well as the supply chain implications. DSIT should categorise, map and quantify relevant feedstocks, in particular for waste resources, and make this information publicly available. This could be used by industry and should inform the technologies that are prioritised and supported through interventions such as public procurement. (Paragraph 234)

86. Government response: We agree that we need to consider the feedstock supply chain, and this will form part of wider DSIT work assessing the EB value chain.

87. The Biomass Strategy recognises that sustainable biomass is a limited resource and future availability to the UK is uncertain, and its use should be prioritised where it offers the greatest environmental, economic, and social benefit. We will continue to monitor the levels of biomass supply to ensure the UK can secure the levels of biomass supply needed in the future. The Bioenergy Resource Model was used to support the Biomass Strategy and provides illustrative scenarios of future sustainable biomass supply to the UK. The Strategy sets out a series of guiding principles covering net zero, air quality, sustainability and circular economy to support the priority use assessment for biomass, recognising it is a limited resource that will require targeted uses to achieve the best outcomes.

Recommendation: The UK needs a coherent strategy for waste valorisation, with clear financial incentives in place for companies that can find ways to turn waste back into useful products. Projects that have multiple benefits—for example, converting captured carbon dioxide and domestically-produced hydrogen into sustainable aviation fuels, which supports three industries and makes use of waste—should be prioritised. (Paragraph 235)

88. Government response: In principle, the Government agrees with this recommendation however is unable to commit to prioritising any one sector or industry prior to concluding the development of the Circular Economy Strategy for England.

89. The government is committed to transitioning to a circular economy, a future where we keep our resources in use for longer, waste is reduced, we accelerate the path to net zero, we see investment in critical infrastructure and green jobs, our economy prospers, and nature thrives. Maximising the value of resources and supporting economic growth will be central to the Circular Economy Strategy. As we develop the strategy, we will consider the evidence for action across the economy and outline a series of roadmaps detailing the interventions that the government and others will make on a sector-by-sector basis.

90. The best environmental outcome for waste that cannot be either prevented or prepared for re-use is for its value to be maximised by that material being recycled. There is nothing preventing companies, innovators, or others in seeking

to maximise the value of resources. There are already a range of waste treatment and management options - both established and emerging - that will be selected according to market conditions and local needs, taking account of the waste hierarchy and the need to ensure the best available environmental outcome for the waste. The existing regulatory framework provides a level playing field, which allows companies and innovators to promote the benefits of their technologies and outputs where appropriate, including where these are emerging, but not yet proven at scale.

Chapter 6: Operational challenges for engineering biology

Public Acceptability

Recommendation: The Government should support a public engagement programme for engineering biology, focusing on consumer-facing products that have the potential to be available in the medium term. As part of their remit, regulators in these areas should explain the new technologies they are regulating and why, and they should be fully resourced to do this engagement work. UKRI should continue to fund research into public attitudes and dialogues around the ethical implications of engineering biology technologies as they come to market. (Paragraph 244)

91. **Government response:** We support and agree with the Committee's view that the Government should engage the public on EB. DSIT is committed to fostering responsible and trustworthy intervention in EB. An EB ecosystem and culture of responsible innovation will help to earn the trust of the public and consumers as we address the social and ethical questions that may be raised by certain applications.
92. We recognise that to achieve this we must encourage a conversation that engages with peoples' concerns about the technology and be transparent and clear about the processes to show how applications are regulated as safe and that public concerns have been taken into account in developing that regulation.
93. In August 2024, DSIT surveyed 3,000 UK adults (<https://www.gov.uk/government/publications/engineering-biology-public-trust-survey-findings>), aged between 18-65+ to gain insight into their understanding and their perceptions of EB. The survey assessed public perceptions of EB across five application areas: health, agriculture and food, low carbon fuels, chemicals and materials and waste and environment. The survey results show that there is limited public awareness of EB, but that people are likely to be optimistic about using EB to solve societal challenges. Across all five application areas surveyed, more than three quarters of respondents thought it would be useful to use EB.
94. UK Research and Innovation (UKRI) has been working actively to deepen its understanding of public perceptions of EB. Building on the 2010 BBSRC and EPSRC Synthetic Biology Dialogue UKRI partnered with Sciencewise and the British Science Association in 2023 to produce two reports covering applications in Health and Food. The 2022 Dialogue on Genome Editing of Farmed Animals which includes attitudes towards the use of biotechnology.
95. Using the insights from these reports and surveys, HMG and UKRI will continue to explore the ideas raised and consider specifically how to structure public engagement for specific technologies that are being regulated, so that we build public awareness of the potential of EB. Of relevance to this will be an upcoming short scoping review, commissioned by the Economic and Social Research Council, on how social science can benefit the development and adoption of EB technologies for societal and economic benefit.

96. Regulations and standards are key to creating an environment in which EB can safely reach its full potential and consequently provide assurance to the public about the safety and quality of products. HMG continues to work closely with UK regulators both through the EB Regulators Network and the Regulatory Innovation Office to help regulators bring EB products to market safely and more quickly.

Biosecurity and risk management

Recommendation: The new Government should explicitly commit to the key measures in the UK Biological Security Strategy around biosurveillance and population-level testing, empowering public health authorities such as UK Health Security Agency to learn and implement the lessons from the pandemic. The Government should publish an update on the implementation of the Biological Security Strategy by its second anniversary in June 2025 and set out actions that have been taken towards each of the outcomes. (Paragraph 254)

97. Government response: This government has adopted the 2023 UK Biological Security Strategy (BSS) to reaffirm the UK's commitment to improving our preparedness for future pandemics and infectious disease outbreaks, countering proliferation of biological weapons and mitigating the risks of biological accidents and incidents. We are prioritising a holistic approach to developing national capabilities to shore up our defences and learning and applying lessons from COVID-19.
98. Implementation of the strategy is led by the Cabinet Office, with individual actions taken forward by relevant departments. After adopting the strategy and agreeing to be Lead Minister for the BSS, the Chancellor of the Duchy of Lancaster committed to making an annual report to Parliament on progress; he updated the House on 24 October 2024. Over the past eighteen months, the Strategy has delivered impact across its short-, medium- and longer-term commitments, including enhancing the UK's early warning capabilities through a prototype Biothreats Radar and pilots for a new National Biosurveillance Network.

Recommendation: Key measures in the UK Biological Security Strategy, such as creating a robust system for biosurveillance and population-level testing to identify any new concerning pathogens, must be implemented without delay. The UK should have testing, vaccine and therapeutics infrastructure capable of being scaled up if a new pathogen emerges. Public health authorities such as UKHSA must be sufficiently resourced to undertake their responsibilities under the Biological Security Strategy, including more comprehensive biosurveillance and population testing measures. (Paragraph 258)

99. Government response: We agree on the importance of the measures under the BSS. The vision of the BSS is that the UK is resilient to a spectrum of biological risks and a world leader in responsible innovation, making a positive impact on global security, economic and health outcomes. The Strategy commits Government to bolster our capabilities to:

- a. Create a national biosurveillance network engendering a One Health approach
 - b. Achieve enhanced capability to rapidly roll out diagnostics for population use in response to new or existing biological threats
100. We are committed to building on our strong foundation in life sciences and the UK's vaccine development and manufacturing capability. The Life Sciences Innovative Manufacturing Fund, a capital grants fund of up to £520m over five years (2025-30), will invest in the UK's life sciences manufacturing capability.
101. In addition, under the Moderna-UK Strategic Partnership (MSP), Moderna is investing over £1 billion in R&D in the UK and building an mRNA manufacturing facility and clinical laboratories in Harwell, Oxfordshire – the Moderna Innovation and Technology Centre (MITC). The MITC will be able to manufacture a range of respiratory mRNA vaccines. As the characteristics of a future pandemic pathogen cannot be anticipated, our established countermeasures programme covers a range of capabilities, recognising the benefits of being able to access a range of vaccine platform technologies.
102. In partnership with Oxford Nanopore Technologies (ONT), NHS England and the UK Health Security Agency, the UK is creating the world's first real-time surveillance system to monitor the threat of future pandemics. Utilising ONT's long read sequencing technology, which analyses genes and pathogens to diagnose a range of illnesses including infectious diseases, the UK will create an early warning system for future pandemics and potential biological threats, both preventing disease and protecting the public.
103. The technology will be used in the expansion of NHS England's Respiratory Metagenomics programme, being led by Guy's and St Thomas' NHS Foundation Trust, from 10 up to 30 sites. This programme utilises rapid genetic testing to match patients with severe respiratory infections to the right treatments within 6 hours. This novel and world-leading application will allow potential outbreaks of bacterial or viral diseases to be monitored alongside antimicrobial resistance across the country.

Recommendation: The UK must engage with, and where appropriate lead, global efforts to ensure that any risks from engineering biology are well-regulated internationally. (Paragraph 260)

102. Government response: We recognise the importance of engaging internationally to ensure UK resilience and agree with the view of the committee. Biological threats do not respect borders, international law nor politics and could have devastating impacts on the health, security and economy of the UK. The 2023 BSS commits the government to international engagement and leadership to improve global health security and future pandemic prevention, preparedness and response, shape international

biosafety and biosecurity norms, standards, practices and strengthen non-proliferation instruments and mechanisms.

103. The UK is working with partners both bilaterally and multilaterally to shape international norms and standards. We are active members of the G7, G20, OECD, NATO and Council of Europe, among other groupings, and signatories to UN conventions such as the Biological and Toxin Weapons Convention and the Convention for Biological Diversity. In January 2024 we convened a new US-UK Strategic Dialogue on Biological Security, marking a significant new bilateral partnership with our closest ally, and reflecting our shared ambition and approach to protect against a growing and diverse spectrum of biological threats.

Recommendation: The UK should work with international partners towards standardising the screening of sequences of concern, with a view to making DNA synthesis screening a mandatory requirement for anyone synthesising or ordering synthesised DNA in the UK. It should pursue export controls and international treaties to ensure that this takes place on a global basis. (Paragraph 269)

104. Government response: Where appropriate, we welcome the chance to collaborate bilaterally and multilaterally with our partners to promote best practice in DNA synthesis screening practice.
105. In October 2024, the UK was one of the first countries to publish guidance to promote the screening of synthetic nucleic acid consumers and sequences. Promoting screening helps to deliver on the UK's commitment to fostering responsible innovation in EB technologies – it guides the use of synthetic nucleic acid for legitimate purposes. We are working with our international partners to showcase UK best practice in screening and encourage uptake of similar screening practices and principles to foster innovation whilst mitigating risks.
106. The government will consider putting the guidance on a statutory footing in the future if we deem it necessary and appropriate. A statutory requirement to screen would go further in addressing biosecurity risk, but moving too quickly risks damaging the UK's biotechnology sector and the economic and societal benefits that it brings. Voluntary guidance will allow us to test whether the guardrails are proportionate and make amendments before considering moving it to a statutory requirement.
107. The government takes its export control responsibilities very seriously and we operate one of the most robust and transparent export control regimes in the world. The Export Control Joint Unit (ECJU) administers the UK's system of export controls and licensing for military and dual-use items. The ECJU are responsible for implementing the UK Strategic Export Control Lists, which sets out what types of goods are controlled. Types of controlled goods include items specifically designed or modified for military use and their components, dual-

use items that can be used for civil or military purposes, and associated technology and software.

108. We also work with our partners through the Australia Group - a co-operative and voluntary group of 42 member states and the EU – to harmonise export controls and ensure that we do not contribute to the development or acquisition of chemical and biological weapons. These controls include nucleic acid assemblers and synthesizers that meet certain conditions.

***Recommendation:** The Health and Safety Executive needs to demonstrate that it has sufficient expertise and powers to monitor and prevent accidental release from the most secure facilities. It should be transparent about lab accidents that do occur so that lessons can be learned. (Paragraph 272)*

109. **Government response:** The government accepts the recommendation, but the Health and Safety Executive (HSE)'s Major Hazards Regulatory Model makes it clear that responsibility for managing risks rests with the duty-holder. HSE currently has enough resource, expertise and sufficient powers to regulate this area proportionately. As the EB sector continues to develop, HSE will monitor expanding demands and identify new risk areas. Based on the information gathered, HSE can consider whether changes are required to our regulatory role or our capacity in this area.
110. For EB technologies, many activities involving GMOs are likely to be regulated under the Genetically Modified Organisms Regulations (Contained Use), 2014, which are enforced by HSE. HSE has powers to impose conditions on contained use activities, both at the notification stage before the work starts and when the work is in progress. Where required, HSE can revoke consents and impose a requirement to suspend or terminate work in contained use. HSE recruits technical specialists directly from relevant work sectors to ensure that it has the necessary expertise, skills and subject knowledge to be able to assess and regulate GMO and EB activities effectively and proportionately.
111. There is a requirement for the duty-holder to inform HSE of accidents that occur under contained use. HSE then collect relevant information to conduct an analysis of the accident and where appropriate make recommendations to limit the effects and prevent a recurrence of the accident.
112. Where there is a risk to human health, the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR), made under the Health and Safety at Work etc Act 1974, require the duty holder to report accidents or incidents involving biological agents to HSE. HSE analyse the causes from the reports to decide on an appropriate regulatory response, proportionate to the level of risk.

***Recommendation:** Regulators such as Natural England should be part of the regulatory framework for engineered plants and animals. This should include impact assessments*

on any possible risks to biodiversity from releasing engineered organisms into ecosystems or using them in agriculture. (Paragraph 276)

113. Government response: No genetically modified (GM) crops have been cultivated for commercial purposes in the UK, though GM crops have been cultivated in several countries around the world over the last two decades. The environmental impact of GM crop cultivation has been studied extensively, and the results suggest that the use of this technology is no more harmful to the environment than traditional breeding.
114. When the terms “engineered plants and animals” and “releasing engineered organisms” are in reference to Genetically Modified Organisms then the legislation requires Defra to consult Natural England on applications to grow GM crops in England. All GM crops must undergo an environmental risk assessment before they can be grown in research and development trials or before they can be cultivated for commercial purposes. This includes an assessment of whether the GM crop could harm populations of wild plants or other species in the environment. Applications to cultivate GM crops must also contain a post-market environmental monitoring plan, which is assessed before any authorisation can be given.
115. When either term concerns Precision Bred Organisms, then the scientific advice is that these represent no greater risk or likelihood of impact to the environment than their traditionally bred equivalents, and therefore individual organisms do not require an environmental impact assessment.