**Phil Willis MP, Chair, House of Commons Select Committee on Innovation, Universities, Science and Skills**

**Engineering Inquiry report**
**Speech for the Foundation for Science and Technology debate 7th July, 2009**

**The slides are at the end of this document.**

***SLIDE 2***

*'To the optimist, the glass is half full. To the pessimist the glass is half empty. To the engineer, the glass is twice as big as it needs to be.'*

***SLIDE 3***

The last time I was here addressing the Foundation for Science and Technology was in 2007. I was discussing the implications for science and technology in the wake of the disbandment of the DTI and formation of DIUS…

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Now, almost exactly two years on, I am back. DIUS has been abandoned, and BIS formed in its place.

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Before I get onto the engineering report, I would just like to say a quick thank you.

On the announcement of the new department, my colleagues and I on the Innovation, Universities, Science and Skills Select Committee (or IUSS for short) were inevitably concerned about Science, Technology and Engineering becoming lost in the new 'monster' department headed by Lord Mandelson.

We quickly met and published a report calling on the Government to establish a Science and Technology Select Committee, and were backed by organisations from across the sector.

The RSC coordinated a joint letter to Harriet Harman, signed by the Institute of Physics, The Royal Academy of Engineering and the Royal Society to name but a few. The sheer amount of support for this committee just underlines that the principle of scrutiny runs right to the heart of the science and engineering community.

What was particularly pleasing was the speed and grace with which Lord Drayson, the Minister for Science and Innovation, responded. I don't believe I have ever received such a prompt response from a Government Minister, nor one that so wholeheartedly backed our proposals.

With the Government's support and cross-party agreement, the Science and Technology Committee was reinstated, and will be formed on 1st October 2009.

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I'd like to take this opportunity to thank everyone who backed our report, and helped to ensure that science, technology and engineering will once again have the kind of Parliamentary scrutiny that is needed to keep the Government performing to the best of its abilities.

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So, the engineering report. Why, you might ask, did the IUSS committee, with its huge remit—innovation, universities, science and skills—choose *Engineering* as the subject of its first major inquiry?

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Because, engineering not only cuts across the whole of DIUS's remit, but also will be key as we face some of the largest challenges ever to have faced mankind.

Engineering will be central to our ability to deal with issues such as climate change, energy security, food security and water supply.

***SLIDE 9***

And the recession has highlighted the importance of engineering to the UK's economic health.

Engineering makes up between a quarter and a third of our GDP, through sectors such as construction, manufacturing, mining and quarrying and electricity, gas and water.

***SLIDE 10***

As Lord Mandelson aptly put it: "If you really want to change the world, choose a career in engineering. And I mean real engineering, not financial engineering."

The economic downturn reminds us of the importance of engineering and engineers. The importance of industries that build *things* rather than simply profits, and that provide employment opportunities on national scale.

Lord Mandelson's quote is particularly significant considering his new role as the head of BIS, where he will be responsible for innovation and business. But we must now wait to see whether this ideological support for engineering will translate into real policy.

In addition to economic challenges, the UK has a huge future works programme which relies upon a significant body of engineering expertise.

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Over 2.5 million people are currently employed in the construction industry, and this is estimated to rise to 2.8 million by 2012.

The UK's future works programme includes projects that are truly vast in scale, such as the 2012 Olympics.

I visited the site last month, and was astounded by the sheer scope of the project, and its planned legacy. The apprenticeships and training schemes currently operating on the site should serve as examples to the rest of the construction industry—aimed at training, employing and then finding further employment for significant numbers of workers, and particularly targeting women and the disabled who traditionally are not a part of the industry.

***SLIDE 12***

Other projects include the planned Crossrail line for London, with an estimated economic benefit of at least £36 billion for the UK

***SLIDE 13***

… the £45 billion 'building schools for the future programme'

***SLIDE 14***

… and plans to build 240,000 new homes per year until 2016.

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In addition to these, London's skyline is getting its own £2.5 billion makeover through new builds such as the Shard of Glass, Heron Tower, The Pinnacle, The Cheese Grater and The Walkie Talkie.

***SLIDE 16***

In order to match the predicted growth in jobs, the UK needs to increase the number of graduates with STEM degrees from 13% to around 25%. And this itself will rely on getting young people interested in science, maths and engineering subjects from a much younger age, and providing vastly improved careers advice to shape those subject choices early on.

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The development of the UK's energy sources also poses key challenges for the engineering industry. These include the development of new nuclear power stations, the decommissioning of existing nuclear power facilities and nuclear waste disposal; the development of the UK's energy generation infrastructure, including renewable energy; and the mitigation of the effects of climate change such as building flood defences**.**

So the national and global challenges are significant, and there is great potential for growth in the sector.

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But what about the departmental challenges?

Engineering was also chosen because it cuts across every part of DIUS's remit.

Engineering is critical in the innovation agenda: it is engineers who turn ideas into reality.

It is critical to the university sector: 6% of our students are engineers.

And it is critical to the skills sector. The UK is short of engineers, and if we are to meet the UKCES's targets for 2020, we will need to increase our skills base right across the board.

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When forming the Innovation, Universities and Skills Committee, we decided that Science needed to be added to our title, to reflect the importance of the scrutiny of science in Government. We also felt that this would enable us to capitalise on the inevitable overlap between the innovation, skills, universities and science agendas.

However, this inquiry demonstrated to us the intractable link between each of these areas and engineering.

***SLIDE 18***

Perhaps we should have considered becoming the committee for innovation, universities, science, skills and engineering, or engineering and technology. It think IUSSET would have been taking things a bit too far.

As well as global, national and departmental issues, the inquiry also arose from some initial concerns about the state of UK engineering.

These included the UK's performance at turning brilliant ideas into thriving industries based in the UK, for example plastic electronics.

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The 'Valley of Death' between university spin-off companies and commercially viable large employers continues to stubbornly refuse our attempts to build bridges.

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We were also concerned that many employers were struggling to recruit engineers. Many complain that there are too few high quality engineers, that they leave engineering to find money in the financial sector. Well, we aren't going to save the planet with bankers.

***SLIDE 21***

And finally, we were concerned about the Government's optimism about the feasibility of its nuclear new build: does the UK have the skills needed to deliver on its ambitions?

***SLIDE 22***

The process of the inquiry itself was very thorough; the committee received nearly 400 written submissions from across the sector.

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We held 13 evidence sessions, interviewing a total of 86 witnesses.

***SLIDE 24***

We couldn't possibly cover all of engineering. It's just too big. So we decided to take a case study approach, exploring key themes through the 'lenses' of nuclear engineering, plastic electronics, geo-engineering and engineering in Government.

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We found that the Government's recent enthusiasm for nuclear power raises key questions about the UK's capacity to deliver a new generation of nuclear power stations.

There are significant skills shortages in the UK that could affect plans to bring new plants online by 2020.

According to the UKCES Ambition 2020 report, for low, intermediate and high level skills, the UK is currently 17$^{th}$, 18$^{th}$ and 12$^{th}$ respectively out of OECD countries.

This is predicted to fall to 23$^{rd}$, 21$^{st}$ and 10$^{th}$ by 2020. This will affect every sector in the UK, but particularly growing areas like engineering.

We concluded that a 'master roadmap' is needed for all major engineering projects, including nuclear new build**.**

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The plastic electronics case study highlighted the potential opportunity afforded to the UK through the support of emerging, innovative industries.

Hailed as a disruptive technology, the UK research base in this area of plastic electronics is world-class. However, while the pioneering research into Plastic Electronics took place in Cambridge, the factory opened in Dresden.

We were concerned that the UK is likely to miss out on the economic return associated with translating the findings of research into commercialised technologies.

And we called for a serious revision of the structures used to support the growth of fledgling industries.

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The discussion of geo-engineering research really highlighted the global nature of many engineering challenges.

During this case-study, the committee considered the implications of a new engineering discipline for UK policy-making.

It became clear that, if the Government is to be an informed actor in the development of any future international policy relating to geo-engineering, it is essential that the views of the science, engineering and social science communities be seen as complementary sources of expertise, and their advice actively sought and considered.

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The final case study went further and demonstrated that engineering advice and scientific advice offer different things, and that this should be recognised in the policy process.

We found that Government, in key policy areas of several departments, does not have sufficient in-house engineering expertise to act as an intelligent customer. Engineering advice is frequently not sought early enough during policy formulation.

We were shocked to discover that engineering advice had been lacking in the formulation of policies as important and diverse as eco-towns, renewable energy and large IT projects.

The Government responded to our report just last month. And it is fair to say that it was generally very positive.

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The Government agreed with our suggestion that ‘roadmaps’ are needed for all major engineering projects.

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They agreed that more could be done to stimulate innovation through Government procurement.

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They agreed that it would be sensible to make policy considerations for a plan B for tackling climate change—geo-engineering—just in case plan A fails.

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The Government also agreed on the need for more generalist engineers.

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And that there should be a clearer understanding of who does what in terms of skills provision.

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Although the Govenrment's map, which apparently explains who does what, leaves a little to be desired.

***SLIDE, SLIDE 30***

The Government also agreed with some of our suggestions on engineering in Government.

***SLIDE 31***

It agreed that there needs to be a better understanding of the expertise that we have currently in the civil service.

***SLIDE, SLIDE 31***

We should recruit more experts into the science and engineering fast stream, distribute them more widely and provide real opportunities in career progression while retaining specialist skills.

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And they agreed that links between the public and private sector need to be strengthened through secondments.

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Fundamentally, the Government agreed that engineering advice in policy making is absolutely crucial.

***SLIDE 31***

Unfortunately, they disagreed with us on how to maximise efforts and put engineering at the heart of Government policy.

***SLIDE 32***

Here is a map that shows how science and engineering advice is currently structured, with the Government Office for Science housed within DIUS—or BIS as it now is.

***SLIDE 32***

And this is what we thought it should look like…

***SLIDE 32***

GO-Science should be placed properly in the heart of Government: in the Cabinet Office.

***SLIDE 32***

The Government should have a Chief Engineer to coordinate cross-department engineering programmes.

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And every Government department should have a Chief Scientific Adviser, a Chief Engineering Adviser, or both.

Unfortunately, the Government said:

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No

***SLIDE 32***

No

***SLIDE 32***

And no.

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The response to the report from the engineering community has been very positive, and it was widely welcomed for identifying many of the issues that cause engineering to be underrepresented and under valued.

EEF said that *'this is a well-timed and positive report … The committee rightly identifies the need for more strategic government procurement and getting the right skills in place to do this'*.

The Institute of Civil Engineers stated that *'we have called for the creation of the post of Chief Engineering Adviser, and we are delighted that the Select Committee is recommending this'*.

So what's next?

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We recommended that the Royal Academy of Engineering should continue the outstanding coordinative role that it took for the engineering community during our inquiry.

***SLIDE 35***

And we also suggested that the Academy should be the first port of call for the Government when it is seeking engineering advice. The Academy is standing tall and is keen to live up to our challenge.

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As Chairman of the soon to be formed Science and Technology Committee, and you as the science and engineering community, we all need to scrutinise—*and support*—the work of BIS. We need to help it to maximise the work of brilliant British engineers to keep the UK at the head of the game. We need to make sure that UK engineering is successful, so that UK plc is successful.

***SLIDE 36***

And to do that we need to support and take further the wonderful work that is already going on to bring on the next generation of engineers. We need to support initiatives like the Big Bang.

In short, we need to raise our game.

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As a wise engineer once said: *'The most important thing is to keep the most important thing the most important thing'*.

***SLIDE 38***


*"To the optimist, the glass is half full. To the pessimist, the glass is half empty.*

*To the engineer, the glass is twice as big as it needs to be."*

2007

dti → Department for Innovation, Universities & Skills

2009

Department for Innovation, Universities & Skills → BIS Department for Business Innovation & Skills

THE ROYAL SOCIETY CELEBRATING 350 YEARS

CaSE

RSC

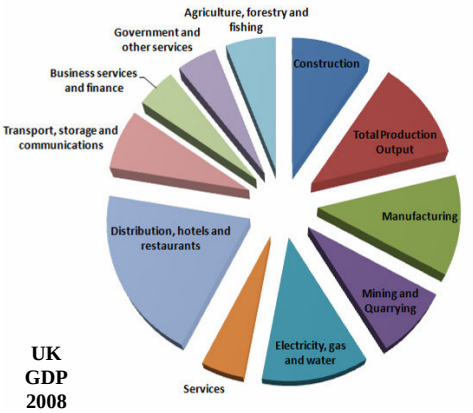
# THANKYOU!

The Royal Academy of Engineering

IOP Institute of Physics

# Science and Technology Committee

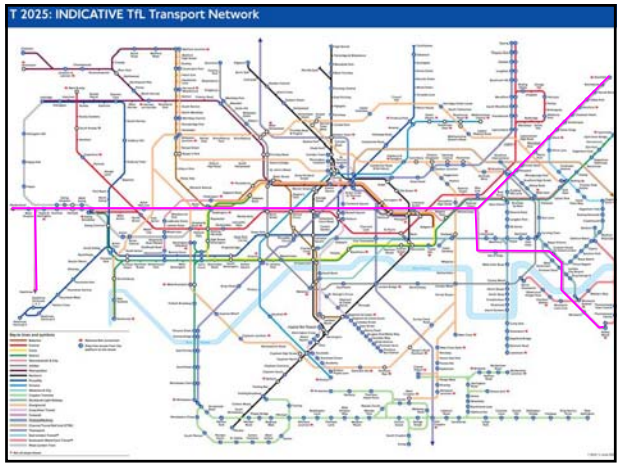
# Why Engineering?


***"If you really want to change the world, choose a career in engineering.***

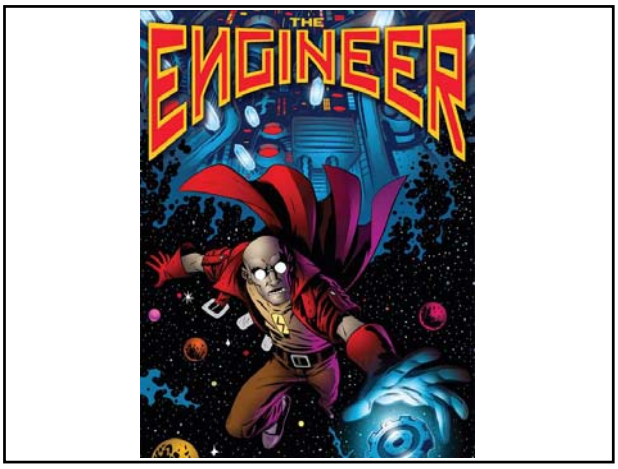
***And I mean real engineering, not financial engineering."***

*Lord Mandelson*



Department for **Innovation, Universities & Skills**

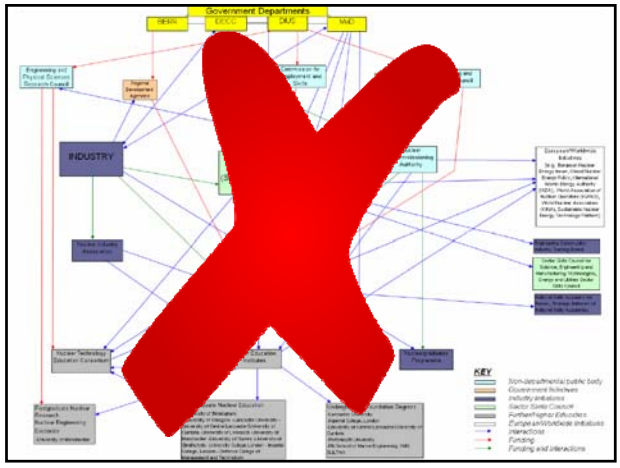
*+ Science and/or + Engineering?*


THE
ENGINEER


$CO_2$

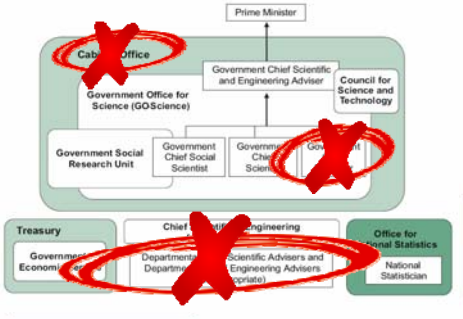


- ✓ Roadmaps
- ✓ Procurement
- ✓ Plan B
- ✓ More generalists
- ✓ Skills provision clarity



- Civil Service expertise
- Sci & Eng Fast Stream
- Public-private sector links

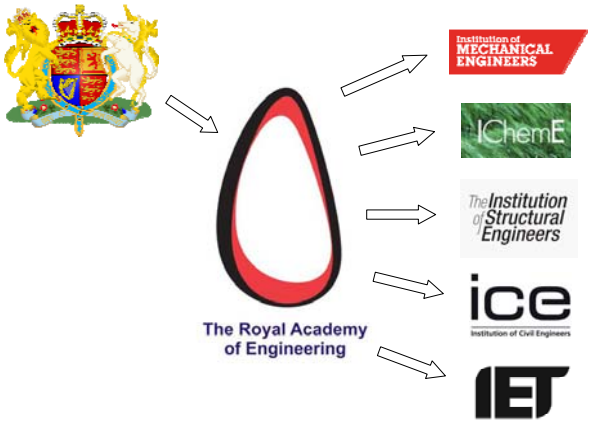
- Engineering advice crucial




House of Commons
Innovation, Universities, Science and Skills Committee

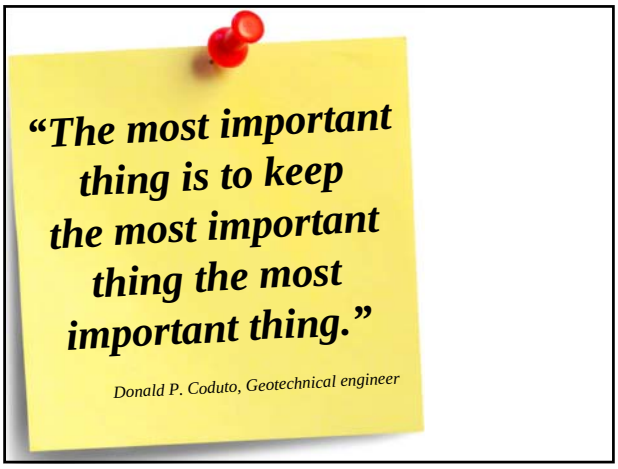
**Engineering: turning ideas into reality**

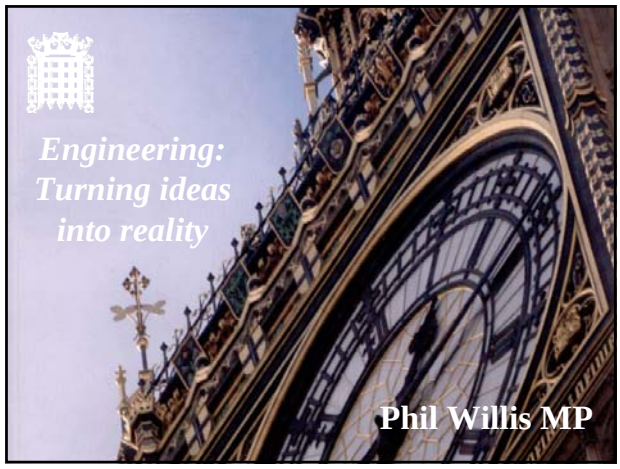
Fourth Report of Session 2008–09




BIS
Department for Business Innovation & Skills

The Big Bang
UK Young Scientists & Engineers Fair


“The most important thing is to keep the most important thing the most important thing.”
Donald P. Coduto, Geotechnical engineer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