Agenda 2030: One Nation Labour's Plan for Science
Submission by the Science Council
July 2014

1 The Science Council

1.1 The Science Council is an umbrella organisation of learned societies and professional bodies, and currently has 41 member organisations drawn from across science and its applications: a list of current member bodies is attached. Collectively member bodies represent almost 500,000 individual members, including scientists, teachers and senior executives in industry, academia and the public sector. The Science Council awards the professional qualifications of Chartered Scientist (CSci), Registered Scientist (RSci) and Registered Science Technician (RSciTech).

1.2 In addition to providing a mechanism for the sector to work collectively, the Science Council develops and leads collaborative projects working with member bodies and the wider scientific community: examples include the Future Morph website[1] designed to provide young people with information about careers opportunities, and LMI analysis of the UK Science Workforce[2].

1.3 In preparing this submission we have consulted member bodies to identify areas of common interest and the issues they raised form the content of this submission. In addition a number of member bodies will be responding individually to the inquiry.

1.4 The Science Council is the leading UK voice on the skills and professionalism of scientists. Its strength comes from its ability to be multi and inter-disciplinary in its approach to identify the changing nature of science skills needs and challenges facing society.[3]

2 The UK needs a long-term vision for science that is aspirational, achievable, sustainable, and benefit everyone.

2.1 The Science Council welcomes the Labour Party's recognition that the UK needs a long-term vision for science. Science will enable us to understand the complex world we inhabit and address current and future challenges such as an ageing population, climate change and food security. The application of science is key to underpinning a strong and sustainable economy, creating jobs, raising standards of living and vital in preparing the nation for future challenges. It is therefore critical to the future success of the UK economy and society that governments continue to see science as a long-term investment priority.

2.2 The strength of the UK's research base, world-class facilities, and research and science skills make it an attractive and productive place to undertake scientific research. However, as competitors increase their investment in science and research the UK cannot afford to stand still it if is to continue to be seen as a global leader in many areas of science. Governments must work in tandem with the science community to develop a compelling long-term vision for UK science that acknowledges current capabilities and expected future needs. The vision must align policies across education, careers, skills development, regional and international activities, planning, and regulation. This will engender confidence with both domestic and international audiences that the UK has the infrastructure in place to meet future needs.

3 Proposals for principles for investment in science

A long-term vision for UK science should be underpinned by a strategy that outlines a coherent set of investment priorities. The Science Council considers decisions about investment in science should be guided by the following principles:

- **Long-term, stable and balanced strategy:** a long-term strategy for UK science must support high-quality multi-disciplinary basic and applied research, the development of a skilled workforce,

[1] www.futuremorph.org
[2] *The current and future UK science workforce* TBR, Sept. 2011 http://www.sciencecouncil.org/content/science-workforce
[3] http://www.sciencecouncil.org/sites/default/files/UK%20Digital%20Skills%20Taskforce_Science%20Council%20evidence%20submission.pdf

sustain our world-leading universities and research institutions, attract industries from all over the world and build a diverse and sustainable innovation ecosystem.

- **Spending decisions based on the long-term strategy:** investment decisions must be determined by robust cost-benefit analysis outlined in a comprehensive business plan, not determined by electoral timetables or political agendas.

- **Robust and transparent decision-making:** a robust mechanism for making funding decisions should be outlined within a long-term strategy. A long-term strategy must set out capital investment priorities *and* provide flexibility for investment in new technologies.

- **Science community-led decisions:** funding priorities and operational-level decisions must be aligned with an overall strategy and made primarily on the basis of scientific excellence and potential impact.

- **Resources to match capital investment:** funding of human and material resources to ensure efficient operation and maintenance of facilities and equipment should be matched to capital investment to ensure that resources are used efficiently and achieve the greatest impact.

- **Nurturing a highly skilled workforce**: a highly skilled workforce is essential to maximise investment. There needs to be an aligned, long-term and adequately resourced skills and training strategy to nurture the next generation of talent to match the long-term investment strategy.

4 Investment priorities should be informed by continuous dialogue between Government and the science community, including employers, researchers, funding bodies, and professional bodies and learned societies to ensure a balanced science and research portfolio.

4.1 Investment in the UK's national science and research capacity must reflect the considerable strategic need to address domestic and global challenges and must match the level of investment of our international competitors.

4.2 The UK must have a balanced portfolio of investment in science and research based on excellence, evidence of scientific outputs and societal impact. Investment should not be determined primarily by the size of the existing user community but should be influenced by a number of factors including the UK's global expertise, opportunity for rapid exploitation of emerging science, the increasing multi-disciplinarity of complex issues and the need for breadth across the UK science base, both scientifically and geographically.

4.3 A long-term strategy for UK science must be achieved through ongoing, transparent and wide ranging consultation and engagement with the science community and user groups and communities[4]. The strategy must be continually reviewed, evaluated and adjusted to meet new challenges arising from within the UK and internationally.

4.4 It is important that investment decisions are influenced by long-term strategic considerations. Short-term, ad-hoc decision-making can cause instability and uncertainty in many scientific programmes, and as a result long-term planning becomes more difficult. Stability will strengthen the development and sustainability of international collaborations and the UK's ability to attract leading international researchers. The Science Council also considers that long-term, stable investment in science and research promotes confidence within the science community at home and to potential overseas investors, establishing global leadership in selected areas.

4.5 There also needs to be a stable regulatory and legislative environment for innovation to flourish. Inward investors need confidence in risk and whether they will see a return on their long-term investment. Currently the UK is seen as a good place for inward investment because it has stable policy and regulatory environments compared to many international competitors[5]. However, Government decisions that may upset this equilibrium, such as significant changes to tax rules,

[4] Including but not exclusive to academia, industry, education providers, professional bodies, learned societies and patient groups
[5] http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf

leaving the European Union or adverse immigration policies for example, are likely to have significant consequences for the UK's ability to attract future inward investment. Getting the right balance between too much and too little regulation and legislation can be problematic. **It is important therefore that Government consults regularly and widely to ensure that regulatory and legislative proposals are proportionate and objective.**

4.6 Sir John Armitt's recent review of infrastructure planning[6] cited successive Governments' lack of long-term strategic planning around infrastructure projects, and proposed a National Infrastructure Commission to identify long-term infrastructure needs. The Science Council recommends a similar model for science capital infrastructure through the establishment of a cross-government National Science Capital Investment advisory group to provide leadership, guidance and direction for a science capital investment strategy. The advisory group should be comprised of representatives from the Research Councils, higher education, government, professional bodies, employers and other user communities at the national, regional and local level.

5 Investment in UK science must be balanced, stable and strategic across all areas of science and research. Investment must also include sufficient long-term resources for operational and maintenance purposes to maximise the use of assets.

5.1 Excellent scientific research can take many years to deliver commercial and societal impact. To give stability to UK science and in order for the UK to reap the benefits of investment in its science base, a long-term investment strategy must be planned to last a minimum of 10 years, which includes sufficient resources for maintenance and replacement of scientific capital facilities. The Science Council welcomes the Labour Party's recognition that long-term investment must be over a similar period.

5.2 Without a long-term investment plan, Government-funded projects are more vulnerable to unforeseen global events, which threaten the capacity to complete projects in development, continue to maintain existing projects or provide flexibility to rapidly exploit new scientific discoveries. Future demand is also an important consideration in investment policy. A long-term strategy must commit adequate resources to horizon-scanning programmes that can identify short and long-term strategic needs.

5.3 Adequate funding for large and small-scale capital infrastructure projects, along with matched maintenance and replacement costs is vital for long-term support for skills, training, jobs and excellence across all science activities. These requirements and the associated costs should be provided in a comprehensive business plan for each proposed capital project. A comprehensive per-project business plan would provide safeguards against underestimated project costs, provide assurances to the public about value for money and provide assurances to the science community that adequate long-term investment was in place for each project[7].

5.4 Arms-length public bodies such as the Research Councils higher education institutions and the Technology Strategy Board are best placed to determine funding decisions at the operational level on the basis of scientific excellence and potential impact. **The Science Council would welcome a commitment by the Labour Party to uphold the Haldane Principle.**

5.5 Higher education institutions play a key role in forging links with other stakeholders and adding value to public investment in scientific infrastructure through leveraging further investment from private investors, which could help build strong science and innovation ecosystems at the local level. The Technology Strategy Board and Research Councils typically act as brokers between public and private sector interests at the national level but could also play a key role at the local level.

6 A highly skilled workforce is essential for maximising investment in science. Long-term education, skills and training strategies must be aligned with strategies for schools, further education and higher education.

6.1 To maximise the benefits of investment in science there must be skills and training frameworks to

[6] http://www.yourbritain.org.uk/uploads/editor/files/The_Armitt_Review_Final_Report.pdf
[7] http://www.iea.org.uk/sites/default/files/publications/files/upldbook419pdf.pdf

develop and maintain cutting edge technical skills and knowledge.

6.2 Investment in the skills pipeline will also increase the attractiveness of the UK to domestic and overseas businesses to invest both R&D and commercial translation activities in the UK. Encouraging and facilitating the world's brightest and best scientists, researchers and students to come to the UK is a vital component of developing a highly-skilled workforce, and underpin its global reach and reputation for excellent science.

6.3 Joined-up policies and investment across Government will maximise the potential benefit to society from the opportunities provided by investment in the science base. For example, consultation and alignment with policy development in education, skills and training, workforce development and regional investment should be informed by science investment decisions. Such an approach would achieve greater coherence, collaboration and productivity.

6.4 The Science Council welcomes the recommendation by Lord Adonis's Growth Review that funding for apprenticeships should only be provided to employers for schemes accredited by professional bodies. Apprenticeships should provide skills and knowledge that are valuable across employment sectors and occupations and meet the broader requirements of the sector. Linking apprenticeships to professional registration[8] can demonstrate this transferability as professional standards are designed to apply across the profession and across employment sectors.

6.5 Much of the focus of STEM workforce investment is in the graduate workforce and there seems to have been little recognition in policy that not every science based job is a graduate job**. It is important to focus effort on increasing the non-graduate technical and science workforce** and establishing greater numbers of Higher and Advanced Apprenticeships in science occupations should be an essential element of the Government's programme. However, the UK is failing to address this issue and has made little progress, in spite of the considerable investment in apprenticeship programmes. The National Apprenticeship Service has admitted that there is an almost complete absence of science apprenticeships.[1]

6.6 There are a variety of reasons why apprenticeships in science are not as well established as they are for engineering. There is relatively little tradition for apprenticeships in science, particularly non-graduate apprenticeships: where programmes exist they tend to be sponsored graduate pathways rather than for technician roles. In addition, science based employers are typically SMEs where the numbers of technicians employed overall is small, and certainly a minority of skilled staff. There is no single 'science' sector of the economy and science is used in all sectors of the economy. Geographical areas may have specific specialism and needs that may not seem significant in national workforce data, for example in forestry or agriculture. These characteristics do not fit well with the skills bodies which tend to be broadly sector based and have developed relationships with large high-profile employers or a small number of sub-sectoral SMEs with similar needs. The NAS and UKCES have depended upon the response-mode Employer Ownership Pilot funding mechanisms to support the development of apprenticeship schemes but appear to have no mechanism for stepping in where no employer-led proposals have been forthcoming. While the Science Industry Partnership in the life sciences is a most welcome initiative, it is worth noting that their ambition over the programme is to create just 1040 level 2/3 apprenticeships and 350 Higher Apprenticeships, and it is likely that a significant proportion of these apprenticeships will be in engineering and manufacturing as this is the current priority need identified for the sector.[9] Data available from the FE sector suggests about 200 intermediate and advanced level science apprenticeship starts in England.[10]

6.7 Alongside this is a need to increase the numbers and status of science technicians and to inspire young people to aim for this route to science careers. The Science Council is investing significantly in this area of work and believes that professional registration will be important in

[8] http://www.professionalregisters.org/

[1] National Apprenticeship Service (2012), Written Evidence Submitted to the House of Lords Science and Technology Committee

[9] http://www.scienceindustrypartnership.com/media/374297/the_science_industry_partnership_-_summary_of_full_bid.pdf

[10] https://www.gov.uk/government/statistical-data-sets/fe-data-library-apprenticeships--2

raising status and aspiration. Numbers of completed science apprenticeships and numbers of registered professional science technicians could also be a useful measure of how well the UK and individual regions are responding to the need for a wider suite of science and technical qualifications and skills.

6.8 The Science Council recommends that an independent National Science Skills advisory group is established to provide advice, leadership and guidance to the Secretary of State on a national science education and skills strategy. The group could provide expert advice to the Secretary of State on the short and long-term science skills needs of the economy, undertake horizon-scanning projects, and make recommendations to Government. The group would have wide-ranging representation across professional bodies, trade unions and associations, academia, charities, employers, qualification agencies, education providers and reciprocal membership with the National Science Capital Investment advisory group. The group would help ensure that science education and skills policy was aligned to an overarching, long-term science strategy.

7 Supporting and providing growth opportunities for all sectors and regions of the UK

7.1 Science and innovation are the drivers of growth and job creation at the local and regional level. Government has the capacity to unlock this potential even more.

7.2 Excellent scientific research and innovation occurs within many different settings. Higher education institutions play an important role in growing regional economies through joint research and development projects, developing high level skills, particularly in STEM sectors[11], and leveraging private investment. Science parks, innovation-driven businesses, and small and medium-sized enterprises (SMEs) at the local and regional level as well as the national level also act as incubators for the development of excellent science and scientists. A national science strategy therefore needs to connect, support and encourage innovation across the whole innovation ecosystem.

7.3 There must be awareness that national and local investment priorities can inhibit other local and regional opportunities. For example, some regions of the UK have responsive local governments, ready access to a highly skilled and educated workforce, good transport links and broadband connection, and an economy with an established infrastructure of schools, centres of culture, and leisure facilities which attracts significant inward investment. Other regions have fewer resources of this kind and science and innovation communities in these areas can be inhibited from participation. A number of coastal and seaside towns do not have the capacity to nurture and sustain their own science and innovation ecosystem because of poor transport links, low performing schools and colleges, and the lack of local university or large research or innovation-driven employers.

7.4 Local Enterprise Partnerships have the potential to play a key role in developing visionary and appropriate science, innovation and skills strategies at the regional and local level. These will need to be in partnership with local employers, schools, colleges, and where possible regional universities and employers. A national level strategy must focus on innovation, skills, support for businesses, and address local and regional infrastructure and skills needs[12]. Without ensuring opportunities at the local and regional as well as the national and international level, there is a significant risk that a two-tier innovation, education, training and skills environment will develop.

7.5 To encourage innovation and promote regional growth, Government-backed Regional Investment Banks could help leverage private investment and provide support to SMEs, high-tech companies and start-ups across the country. Not all investment will generate returns, so to provide the public with best value for money investment should be based on sound risk analysis, but there may also be a case for a small pot of money per region to support riskier business ventures where the return on investment is unknown, for example Graphene, but could deliver tremendous economic and social yields. It must be remembered that it can take many years for research and innovation to produce commercial results. This must be reflected in the duration a Bank is willing to invest in a project.

[11] http://www.russellgroup.ac.uk/uploads/Economic-impact-of-the-Russell-Group_1.pdf
[12] http://www.policy-network.net/publications/4695/Mending-the-Fractured-Economy

8 Strengthening the use of scientific advice in policy-making across the UK

8.1 Scientific advisors within central government, devolved administrations and arms-length bodies play an important role in ensuring that policy decisions are informed by evidence. There should be a continued commitment to strengthen and invest in the role of departmental Chief Scientific Advisor (CSA) and a commitment to strengthen scientific advice at all levels within government departments. It is regrettable that the position of CSA in the Department for Culture, Media and Sport has not been filled since 2010[13].

8.2 It is equally important that policy decisions at the local and regional level are informed by the best available evidence. However there will be differences in the quality of advice available across the country depending on the characteristics of the region and the networks created between regions. Science and research networks across the South East for example are well established, and provide communities within a wealth of opportunity to exchange knowledge and ideas. Other regions will have less established networks that will need cultivating and nurturing. An example of where a science and research network has been developed is in Southampton where its Council has partnered with Southampton University to appoint its own CSA[14]. It is thought to be the only position of its type in the UK.

8.3 Although the partnership is in its infancy we hope that this will provide a successful example for other local and regional governments to adopt in the future. At the local and regional level CSAs could play an important role in helping to drive forward growth strategies by providing expert advice to local government on education, skills, and science and technology-related policy; improve the quality and use of scientific evidence and advice; and help to develop a culture of the use of scientific advice within local government.

8.4 Local and regional CSAs would need to work closely with other stakeholders including LEPs, higher and further education institutions, business and trade associations, and professional bodies to identify skills needs, and develop and take forward subsequent skills strategies. Creating a UK-wide network of CSAs will strengthen the role of science in decision-making at the local government level, leading to greater consistency and transparency in decision making, which leads to better policy advice.

8.5 Handing down greater control of policy decisions to the local level also means that the use of scientific advice can be personalised to the specific needs of individual towns, cities and regions. For example, coastal towns may wish to dedicate more resources to ensuring clean coastlines, whereas towns and cities with higher than average mortality rates may wish to channel resources into more health-related services.

8.6 Government should lead by example and reaffirm its commitment to evidence based policy development. It should seek similar commitments from national, regional and local government and agencies. Where capacity does not currently exist Government should facilitate and support bottom-up networks.

9 Engaging with the public to achieve a vision for UK science

9.1 A vision for UK science must also include a strategy to achieve a society that is excited by science; values its importance to our social and economic wellbeing; feels confident in its use; and supports a representative well-qualified scientific workforce.

9.2 Science and its applications have the ability to provide advances of great benefit and importance to society, and often these benefits will be unforeseen. However the acceptance and adoption of new technologies and innovations is unlikely to be widespread if wider society does not value science and is distrustful of its benefits and of scientists.

9.3 The Science Council recognises the link between understanding the nature of science and how it is conducted to underpinning public trust and confidence in science. It would not be right to promote blind faith in science or an unquestioning acceptance of its authority. It is important therefore for the public to have a healthy scepticism of science, which is born out of deeper level of scientific understanding and knowledge.

[13] http://www.publications.parliament.uk/pa/ld201012/ldselect/ldsctech/291/291.pdf
[14] http://www.southampton.ac.uk/mediacentre/news/2012/aug/12_139.shtml

9.4 Greater understanding and knowledge enables the public to become informed customers of technology, particularly new technology. A population that welcomes new technologies and innovative solutions will be an attractive destination for investment.[15] Access to new technologies can also help empower people, enabling them to participate in society, in political debate and, as more and more aspects of our lives move to online and digital platforms, and participate in everyday life.[16]

9.5 It is important to make science interesting and relevant for the public, but not everyone will be interested in the same topics at the same level. Government and the science community must be sensitive to the complexity of different audience profiles, their interests, priorities and needs. Some audiences will be difficult to reach, for example those communities with little access to online facilities. Government and the science community need to ensure that public engagement activities are carefully considered so that they send out the appropriate messages and reach all the affected and interested sections of a community. **Public engagement that is based on audience needs and profile may also help to attract a more diverse range of people into STEM careers.**

9.6 It is important that public engagement activities ensure that a wide range of STEM careers are provided for. The unintended consequence of overly focusing on the research and academic community is that science careers are only in academia. Young people especially will therefore not develop an awareness of careers in applied science and wider science-using occupations.

9.7 There are also some issues that are highly sensitive and will have a wider interest than others, often affected by the level of direct impact on individuals or sections of society or the immediacy of a decision or the profile of NGO groups. Examples of this include the adoption of fracking technologies or the introduction of wind farms, which will directly impact particular localities of the UK, or around a particular health issue such as MMR which will affect a wider population.

9.8 The Science Council acknowledges that budgets will be very tight over the next few years. However investment in science and research can provide a spur to growth, job and wealth creation, and raise health levels resulting in a more productive workforce. For the UK economy to grow in the long-term, stable investment in science and research is essential. The key requirement is for a coherent, well-argued and properly adhered to long-term vision for UK science and complementary strategy.

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[15] http://eml.berkeley.edu/~bhhall/papers/HallKhan03%20diffusion.pdf
[16] http://www.sciencecouncil.org/sites/default/files/UK%20Digital%20Skills%20Taskforce_Science%20Council%20evidence%20submission.pdf

Member Bodies of the Science Council

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Association for Clinical Biochemistry and Laboratory Medicine
Association of Neurophysiological Scientists
Association for Science Education
British Academy of Audiology
British Association of Sport and Exercise Science
British Computer Society
British Psychological Society
British Society of Soil Scientists
Chartered Institution of Water and Environmental Management
College of Podiatry
Energy Institute
Geological Society of London
Institute of Biomedical Science
Institute of Brewing and Distilling
Institute of Corrosion
Institute of Food Science and Technology
Institute of Marine Engineering, Science and Technology
Institute of Materials, Minerals and Mining
Institute of Mathematics and its Applications
Institute of Measurement and Control
Institute of Physics and Engineering in Medicine
Institute of Physics
Institute of Science and Technology
Institute of Water
Institution of Chemical Engineers
Institution of Environmental Sciences
London Mathematical Society
Mineralogical Society
Nuclear Institute
Oil and Colour Chemists' Association
Operational Research Society
Physiological Society
Royal Astronomical Society
Royal Meteorological Society
Royal Society of Chemistry
Royal Statistical Society
Society for Cardiological Science and Technology
Society for General Microbiology
Society of Biology
Society of Dyers & Colourists
The Organisation for Professionals in Regulatory Affairs