Select Committee on Energy Independence and Global Warming

"Business Opportunities in a Low Carbon Economy"

Wednesday 10th October 2007

Written Testimony

by

Neil Carson,
Chief Executive of Johnson Matthey plc

1. Introduction & Thanks

Thank you for this opportunity to address the Select Committee on this important topic of Energy Independence and Global Warming. May I take this opportunity to share with you, on behalf of Johnson Matthey plc and the UK's Corporate Leader's Group (CLG), my views on the exciting opportunities I believe exist for Business and Government to work together to simultaneously tackle these global problems whilst continuing to grow our own economies.

The CLG is comprised of Chief Executives of leading FTSE100 companies and has previously written open letters on this subject to both the UK government and the European Parliament. The combined market capitalization of the companies in the Corporate Leaders Group on Climate Change is over £300 billion. Together they employ over 850,000 people.

1. Overview of Johnson Matthey plc

Johnson Matthey is a FTSE100 specialty chemicals company focused on its core skills in catalysts, precious metals, fine chemicals and process technology. Headquartered in the UK, Johnson Matthey has operations in over 30 countries and employs around 7,800 people. Its products are sold across the world to a wide range of advanced technology industries.

The group's principal activities are the manufacture of autocatalysts, heavy-duty diesel catalysts and pollution control systems, catalysts and components for fuel cells, catalysts and technologies for chemical processes, fine chemicals, chemical catalysts and active pharmaceutical ingredients and the marketing, refining, and fabrication of precious metals.

Johnson Matthey has continued to develop its technology for almost 200 years, demonstrating the company's ability to maintain world leadership by adapting constantly to rapidly changing customer needs. Rigorous in its own environmental policies, many of Johnson Matthey's products have a major beneficial impact on the environment and enhance the quality of life for millions around the world.

The company is organized into three global operating divisions: Environmental Technologies, Precious Metal Products and Fine Chemicals and Catalysts. More information about these Divisions and our products can be found in Appendix 1.

2. Regulation, Environmental Management & Business Opportunity

Many Johnson Matthey technologies have been developed in response to the global need for cleaner air, greater resource efficiency and a reduction in greenhouse gas emissions. We have found that where strong and consistent government actions have created new market opportunities for products that provide environmental benefits, business has invested to develop and deploy these new products. These investments have not only allowed environmental goals to be met surprisingly cost effectively they have delivered competitive advantage to the companies involved. The environmental challenge of reducing carbon dioxide emissions, in particular, is extremely large. Although this may lead to substantial costs, it is our experience that it can also create correspondingly large opportunities for industry. Competition to seize these opportunities leads to investment by industry in better technologies that can reduce the costs significantly. I am convinced that there is no inherent contradiction between regulating for high environmental standards at the same time as maintaining economic competitiveness and stimulating wealth creation. Indeed, I believe that good regulation is an area of strategic importance to business.

It has been Johnson Matthey's experience that, for maximum effectiveness, a combination of financial and regulatory initiatives are required. Government regulation is of particular importance in the environmental sector. Environmental benefits are a social, rather than an individual, good and consumers – as individuals - typically will not drive development of the market alone.

For example, the US Federal Clean Air Acts and the Californian Zero Emission Vehicle Mandate were instrumental in creating the global market for automotive emission control catalysts and for automotive fuel cell development respectively. In the USA, where vehicle emissions controls were first introduced in 1970, until 2002 the US population *increased* 38%, vehicle miles travelled *increased* 155% and GDP increased 164%. However over the same period total acid gas emissions *decreased* by 31%. A California study suggests that the benefits (cost savings) to public health have been 50 times greater than the cost of the introducing the emission control measures. So it is important to look at direct and indirect benefits of legislation.

Comparable regulation in Europe was weaker and for a long time retarded the development of European adoption of automotive catalyst in the same vehicles, but we eventually followed the Californian lead; in the first twelve years from 1990 it led to reductions in NOx levels from a petrol car and particulate emissions from a diesel for example, by more than 80% in just twelve years.

Voluntary Agreements also have their place, and can contribute to environmental improvements, but by their very nature do not provide the same incentives to achieve targets that legislation provides. This weakens the investment case for new technologies and slows down technical progress.

In order to tackle the rise in transport emissions, a voluntary agreement was signed in 1998 between the European Automobile Manufacturers Association (ACEA) and the European Commission to limit the amount of CO_2 emitted by passenger cars sold in Europe. The agreement seeks to achieve a fleet average of 140 g/km CO_2 by 2008 for new passenger vehicles sold by the association's members in Europe, representing a 25% reduction from the 1995 level of 186 g/km. This was intended to cover the foundation work needed to reach an EU Target of average CO_2 emission of 120 g/km by 2012.

However, having achieved only 160 g/km in 2005, the ACEA agreement has come under fire for likely failing to achieve its target. Consequently, in February 2007 the Commission proposed **binding legislation** on the car manufacturers to reduce their average new passenger car fleet emissions to 140 g/km by 2008 and to 130 g/km by 2012, alongside complementary measures to give a further 10g/km reduction in real terms

The effect of this forthcoming binding legislation was clearly demonstrated at the Frankfurt Motor Show in September of this year, where all major automobile manufacturers showcased new lower emission vehicles combining excellent performance with fuel economy using a wide range of advanced technologies.

Where a legal framework is in place or at least being discussed and firmly anticipated, as with forthcoming Euro 5 passenger car emissions limits, companies are able to plan their investment strategies, which can lead to new products being voluntarily brought to market earlier than legally required. A recent example of this is that of diesel particulate filters, which automakers are already fitting as standard in some vehicles, even though the legislation may not take effect until 2009 or 2010. This is a clear example of a long-term view being beneficial to all concerned: the legislators take time to produce good legislation; manufacturers have time to invest wisely; and the public and the environment benefit from early implementation of a new technology. In this example the consumer is also playing an active role by demanding vehicles equipped with diesel particulate filters, especially in Germany and the Benelux countries which had well publicised problems with diesel emissions in their large cities in summer 2005. It also interesting to see a number of cities,

most notably London, applying 'forward technology' to existing vehicles – creating in effect a new market and economy.

Policy and regulations must be carefully constructed so that it is aimed directly at the outcomes it seeks to drive, independent of the choice of technology solutions. For instance, when considering climate change, achieving a reduction in CO_2 emissions is more important than whether the technology is defined as renewable. It is also worthwhile noting that legislation can pull in more ways than one, and nowhere is this truer than with the automotive industry, reducing emissions on one hand and increasing safety on the other. The added weight of new safety features can make it more challenging for manufacturers to reduce vehicle emissions. The task for us in the environmental industry is to ensure that our efforts enable the challenges to be met.

a Corporate Leaders Group Recommendations

Although consultation with industry is required to ensure that workable regulation is introduced, tightening environmental regulation is not always viewed negatively by industry. The **Corporate Leaders Group** co-ordinated the publication of an open letter to the Prime Minister in June 2005 in which the Chief Executives of twelve UK FTSE 100 companies (including Johnson Matthey) gave their support to well-signposted and effective regulation necessary to reduce CO_2 emissions.

A year later we wrote again outlining our belief that the UK should show leadership in the European negotiations over Phase 2 of the Emission Trading Scheme by taking on challenging targets, and we were delighted when they subsequently capped UK CO_2 emissions at the higher end of the range proposed in the Government's Consultation on the National Allocation Plan.

Similarly, in our 2006 letter to President Barosso of the European Commission, the EU CLG wrote:

> "*As the United Nations Framework Convention on Climate Change (UNFCCC) has agreed, the international community needs to stabilize global greenhouse gas emissions at levels that prevent dangerous climate change. We note that in March 2005 EU Heads of State and Government called for developed countries to consider emission reduction pathways beyond 2012. We also note that scientific opinion across the world is virtually unanimous in agreeing on the urgent need to stabilise the concentration of atmospheric greenhouse gases at a sustainable level. As business leaders, our concern is with how we can help bridge the gap between today's economy and the lower carbon future that will be needed to reach these goals.*

Many companies have already made significant investments in low-carbon technologies, processes and products. However, to promote the necessary step-change in investments in low-carbon goods and services, a strong and clear [domestic and international] *policy framework that creates long-term value for carbon emissions reductions is required".*

In order to achieve medium and long-term goals, for example Kyoto's 2020 & 2050 CO_2 targets, it is vital that legislative (and other) activity starts now and demonstrates consistent long-term aims. For example, construction of a hydrogen or any other low carbon energy infrastructure will take up to fifty years and clear signals are vital now in order to commence investment in this process.

3. New Technology is the Key to the Low Carbon Economy

I believe that investing in new technology is the key both to solving the world's energy problems and to mitigating negative effects of Climate Change, and that the innovation associated with tackling climate change could trigger a new wave of growth and creativity in the global economy. It is about "Doing More with Less", the catchphrase of the UK government Business Taskforce on Sustainable Consumption & Production, which I currently Chair.

The UK Government's Stern Review into the Economics of Climate Change concludes that markets for low carbon energy products are likely to be worth "at least $500 billion per year by 2050, and perhaps much more" and recommends that "individual companies and countries should position themselves to take advantage of these opportunities". Johnson Matthey has a range of products that offer such sustainable solutions and is developing new technology to meet the challenges associated with meeting our future energy needs.

Stabilising and ultimately reducing the world's CO_2 levels will require massive changes right across the energy supply, generation and distribution network. The efficiency balance between central and distributed power generation is an important factor, as is the capture of CO_2 when it is produced. Bringing about energy efficiency improvements and mitigating the CO_2 problem whilst securing energy supplies will require a number of innovative technology approaches.

Johnson Matthey's response to Climate Change and Sustainability Concerns

At Johnson Matthey we have two strands to our climate change and sustainability strategy. The first is, of course, to continually improve the resource efficiency in our factories and offices, driving down the amount of the resources per unit output. This puts money directly onto our bottom line. The second strand is about R&D and new product design. We seek to develop products for our customers that not only use fewer resources in production but also give our customers sustainability benefits in use, therefore providing competitive advantage and enhancing margins. Both make good business sense.

Many of the products that we make are very beneficial to the environment and we are committed to developing more technologies that we believe will be instrumental in enabling others to reduce their carbon footprint. We believe that a Low Carbon Economy will make considerable use of Hydrogen, and many of our catalyst products are positioned at this transition, some of which are described below.

We produce a range of catalysts & process technologies for **the generation of hydrogen gas** from fossil or biofuels that have many applications and a wide range of purification catalysts used to remove contaminants such as chlorine, sulphur and mercury from gaseous and liquid hydrocarbons.

We also develop products for the **abatement** of the harmful **greenhouse gases** (e.g. N_2O) produced by some industrial processes, as well as catalysts that enable "Clean Coal Technology", whereby CO_2 is separated out so that it can be sequestered either being used to improve yields from oil fields or stored underground in exhausted wells.

Johnson Matthey's autocatalyst business continues to contribute to the global effort to reduce CO_2 emissions, as well as a reduction in particulate and acid rain emissions. A **diesel-powered vehicle** emits 19% less CO_2 than the petrol-equivalent, or approximately 0.7 Tonne CO_2 per passenger car per year. We have invested heavily in the technology to develop exhaust catalysts that ensure that diesel-powered vehicles are as clean in their NOx & Particulate emissions as petrol-driven vehicles. This has been instrumental in increasing the percentage of diesel vehicles in the European fleet to approximately 50% market share with no detrimental impact on air quality.

Fuel cell technology is ultimately by far the most efficient way of producing electricity from hydrogen, the only by-product being pure water. Fuel Cell hybrid cars are the logical development of

today's fuel efficient petrol hybrids and offer zero emissions. Fuel cells are also particularly suited to distributed generation since they are highly efficient, quiet, non-polluting and are scalable from watts to mega watts. Their waste energy is highly suitable for use for heating or cooling purposes. Through its dedicated Fuel Cells business, Johnson Matthey is developing enabling technology for this new industry. However, even with the increased efficiency of fuel cells, a truly sustainable hydrogen economy will require that the hydrogen is produced from renewable resources such as biomass or renewable electricity and our scientists are working on a range of applications in this area.

Development of these new Technologies is an integral part of the Johnson Matthey Sustainability Strategy which I believe will ensure our business continues to grow up to our 200th anniversary in 2017 and beyond.

4. Overcoming Barriers to Market for New Technology

Many of Johnson Matthey's new environmental products discussed in the previous section are still pre-commercial. Tremendous hurdles have to be overcome in order to bring any new product to market and, never more so than in the environmental sector, where the main benefit is to the community at large rather than the individual customer. This is invariably heavily influenced by government legislation. In simple terms, whilst production volumes remain low, costs will remain high leading to high payback periods for potential customers. High upfront capital investment is generally required to scale up production to bring unit costs down and a high degree of market certainty is thus required to persuade corporations & the investment community that it is worth the risk.

Legislation which provides market certainty can dramatically reduce this risk profile. Therefore, an on-going cycle of discussion between those who frame new laws and directives, and those whose technical expertise will enable requirements to be met is required ensure the markets can be created in a way to allow business to sensibly invest in this new technology.

For example, Johnson Matthey has recently developed catalyst technology that has the capability to achieve up to 90% reductions in N_2O emissions in both nitric acid and caprolactam manufacturing processes. In the last year we have seen the market for our N_2O abatement catalysts rapidly grow in developing nations through the incentives offered to the nitric acid industry by the Kyoto Clean

Development Mechanism, but eradicated in Europe by the failure of the European commission to include N_2O emissions in the European Trading Scheme.

More generally, the **Corporate Leaders Group** was instrumental in encouraging UK government to lobby for stretching targets for phase 2 of the EU Emissions Trading Scheme, recognising that is has been critically important for providing a central signal to European business about the rising cost of carbon. We strongly support measures to strengthen & broaden its impact and to set long-term term targets, out to 2025, injecting a greater degree of certainty in the future to business stimulating new cycles of innovation & markets for new environmental technologies. However its main impact in the short term is likely to be to incentivise the uptake of the cheaper existing abatement options.

a Corporate Leaders Group Recommendations

In addition to such cap-&-trade schemes, there is a need to introduce policies capable of triggering step-changes in technology development in areas such as carbon capture and storage, hydrogen storage, tidal and wave generation and new transport technologies. The Corporate Leaders Group believes that there is a need to explore how best the development of these technologies can be catalysed, and we are offering to work with the Government to assess a range of policy approaches including public investment in infrastructure, progressive 'stretching' regulations and **forward commitment procurement**.

For example, many promising low carbon technologies such as fuel cells and energy efficient LED lighting need further investment to bring down costs and enable them to be commercialised. R&D is relatively cheap and leads to many prototype products but frequently these do not make it to market because the expense of demonstrating products and scaling-up production is not justified by the future sales prospects. . In the private sector, supply chain management techniques allow suppliers to make these investments by clearly articulating future needs and providing a credible indication of future sales. Public sector procurement has the potential to play a key role in creating markets for low carbon products and services at little risk by using the forward commitment procurement techniques common in the private sector. Conceptually the process is simple: a government department or agency offers to buy in the future a product or service which delivers specified carbon emission benefits at a defined volume and at a cost that it can afford. Suppliers can invest against the certainty of this early market to deliver a cost effective product and have the reasonable expectation that low carbon products will be preferred by the wider market once they are shown to have no disadvantages. Governments have in the past done this supply chain management

successfully in areas of national importance such as defence. By providing low carbon products with early markets in which low carbon characteristics are a competitive advantage public procurement can transform their prospects in the wider market and create the investment case for their rapid development and deployment. Procurement policy is an attractive mechanism because of the scope to apply it to many different areas quickly and flexibly in a way not always possible through the use of legislation. Used in conjunction with progressive product standards it can be especially effective.

5. International Partnerships required to mitigate Climate Change

Climate Change effects know no boundaries between countries & governments, private & public sector, rich & poor, though the poor an invariably least well-positioned to defend themselves. With great wealth & power comes great responsibility to care for our planet and the well being of future generations.

To coin a phrase, I heartily believe in "Doing Well by Doing Good". I am here today to encourage the US government to work in partnership with international business to create markets for the new technology that will enable us to reduce the global carbon footprint by > 50% by 2050.

The two key market instruments I commend to you to achieve this are those of good regulation capping and trading emissions, and forward commitment procurement.

The economic costs of adapting to unconstrained climate change could far outweigh the costs of mitigation. The UK Stern Review, for example, calculated that the costs of inaction could result in the lost of 20% of global GDP (equivalent to the two World Wars and the Great Depression combined). In contrast, Stern calculated that to mitigate climate change might cost just 1-2% of global GDP. It is this "no-brainer" which option that business would chose.

NAP Carson
Johnson Matthey Plc

Appendix 1: Overview of Johnson Matthey plc

Johnson Matthey has operations in over 30 countries and employs around 7,800 people. Its products are sold across the world to a wide range of advanced technology industries. Headquartered in Royston, Hertfordshire, UK, the company is organized into three global operating divisions: Environmental Technologies, Precious Metal Products and Fine Chemicals and Catalysts. More information about these Divisions can be found in Appendix 1.

Precious Metal Products

Precious Metal Products Division is organized into three groups; Platinum, Colour Technologies and Gold and Silver.

Our platinum business consists of our worldwide platinum marketing and fabrication activities. Marketing is headquartered in Royston, UK with support facilities in Philadelphia and Hong Kong. We are the world's leading distributor of platinum group metals (pgms) and the sole marketing agent for Anglo Platinum, the world's largest producer of platinum. Our platinum fabrication business makes a wide range of platinum group metal products primarily in the UK and USA. Our Pgm Refining business recovers pgms from spent catalysts and other secondary materials and refines primary pgms from global mining operations. It has refining facilities in the UK and USA.

Headquartered in the Netherlands, our Colour Technologies business manufactures black obscuration enamels and silver conductive materials for automotive glass. It also makes colors, enamels and decorative precious metal products for other glass applications such as bottles and architectural glass as well as for tableware and other ceramic applications.

Gold and Silver comprises our gold and silver refining and bullion manufacturing operations. Johnson Matthey is a market leader in the refining of gold and silver. The business serves the world's mining industries and recycles secondary scrap material. We are also a leading manufacturer of high purity small gold bars for investment and jewellery manufacture. Gold and silver refining operations are located in the USA and Canada.

Fine Chemicals and Catalysts

Fine Chemicals & Catalysts Division is a global supplier of specialty chemical products and services to the fine chemicals and pharmaceutical industries. Its Catalysts and Chemicals business

manufactures base and precious metal catalysts and chemicals from its facilities in the UK, USA, Germany, India and China.

The division's Macfarlan Smith (UK) and Pharmaceutical Materials and Services (USA) businesses manufacture active pharmaceutical ingredients (APIs) and provide services to pharmaceutical companies through every phase of the development and commercial manufacture of a pharmaceutical product. Both businesses specialize in the manufacture of low to medium volume, high value products, especially controlled drugs and provide a full range of commercial scale manufacturing services for APIs to both generic and branded pharmaceutical companies.

The Research Chemicals business is a catalogue-based supplier of specialty inorganic and organic chemicals. It operates under the Alfa Aesar brand name and is based in the USA and the UK.

Environmental Technologies Division

Environmental Technologies Division is focused on technologies concerned with protecting the environment such as pollution control, cleaner fuel, more efficient use of hydrocarbons and the hydrogen economy.

The division operates globally under the market identity of Johnson Matthey Catalysts and consists of three separate business units. Johnson Matthey's Emission Control Technologies (ECT) business, which manufactures catalysts for automobile emission control and the reduction of emissions from industrial processes, the Fuel Cell business which manufactures fuel cell catalysts and catalyzed components and the Process Technologies business comprising the Syngas & Gas to Liquids (GTL), Refineries & Gas Processing, Davy Process Technology and Tracerco businesses.

ECT comprises Johnson Matthey's global autocatalyst, heavy duty diesel and stationary source emissions control businesses. Johnson Matthey are a world leading manufacturer of catalysts for vehicle exhaust emission control and a leader in catalyst systems for the reduction of volatile organic compound emissions from industrial processes. Manufacturing takes place in the USA, UK, Belgium, Mexico, Argentina, South Africa, Japan, Malaysia, India, China and South Korea. A further plant is nearing completion in the Russian Federation. R&D facilities are located in the USA, UK, Sweden, Japan and Brazil.

Process Technologies manufactures base and precious metal process catalysts for the syngas, coal to chemicals, gas to liquids (or GTL), oil refineries and gas processing industries. It has manufacturing facilities in the UK and India. Davy Process Technology develops chemical process technologies and licenses them to customers in the oil, gas and petrochemical industries. It is headquartered in

London and has an extensive R&D centre in Stockton-on-Tees, UK. Our Tracerco business is an industrial leader in specialist technology for the diagnostics, measurement and analysis of process plant conditions across the hydrocarbon chain.

Johnson Matthey Fuel Cells is the world's leading producer of precious metal catalysts and catalyzed components for fuel cell applications, specializing in membrane electrode assemblies (MEAs), anode and cathode catalysts, fuel processor catalysts and coated components for the complete fuel cell system.

Appendix II: Personal Biography of Neil Carson

Neil Carson joined Johnson Matthey in 1980. He was appointed Division Director, Catalytic Systems in 1997 after having held senior management positions in the Precious Metals Division as well as Catalytic Systems in both the UK and the USA.

Neil was appointed to the board of Johnson Matthey as Managing Director, Catalysts & Chemicals in August 1999 and additionally assumed board level responsibility for Precious Metals Division in August 2002. He was appointed as Chief Executive in July 2004. He is currently the Chairman of the Business Taskforce on Sustainable Consumption and Production and is a member of the management committee for the Prince's Business & the Environment Programme.