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Academy Awards celebrate UK engineering

The annual Academy Awards dinner was held at the Imperial War Museum in London on 9 June 2009. The event's top awards were presented by Senior Fellow HRH The Duke of Edinburgh and the evening was compered by BBC News 24 presenter Nicholas Owen and science journalist Vivienne Parry.

The most anticipated award of the night was the MacRobert Award, the highest accolade in UK engineering, which offers the winner £50,000 and a solid gold medal. The winner of the 40th MacRobert Award was a team from engineering group Arup for the design and construction of Beijing's 'Water Cube' Olympics aquatics centre.

The concept of the Water Cube is based on that of a self-regulating greenhouse, clad in inflated bubbles of lightweight ETFE material arranged in a geometric pattern based on studies of soap foam. The building has an impressively low carbon footprint and set milestones in the use of virtual prototyping and the use of holistic design methods. The Duke of Edinburgh presented the award to Project Director Tristram Carfrae, Structural Engineer Mark Arkinstall, Building Modeller Stuart Bull, Sustainable Energy and Facade Engineer Haico Schepers, and Fire Engineer Marianne Foley.

The MacRobert Award finalists were QinetiQ, for its Tarsier airport runway detection system; Rolls-Royce for its Trent 900 aero-engine; and Cambridge-based Orthomimetics, for Chronromimetic, an implant that allows soft tissue and bone to regrow after injury.

Other awards presented included the Public Promotion of Engineering Medal, which went to Cardiff-based initiative *Engineering Explained*. The aim of the initiative is to inspire young people about engineering through interactive presentations and by demonstrating how it influences all aspects of life, from music to cooking food. The award was presented by Professor Lord Robert Winston HonFREng to Huw James from *Science Made Simple*, the organisation behind *Engineering Explained*.

Also announced were the winners of this year's Silver Medals, which recognise outstanding contributions to UK engineering that have resulted in commercial success. The 2009 winners were: Andrew Graham and Dr Rob Buckingham from OC Robotics, for their work on commercialising snake-arm robots; Andrew Livingston FREng, for bringing several of his inventions successfully to market; Ian Pratt of Citirix Systems, for his work on establishing a holistic approach to software design; and Professor Nicholas Warrior, for applying research in composite materials in the automotive market.

The President's Medal, presented to an organisation or individual that has made a significant contribution to the aims of the Academy, was presented by Lord Browne of Madingley to Sir Alan Rudge CBE FREng FRS, chairman of the ERA Foundation.

The winner of the 2009 International Medal was former President of India Dr A P J Abdul Kalam, recognising his success in bringing science and engineering to the heart of Indian society.

The Awards were made possible through the support of main sponsors BAE Systems, with support also provided by Bosch, Shell, Arup, BP, E.ON, and Thales.

For more information on the Academy Awards 2009 and to see a video of the evening, visit:

www.raeng.org.uk/prizes/awards

The team that led the design for Arup's Water Cube aquatics centre (right), won the 2009 MacRobert Award



The President's column



Lord Browne and Abdallah Jum'ah, former Chief Executive of Saudi Aramco, answer questions at the annual International Lecture, held at BMA House in London on 17 June 2009

As engineers, we don't need to imagine what this country would be like without our profession; society as we know it would soon grind to a halt. Critical infrastructure would crumble and fall apart; telecommunications would cease to function, affecting emergency and health services; there would be no energy production, no electronic payments, no television, radio or internet. All the things we rely on to live our modern lives would disappear.

It is clear, then, just how crucial engineers and engineering are to the functioning of UK society. Yet little credence is given to this in the wider world and one of the Academy's most important tasks is to promote the fact that engineers are a vital part of any developed nation's stability and an important source of growth and development into the future.

Engineers are, by training, innovators. Nowhere is this better demonstrated than in recent advancements in medical care, with the introduction of techniques such as robotic surgery and replacement body parts. Orthomimetics, one of the finalists for this year's MacRobert Award, is pioneering the development of bioactive scaffolds to speed natural regeneration of bone and soft tissue after joint injuries, avoiding the need for joint replacement surgery.

New methods to ameliorate climate change are also high on our industry's agenda, including more efficient solar panels, viable hydrogen fuel cells for our cars and of course creating a smart electricity grid that can better accommodate renewable energy sources.

In recent decades the UK has moved away from high-volume manufacturing to more specialised hi-tech manufacturing and knowledge-based services. In order to remain globally competitive, we as a nation must continue to exploit what we do best: technological innovation as well as refinement of the methods used to design and manufacture goods. Engineers offer the expertise needed to ensure that the national economy benefits from and exploits this evolution in our industrial culture.

Building such an economy will require engineering skills at every level but currently there are simply not enough engineering graduates emerging from UK universities. The number of young people finishing degrees in engineering and technology has increased by just over 2% in the last five years and funding for engineering degree courses is still running below the level needed to meet future requirements. Academia and business need to develop more effective ways of working together to ensure that the needs of industry are met in terms of skilled engineers and the knowledge they possess. Experience-based courses are a practical way to ensure the UK has a large base of engineers able and willing to build a hi-tech economy and the Academy is well placed to act as an intermediary to achieve this.

Through its research posts, secondments and placements, often jointly funded with industrial partners, the Academy is able to offer a connection between universities and the commercial world, providing valuable experience to up-and-coming engineers as well as those already advanced in their careers.

Ultimately, however, the creation of a highly skilled, practically experienced engineering workforce begins with the very young. The Academy has a huge role to play in inspiring young people to take up careers in engineering, through the use of interactive projects, talks in schools from excellent role models, and practical demonstrations of the benefits that engineering brings to society.

Initiatives such as the London Engineering Project, now being rolled out nationally, help to promote engineering in the classroom and the new 14-19 Diploma in engineering, which entered classrooms in September 2009, is already providing a hands-on route into vocational training and higher education in engineering.

Engineering is central to the development not only of this country, but the entire world. By investing in the necessary programmes now, we can ensure stability and success into the future.

Meetings and visitors

The President recently met:

HRH The Duke of Edinburgh Senior Fellow

Lord Baker of Dorking Chairman, Graphite Resources plc

Professor William M Banks FRSE President, Institution of Mechanical Engineers

Professor Lorna Casselton FRS Vice-President, Royal Society

Michael Franklin Director, Lloyd's Register Educational Trust

Dr Paul Golby FIET FIMechE Chief Executive, E.ON

Dr Tony Hayward Chief Executive, BP plc

Lord Rees of Ludlow OM Kt HonFREng President, Royal Society

David Moorhouse CBE Chairman, Lloyd's Register

Professor Adrian Smith FRS Director General, Science and Research, DIUS

Sir Martin Taylor FRS Physical Secretary and Vice-President, Royal Society

Dr Jean Venables OBE FREng President, Institution of Civil Engineers

Is nuclear energy the future?

The energy challenges of the 21st century are global and an escalating world population will increase the stresses on resources – but nuclear power could provide one answer to the problem of ensuring cheap supplies of energy in the future, argued Dr Sue Ion OBE FREng at the annual Lloyd's Register Educational Trust (LRET) lecture in April 2009.

Dr Ion, a former Group Director at British Nuclear Fuels and past vice-president of the Academy, outlined the current state of the global energy market, in particular the need to ameliorate climate change and ensure the security of energy supplies, stressing that nuclear energy has a key role to play in addressing both issues.

She presented figures that show nuclear power's carbon footprint to be equivalent to that of wind power and showed that nuclear power would offer the UK greater self-



Dr Sue Ion OBE FREng

sufficiency, with nuclear energy acting as a buffer to the fluctuating costs of imported fossil fuels.

"Our future electricity must be low-carbon, safe and secure, and deliverable in large quantities to meet the demands of a 21st century industrialised society. For me that means it ought to be nuclear," she said.

Dr Ion reassured the audience that there are ample supplies of uranium for coming generations.

She also reiterated her view that a dedicated nuclear programme will benefit the national economy and provide a much-needed boost to the engineering profession.

Bionic hand is a model for innovation

The directors of a small Scottish company that made the world's first fully articulated bionic hand presented their story at the annual joint lecture held in March 2009 by the The Royal Academy of Engineering and Royal Society of Edinburgh.

Touch Bionics, which won the prestigious MacRobert Award in 2008, developed a prosthetic hand that no-one thought was a marketable possibility. With five individually powered digits, the i-LIMB Hand is a fully articulated replacement for lost limbs that allows wearers to carry out dexterous tasks like opening cans of fizzy drink and even peeling a banana.

Previously, development of prosthetic hands focused on an outdated 'claw' design that gave patients limited control and manoeuvrability.

Hugh Gill, Touch Bionics' Director of Technology and Operations, and Philip

Newman, Director of Marketing, outlined how they managed to bring to market one of the most important innovations of recent times and transform the company into a successful business.

Philip Newman described the development of the i-LIMB from a prototype through to the fully developed product it is today. By entering the US market early, Touch Bionics managed to make breakthroughs even when they had no previous sales at all. Trials took place in conjunction with several large US companies, helping to drive improvements in the technology while forming business partnerships.

To promote the i-LIMB before going to market, Touch Bionics recorded testimonials from trial patients, using YouTube and even uploading footage to satellites for media agencies to download.

HM The Queen's Birthday Honours 2009

Knight Bachelor

Professor William Arnot Wakeham – Vice-Chancellor, University of Southampton. For services to chemical engineering and to higher education.

Commanders of the Order of the British Empire (CBE)

Martin Barnes – for services to civil engineering.

Professor Lynn Faith Gladden – Shell Professor of Chemical Engineering and Head of Department of Chemical Engineering and Biotechnology, University of Cambridge. For services to science.

Peter Saraga – Vice-President, Royal Academy of Engineering and lately President, Institute of Physics. For services to science and to engineering.

Ian Shott – for services to the chemical engineering industry.

Officer of the Order of the British Empire (OBE)

Professor Peter Mitchell Grant – Regius Professor of Engineering and Electronics, University of Edinburgh. For services to science.



The i-LIMB Hand can perform dexterous tasks

Development

Closer ties with Sharjah

Following the establishment last year of formal ties between the Academy and the American University of Sharjah, a delegation from the Academy travelled to the emirate of Sharjah for discussions on future relations between the two institutions .

Dr Sheikh Sultan Bin Mohammed Al Qasimi, United Arab Emirates Supreme Council member, Ruler of Sharjah and President of the American University of Sharjah (AUS), welcomed a delegation from the Academy in May to discuss plans to take forward the memorandum of understanding signed between the AUS and Academy in November 2008.

The Academy delegation was led by past president Lord Broers FEng FRS, Dr Chris Elliott FEng, Hermann Hauser FEng, and Academy Chief Executive Philip Greenish CBE. The discussions were helpful in paving the way for a joint Sharjah research programme.

Dr Peter Heath, Chancellor of the AUS, and Hamid Jafar, member of the AUS Board of Trustees, were also present at the meeting.



The Academy delegation with Dr Sheikh Sultan Bin Mohammed Al Qasimi

Funding in place for new Academy scheme

The Academy's *Making Things Better* campaign has announced a funding partner to support a new postgraduate scheme.

The Academy campaign continues to grow and has announced Petrofac as a new partner. Petrofac is a leading international provider of services to the oil and gas production industry, including the engineering and design of oil platforms, and has generously committed £250,000 funding over three years to support a new postgraduate fellowship scheme.

Starting in September 2009, up to six fellowships will be offered each year to

selected graduate engineers wishing to study for a one-year full-time Masters degree on pre-agreed courses in applied engineering technology subjects.

In addition to offering funding to graduates, the scheme also helps to address the long-term need for highly skilled engineers in the UK. A large number of applications were received within days of the scheme being announced.

The new partnership and scheme were made possible by Malcolm Brinded FEng, who introduced Petrofac's Group Chief Executive, Ayman Asfari, to the campaign team.

Campaign dinner



Sir John Parker FEng and Vincent de Rivaz

A dinner hosted by an Academy Fellow helped to boost the profile of the Academy's *Making Things Better* campaign and provide a glimpse of the Academy's future plans.

Sir John Parker FEng, Chair of the Academy's £25 million *Making Things Better* campaign, hosted a dinner in April 2009 on the theme of the UK's energy mix and carbon reduction targets. He used the opportunity to outline the campaign and to share the vision of a forum for engineering at 3 Carlton House Terrace.

APEG news

In March, the Associate Parliamentary Engineering Group heard Lt Col. Rufus McNeil OBE, from 13 Air Assault Support Regiment, address a joint meeting of APEG and the All-Party Parliamentary Group for the Army on the subject of transporting a turbine across a war zone to the Kajaki Dam in Afghanistan. In April, Ian Pearson MP, BERR Economic and Business Minister and Economic Secretary to the Treasury, spoke at the APEG Annual Dinner.

In May 2009, Phil Willis MP, Chairman of the Innovation, Universities, Science and Skills Select Committee, along with Cambridge University lecturer Dr Geoffrey Parks and Professor Mike Cook, Imperial College London Visiting Professor, spoke on the question of whether UK universities are up to the challenge of educating a new generation of engineers. The group heard a lecture from John Armitt, Chairman of the Olympic Delivery Authority, in June 2009. Mr Armitt spoke on the engineering aspects of delivering the London 2012 Olympics.

News of Fellows

Professor Graham Davies FREng was awarded the Platinum Medal by the Institute for Materials, Minerals, and Mining.

Professor John Dodds FREng was awarded the honour Chevalier in the Order of the Palmes Academiques by the French Government.

Professor Vincent Fusco FREng was elected to the Royal Irish Academy of Engineering.

Anne Glover HonFREng was reappointed to the Technology Strategy Board.

Professor Dame Wendy Hall FREng was elected a Fellow of the Royal Society.

Richard Maudslay CBE FREng was appointed Chairman of the National Nuclear Laboratory.

Dr Daniel McCaughan OBE FREng has been appointed an Honorary Professor at Queen's University, Belfast.

Professor David Nethercot OBE FREng was awarded the Institution of Structural Engineer's Gold Medal.

Professor Roderick Smith FREng was elected Deputy President of the Institution of Mechanical Engineers. He was also appointed chair of the H52 Expert Challenge Panel for a new UK high-speed rail line.

Professor Christopher Snowden FREng FRS was appointed to the Technology Strategy Board.

Professor Brian Spalding FREng received the 2009 Global Energy International Award from Russian President Dmitry Medvedev at the International Economic Forum.

Professor Michael Sterling FREng has been nominated to become Chair of the Science and Technology Facilities Council. The current post holder is **Peter Warry FREng**.

National prize for Research Fellow



Dr Eleanor Stride (second from right) displays her winner's medal along with the other SET for Britain medallists and Doug Naysmith MP (left) and Brian Iddon MP (right)

An Academy Research Fellow has won a national engineering prize for her work in ultrasound imaging and therapy.

Dr Eleanor Stride won the £3,000 Engineering Prize and Medal in this year's SET for Britain competition, for her research into the characterisation and design of microbubble agents for use in ultrasound imaging. Dr Stride is an Academy/EP SRC Research Fellow at University College London.

SET for Britain is a nationwide competition that is open to all early career research scientists, engineers and technologists. This year the event was held at the House of Commons in March and provided an excellent opportunity for presenters to discuss their research with local MPs and scientific peers.

The day was divided into three sessions – Biological and Biomedical Science, Physical Sciences, and Engineering – with 60 submissions presented in each. Prizes are sponsored by various academies and institutions and The Royal Academy of Engineering sponsored the prizes for engineering.

The engineering section had 160 initial entries, ensuring a highly competitive selection process. The judging panel, chaired by Professor Liz Tanner FREng, was responsible for selecting four outstanding presentations on the day.

The Academy's Chief Executive, Philip Greenish, presented three runner-up prizes of £1,000 each to Dr Dan Allwood from Sheffield for his research on magnetic nanowires; Dr Rebecca Cain from Warwick for her methods on producing positive sound in urban spaces; and Dr Ruth Oulton from Bristol for her research on spins and light for quantum computing.

To commemorate the event's founder, Dr Eric Wharton, a new medal was struck, the Westminster Medal, which was awarded to Dr Marina Kuimova from Imperial College London for her research on microscale viscosity and disease.

Call for Fellows with Middle East experience

The Middle East will be a focus for Academy policy activity this year and on into 2010. As an initial step, the Academy will shortly be holding a stakeholder meeting for Academy Fellows with strong experience and interest in the region, with the aim of mapping out the potential for Academy policy activity in areas such as oil and energy, water, defence, infrastructure, and education.

For further information, contact Cuong Dang at cuong.dang@raeng.org.uk

International

Euro-CASE conference

A report of the first annual conference of Euro-CASE, the umbrella organisation of European national academies of engineering, has found that a lack of political endeavour could damage chances of meeting carbon reduction targets.

The inaugural conference was hosted by the Academy on the topic of the European Union's 20:20:20 renewable energy targets – the commitment to meet 20% of Europe's total energy needs from renewable sources by 2020. The conference was chaired by Academy President Lord Browne FREng FRS, and EU Energy Commissioner Andris Piebalgs delivered the keynote speech.

The conference identified a lack of political will as the greatest threat to achieving these targets and called for greater engineering input at every stage of European and national policy development. Delegates urged governments to rapidly develop principles of systems thinking about national energy infrastructures and pan-European dependencies.

Reports can be obtained from Acting International Manager Shane McHugh (shane.mchugh@raeng.org.uk), while electronic copies of the reports, video footage of the keynote speeches and all powerpoint presentations are available at www.raeng.org.uk/links/international/eurocase

Briefing on EU innovation



Professor Julia King CBE FREng gave the keynote speech at the briefing of the EIT

The Academy hosted a briefing for UK stakeholders in the European Institute of Innovation and Technology (EIT) in March 2009. The EIT aims to change the landscape of European innovation by introducing dedicated knowledge networks spanning academia, business, and research.

EIT Governing Board member Professor Julia King CBE FREng was the keynote speaker of the event, which was chaired by Professor Richard Williams OBE FREng. Presentations were also given by Gary Logan from the Department for Innovation, Universities, and Skills and Graham Mobbs of the Technology Strategy Board. The briefing was attended by stakeholders from Government, academia, research, and industry.

The institute hopes to achieve its aims through the establishment of Knowledge and Innovation Communities (KICs). These are highly integrated public-private networks of universities, research organisations and businesses across the European Union, which will be focused in three broad thematic areas: Sustainable Energy, Mitigation and Adaptation of Climate Change, and the Future Information and Communication Society. The EIT Governing Board has now launched a call for proposals across these three thematic areas and aims to select the initial two or three KICs by January 2010.



Former Indian President Dr A P J Abdul Kalam was awarded the 2009 Academy International Medal, for his work in placing engineering at the heart of Indian society and Government

Australian workshop

John Loughhead FREng represented the Academy at a workshop about accelerating technological change for low-carbon energy held by the Australian Academy of Technological Sciences and Engineering in Melbourne.

There is now increased Australian interest and investment in low carbon technologies, especially carbon capture and storage. Among other overseas Academies who participated were the Canadian Academy of Engineering, the Spanish Academy of Engineering and the Engineering Academy of Japan.

Public Engagement Fellowship



Dr David James

The Academy has awarded its first Public Engagement Fellowship to Dr David James, a Senior Sports Engineer at Sheffield Hallam University. Dr James uses cutting edge

techniques to engineer gains in athletic performance for sports equipment manufacturers and elite performers.

Dr James will spend his Fellowship time exploring the societal impact of his work, examining the ethics of engineering on athletic performance, and initiating and taking part in public dialogue on these issues. The Fellowship was funded by the Academy's *Ingenious* grants programme for public engagement with engineering.

During his Fellowship, Dr James will develop an ethics case study in sports engineering, with advice from some of the UK's leading ethicists and philosophers, and he hopes to include this work later in teaching sports engineering.

The Academy's funding will also give him time to consult with the public on how to balance technical advances with the need to keep sport fair and accessible for all.

"People have strong views on the role of the sports engineer and on whether technology is actually improving sport. As we strive to provide the best results for national teams or multinational companies, some people think it promotes unfair play, that it detracts from sporting tradition and that it's becoming exclusive to the wealthy," says Dr James. "I think these are really important questions, especially for the future."

The Academy has also funded 13 other *Ingenious* projects across the UK to facilitate public engagement with engineering over the next year. The *Ingenious* funding programme encourages engineers to be proactive in taking part in public engagement on engineering and its impact on society.

For more information visit:
www.raeng.org.uk/engagement

Fellows visit home of wartime code-breakers



An original German naval Enigma machine

In April 2009, Fellows and their guests visited Bletchley Park, the site of the UK's top-secret wartime code-breakers.

During the Second World War, Bletchley was home to the mathematician Alan Turing, whose theoretical work inspired early computing, and to Tommy Flowers, the engineer who built Colossus, the first true electronic computer.

Highlights of the visit included a working 'Bombe', the electromechanical device used to crack the German Enigma machine; a close-up view of two Enigmas, and a Type X British coding machine. Perhaps the most fascinating exhibit was Colossus itself, entirely rebuilt from original blueprints and salvaged parts.

All were grateful for the welcome given by the Bletchley Park volunteer staff and shared in their enthusiasm for this memorial to the outstanding dedication and ingenuity of British and Allied engineers during the war.

Council news

The Council held its second meeting of the year on 20 April. The President briefed the Council on a number of issues, including the joint approach with the Royal Society and the British Academy to Lord Drayson on enhancing UK innovation capacity. Also mentioned was the Low Carbon Summit, which was chaired by the President and attended by the Prime Minister and other senior ministers.

Chief Executive Philip Greenish reported on current activities, including: the national roll-out of the London Engineering Project; the success in raising sponsorship for the Awards Dinner; and improvements to be made to one of the public rooms at 3 Carlton House Terrace.

The Council approved a revised plan for the development of 3 Carlton House Terrace. This will involve creating a large lecture theatre on the first floor, while leaving open the possibility of developing basement facilities at some future date.

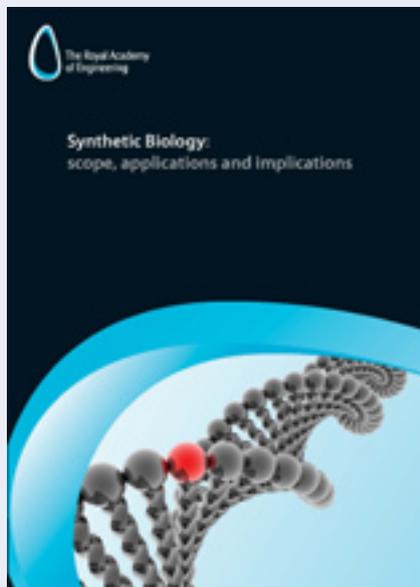
In response to a paper from Dr Chris Elliott FREng, the Council agreed that, with effect from the elections due in 2010, candidates for election need not be grouped by engineering discipline. From next year onwards, there will be one list of candidates from which five will be elected.

The Council approved choices for the 2009 awards of the Sustained Achievement Award, the Sir George Macfarlane Award, four Silver Medals, and the Public Promotion of Engineering Medal.

In preparation for the AGM, the Council approved a number of recommendations. It agreed the names of candidates to go forward for election as Fellows, International Fellows, and Honorary Fellows, and names of Fellows to be proposed to fill a number of vacancies as Council Officers. Also approved were the Academy's reserves policy, the reappointment of auditors and changes to Fellows' subscriptions to take effect from January 2010.

Policy and public affairs

New report on synthetic biology



The cover of the new report

The Academy has published a major report on an innovative and critical new field that is expected to shape the world of the future, *Synthetic Biology: scope, applications and implications*.

Synthetic biology is an emerging field which aims to design and engineer biologically based parts, novel devices and systems as well as redesign existing, natural biological systems. It is truly multidisciplinary in nature, combining aspects of biology, engineering and chemistry and promising a wealth of potential applications in health, energy, agriculture and materials. The ethical and philosophical issues raised by the subject also make the involvement of social scientists crucial. The report, led by Professor Richard Kitney OBE

FREng of Imperial College London, details the emergence of synthetic biology as a subject in its own right and summarises the fundamental approaches and techniques currently employed by researchers in the field.

It continues by offering a vision of how synthetic biology might develop over the coming years and, in particular, the likely applications in various sectors of the economy. It notes that the first application expected to be realised is a synthetic version of the anti-malarial drug artemisinin, which is hoped will be an effective treatment for malaria at a fraction of the cost of traditional treatments. Other applications expected over the coming years include advanced biofuels, personalised drugs and biologically based microprocessors.

The report makes three recommendations. First, the need for Government to formulate a national strategy for synthetic biology in the UK, in collaboration with academia and the national academies. Its aim would be to ensure that the UK's current strong position in synthetic biology research is successfully translated into wealth creation and jobs.

Second, increased funding to strengthen the training and research infrastructure with the creation of a number of academic centres dedicated to synthetic biology. These will provide the personnel required for the UK to compete globally in the field. Third, that synthetic biology research should be conducted in collaboration with social scientists and philosophers in order to raise awareness of the ethical and societal issues. To support this, a public engagement programme will be established to allow the public to share their hopes and concerns as the technology develops.

Synthetic biology is destined to become increasingly important, both academically and in the creation of new industries and applications. It is hoped that this report will help to raise awareness of the subject within the UK Government, as well as the broader community, and place the Academy in a leading role within the field.

The full report can be found at www.raeng.org.uk/synbio

Heat beneath your feet

The use of geothermal energy is on the rise in the UK and could be a major factor in lowering national carbon emissions. This was one of the main points discussed at a seminar hosted by the Academy in April 2009.

Geothermal technologies are widely used across the world but have failed to take off in the UK because of the availability of cheap oil and gas. However, with the future price of fossil fuels being uncertain and with ambitious carbon emission reduction targets, the UK must reconsider geothermal technologies as an important addition to its energy portfolio.

Speakers at the seminar, *The Heat Beneath Your Feet - geothermal energy in the UK*, considered the history of geothermal innovations, the different types of technology available to extract energy from the ground and who would benefit most. While deep geothermal projects are restricted to a few locations, ground source heat pumps can be installed anywhere in the UK and there are an estimated 6,000 such pumps already in use.

The seminar also discussed existing and future geothermal projects in the UK, including the growing popularity of ground source heating schemes. David Banks spoke of the "vast resource of untapped energy" in the ground beneath the UK and described how ground-source heat systems can not only provide heating but cooling for buildings such as schools, offices and hospitals.

Professor David Manning, from Newcastle University, described a deep geothermal project being developed in Weardale, County Durham, that has the potential to create a new renewable energy village. The 1 km borehole produces water at 40°C, sufficient to heat buildings and provide a natural spa in the North East.

Dr John Garnish and Dr Ernst Huenges provided European perspectives on geothermal projects, while Dr Michel Feliks from the Department of Energy and Climate Change gave an overview of Government energy policy.

Hearing technologies

Hearing technologies are becoming increasingly sophisticated and varied, as revealed at a seminar hosted at the Academy in April 2009.

The UK Focus for Biomedical Engineering, held under the auspices of the Academy, organised the seminar on hearing technologies to discuss current and future developments in the field.

There are now a range of methods for tackling different types of hearing impairment using novel materials, micro-technologies and automated surgical tools. These methods offer new opportunities to produce advanced devices that can be implanted efficiently and precisely, with fewer complications.

Speakers at the seminar, *Hearing Technologies*, provided perspectives on current and future hearing technologies, the state of research and development, patient needs, and policy on provision. Deafness, of varying levels of severity, affects over 7% of the UK's population. It is estimated that demographic trends will more than double this proportion over the next decade and will place additional demands on healthcare provision.

Policy team site visits

The Academy's Policy team has made a number of site visits to get a better understanding of the engineering industry.

In 2009, the team visited the EADS Astrium site in Stevenage, to discuss common policy issues before touring the site. The satellite industry is of great relevance to Government policy as a number of essential services such as GPS are dependent on satellite technology.

The team also visited Dungeness B power station to discuss the demand for nuclear skills, the prospect of a new generation of nuclear power plants and to get a real sense of what it takes to run and maintain a nuclear site.

The team is very keen to continue its visits, so suggestions for sectors and sites to visit would be welcome.

External affairs committee

Today there is no organisation that can afford to ignore the impact of Government policy.

Over the last year, the Academy has been developing its public affairs strategy and setting in place the mechanisms needed to engage more closely with national policymaking and raise the profile of engineering. This work programme will be delivered via the newly formed External Affairs Committee whose remit is to develop an integrated communications, public affairs and public engagement strategy for the Academy.

The committee, which has taken on the work of the Communications and Public Engagement Committee, will drive forward an ambitious agenda to raise the profile of the Academy's policy work through its standing committees for education, international affairs and engineering policy.

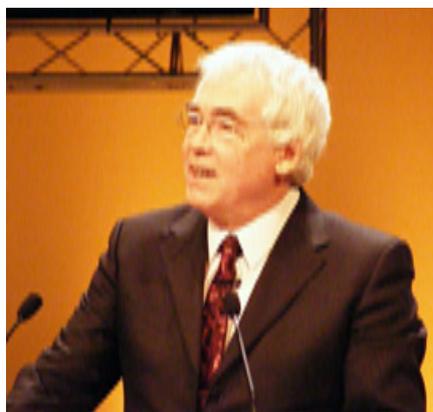
The committee, chaired by Dr Scott Steedman FREng, held its inaugural meeting in March 2009. The committee comprises eight Fellows of the Academy along with representatives from other organisations that can provide an extra dimension to the work – including the CBI, Equality and Human Rights Commission and the Carbon Trust.

In addition, the Academy is developing a wider group of engineering spokespeople from across the profession and a media advisory panel made up of journalists and a PR specialist who will provide ongoing advice and support.

As part of the Parliamentary contact programme the Academy has been holding a number of working roundtable breakfast and dinner meetings.

In February, a lively dinner discussion was held with Greg Barker MP, Shadow Minister for Climate Change, on the topic *Engineering solutions: How can high value-added industries help the UK out of the recession?*, in which he set out Conservative thinking on how the UK can tackle climate change in the current economic downturn. The committee worked in association with Reform, an independent think tank, to organise the event.

Following publication of the report *Engineering: turning ideas into reality*, Innovation, Universities and Skills Select (IUSS) Committee Chairman Phil Willis attended a meeting at the Academy with CEOs of a number engineering organisations. Discussion revolved around the recommendations of the report, as well as the expected Government response.



Phil Willis MP, chairman of the IUSS Committee, attended a breakfast meeting at the Academy

Other topics included the *Engineering the future*, the engineering profession's new joint policy and promotion campaign, the importance of engineering-based companies to the UK economy and the growing importance of manufacturing and innovation, engineering skills and diversity.

Further breakfast meetings are planned for later in the year. Topics will include the manufacturing industry, nuclear industry, the UK's internet capabilities and biomedical engineering.

Education

How to attract girls... into engineering



Director of WISE Terry Marsh

The Academy is dedicated to attracting more women into the engineering profession in order to widen the pool of talent available. As part of its aims it hosted a joint one-day seminar in May 2009 about how to get girls and young women interested in engineering and related subjects.

The seminar was a joint project between the London Engineering Project (LEP), the UK Resource Centre for Women in SET (UKRC) and WISE (Women into Science, Engineering and Construction). It was supported by the Women's Engineering Society (WES) and the Academy.

Proceedings were opened by Terry Marsh, Director of WISE, who introduced talks by three guest speakers. Liz Hodgkinson from the University of Plymouth brought her experience in widening participation to the proceedings. Barry Sullivan, from Leicester City Council's Positive Action

Programme, spoke about his 20 years of involvement in encouraging women and girls to apply for apprenticeships in craft trades and the construction industry. Famida Noor-Mohammed from Little Ilford School in Newham spoke about her school's involvement with the LEP and the effect it has had on her students.

Workshops in the afternoon focused on the problem of putting policy into practice and how the LEP might embed its work into London schools and London's engineering arena and thereby leave a lasting legacy.

The LEP is currently coming to the end of its first three years as an Academy-led education programme. In that time it has worked in 40 south and east London schools, four higher education institutions and with a number of top engineering employers such as Transport for London and Tube Lines.

The aim has been to widen participation in engineering and science at undergraduate level and the programme has worked to engage as many school pupils from the widest possible spectrum of backgrounds in STEM (science, technology, engineering and mathematics) activities. The suite of activities has included after-school clubs, competitions, day and residential workshops and summer schools – all developed and delivered by a team of dedicated LEP fieldworkers.

A publication, *Getting Girls into Engineering: A Practical Guide*, was given to all delegates and participants. Containing effective practice tips and advice from the LEP and UKRC, the booklet is available to download from the LEP's website, at:

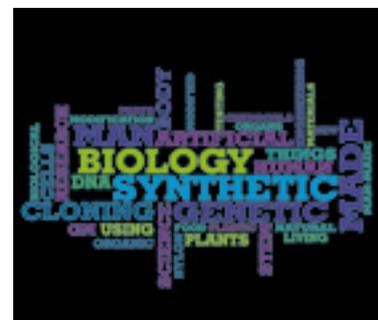
www.thelep.org.uk/about/girls

Solar races at South Bank University

Solar-powered miniature race cars took to the track in June 2009 at an event organised by the London Engineering Project (LEP).

The car park at South Bank University became the arena for youngsters from London schools to battle for the chequered flag in an exciting series of races. The team from Little Ilford School took first place on the podium. Comperes for the day were members of the Science Museum's Punk Science team, known for their stand-up shows which fuse music and comedy to inspire audiences about scientific issues.

Public dialogue: synthetic biology



Earlier this year, People Science and Policy (PSP) conducted two public dialogue meetings on behalf of the Academy to explore public attitudes to the emerging field of synthetic biology.

The study involved in-depth discussions with a group of 16 people and a telephone survey of 1,000 adults across the UK.

The study found that the majority of people were, in principle, supportive of the prospect of designing micro-organisms that can help to manufacture medicines and biofuels. However, there was also evidence of concern, with four in ten people thinking the technology was worrying.

The in-depth discussions revealed that people were supportive of the production of synthetic biological organisms when kept in controlled conditions, such as large fermentation vats. There was, however, particular resistance to the concept of deliberately releasing re-designed organisms into the environment to tackle pollution.

Participants were also keen to see proper regulation of synthetic biology in a way that keeps up with the technology effectively but does not stifle its development.

More consultations are already being planned by bodies such as the Research Councils and it is hoped this initial survey will provide a valuable basis for their investigations.

Education Programmes

BAE Systems Engagement Project

The Department for Children, Schools and Families (DCSF) has generously co-funded one part of the BAE Systems Engagement Project. This extra funding will be used to work with the National Science Learning Centre to draw up continuing professional development (CPD) for design and technology teachers at Key Stage 3 and beyond.

Planned to run over three years, the BAE Systems Engagement Project will supply CPD to teachers via the already established network of Science Learning Centres, produce high quality curriculum resources, support the development of STEM Ambassadors who are specifically focused on engineering, and support after-school provision in the form of science and engineering clubs.

The 10 nationwide Science Learning Centres currently provide quality CPD, at all levels, for everyone involved in science education. The BAE Systems Project will enable the centres to expand this to include courses and resources for design and technology teachers and those teaching the new Diploma in Engineering.

Based at the Academy, the recently employed BAE Systems Project Manager will initially work closely with the Barrow Engineering Project, enhancing the training of STEM Ambassadors already employed by BAE Systems in Barrow.

STEM Ambassadors (formerly known as Science and Engineering Ambassadors) are everyday people from real working backgrounds who give up their time to act as inspiring role models for young people. Each Ambassador is registered and trained by STEMNET (Science, Technology, Engineering and Maths Network). The BAE Systems Engagement Project will give extra training, including gender and ethnicity awareness training, to BAE STEM Ambassadors who will then work with the Barrow Engineering Project to encourage students in Barrow schools to consider engineering as a potential career.

The long-term plan is to place a trainer (or trainers) within the BAE Systems site at Barrow who will be able to take on the delivery of the booster training independently. Once this training is established in Barrow, it will be rolled out nationwide over the lifetime of the project.

President calls for energy policy rethink

The state must step in to take control of energy markets if the UK is to meet its climate change targets, according to the President, Lord Browne of Madingley.

Giving the 49th William Menelaus Lecture at the School of Engineering, Cardiff University, Lord Browne warned that, although the markets will be capable of driving renewable energy, the Government should guide and support the private sector to ensure growth targets are met and renewable energy projects are completed.

In his lecture in March 2009, the President called for a concerted approach to tackling climate change. He said: "It is essential that we do not compartmentalise climate change as an issue. Environmental integrity should be made a tangible part of other social priorities, such as economic prosperity and national security.

"This will require a new approach to policy across all levels of Government and all Government departments. Environmental integrity isn't an option or a luxury: it's fundamental for society to flourish."

Academy sponsors 2009 Cheltenham Science Festival

The Academy was a sponsor and partner for the 2009 Cheltenham Science Festival, which took place between 3 and 7 June 2009.

This is the third year the Academy has supported the festival, by providing financial sponsorship along with assistance and input into the content of the event's programme.

The festival helped to highlight the extent of engineering's impact. The common public perception of an engineer is that of 'Mr Fix-It' but events at the festival revealed they are behind the emerging new field of synthetic biology, crucial in the world's fight to mitigate and adapt to the effects



Professor Roger Kemp FEng (centre) and Science Minister Lord Drayson (second from left) take part in a panel discussing ways to tackle and adapt to climate change

of climate change, and are central to the debate on digital surveillance technology.

A number of Fellows attended the festival to discuss and debate many issues of public interest and the Academy sponsored

several events over the five days of the festival. This included a discussion of the benefits and concerns regarding synthetic biology, an assessment of current thinking on flood prevention, and a debate on tackling climate change..

Obituaries

Professor Robert Francis Boucher CBE FREng died on 25 March 2009. Before his retirement he was Vice-Chancellor, University of Sheffield

Mr Edmond Urquhart Broadbent CBE FREng died on 28 March 2009. Prior to retirement he was a Director at John Laing and Son Ltd

Professor Harold C A Hankins CBE FREng died on 2 May 2009. Before retiring he was Principal and Vice-Chancellor, UMIST.

Professor Kenneth H Heron FREng died on 3 June 2009. At the time of his death he was Senior Fellow, QinetiQ.

Sir William Kirby Laing FREng died on 12 April 2009. Before his retirement he was Chairman, John Laing plc.

Dr John Frederick Leathard FREng died on 23 May 2009. Prior to retirement he was Director, A and P Appledore International Ltd.

Professor Louis Joseph Rydill OBE FREng died on 21 March 2009. He was Emeritus Professor of Naval Architecture, University College London.

Dr William Arthur Simmonds FREng died on 16 July 2008. Before his retirement he was Director, Midlands Research Station, British Gas Corporation.

Contact

If you would like to find out more about any of the articles in the newsletter, please contact:

Chris Atkinson (Assistant Editor)
Email: chris.atkinson@raeng.org.uk

Guidance for 2009 Fellowship nominations

The deadline for nominations is 31 July 2009. Those preparing cases might like to check them against the following questions:

- Do the 'full' and 'brief' citations meet the Proposer Guidelines, including identifying personal engineering achievements and prescribed length?
- Are the achievements expressed so that Fellows unfamiliar with the candidate's field can broadly comprehend their significance?
- Do cited publications interlock with the contents of the 'full' citation?
- Are employment details, honorary appointments and recognition signposted succinctly in the Career Summary?
- Are assertions of likely service to the Academy evidence-based?
- Is the proposal drafted so as not to rely on the proposer's eminence or seem obviously the candidate's work?
- If the candidate is not yet a Fellow of a chartered engineering institution, are remedial steps in hand?
- Has the candidate been made aware that cases which do not succeed first time stay in the system for three further years?

If you would like advice or assistance in writing nominations, contact the Proactive Membership Chair, Ian Nussey (ian_nussey@uk.ibm.com) or Fellowship Manager, Chris Coulter (chris.coulter@raeng.org.uk)

Staff news

Nadia Azzouzi has taken on the permanent role of Team Administrator, Development. She was previously in the same role on a temporary basis.

Bernadette Benati has changed job titles. She is now Head of Fundraising.

Claire Little has left the Academy as Team Administrator, Development. She has taken a project role at the Science Museum.

Xameerah Malik has left the Academy as Policy Advisor to become a Committee Specialist with the House of Commons Science and Technology Select Committee.

Sapna Somani, Maths Coordinator for the 14-19 Diploma in Engineering, gave birth to a baby girl, Siyona Sachin Somani, on 3 February 2009.

Melanie Washington has joined as Project Manager, Education. She was previously STEM Coordination Manager at the Royal Society of Chemistry.

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