

BIA consultation submission: Labour Economy, Business and Trade Commission

June 2019



Summary of this submission

- The UK has a thriving life sciences sector, which provides jobs and contributes to the economy, and delivers health and social benefits, such as new medicines for patients and technologies to support clean growth
- Labour’s 2017 manifesto set out a vision of “an innovation nation” with 3% of GDP spent on research by 2030 and for the UK to have the highest proportion of high skilled jobs in the developed world. These are very welcome ambitions, shared by our industry, and we are keen to be a partner with the next Labour government to achieve them
- Labour’s focus on investing in skills is welcome. Individuals will need knowledge and skills in the traditional sciences, social science and data sciences, as R&D and new treatments and technologies span these disciplines. Industry is already working to increase entrepreneurial and manufacturing skills, and Labour can support this activity
- The BIA has developed five principles for public funding streams to support a strong partnership between state and industry and leverage private investment most efficiently to achieve Labour’s target to raise overall R&D investment.
- Government has an important role in creating the right conditions for business investment. For life sciences SMEs, R&D tax credits and the Patent Box are proven catalysts for investment and job creation
- Frictionless and tariff-free trade is essential to ensure that patients in the NHS and around the world can have access to medicines
- The BIA sees this submission as the beginning of the conversation and would welcome more in-depth discussions with members of the commission

Overview of the UK’s life sciences sector

The UK life sciences sector shares the ambition of the Labour Party to see more investment, more research, and more high-skilled jobs in the British economy. The sector consistently invests more in R&D than any other, supports almost half a million jobs – two-thirds of which are outside London and the South East – and consists of almost 5,900 companies, 80% of which are SMEs. Private investment in the UK’s life sciences start-ups and scale-ups doubled between 2017 and 2018, signalling a bright and innovative future.

The sector is not only a strong contributor to the UK economy but also improves the health of the nation and enables clean growth. From improving patient lives through new treatments and early diagnosis, to the development of environmentally sustainable technologies, such as biodegradable bioplastics and the cleaning of polluted waters, our deep understanding of biology is helping the UK address humankind’s greatest challenges, both at home and around the world. We have provided case studies in appendix one to illustrate the value being created by UK life science companies.

These benefits are the result of a continuous and supportive industrial strategy delivered by successive governments. The next Labour Government will have the opportunity to continue this success and work

with life sciences businesses to generate further jobs, deliver new medicines and promote environmentally sustainable long-term economic growth.

How can life sciences improve health?



Earlier identification of disease risk and diagnosis, through genetic screening



Disease prevention through more effective and better targeted vaccines



Faster drug development and more accurate drug delivery



New treatments for previously untreatable conditions

How can life sciences improve the world we live in?



Lower environmental pollution with bio-degradable plastics and plastic-digesting bacteria



Reduced reliance on fossil fuels through biologically-produced chemicals and fuels



More efficient food production with engineered crops and improved fertilisers



Novel high-performance materials for fashion, sports and construction industries

How the life sciences sector can help deliver Labour's innovation nation

Labour's 2017 manifesto set out a vision of "an innovation nation" with 3% of GDP spent on research by 2030 and for the UK to have the highest proportion of high skilled jobs in the developed world. These are very welcome ambitions and shared by our industry. Currently, two-thirds of the UK's R&D investment comes from the private sector, totalling about £20bn per annum. To achieve Labour's 3% target, industry investment must rise; this will require partnership between state and industry to create the right conditions.

Almost half a million people are employed in our mainly high-skill, higher-wage sector, with jobs ranging from high-tech manufacturing technicians, to scientists and doctors. Analysis suggests that workforce productivity in our sector is twice that of the UK average and the sector also invests more in R&D than any other part of the economy – over £4 billion a year – driving further innovation and job creation. The life sciences sector is therefore well positioned to help deliver Labour's vision. The rest of this submission explores how we can work together to achieve it.

Investing in jobs and skills

Like many high-tech industries, the life sciences sector faces skills shortages as too few students study STEM subjects. These shortages risk R&D moving overseas. Labour's focus on investing in skills is welcome and will need an urgent focus on the skills the life sciences sector needs – not just to ensure these high skills, high-wage jobs stay in the UK, but to ensure the best possible care for patients in the NHS. A multi-

disciplinary workforce is needed for the UK to remain at the leading edge of scientific and medical progress. Individuals will need knowledge and skills in the traditional sciences, social science and data sciences, as R&D and new treatments and technologies span these disciplines.

The UK also needs people who will translate public investment in R&D and skills into successful businesses paying tax and manufacturing new products in the UK. This is why the BIA is working with the largest publicly funded research institute in Europe, the Francis Crick Institute, to deliver training to young entrepreneurs and researchers to help them start and grow their own innovative businesses. In addition, in collaboration with the Cell and Gene Therapy Catapult, the BIA is helping to deliver an apprenticeships programme to ensure the UK has the capacity to manufacture the next generation of medicines. The programme is in its first year but, to date, 32 apprentices have already been enrolled in 11 companies and this will rise to upwards of 65-70 apprentices in 26 companies by September 2019. Labour's support to expand programmes like these is needed to ensure the life sciences sector continues to provide well-paying jobs across the country.

Achieving value for money from public R&D funding

The state is a partner in innovation with industry and both the state and the life sciences industry are long-term investors in R&D; for example, it takes over 10 years and over £1bn to get a medicine from discovery to patients. The majority of this investment is in large-scale clinical trials funded by the company. However, early-stage public R&D funding for universities and SMEs plays an important role in the first steps of innovation and it is essential that taxpayers get value for money. The BIA has therefore looked at what makes public funding of R&D successful and developed five principles, detailed below. Labour should adopt these to ensure that public funding streams support a strong partnership between state and industry and leverage private investment most efficiently to achieve Labour's target to raise overall R&D investment.

- 1. Balance responsive and challenge-led programmes** - to allow all types of innovation to thrive
- 2. Sector-specific** - to provide long-term consistency and assurance to researchers and investors
- 3. Grants, not loans** - to ensure it pays to start and grow innovative companies
- 4. Maintain a variety of funding streams** - to support the varied needs of life science SMEs
- 5. Unbureaucratic and informed by the needs of the sector** - to ensure SMEs are consulted, the right areas are funded, and the Industrial Strategy priorities are delivered

Creating the right environment for investment

Key to achieving Labour's vision of an innovation nation and growing the UK's life sciences sector, with the jobs and social benefits that brings, is ensuring that the UK has the right environment for business investment.

The R&D Tax Credit schemes are enormously valuable to life sciences SMEs. They provide a minimal-bureaucracy system that rewards and amplifies companies' own investment in R&D, stimulating further investment. R&D tax credits are particularly critical for young companies yet to generate revenue. Loss of this support would be extremely detrimental to the UK's SMEs, their R&D investment and the jobs that they provide. The Patent Box is another valuable fiscal driver of R&D investment and commercialisation. It incentivises companies to maintain their operations in the UK, ensuring public and private R&D investment translates into long-term jobs and tax revenues.

Delivering medicines to NHS and global patients through frictionless trade

Whilst efficient borders and frictionless trade is a key issue for industry sectors beyond the life sciences, it is especially vital for medicines, given that patients are at the end of complex supply-chains that span Europe.

The UK's medicines supply-chain is intertwined with Europe and has grown around a European supply and regulatory hub. Medicines manufactured in the UK require ingredients from different specialist overseas sources that cannot be easily duplicated. During its manufacturing process, a medicine may cross between several European countries for parts of the production process before it is a final medicine. Frictionless trade is therefore essential, especially for medicines with short shelf-lives.

Our submission to the Labour International Policy Commission provides more detail on our sector's trade needs.

This top-level submission is the start of a conversation with the Labour Policy Commission. We would welcome further discussions to provide more detail.

About the BIA

The BIA is the trade association for innovative life sciences in the UK. Our goal is to secure the UK's position as a global hub and as the best location for innovative research and commercialisation, enabling our world-leading research base to deliver healthcare solutions that can truly make a difference to people's lives.

Our members include:

- Start-ups, biotechnology and innovative life science companies
- Pharmaceutical and technological companies
- Universities, research centres, tech transfer offices, incubators and accelerators
- A wide range of life science service providers: investors; lawyers; IP consultants; and investor relations agencies

We promote an ecosystem that enables innovative life science companies to start and grow successfully and sustainably.

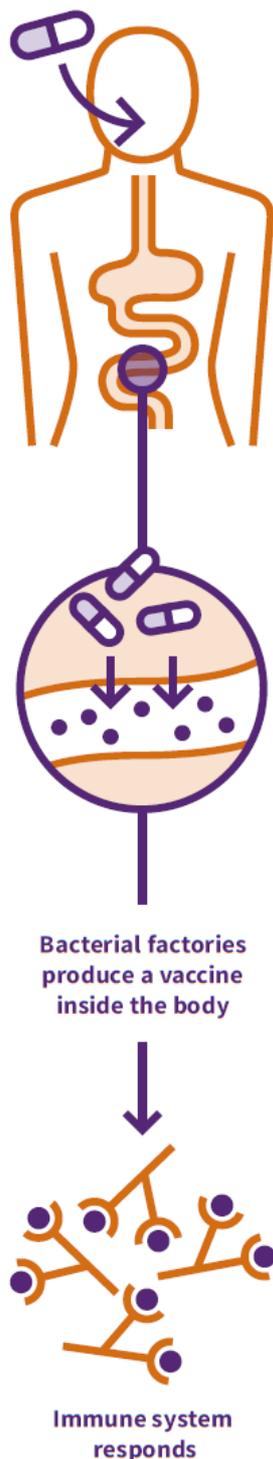
Prokarium

London

Innovation support:

Innovate UK

Sub-sector: Health



Prokarium is an engineering (synthetic) biology company that develops a new, more convenient way to produce and administer vaccines.

The company's oral vaccine delivery platform, Vaxonella®, uses a modified, harmless version of *Salmonella* bacteria to deliver vaccines via the lining of the gastrointestinal tract. This approach may generate medicines that are cheaper to make and easier to store and distribute than existing injectable vaccines. It may also expand the range of diseases that can be targeted.

Prokarium has received funding from Innovate UK in various stages of the company's growth, which have been instrumental to the development of the company. A government grant enabled the company to spin-out from Cobra Biologics, a contract manufacturing organisation. Prokarium subsequently secured private investment and Innovate UK grants, which allowed the company to fund collaborations with UK universities and other companies to develop vaccines for various infectious diseases.

A grant of £374,000 from the Newton Fund has helped fund the development and manufacture of a novel vaccine for enteric fever (typhoid and paratyphoid), which will enter a Phase 1 clinical trial later in 2019. Prokarium is also working on a £1 million Innovate UK-funded project to complete the pre-clinical evaluation of its plague vaccine.

The development of these technologies enabled Prokarium to conclude a \$10 million (~£8 million) fundraising round at the start of 2018. The data package generated from the Innovate UK-funded grants was critical in securing this investment.

A significant portion of Prokarium's grant funding has been spent at UK-based contract research organisations, contract manufacturing organisations, reagent suppliers and other service providers. In addition to the grants, Prokarium has received significant fiscal support in the form of R&D tax credits.

From grant funding of £3.2 million, Prokarium has raised a total of around £13 million from overseas angel and institutional investors – generating £4 for every £1 of public funding and accelerating the development of vaccines for unmet medical needs worldwide.

CHAIN
Biotechnology
 Nottingham

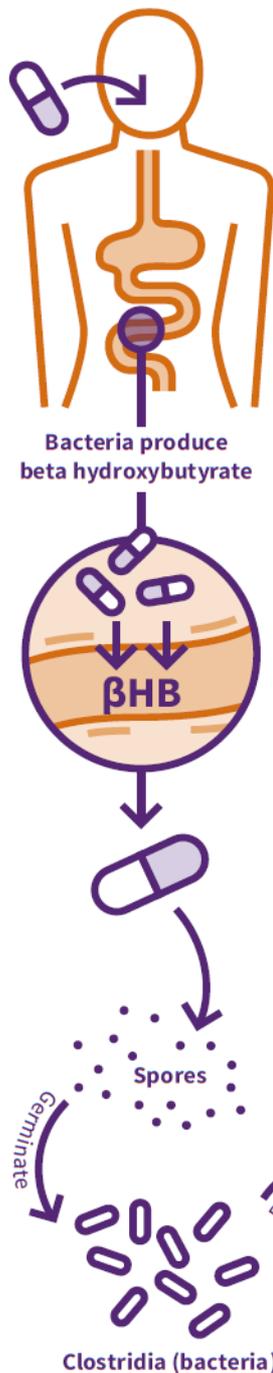
Innovation support:
 ISCF Wave 1
Sub-sector: Health

CHAIN Biotechnology is a privately-held microbiome therapeutics company based at Medicity in Nottingham.

CHAIN develops a disruptive technology for the production and delivery of therapeutic molecules to relevant targets in the human gut. Its lead product produces a potent anti-inflammatory targeting ulcerative colitis.

CHAIN uses harmless *Clostridia* bacteria as mini drug factories. *Clostridia* are one of the main groups of microbes naturally found in the gut where they break down dietary fibre and produce short-chain fatty acids that keep the lining of the colon healthy. CHAIN's *Clostridia* experts engineer the bacteria to additionally produce useful molecules that confer further therapeutic benefits.

The engineered strains form spores which are formulated for ingestion and survive the acidic stomach before germinating in the lower part of the intestine. There, they replicate and secrete the therapeutic bioactive. Unlike most biologics, spores do not require any cold storage and have a long shelf life.



“In addition to helping CHAIN and other UK microbiome companies to de-risk and accelerate their innovative products, the facility would also provide unique contract manufacturing services to the rapidly expanding global microbiome industry and support new highly skilled jobs in the UK. This has great export potential of a new class of medicines, helping to anchor R&D investment and build on the UK’s biomanufacturing capabilities.”

Dr Basil Omar, Co-founder & Director, CHAIN

Due to the novel nature of CHAIN’s technology, there is currently no biomanufacturing facility in the UK where CHAIN can develop its spore-based therapeutic products to meet regulatory requirements. In 2018, CHAIN was part of a project to explore the business case for building such a facility in collaboration

with two other UK companies. The project size was £100,000 and funded through the Medicines Manufacturing Challenge of Wave 1 of the ISCF.

The funding received through the ISCF facilitated new collaborations and helped to de-risk the project. CHAIN and its collaborators are in discussions with private investors and local government to secure funding for the spore manufacturing facility.

CustoMem

London

Innovation support:

Innovate UK +
Horizon 2020

Sub-sector:

Environment

CustoMem helps to protect global environmental and human health by engineering bio-based materials to capture target chemicals in wastewater. The company was spun-out from Imperial College London in 2015 and is today is headquartered at White City in London.



In 2017, CustoMem was awarded a £100,000 grant from Innovate UK. The award was key to develop and produce CustoMem's first product, a novel material that can selectively and efficiently remove dangerous chemicals from industrial wastewater. CustoMem Granular Media (CGM) is a bio-based material and can be customised to bind some of the most polluting, resistant artificial substances. It does so in a manner that allows both the material, and the pollutants it removes, to be recycled.

The Innovate UK grant also enabled CustoMem to initiate three customer trials to prove the performance of CGM. The success in these trials enabled the company to win a two-year €1.4 million Horizon 2020 award. The award is funding a project, started in April 2018 and currently underway, which will ensure that CGM is scaled and deployed for water treatment.

“Funding from Innovate UK and Horizon 2020 was vital to allow us to develop, produce and scale our product. The awards have also allowed us to grow our internationally diverse team of experts from four full-time employees in 2017, to eleven today, with seven more due to join in 2019.” Henrik Hagemann, Co-founder and Chief Executive Officer, CustoMem

CustoMem's technology has already attracted large industrial companies which are facing increasingly stringent waste-regulations. In Spring 2019, CustoMem completed a £2.5 million private funding round, further enabling the company to grow and scale its technology.

BioAscent

Glasgow

Innovation support:

Medicines Discovery
Catapult

Sub-sector: Health

BioAscent provides comprehensive integrated drug discovery services to companies, universities and research institutes.

The company's Compound Cloud contains approximately 120,000 compounds, which can be accessed on-demand. Typically, these compounds are tested against disease targets to identify the specific active compounds for optimisation. The active compound(s) then become the starting point for drug development.

To enhance the Compound Cloud further, the compounds could be analysed and grouped together into targeted subsets. As an SME with limited resources, BioAscent required external support to leverage scarce expertise. BioAscent partnered with Medicines Discovery Catapult (MDC) which helped to deliver the project.

MDC, based in Cheshire, is a national facility providing unique scientific capabilities and expertise, connecting the UK community to accelerate innovative drug discovery. The MDC team helped BioAscent to apply artificial intelligence (AI) across the entire Compound Cloud library to learn which features of a compound make it active towards different drug targets. The project added value to the Compound Cloud and enabled the creation of compound subsets – ultimately helping BioAscent's clients to conduct faster and more efficient drug discovery.

“It has been great to access the AI expertise at MDC for this collaboration. The MDC team have taken an innovative approach to characterising the compounds in Compound Cloud which we believe adds value to the collection. From our perspective the collaboration was easy to establish and worked extremely well, and we look forward to working with MDC on further AI initiatives in the future.” Phil Jones, Chief Scientific Officer, BioAscent

Green Biologics

Oxfordshire

Innovation support:

Innovate UK

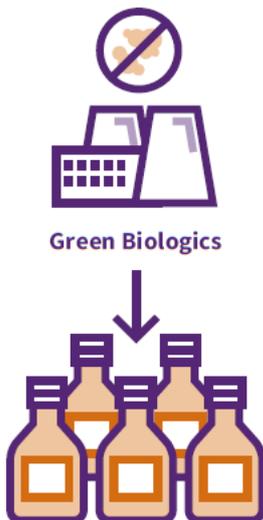
Sub-sector:

Environment

Green Biologics is an industrial biotechnology company that engineers biology to manufacture cleaner speciality chemicals, used to make a wide range of products, from pharmaceuticals and cosmetics to paints and plastics.

Green Biologics has re-commercialised the clostridial Acetone-Butanol-Ethanol (ABE) process, which allows the company to produce bio-based chemicals that avoids the high environmental cost of standard hydrocarbon-based manufacture.

Headquartered in Oxfordshire, Green Biologics benefits from the UK's strength in training scientists and the emphasis on interdisciplinary collaboration. Strong links with university groups, encouraged and supported by funding from the research councils, such as the BBSRC and the EPSRC, have resulted in a productive environment in which to carry out applied industrial research. The Networks in Industrial Biotechnology and Bioenergy, funded by the BBSRC, have been particularly beneficial in promoting collaborations between Green Biologics and academics from across the UK.



Innovate UK grant funding of just over £3 million since 2009 has been a key factor in supporting Green Biologics' long-term growth and securing over £100 million of investor funding.

Green Biologics benefits from R&D tax credits, which has allowed the company to focus on the development of their technology and retain talented staff. Green Biologics has also had the support of several Innovate UK grants, totalling a value of just over £3 million since 2009, which have been used to develop the company's sustainable solutions.