



Materials Processing Institute

REDUCING COSTS IN INNOVATION FOR UK INDUSTRIAL COMPETITIVENESS - PAYBACK TIMES AND INVESTMENT IN COMMERCIALISATION, TAXATION POLICY, AND DEVELOPING GLOBAL SUPPLY CHAIN RELATIONSHIPS

A Speech Given at the Westminster Energy, Energy, Environment and
Transport Forum policy conference Priorities for UK Industry
Decarbonisation.

Thursday 14 January 2021



Good Morning, I am Chris McDonald and I am the Chief Executive Officer of the Materials Processing Institute, which is the UK's national centre for innovation in the steel and metals sector. The Institute carries out industrial research from our base in Teesside, focussing on the areas of Advanced Materials, Decarbonisation, the Circular Economy and Digital Technologies.

As well as my role at the Institute, I am also the Chair of the UK Metals Council, which is the sector body that connects government with the 11,000 companies throughout the UK in the metals supply chain.

The focus of this session is on overcoming the challenges for industrial low-carbon transitions and I will look particularly at how the cost of innovation may be reduced, particularly with regard to the foundation industries sectors, such as steel & metals, chemicals, glass, ceramics, cement and paper. These sectors form the basis of all our industrial supply chains and are a crucial part of our sovereign capability, but have some of the most significant challenges in terms of decarbonisation. All of these materials producing sectors are significant emitters of carbon dioxide, but face particular challenges around decarbonisation. They generally unable, for instance, to switch from carbon fuels to electrification for technical reasons, such as, for instance, the use of carbon as both a fuel and as a component in a chemical process.

Let's consider first why the cost of innovation is important. This may seem a strange question to ask, when for instance at my Institute, the research and innovation projects that we undertake for companies in the steel and metals sector yield an average return on investment for the company involved of at least 8:1.

With returns like this, you would imagine that cost would not be a major concern and yet we see relatively lower levels of investment in industrial R&D in the UK compared with the OECD average and in my own personal experience, I have worked as a research manager in multinational industrial businesses that have been forced to cut back on R&D, for the simple reason of affordability.

Intense global competition in cyclical commodities, such as steel and the wider foundation industries, combined with high capital cost facilities and slim margins, can create the circumstances where the only option for survival is investment in continuous and relentless innovation and yet, the cash required for long term sustained investment in innovation may not be available.

The crux of this problem is that when a business engages in research and innovation projects, you know at the outset that not all projects will be successful, you just don't know which ones and so this becomes a problem of risk management.

That is why repeated studies have shown that increasing government investment in industrial innovation crowds out private sector investment too. The UK has laudably held to this policy for over a decade now and has an ambition to grow government investment further, but I would like to offer some opinions on what are the right policies to make this a success.

First, think where government should spend the money. We need to do more to **invest in our industrial innovation infrastructure and platform technologies**. We currently direct 90% of our science and innovation budget to fundamental research and 10% to commercialisation in industry. My practical experience suggests that this ratio is the direct opposite of what it needs to be to actually make use of that early stage investment.

Industrial innovation is highly capital intensive and by investing in national, open access innovation facilities, government can ensure that UK industry is able to derisk and accelerate the commercialisation of innovation. For the Foundation Industries this is best done through the existing network of industrial research centres that already exist in metals, glass, chemicals and ceramics, in sectors such as manufacturing government can make use of the Catapult network, but whatever the sector, the optimal approach, both in terms of value for money and speed to market, is to invest in and leverage existing capability.

Returning to the challenging of decarbonisation, for the foundation industries, successful decarbonisation requires the industries to develop their own technologies and then to become part of a wider low carbon ecosystem, that will include for instance carbon capture networks and hydrogen generation. The industries themselves cannot take responsibility for developing these wider solutions, but will need access to specialist innovation expertise to understand the integration of their industrial processes with such infrastructure and that becomes an important role for government investment in innovation platforms.

Second, we should increasingly ***allow companies and research institutes the freedom to decide themselves*** what innovation investments provide the best return for their businesses. There is of course a place for national challenges, for strategic government investment, but more attention should be given to daily incremental improvements in competitiveness, productivity, product and service offering made by enabling companies up and down the supply chain to direct their own innovation. The continuation of policies such as the R&D tax credit are important here, but so too would be greater use of responsive mode funding for industry and a general acknowledgement that by far the greater number of practioners of the latest, cutting edge technology reside not in the hallowed halls of our universities, but in industry, in companies large and small, developing, adapting and innovating.

Third, we need to ***seek greater cross sector and through supply chain collaboration***. Having heaved ourselves through Brexit and battled through COVID, as we emerge out the other side climate change will still be there, as the biggest threat to our society, to mankind, to the planet. And yet at this time we also have, potentially, one of the biggest potential toolboxes available to tackle this as we continue through the fourth industrial revolution, this explosion in new digital technologies.

The very nature of these technologies is that they are sector agnostic, and whilst it is true that some of the most demanding, far reaching and early stage applications of technologies such as artificial intelligence and robotics have been made in industries as diverse as steel and logistics, so it must be that by bringing together disparate potential users around common technology platforms we can maximise the return on our collective investment in innovation.

In summary then to make innovation more cost effective, and ultimately more successful, particularly for difficult to decarbonise industrial sectors, such as the foundation industries, requires government investment in innovation infrastructure and platform technologies. Industries and their supply chains can then use these facilities to implement their own research priorities.

Chris McDonald is the Chief Executive Officer of the Materials Processing Institute. The Institute carries out industrial research and innovation in advanced materials, industrial decarbonisation, digital technologies and the circular economy supporting the materials, processing and energy sectors for over 75 years. Chris led the divestment and return to independent, not-for-profit ownership of the Institute in 2014.

Chris's background is in industrial research and manufacturing, where he has worked internationally. A graduate of Cambridge University, Chris is a Fellow the Institute of Chemical Engineers and of the Institute of Materials, Minerals and Mining. He sits on industrial advisory boards at a number of universities, including Oxford and Sheffield.

Chris has an interest in innovation management and industry dynamics and in addition to leading the Institute, he provides expert opinion and consultancy support to companies, institutes, Governments and public bodies in innovation and technology strategy and management. He also advises on the technical due diligence aspects of mergers and acquisitions.

Chris is prominent in the development of public policy, around innovation, steel, SMEs, where he works to support growth and inward investment. Chris is the policy chair for Innovation and Enterprise for the Federation of Small Businesses, a member of the CBI Regional Council and Shadow Monetary Policy Committee for the North East, the Chair of the UK Metals Council and a member of the Steel Advisory Board for UK Steel (EEF).

Chris is often called to commentate in the media on innovation leadership and the steel industry.

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Chris McDonald
Chief Executive Officer
Materials Processing Institute

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The Materials Processing Institute is an independent, open access and not-for-profit technology and innovation centre working with industry, government and academia worldwide. Support ranges from small scale, site based investigations, through to long term collaborative research programmes.

The Materials Processing Institute is expert in advanced materials, industrial decarbonisation, digital technologies and the circular economy, specialising in challenging processes, particularly those involving high specification materials, high temperatures and difficult operating conditions.

The Institute has over 75 years' experience as a leading UK technology provider. Extensive materials processing knowledge is supported by state-of-the-art facilities with a broad range of equipment, from laboratories through to demonstration, scale-up and production plant.

Scientists and engineers work with industry and apply their expertise to develop and implement robust solutions to research and development and improvements for products and processes.

Expertise is spread across a wide range of disciplines, including:

- > Materials Characterisation, Research and Development
- > Simulation and Design
- > Monitoring, Measurement and Control in Hostile Environments
- > Process Development and Upscaling
- > Specialist Melting and Steel / Alloy Production
- > Engineering / Asset Management
- > Materials Handling
- > Minerals and Ores

Research and project management teams deliver support across a wide range of industrial and manufacturing sectors including:

- > Metals and Metals Manufacture
- > Chemicals and Process
- > Nuclear
- > Oil & Gas
- > Energy
- > Aerospace and Defence
- > Mining and Quarrying





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