Science in Scotland – Making a Difference

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My first 12 months as Scotland's first Chief Scientific Adviser have been a baptism of fire. Days have been filled with delivering talks, establishing networks, fact-finding visits and getting to grips with the complexities of the civil service and a change of Government. Most of all though, it's been a fantastic opportunity to sell science. From the children I met in National Science and Engineering Week, to Chinese journalists, and Irish government officials, I've spent the past year not just talking about the career opportunities that science presents in Scotland but also the strength and depth of the science base we have here, and the opportunities this offers to both our indigenous industries and to inward investors. It is important that the wider business community in Scotland and globally is aware of and can take advantage of developments in our science base. The Scottish public can be justifiably proud of our impact on the rest of the world as science is one of the areas in which we truly excel as a nation.

Like the rest of the UK, Scotland has its fair share of doom-mongers and nay-sayers: the people who complain about falling uptake of science at school and degree level, and those who talk of a brain drain in the upper echelons of research. But the truth is more positive than they would have you believe. Year after year, Mathematics is the second most popular subject at Higher/A level, followed by Chemistry, Biology and Physics – with a slight increase in uptake of all four over the last year.

At degree level, the overall picture is good with a sustained upward trend in the overall numbers of Scots studying science subjects at Scottish Higher Education Institutions, particularly in the Mathematical and Biological Sciences. It is true that there are fewer students choosing Chemistry, but other areas – including Forensic Science (which contains an awful lot of analytical chemistry) – have grown, highlighting an apparent shift from 'pure' science subjects to those with a more applied or vocational focus. Encouragingly, the report also suggests that there will be a strong demand for scientists within the Scottish labour market in the future.

The strength and quality of our science and research base impacts very positively on our teaching and this is reflected in the high numbers of foreign students studying science in Scotland. They may be developing the global research partnerships of the future and this type of early interaction can provide links to Scotland they can call upon later in their careers.

And what about those students who decide to continue to work in science after graduating? Talk of a brain drain from Scotland is somewhat premature. Dundee, for example, is recognised worldwide as a major centre for life sciences research and is also home to a cluster of computer animation studios able to attract IT specialists from around the globe.

Other areas of Scottish expertise involve world-leading stem cell research in Edinburgh, home to Europe's largest stem cell network, including a new Centre for Regenerative Medicine that is bringing together basic research as well as technology development and more commercial activities. Scotland is also home to the Institute of Nanotechnology, the UK Astronomy Technology Centre, and several centres of excellence in computing and informatics that generate cutting edge research as well as underpinning other disciplines such as genomics and proteomics. Neither should we forget that our environment and abundant coastline mean we are predisposed to be at the forefront of developments in renewable energy. We are not short of wind, waves, tides and water.

Scotland has only 0.1 per cent of the world's population yet we publish 1 per cent of all scientific papers. This level of activity in high-quality scientific research means we can

attract scientists of the highest calibre to Scotland. In turn, it makes Scotland an appealing place in which to invest – and major investors such as Wyeth and the Wellcome Trust are testament to that. Through initiatives in research pooling, we have provided the means to allow our universities to work more closely together, including having joint graduate schools, in a number of areas such as Physics, Chemistry, Environmental Sciences and Life Sciences. Our scale and connectivity allow us to maximise the use of resources and compete internationally in research, attracting some of the world's best scientists to come and work here. The next challenge is to ensure that scientific excellence is translated into commercial activity and business innovation. This is no small task but we have some interesting examples of imaginative ten year investment in pre-competitive research through three Intermediary Technology Institutes (ITIs) in Life Sciences (Dundee), Techmedia (Glasgow) and Energy (Aberdeen). These aim to bridge the gap between publicly-funded early stage research and privately-backed commercial development and recognise that effective translation of research takes time and specialised input.

I believe the science base is strong in Scotland, but I don't think we can be complacent. Investment has to be maintained, and a key role in ensuring that future generations study and work in science has to be played by our scientists themselves. All of us with an interest in the future of science share this responsibility. A back-of-an-envelope calculation comes up with 1 in 75 of the population working in science – imagine the difference it could make if we all talked to schools and to the public, engaged with all sectors of society to show the relevance of science in everyday life, made it accessible and even showed how much fun it can be. Importantly, we need to get the public fully engaged with science's role in answering some of the most pressing issues of our time, including climate change, curing diseases, and the future of the developing world.

On this last point, I think our science community can play a key role. There are lots of areas where Scotland has significant expertise and can make a real difference in developing countries, for instance renewable energy technologies and health research. The recent announcement that the Scottish Government will double its international aid budget is good news, and I'm convinced that aid can be effective and sustainable through the practical appliance of science. I want to work to strengthen the international links that our universities and research institutes have with the developing world so we can exchange information and grow together. It would be hard to better Louis Pasteur's sentiments when he said "Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world."

Closer to home, as Head of Science and Engineering Professions within the Executive I'm keen to represent the views of scientists working here, and to ensure a variety of satisfying career paths that make the most of their talents. We are working closely on this with colleagues within Government throughout the UK. I also want to promote science within the civil service in Scotland, as part of the evidence base for Ministers. I'd like to see science as fundamental a consideration as funding when policy is developed. I was surprised when I started working within the Executive how few scientists consider a career in the civil service. It would be good to attract more to increase the diversity of backgrounds and skills found here to reflect, and meet, the wide-ranging demands of Ministers across their portfolios.

The truth is that science matters and touches everyone in their daily lives but we are so dependent on science and technology – our phones, our internet, our transport systems, the food that we eat, our health and environmental services – that we have almost lost sight of it. Science is inspirational and exciting and it would be fantastic to see a cultural shift in Scotland, with science becoming as valued as the arts and music scene. My team also deals with funding for science engagement, including supporting the Royal Society of Edinburgh, the four science centres in Aberdeen, Edinburgh, Dundee and Glasgow, and vibrant science festival activity stretching from Edinburgh to Shetland. These activities show just how fun, exciting and inspiring science can be. We aspire to a Scotland where science is accessible, whatever your age or background, where science literacy amongst the general population is high and provides the tools with which to engage in debate about science and technology issues that will shape the 21st century.

Scotland's future depends so much on science, engineering and technology – not just our economy but our quality of life, health and environment. There are challenges of course, but I believe the outlook for science is good in Scotland, and that it can make a significant contribution to the rest of the world.