ECONOMIC DEVELOPMENT & TRANSPORT COMMITTEE

EDT(2) 14-05 (p5)

Date:	**2 November 2005**
Time:	**9.00 am to 12.30 pm**
Venue:	**National Assembly for Wales, Cardiff Bay**
Title:	**Science Policy Review – Summary of issues emerging from written evidence**

Science Policy Review – Summary of issues emerging from written evidence

1. Synthesis of key points

There is significant support for the principle of developing a coherent Science Policy for Wales. Two main challenges have been identified for R&D in Wales – relating to the relatively small size of the research community and the lack of connectivity between its components.

There is reasonable consensus on what should be covered within an overarching Science Policy:

- Building and sustaining HE research excellence – (a) Finding the difficult balance between supporting fundamental and visionary research and academic research freedom while recognising that strategic decisions must be made for Wales and resources prioritised; (b) Potential for new types of support, e.g. Research Professorships, Centres of Excellence.
- Developing HE-industry linkages for knowledge transfer, commercialisation of research and inculcating entrepreneurial culture – with understanding of the complementary strengths of the sectors, i.e. without HE attempting to do what industry can do better.
- Supporting infrastructure and financing for innovation – new infrastructure and mechanisms,

taking into account that HEIs are not the only source of research in the public sector.
- Skills provision – at technician, graduate, postgraduate and lifelong learning levels, plus issues for retention of skilled staff in Wales.
- Promoting public awareness of science.

All respondents acknowledged that much is already happening in these areas – the objective for an integrated approach to Science Policy would be to satisfy the commonly-expressed concern that individual actions and strategies are currently fractured/uncoordinated with resultant confusion, gaps and duplication. An overarching Science Policy, if successful, would be expected to inspire as well as coordinate and direct efforts within Wales and, at the same time, promote Welsh strengths in the UK and beyond.

No-one doubts that there are many examples of R&D excellence in Wales – although these are sometimes understated – but there is a common perception that Wales under-performs by comparison with, for example, England and Scotland. In identifying and specifying the responsibilities and instruments for a Science Policy, respondents advised taking account of lessons learned – for example in models of knowledge transfer – from elsewhere.

The main industry sectors referred to in the responses are chemicals, pharmaceuticals, biotechnology, ICT, aerospace – it may be necessary to solicit information on issues for other sectors.

Many of the respondents emphasised that a coordinated Science Policy should cover education at all levels with particular issues for teaching school science, attracting skilled and motivated teachers and encouraging more young people into science. While some of the issues for school science may not fall directly within the core remit of the Science Policy Review, there are implications for connectivity between schools and HE, FE and industry that are highly relevant.

Some other potential lines of inquiry for the Policy Review were raised frequently by respondents:

- The need to audit/map current R&D expertise.
- The need for strategic research collaboration between HEIs in Wales, to develop critical mass, avoid duplication, tackle new research priorities and ensure regional provision.
- The need to build inter-disciplinary interfaces, but based on excellence in the individual disciplines.
- The need to maximise inward R&D investment, from EU, from UK Research Councils and from Whitehall departments. This is partly a matter of building preparedness in HE infrastructure and human resources but also of ensuring commitment to engage effectively with policy-makers outside of Wales.
- The need to comprehend that science contributes to public policy, decision-making and quality of life broadly – Science Policy is not only a driver of economic competitiveness.
- The need to better advertise Welsh research strengths and skills – to the business sector and internationally.

- The need for an overarching Science Policy to be well integrated with other policy initiatives so as to avoid duplication and dissonance – and to simplify support mechanisms for innovation.

Many of the responses are ambitious in defining what Science Policy might cover and achieve but most lack detail on the amount of extra funding envisaged, or how coordination will be managed, responsibility allocated and effectiveness measured. Some suggest that the Welsh Assembly should take more of a leadership role in science and that the implementation of Science Policy might be facilitated by creation of a specific Ministerial post in science (with engineering and technology), at junior or Cabinet level.

2. Synopsis of written evidence submissions

2.1 Higher Education bodies: HEFCW and universities

HEFCW (SP19)

Covers the three main functions of HEFCW in supporting science: (a) Science education – excellence at HE level plus promoting wider interest in science; (b) Research activity – through dual support system, QR funding based on RAE rating plus small Research Investment Fund to develop new strengths; (c) Knowledge transfer (third mission activities) by technology transfer and people mobility but also importance of engendering culture of enterprise within HEIs.

Provides evidence and examples of HEFCW activities and cross-refers to "Reaching Higher" goals. Highlights current HEI strengths and weaknesses (e.g. low contract research income from business).

Recommends further development of dual support system by more strategically coordinated funding approach across all organisations in Wales that facilitate exploitation of HE outputs; HEFCW Third Mission Committee in response to Nexus Report is exploring ways in which HEFCW-WDA can work strategically to support knowledge transfer activities. For example, through mobility; engagement with Sector Skills Councils and others to stimulate business R&D; support for research in priority business sectors; supporting routes to commercialisation of Intellectual Property; creating entrepreneurial culture in HE; maximising inward investment (in particular, Framework Programme 7).

Cardiff University (SP 21)

Input is a brief summary from VC, covering: (a) Importance of fundamental research and interfaces between established disciplines; (b) Importance of Welsh Science Policy in understanding and progressing how Welsh HEIs can attract more research funding; (c) Importance of HEI-industry linkages in economic development - but recognising that research also contributes more generally to quality of life and that this involves the social sciences, recommends that EDT Committee Inquiry should continue to take a broad perspective on how science can make an impact; (d) Importance of skills provision for graduate and technician supply.

Welsh e-science (SP 11)

Focuses on issue of capitalising on next generation of ICT in supporting scientific advance broadly. Welsh e-science Centre at Cardiff University recommends that Science Policy should act to: (a) provide support (policy and financial) for ICT infrastructure, in particular the Grid model; (b) provide support for strengthening and broadening ICT skills of science graduates; (c) ensure next round of European Structural Funds covers ICT strategy for Wales.

University of Wales, Swansea (SP 20)

Wide-ranging review, welcomes EDT Committee Inquiry and main areas covered include:

a. Knowledge base – importance of fundamental research, particularly that which pushes at boundaries of conventional wisdom – and WAG should allocate funds for this. Inter-disciplinary practice is important, requiring funding of broad spectrum of disciplines. Research partnerships are also important – and operational criteria need to be clear.
b. Role of private sector in scientific enterprise – importance of HEI-industry partnerships and need to understand complementary strengths of partners.
c. Primary and secondary education systems – for example, importance of nurturing most able and developing coherent curriculum with skilled, motivated teachers.
d. Problem of fractured nature of current Science Policy activities in Wales – need to align and engage with what is relevant in UK and EU policies and to support more coordinated approach by Welsh industry to HE sector. Expresses disappointment at lack of clear Science Policy by WDA and National Assembly for Wales and lack of their commitment to communicating about science.
e. Scale of research – although improving, Wales under-performs in terms of international research quality (vs England, Scotland). Substantial pump-priming investment is needed if Wales is to compete in world-class science and this may require channelling resources away from HEIs who are not active in research
f. Developing a Science Strategy – required elements similar to HEW Science Strategy document.

Bangor University (SP 17)

Wide-ranging review and expects benefits from Science Policy to cover: (a) Basic and applied research – requiring more WAG investment; (b) Economic development – better responsiveness in using science base; (c) Use of scientific evidence in decision-making more broadly; (d) Infrastructure, training and retention of scientists; (e) Public understanding of science – need for better communication.

Among the other needs articulated are – national and international networking to address R&D goals for Wales and embed Welsh initiatives in UK and EU contexts; audit of research strengths and recognition of importance of collaboration to develop critical mass; deciding on how to address strategic areas where

Wales requires research capacity but is currently weak. Expresses concern at post-devolution weakness in linkage between science in Wales and UK research funding departments and sees solution in better linkages between providers and users in Wales and UK funders. Advises that there is potential to adopt new models for knowledge transfer (e.g. based on Cambridge-MIT model) and, in general, models and initiatives already found in UK and EU require either high-level Welsh representation or parallel bodies in Wales.

University of Glamorgan (SP 22)

(from Murphy, Head of Biotechnology Unit)

Notes that R&D in Wales is often underestimated. There are many examples of research excellence and commercialisation but two main challenges: the relatively small size of the research community in Wales and the lack of communication and connectivity between its components. R&D can be strengthened by facilitating collaboration, particularly at the pre-competitive level and using virtual groupings, and by embarking on a more pro-active policy of encouraging external links and investment. The problems of lack of critical mass and needless duplication of research are judged to apply in particular to post-1990 HEIs and lessons can be learnt from the improved performance of the sector in Scotland and Ireland. For example, Scottish HEIs have established networks to form more effective entities for evaluation of research potential in RAE 2008.

There is also need to improve science awareness, skills provision and entrepreneurial culture – this must begin at school and the Assembly should also do more to raise the profile of Welsh science, for example via awards and public discussion on topical issues.

2.2 Business sector - Innovation, commercial development and skills needs

WDA (SP 28)

Comprehensive review of current status of innovation in Wales and WDA activities. This input is not now analysed in detail on the assumption that it will be updated/reviewed when WDA is called to give oral evidence.

The WDA notes the importance of detailed mapping of academic expertise as part of actions responding to Nexus Report and updating of "Research Wales" directory. In looking forward to strengthen public and private sector R&D, WDA observes that "Development of a Science Policy for Wales that inspires, coordinates and directs would add to the process and would increase the effectiveness of funding and assist in the achievement of critical mass". Advises that Science Policy must fit with priorities of UK and EU and should not attempt to be different. Objectives include: building on strong sectors, growing business R&D, developing collaboration across HEIs and linkage with industry, attracting additional external funding and monitoring the impact.

Identifies importance of nominating a body to be responsible for implementing Science Policy with regard to science awareness, skills provision, HE excellence, technology transfer and innovation.

Wales Gene Park (SP 16)

Description of current status and achievements of Wales Gene Park as a virtual entity (but provides little information on technology transfer to health care system and commercial sector). Notes that "what the world wants" increasingly is translational research and clinical medicine for which there are some significant competitors in UK and internationally (but no mention made of other UK Gene Parks and potential for network of excellence).

Recommends that a Science Policy should: help Wales Gene Park realise its vision; invest in bioscience strengths; develop Welsh funding for translational research and experimental medicine and capitalise on UK Research Council initiatives; raise profile of Wales in stem cell research; provide support and infrastructure to facilitate bidding for EU Structural Funds and Framework Programme 7; support HE third mission activity, including spin-outs. These individual objectives should be underpinned by development of an integrated bioscience sector strategy for Wales and WDA investment in promising academic projects.

Federation of Small Businesses in Wales (SP 23)

Comprehensive input, strongly supportive of Science Policy Review. Advises that a Science Policy in Wales with ring-fenced funding is needed to help identify and promote existing strengths, nurture centres of excellence, develop networks and support innovation by SMEs and HEIs. There is requirement to refocus existing schemes under an overarching policy vision, testing what has been successful to date.

FSB analysis is based on comparison with countries that have already adopted science strategies (e.g. Ireland, Scotland) and institutions with a role in knowledge transfer and R&D collaboration (e.g. Steinbeis Institute and Fraunhofer Institutes in Germany – while Wales might be too small to sustain such models, it might become a location for a constituent institute within an international network).

Key elements recommended for a Science Policy include: (a) Independent foresight exercise with a view to targeting significant funding and improved infrastructure; (b) WAG to create a Junior Ministerial post for Science, Technology and Innovation; (c) Mapping of R&D activities in Wales, to identify strengths, gaps and what can attract industry; (d) Technium programme readjustment; (e) Addressing weaknesses in technology transfer between HEIs and SMEs in Wales (and in interactions between SMEs and larger companies already conducting R&D) – need to learn from best practice, create more entrepreneurial climate within HEIs and build on previous successful schemes (e.g. UK University Challenge, Science Enterprise Challenge, LINK, Faraday Partnerships).

FSB will be an important witness for a future oral evidence session.

Wales TUC (SP 15)

Agrees that WAG needs active Science Policy as a priority; emphasises importance of institutional measures to support fiscal measures and comparison with overseas competitors with higher productivity and innovation. Key priorities include: (a) R&D collaboration; (b) Technology transfer and capitalising where quality of science is high; (c) Good regional networks between all scientific institutions and commerce, not just HEIs; (d) Partnership at work for skill improvement and effective implementation of new technologies; (e) Means to measure effectiveness of policy.

Forestry Commission Wales (SP 5)

Short input, cross-referring to "Science and Innovation Strategy for British Forestry". Describes current activities of Forest Research in Wales. While it does not itself offer any specific points for Science Policy Review it exemplifies the value of coherence in strategy that can cover all economic and other policy applications of science.

SEMTA (Sector Skills Council for Science, Engineering and Manufacturing Technology) (SP 18)

Short input, describing stages in producing sector Skills agreement (for bioscience). May want to consider as oral witness or follow up for further information.

2.3 Councils, regional, education and science awareness activities

Mid Glamorgan Education Business Partnership (SP 1)

Short input, with key issue identified as how to encourage children to take an interest in science (providing example of Science Clubs).

Ceredigion Council (SP 2)

Short input, agreeing importance of science for economic development and highlighting need to encourage regional dispersal of science investment (as well as funding established centres). Also covers value of networking between industry and public research bodies and the need to address skills deficit at technician level.

Vale of Glamorgan Council (SP 4)

Short input, supports establishing coherent Science Policy and linking with learning initiatives (requiring input from schools sector).

Torfaen Council (SP 6)

Short input covering range of issues. Highlights challenge of how better to advertise Welsh HE research activity, skills and strengths – to the business sector and to an international audience. Also warns against duplication of research effort in HE and advises need for integrated strategy for research at specific locations.

Pembrokeshire County Council (SP 27)

Short input, agreeing that Science Policy can have role in addressing regional problems. Key issues in maximising opportunities for economic growth include: (a) Supporting business clusters through education and training initiatives; (b) Procurement and supply chain activity; (c) HE engagement to build R&D; (d) Important role for Techniums to bridge HE-business and deliver sustainable knowledge economy.

Science Policy initiative must reinforce, simplify and add value to other economic performance initiatives – learning lessons from confusion previously created by plethora of uncoordinated schemes – and in consultation with customers.

Setpoint Wales (SP 13)

Supports Science Policy Review and identifies key issue as declaration of importance of public engagement with science and technology and scientist engagement with public. Recommends Assembly funding for this objective and proposes development of Wales Hub for School Science, to coordinate provision, underpin regional flexibility and develop concordat between all providers. SETNET is currently in discussion with UK government to establish regional science hubs – to be piloted with SEEDA and Yorkshire Forward RDAs - could this be a model for Wales?

2.4 Personal contributions

Tony Campbell (Cardiff University and Darwin Centre) (SP 7)

Supports Science Policy as key area for Assembly and identifies important issues: (a) Encouraging curiosity-driven, speculative science by individuals and focus resources for teams on small number of flagship projects; (b) Managing HE Intellectual Property, enabling SME spin-outs with management structure and reduced bureaucracy so that inventors can still do science; (c) Correcting peer review deficiencies; (d) Building bridges between HE and school (e.g. Darwin Centre), involving HE in setting school science curriculum; (e) Communicating past successes to inspire future vision and bridging between sciences and arts; (f) Using modern science to monitor and protect environment as greatest natural asset; (g) Developing Wales as a sabbatical centre to attract leading scientists, students, teachers, industrialists to inspire the next generation.

Justin Cooper (Caerphilly Council) (SP 3)

Short input with key issues including: (a) Individual excellence – fund for longer term without constraint; (b) Higher priority for teaching science and maths in schools; (c) Put science at heart of Welsh Assembly decision-making by developing better formal relationships between political and scientific communities; (d) Create WAG leadership to harness joint working between business and academic communities – not just HE but also FE, schools, public sector bodies.

John Steele (SP 8)

Covers issues for Welsh academic and skills aerospace strategy. Skilled recruits are a problem because of disconnect between industry and academia so that recruits have few work-related skills and engineering as a whole is not seen as attractive employment prospect. Solution lies in improved teaching of maths, science and innovative skills at school and in encouraging industrial and other scientists to teach.

Welsh Assembly can do more to support issues for skills and for investment in innovation, procurement and market analysis: (a) Consider introducing Cabinet post for Science, Engineering and Technology; (b) Develop and maintain Welsh National Aerospace Strategy; (c) Support creation of market observatory to help aerospace industry determine opportunities and routes to market; (d) Attract private sector finance; (e) Implement UK government Defence Industrial Policy; (f) Reform defence acquisition process to balance risk and reward.

Martin Evans (SP 24)

Short input on aerospace sector – despite significant level of aerospace manufacturing in Wales, little aerospace research is undertaken by HEIs in Wales. The problem is not lack of funds available (from industry, government, EU) but rather that HEIs need to collaborate to build research infrastructure and attract research funding – WAG has role in investing in this infrastructural and developmental funding.

Jeremy Jones (SP 12)

Supports Science Policy Review and notes that chemistry, physics and biology are all becoming weaker in Wales HE. The recommended solution is to promote collaboration by HEIs for the long-term, judging that HEIs have been weakened since diminution of Federal University of Wales in mistaken belief that individual colleges were strong enough to compete. There is continuing need for research-led ethos. The totality of expertise across HE in Wales is complementary and compares favourably with other UK universities. But taken separately, activities rarely receive recognition because of limited impact. Thus, argues for importance of Federal structure in HE and expresses concern that HEFCW mission statement (unlike HEFCE) makes no clear commitment to research excellence.

2.5 Written evidence covered during oral evidence session on 6 October

CASE (SP 9)

ABPI (SP 10)

Biosciences Federation (SP 14)

Royal Society of Chemistry (SP 26) with Heads of HE Chemistry (SP 25)