ISSUE SEVEN *AUTUMN 2007*

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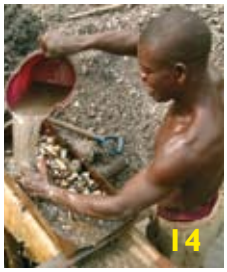

***COVER PICTURE:** One of the pictures used on departmental banners on display during the Centenary reunion weekend. This shows the application of laser diagnostics to a lean burn combustion device in work sponsored by Rolls-Royce. See pages 8 and 9 for reunion pictures.*

Imperial ENGINEER

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COPY DEADLINE FOR THE NEXT ISSUE IS MONDAY FEBRUARY 11

Peter Garratt

AS I write this, a quarter of my term as president of the CGCA has already sped past. Given the transient nature of the presidency (relative to the tenure of those dedicated officers who run the show on a day-to-day basis) it is helpful if there is continuity of opinion between successive presidents on the key issues that face us. I am in complete agreement with my predecessor, John Banyard, on the overriding challenge of ensuring that the organisation is seen to be relevant and useful by its younger members.

With this in mind, the speaker at the president's evening was an engineer who has successfully made the transition to head a leading business consultancy. He spoke of the great opportunities presented by today's global economy for those engineers with the breadth of knowledge and experience to rise to the top of the corporate tree. Imperial is striving to produce these polymaths and CGCA must strive to satisfy their needs as alumni via a dynamic and responsive association, treading carefully between its history and traditions and the imperative of constant change to meet current and future needs.

We are fortunate in having a new, strong and dynamic CGCU team. Tristan Sherliker, the Union president, has already come up with some excellent ideas as to how we can define and navigate this path. A further enormous asset is the unique insight brought by Dame Julia Higgins, our senior vice president, based on her experience as Engineering Faculty principal.

One of the issues the Association faces is the dearth of younger members actively involved as officers. As with many similar organisations, day-to-day management is shouldered by a very committed few so it is essential not only to spread the load but groom successors for key executive roles. (See plea on page five). To meet these requirements, we need to order our affairs in such a way that the role of a CGCA officer is fulfilling and enjoyable. In my experience, the burden of bureaucracy can be eased greatly by humour, camaraderie and intellectual challenge.

CGCA can and should have something to say on the key issues of the day, especially those global challenges that can be met only with the help of technical insight and innovation. In this context, the renewable energy theme of this issue of *Imperial Engineer* could not be more relevant, and I am pleased to have had the opportunity to complement the traditional president's report with a feature article which I hope you will find interesting.

Kurt Budge

PRESIDENTS REPORT

RSM HAS changed significantly over recent years, but it remains very much alive, thanks principally to the evergreen vibrant student body, whose energy and commitment uphold the values and traditions that have made RSM a fundamental part of Imperial College's history and today's fabric.

RSM may no longer be the bricks and mortar institution it once was, yet it now stands as a key partner in the Faculty of Engineering. No doubt there are some RSM alumni who sit and wonder what the RSM constitutes and what the RSMA actually does. Let me reassure you that it still produces graduate associates of the RSM, in Geology, Geophysics, Geosciences, Petroleum Engineering, Petroleum Geosciences, Material Sciences and Engineering, as well as providing PhD opportunities. In addition, the RSMA is firmly recognised by Imperial College, and the committee is supporting many of the Centenary events that are taking place this year, including attendance during Her Majesty the Queen's recent visit to College, the Rector's Guildhall lecture and participating in the forum 'Global sustainability: the future for engineering education'.

As I take over stewardship of the RSMA from Roger Clegg, I follow a succession of presidents who have cemented the RSM and RSMA in Imperial College's future. The challenge rests with me and the RSMA Committee to grow the RSM's influence and relevance for all its stakeholders – industry, students, faculty, alumni and Imperial College.

Given the smaller numbers of graduates from the RSM, the question of the Association's sustainability needs to be tackled. The RSMA committee will, over the coming months, be contacting alumni to seek their views on what the RSMA needs to do to meet their needs. We will also be engaging with recent graduates and students in their final year to encourage them to become members, if not already, and to contribute in whatever way they can to the RSMA's work.

In this new academic year, the RSMA committee will be working very hard to build for a stronger and more effective RSMA. In our endeavours, we need RSM alumni to support and engage with us, starting with keeping your subscriptions up-to-date, and actively communicating with us on your thoughts and ideas. Finally, wherever you are in the world, please remember, in the immortal words of *The Mines Song,* we are all 'Mighty works of God' as Royal Mining students, past and present, so from where I stand the future for the RSM and RSMA is bright!

READ ABOUT THE NEW PRESIDENTS ON PAGE FIVE

IN BRIEF

Lottery winner

AS PART of the Big Lottery Fund's latest payout to its Changing Places programme, Imperial has been awarded £11.7 million to implement the Open Air Laboratories network. This was designed to inspire and support countrywide communities to study, enjoy and protect their environments.

RSMA recruits

RSMA'S AGM and dinner for final year students in June was once again an enjoyable affair. Thanks to alumni generosity, the students were entertained for free, reports RSMA president Kurt Budge. They are pleased to report that every undergraduate joined the RSMA.

DAVID Hattersley, above, past president of CGCA (2000-1) was made an MBE this summer for services to the construction industry and charity. He is involved with many organisations, from international engineering to the arts, and is constantly busy, despite intending to 'slow down'.

Top rank

IMPERIAL College is the third best university in Britain, after Oxford and Cambridge, in the *UK University Guide 2007*. Imperial ranks in the top 10 for all of its subjects, is also in the top five for 12 out of 14 of the subject groups and second for two subject – chemical and civil engineering.

Marathon man

RSMA president Kurt Budge completed this year's London Marathon in 4hr29mins – with no training.

Queen at celebrations

DURING The Queen and Duke of Edinburgh's visit to celebrate the Centenary of Imperial College, Her Majesty opened the College's new Institute of Biomedical Engineering. They then took part in an honorary graduation ceremony that celebrated both its Centenary and Imperial's new independence from the University of London.
LEFT: Computing's Professor Guang-Zhong Yang demonstrates the latest in computer-controlled micro surgery.

New principal – new opportunities

'I'VE BEEN an acquaintance of Dame Julia Higgins for some time and I am aware of the excellent initiatives put in place during her time here. I hope I can build on her legacy', said Professor John Wood, as he took up his role as the new principal of the Engineering Faculty.

He was previously chief executive of the Council for the Central Laboratories of the Research Councils and is chair of the European Strategy Forum on Research Infrastructures (ESFRI).

Professor Wood is also chair of the international steering group building a free electron laser. Its 3.4 km-long particle accelerator will enable scientists to produce super-brilliant, ultra-short flashes of X-ray light.

'I hope that several members of staff at Imperial will become involved in the development of the laser as part of the UK contribution and use of this ground-breaking machine.'

Professor Wood has been involved in initiatives including the Foresight Programme which provided a vision for UK industry and government. He hopes his extensive experience, embracing the Far East, will help to foster more strategic partnerships for the College.

Declining numbers of UK students studying engineering are a cause for concern, confirms Professor Wood. 'We need future engineers to take a sustainable approach and it would be great to encourage more women into the profession. I praise the work already undertaken by the College'.

Dame Julia Higgins with her successor John Wood.

Charles looks for Silver Lining

CHARLES HUTSON (Geology 82) is not able to return to the work he loved – running a financial investment boutique – and is devoting much of his time to raising money for others who are disadvantaged.

Charles was seriously injured in 2003 when he was thrown off the bonnet of a speeding car when trying to stop a robbery.

In early October, he set out to walk Hadrian's Wall supported by carers from Headway. Beneficiary of his walk is The Silver Lining charity which is raising money to send a group of brain injured people and carers to Uganda to build a school for an orphanage.

Recently, Charles has been selling some of his mining paintings and is making jewellery.

More funds are needed for the Uganda project and donations to The Silver Lining can be sent to Teresa Sergot (see address page two).

Online reading

Once again, high levels of contributions mean that some articles have had to be abbreviated. For more info go to www.imperial.ac.uk/engineering/about/alumni/imperial engineer to read them in full.

Two new men heading associations

CGCA president for the current year is Peter Garratt (Civils 68) who has over 35 years' experience in international infrastructure project development. In recent years the implementation of such projects has been under private sector financing.

Peter is a director of the international consultancy Scott Wilson, having been chairman of the British practice of Knight Piesold. He was chairman of what is now British Expertise and was awarded an OBE for services to exports. Actively involved in promoting trade and cultural links between the UK and Latin America for many years, Peter is chairman of Canning House, 'the home of Latin America in London' and director of the Caribbean Council.

He has worked on renewable energy projects from hydropower to biomass.

Peter's opposite number at RSMA, Kurt Budge (Mining 92), is in his role for two years.

Son of the man who set up RJB Mining, Kurt works for Rio Tinto in business analysis and corporate strategy. He was with Schroder Ventures before joining RJB. There, he first managed three coal mines.

Directorships followed which involved building partnerships with local communities, politicians and action groups and developing corporate social responsibility and sustainable development strategies.

Kurt gained an MBA in 2004.

Top engineers honoured by peers

THE FIRST presentation of three Teaching Excellence in Engineering Education awards was made this summer by the Engineering Faculty's EnVision 2010 scheme.

John Cosgrove of Earth Sciences, Tony Field of Computing and Civil Engineering's Constructionarium team of Alison Ahearne, Sunday Popo-Ola and Rebecca Naessens each received £10,000. The awards were given in recognition of individuals or teams who are renowned for their teaching excellence and who have enhanced the quality of engineering students' learning.

At the Royal Academy of Engineering's awards' dinner, professors Nigel Brandon (Earth Sciences) and Chris Toumazou (Biomedical Engineering) received prestigious Silver Medals. The medal was established in 1994 'to recognise an outstanding and demonstrated personal contribution to British engineering, which has led to market exploitation, by an engineer working in the UK'.

PSE success

Process Systems Enterprise (PSE), one of Imperial's first successful spin-out companies, received the coveted MacRobert Award. It was presented by the RAEng's senior fellow Prince Philip for gPROMS, PSE's cutting-edge mathematical modelling system

The MacRobert Award, the UK's most prestigious prize for innovation in engineering, is awarded annually for the demonstration of engineering excellence and innovation with proven commercial outcomes and benefits to the community. Worth £50,000, it was received by Costas Pantelides and team of Sandro Macchietto, Mark Matzopoulis, Stratos Pistikopoulas and Nilay Shah.

gPROMS is used by the chemical process industry and was developed in the Centre for Process Systems Engineering. It maximises product quality, minimises production cost and controls environmental impact.

The software can accurately predict temperatures and product compositions inside a complex chemical reactor, helping to improve production and product quality and providing advance warning of dangerous 'hot spots'.

Picture: Mike Crick

TOP: from left, Tony Field, John Cosgrove and Rebecca Naessens, Sunday Popo-Ola and Alison Ahearne.
ABOVE: The Duke of Edinburgh with the PSE team.

CGCA needs help in key roles

THE CGCA committee has a few vacancies because a certain amount of dedicated input is needed to make the prestige events it runs go smoothly.

Key activities where help is urgently needed are:

- maintaining membership records;
- helping with recruitment policy (and putting this into effect),
- fully or partially organising prestige receptions or the annual dinner.

The rewards will be those of working with fellow alumni and of seeing the long-standing traditions of CGCA and the City & Guilds College maintained, says hon sec Chris Lumb. Volunteers will become ex-officio committee members.

If you feel you could derive satisfaction from being involved and at the same time give something back to fellow alumni and today's student body, please contact the office (details on page two).

£15

...IS THE NEW ANNUAL COST OF CGCA AND RSMA MEMBERSHIP.

After many years unchanged, the annual fee for membership to CGCA and RSMA has risen from £10 to £15. Unless you are a life member, please ask your bank to increase your standing order TODAY!

Money is not collected by direct debit so for us to receive the correct amount, YOU need to take action. Thank you.

DEVELOPMENTS AROUND THE ENGINEERING FACULTY

Engineering's leading role

LEADERS of industry, academia and goverment gathered in September at Imperial for the 'Global Sustainability: the future for engineering education' forum.

It outlined Imperial's visions for future engineering undergraduates including equipping them to take a leading role in identifying issues and designing solutions to local, national and global challenges affecting society and the world around us, without compromising their technical education.

Who's for Chateau Nessie?

BY 2080, the south of England might be too hot for wine-making, according to Earth Science & Engineering's (ESE) Professor Dick Selley.

Scotland could be an ideal country for wine-making but riesling could grow quite comfortably on Snowdonia's slopes. The likes of Loch Ness would be ideal for vines – the north-west slopes of the loch have the same geology as South Africa's Cape Province.

Fast green clean machine

THE 10th Formula Student competition held at Silverstone, home of the British Grand Prix, featured three racing cars powered by alternative fuels, including one from Imperial, alongside around 100 petrol-powered vehicles.

Imperial's Racing Green team has built a car which runs on a combination of hydrogen fuel cell and a battery and which can go from 0-60 mph in 4 seconds. That's 'ferociously quick', team member Ralph Clague comments.

'Electric motors have much better torque characteristics: you can get off the line much quicker.'

A NEW fingerprinting technique with potential to detect diet, race and sex of a suspected criminal has been devised by a team led by professor of Chemical Engineering, Sergei Kazarian.

Conventional fingerprinting techniques often distort or destroy vital chemical information in all fingerprints. Until now there has been

Sustainable MSc

A NEW MSc programme in Sustainable Energy Futures began with the new academic year. It is combining academic and industrial experience across Imperial's faculties.

Team finds foolproof way to keep fingerprints

no easy way of lifting residues for chemical imaging.

Now Professor Kazarian's team has found that commercial gelatine-based tape provides a simple method for keeping fingerprints intact along with their chemical residue. Once lifted they are analysed in a spectroscopic microscope. The sample is irradiated with infrared to identify individual molecules and give a detailed chemical composition.

Professor Kazarian believes that this technique could allow forensic scientists to observe how fingerprints change.

'By focusing on what is left in a fingerprint, scientists could potentially gauge how old a crime scene is. Studying what happens to prints when they are exposed to high temperatures could also be particularly significant, especially in arson cases where lifting prints has been notoriously hard', he said.

The source of some of these articles and some of the words come from* Reporter, *newspaper of Imperial College.

Hot and cold cycles found

ANALYSES of glacial sedimentary rocks in Oman have produced clear evidence of hot-cold cycles in the Cryogenian period, roughly 850-544 million years ago, dealing a blow to the idea of 'Snowball Earth'.

Philip Allen (ESE) comments: 'If the Earth had become fully-frozen for a long time, climatic cycles could not exist.

In fact, once the world was fully frozen, it would be difficult to create the right conditions to cause a thaw, since much of the incoming solar radiation would be reflected back.

LIFE ON MARS?

MICRO-MACHINE technology supplied by Imperial is being used in NASA's current Mars Phoenix mission to search for potential biologically habitable zones.

Dr Tom Pike and his team from Electrical and Electronic Engineering have provided substrates-surfaces to hold dust and soil samples for imaging by an optical microscope and an atomic force microscope. They will provide the highest resolution of imaging ever taken on another planet. The team at Imperial conducted trials on a replica of Phoenix's microscope station to work out the best way of studying the Martian soil. They also visited Mission Control and spent a week going through a simulation of the mission.

During the analysis phase Dr Pike and his team will be based at Mission Control.

Water call

BETTER co-ordination between the bodies responsible for surface water drainage in the UK has been called for by David Balmforth, visiting lecturer in Civil Engineering

It followed the leak of an Environment Agency document which says that flood defence spending was cut this year and that there will be no increases for four more years,

David, who advises local authorities and central government on flooding, says: 'We must learn to live with the weather and look for low-impact surface water solutions'. This means better planning to use existing infrastructure before building bigger and more expensive sewers and pipes.

Flooding's nothing new to Britain

CATASTROPHIC flooding which separated the British Isles from Europe some time before 200,000 years agow, has been identified by a sonar study of the English Channel by Imperial researchers.

Sanjeev Gupta, Earth Science and Engineering's reader in sedimentology says: 'It has revealed deep scars on the Channel bed that must have been cut by a sudden, massive discharge of water'.

The torrent probably came from a giant lake in what is now the North Sea after something, perhaps an earthquake, caused the lake's rim to breach at the Dover Straits.

For details of two multi-million projects, see page 11

Eco-friendly duo reaches Mongolia

ROBIN NORTH has returned recently from a 10,000 mile adventure driving to Mongolia across 17 countries. His companion was Bojan Slavujevic, founder and director of a mobile location start-up. Their transport was an old Suzuki SJ410 with a tiny 970cc engine.

With an SU carburettor and electric fuel pump conversion and adapted bodywork to improve aerodynamics, the trip was as eco-friendly as possible.

For every 1,000 litres of petrol used, the vehicle generated 1,000 litres of water, some of which was collected and purified and some used in a solar cooker. Water was heated by the sun and the engine, reports Robin (right), who is a research engineer focusing on transport and air quality in Imperial's Centre for Transport Studies.

During the day a tasty stew could be cooked in a highly-insultated box while waste heat from the engine also fueled a hot-plate.

Apart from the research aspect, the team took part in the Mongol Rally 2007. On the way they delivered supplies to Romania for the charity Hope and Homes. At the end, the car with its easy-to-maintain technology, was donated to Mercy Corps Mongolia which helps rural communities remain independent and self-sufficient.

Break in John's challenge

AFTER a considerable hiccup in his plans, last year's Imperial Union president (and CGCU 2004-5) John Collins, completed a 1,000 mile cycle ride from John O'Groats to Land's End.

Earlier it looked as though the event was off when he broke his right wrist just six miles into his first attempt. But by early September, with a permanent plate in place, he was battling downpours in Scotland to raise around £3,000 for major building work in the Student Union building and facilities

'I love a challenge and have always wanted to do a long distance cycle ride', comments John. 'I wasn't aiming to try and beat any records but I reached Land's End in just over 12 days.

He chose to face Scotland first as girlfriend Nichola was able to provide a backup vehicle in the first week. After that he was on his own facing up and downs in Devon and Cornwall's.

John had excellent support from the CGCA and the union. To add to his sponsorship go to www.john.collins.org.uk

OC Trust grateful for latest bequest

THE OLD Centralians' Trust has received a legacy of £5,000 (plus interest) from the estate of Donald Cameron Miller (Mech Eng 1943-45 & 47-48), who died in 2006.

A key part of Donald's career was with Bristol Siddeley Engines (later a division of Rolls-Royce Aero Engines), when he joined the team working on the aerodynamic design of compressors for engines in Concorde and the Harrier.

He became very involved in the development of high-pressure compressors for over 20 years. This work was the basis of technology incorporated in modern aero engines, particularly the V2500 and BR700 series. He was widely respected for his knowledge of a complex subject.

'Donald's generous gift will be applied to the Trust's General Fund and will be used to support a wide range of student awards', says Trust chairman Chris Lumb.

DIARY DATES

Friday November 23
RSMA Annual Dinner, Polish Club Ognisko, 55 Exhibition Road, 7 for 7.30 Booking form on reverse of address carrier.

Tuesday November 27
CGCA Dinner with the President and General Committee. Speaker Chris Head on 'Hydropower in a Changing World', 170 Queen's Gate, 7pm

Saturday December 1
Walks with a Past President, Camden Town & St Pancras. Meet Camden Town tube station, 10.30
New members and guests are welcome. If you are interested, look at cgca.org.uk to register interest or email David Hattersley at davidhattersley@aol.com , tel: 020 8504 8263

Wednesday December 12
CGCA Christmas Lunchtime Seminar, 170 Queen's Gate, 12 for 12.30pm

2008
Tuesday March 11
CGCA Annual Dinner, Ironmongers' Hall, 6.45 to 10.45pm Booking form inserted in magazine

Wednesday May 28
CGCA AGM & President's Evening Read LT and 170 Queen's Gate

Thursday June 26
RSMA AGM /Final Year Dinner. Venue: tbc

For more information and booking for any of these events, contact Teresa Sergot t.sergot@imperial.ac.uk or phone

Engineering's

a picture roundup of events wh

EACH department within the present-day Faculty of Engineering chose a slightly different combination of events for the open day on Friday September 14. It launched the alumni reunion weekend. At some point each featured a drinks' reception!

Aeronautics started its reunion with a series of talks followed by a champagne reception. On hand was their friendly chef in his whites making sure the food was up to scratch. During the tour of the department which followed, alumni watched the workings of the Honda wind tunnel and envied Dr Varnavas Serghides as he demonstrated the flight simulator.

At what appeared to be the largest gathering, over 300 alumni and their spouses joined Chemical Engineering's celebrations. There was a buffet lunch and dinner and departmental tour programme. The department's Centenary Symposium was attended by 150 delegates in which some of the eminent staff and alumni spoke of past experiences and future trends in chemical engineering.

Civil Engineering's open house in the labs and its Constructionarium allowed past students to see how things have changed over the years. It was followed by a reception where those who had not met since graduation got to know each other again. Many of them went on to dinner at the Polish Club.

Professor Peter Cheung completed Electrical and Electronic Engineering's open day with a tour of the department. Prior to that there was a drinks and canapes party. A number then repaired to a Moroccan restaurant.

High point of Mechanical Engineering's reunion was a nostalgic look at the department called 'From Boanerges to Oblivion', delivered by 94-year old emeritus professor Sir Hugh Ford. It was proceeded by tea and tours of the lab and followed by drinks and a buffet in the department's foyer.

The two departments of the Royal School of Mines combined for their reunion. After drinks and a buffet, alumni enjoyed a round-up of over 150 years of RSM's history by professors Martin Blunt and Alan Atkinson. Many then transferred to the Union bar to watch the rugby and continue the reunion into the early hours.

Between talks and tours, Mechanical Engineering (above) and Chemical Engineering lined up for another shot for the album


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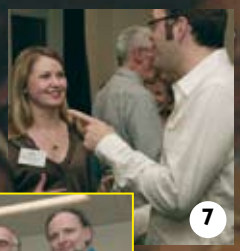


reunion of a lifetime

hich kicked-off Imperial's Centenary alumni weekend

In the pictures...

***COMPUTING:** 1 Senior research fellow Jim Cunningham with Naseer Ahmad (MSc 75). 2 Prof Guang-Zhong Yang speaks about Computing's latest use of robotics in micro-surgery. 3 Andreas Fidjeland introduced John Chittock (Computing 80) to robot Ludwig. 4 Head of Computing Jeff Magee (left) gets re-acquainted.*

***ROYAL SCHOOL OF MINES:** 5 Head of Earth Sciences and Engineering Professor Martin Blunt starts a talk about RSM, its past and future. He was joined by new dean Professor Alan Atkinson. 6 From left, Prof Jim Williamson (Materials), Oscar Dam from Venezuela (MSc, Extractive Metallurgy, circa 1980), David Bishop from Rio Tinto, emeritus professor John Monhemius and Tomas Vargas from Chile (PhD Metallurgy 84). 7 Rachel Argent (née Evans, 95) catches up.*

***CIVIL ENGINEERING:** 8 Left, RF Gopel (57) with David Baxter (56) catch up with some memorabilia. 9 Juan Sagaseta shows Andrew Coats (73 & 77) how the results of testing a high-strength concrete beam to destruction are logged. 10 Tony Waterfield (left, 52), former British High Commissioner to Guyana Philip Allsop (54), and Mike Knill (53).*

***MECHANICAL ENGINEERING:** 11 Sir Hugh Ford reminisced in his speech 'From Boanerges to Oblivion'. 12 September 14 gave an opportunity to catch up and introduce wives to old friends. 13 Dr Paul Isherwood (centre) and colleagues.*

***AERONAUTICS:** A keen audience watches Dr Serghides operate the flight simulator. 15 Reunited after 50 years, from left, David Hyde, Geoff Edwards and Raymond Morgan. 16 From left, Dr Lucio Raimondo (research associate), Khadijeh Mohri (PhD student), Dr Abdel Fiala (alumnus) and Katie Blackmar (PhD student). 17 Air Vice Marshall Sir Colin Terry (right) enjoys a joke with Robin Johnson and Graham Perry.*

***CHEMICAL ENGINEERING:** 18 John Dyson (class of 1938) receives an award from Professor Stephen Richardson, head of Chemical Engineering, for being the oldest alumnus at its reunion. 19 Two alumni tour the undergraduate pilot plant area. 20 Sisters Maria-Elena Urso and Teresa Oliveira (both PHd 01) and colleagues.*

***ELECTRICAL & ELECTRONIC ENGINEERING:** 21 CGCA hon sec Chris Lumb (61) with class-mate Mike Hughes and Dera and David Cheeseman. 22 The reunion was a happy event – David Bishop, centre, who had travelled from Australia, and Chris Heaton Armstrong. 23 From left, Bob Weeks, Brian Dean and Peter Davies, who all graduated in 1957. Bob and Brian went on to do the first postgraduate DIC in Nuclear Power under Professor John Kay in 1957/58.*

In the background picture, the audience at Mechanical Engineering applauds Sir Hugh Ford.

Pictures by Emma Bowkett, Neville Miles and Lynn Penfold.

RSM looks set to improve on last year's achievements

by RSMU president Daniel Hill

THE RSM starts in high spirits this year with freshers' events looking set to break the record turnouts of last year. With the aid of 'Facebook', events can be advertised way in advance with minimal effort and can reach every student within the Imperial network.

The Freshers' Introduction Talks & Drinks, Pub Crawl and Bar Night were set up for RSM freshers' week, followed closely by the Freshers' Dinner on October 19. Alongside these, the RSM sports clubs and the DLB Club have events planned for the first couple of weeks including the traditional Queen's Tower Trip run by the DLB and Pub Golf run by RSM Golf.

Last year was a highly successful one for the RSM. Large amounts of sponsorship lead to profits being made at events and an increase in attendance.

Last term saw the official handover of the RSM committee at the end of year event, the 'Final Finale', held in the Union Dining Hall. This was a fantastic night which was attended by nearly 120 people. Of course, huge amounts of beer, food and wine were available.

The night saw boat races (boys v girls, freshers v oldies), presidential yards, handover of the pink pants and the presentation of the RSM colours and some rather entertaining 'special awards'.

The first 'Back to School' RSM Sports Day was held a couple of weeks after in Hyde Park. All sports were obviously drink-related and everyone had to be in fancy dress. It ended at the Union in the early hours.

The RSM continues to go from strength to strength. With a young and enthusiastic committee this year, the new generation of RSMU hopes to attract many more freshers and drive into them the RSM spirit and traditions.

I very much look forward to leading the RSM this year and hope to see the return of some traditions that have been lost over the years, regain the RSM's former glory, and, most importantly, bring home the Bottle!

CGCU – new team keeping up old college traditions

by CGCU president Tristram Sherliker

I HAVE been Union president now for two months, working as a summer sabbatical (thanks to help from CGCA) and really trying to kickstart the revival of City and Guilds at Imperial College.

The Lord Mayor's Show participation and the Centenary Dinner – bigger and better than the usual Freshers' Ball – have been my major activities, and the dinner especially is stacking up to be an exciting and well-attended event. Prof Michael Kelly has agreed to speak, and the huge marquee on Queen's Lawn is booked as a venue. However, we're still searching for sponsorship as I write! (Any leads gratefully accepted…)

My other main project has been exposure for freshers to what City and Guilds is for and revive some flagging traditions. All sorts of media are being used to brand us, from a really excellent *Handbook and Guildsheet* (designed by Nicholas Simpson) to branded rubber wristbands given out for free on their first day.

After office hours, I've been keeping busy getting my hands on some hefty mascots to rile the other unions. As well as our own Spanner and Bolt, C&G is in possession of Davey the Davy Lamp (RSM) and two of the four component parts of Theta the Thermometer (RCS). The ransom demands, if they manage to pay up, will raise between £400 and £600 for RAG charities and ought to remind everyone that a bit of interfaculty sportsmanship can be fun!

With plans already in place to appoint a new union officer to represent CGCA, and for a large membership recruiting event at the end of the year, I look forward to working with CGCA during this year.

FINDERS KEEPERS? Tristram Sherliker (second left) with fellow conspirators Matt Taylor, Christian Carter and Mark Mearing-Smith.

This issue of *Imperial Engineer* turns its spotlight on renewable fuels' technology within 11 pages of articles by alumni and others

Project is cooking with sound

IT'S A cooker, a fridge and a generator in one – and it could have a huge impact on the lives of people in the world's poorest communities.

The £2m SCORE (Stove for Cooking, Refrigeration and Electricity) project brings together experts from across the world to develop a biomass-powered generator capable of both cooking and cooling food. By developing an affordable, versatile domestic appliance SCORE aims to address the energy needs of rural communities in Africa and Asia, where access to power is extremely limited.

Representing Imperial as one of four UK universities involved is Mechanical Engineering's Developing Technologies group. It uses student project work to provide technical support to organisations working in developing countries. Head of the project is Dr Keith Pullen with Roy Dennis.

Nottingham is the lead university with Manchester and Queen Mary London, plus US research centre Los Alamos National Laboratory, electrical goods manufacturer GP Acoustics, charity Practical Action and numerous universities in Africa and Asia

Key to the collaboration is ensuring that the device is acceptable in poorer communities at a technological, economic and social level and that there is sufficient scope for them to develop numerous businesses from the manufacture, repair and innovative applications of SCORE.

The operation of the electricity generation and refrigerator parts of the proposed device will be based on a novel application of thermoacoustic processes. Fundamentally, these rely on the interaction between an acoustic field and solid boundaries, leading to a range of fluid- and thermo-dynamic processes. They do not require harmful working fluids or moving parts in the traditional sense and the electrical power extraction is accomplished by a linear alternator.

Programme challenges are:

- Combining a thermoacoustic engine, linear alternator and cool box in a single device powered by a biomass stove. This has not been tried before.
- Designing a rugged and inexpensive linear alternator that could be easily mass-produced,
- The overall system design considering low cost, indigenous materials, local manufacturing skills and simplicity of assembly.

Field trials and wide distribution of SCORE stoves among target communities will complete the project.

Plants lead the way

AN INTER-DISCIPLINARY team from Imperial is working to harvest solar energy to produce renewable, carbon-free and cost-effective hydrogen as a sustainable energy source. It will develop both biological and chemical solar driven processes.

The five-year project, within the Energy Futures Lab, has been made possible by £4.2m funding from the Engineering and Physical Sciences Research Council (EPSRC).

Head of the Lab, Professor Nigel Brandon, who is also the project's principal investigator, says:

'Successful production of solar energy-driven renewable hydrogen could transform the supply of carbon-free fuel and make an enormous impact on the viability of hydrogen as an energy carrier. It will be an essential step to fully exploiting fuel cell technology. It will position the UK as a world leader in one of the very few solutions to a truly sustainable energy future.'

Current solar energy research is focused on the use of photovoltaic or solar thermal devices which are costly, points out Professor Brandon. 'An innovative approach to overcoming this is to exploit low temperature natural biological and photocatalytic processes.'

Breakthrough

A major impetus for this concept has come from the recent breakthrough by Jim Barber and colleagues at Imperial. They identified the molecular details of the catalytic centre of nature's solar-powered water splitting enzyme: that of the photosystem two (PSII) complex found in plants and cyanobacteria and used in photosynthesis.

This major advance now provides a blueprint for the design of a man-made catalyst that would allow the light-driven photolysis of water in molecular hydrogen and oxygen, providing a renewable route to hydrogen generation using only solar energy and water as reactant. This offers encouragement that efficient bio-inspired chemical catalysts for solar hydrogen generation can be developed.

The project will culminate in the design, build and operation of a working prototype system, aiming to demonstrate that solar energy can be directly harvested to produce hydrogen and, in turn, cost-effective electricity and heat.

The team comprises Jim Barber (Molecular Biosciences), James Durrant (photochemistry), Klaus Hellgardt (catalytic reactor engineering), Geoff Kelsall (electrochemical reactor engineering), David Klug (molecular energy transduction), Geoff Maitland (energy engineering), Peter Nixon (Biology) and student researchers.

A spoonful of sugar helps carbon emissions down

CGCA president Peter Garratt learns lessons from the Cuban sugar industry

MUCH HAS been written about the production of biodiesel and ethanol road vehicle fuels from food crops and concerns have been expressed about the effects of their large-scale cultivation on food production and costs.

A dramatic illustration is provided by the spectacular rise in the world price of wheat. It has doubled over the past year. While this is in part attributable to poor weather in certain major wheat growing areas, the rapidly-increasing demand for bioethanol has been a major factor in changing the supply/demand balance. Similar comments apply to maize. Another food crop that is used extensively for biofuel is sugar, for example in Brazil, where ethanol is produced from sugar on a very large scale.

Cuba also has a major sugar industry and is equally focused on the development of renewable energy sources. However, its government is opposed to the production of biofuels at the expense of food security and it has adopted an interesting alternative approach.

Hard currency

The sugar industry has for many years been the mainstay of the Cuban economy. Production levels peaked in 1992, when some 70 million tonnes of cane were milled during each production season to produce 7.6 million tonnes of sugar. It amounted to 7.3% of world production. The export of sugar provided 80% of Cuba's hard currency income.

These production levels were achieved from 155 sugar factories supplied with cane from a cultivated area of 1.7 million hectares. Each sugar factory incorporated a cogeneration unit to supply electricity and process steam to the factory.

These were fuelled by bagasse, the sugar cane residues not consumed in the process of manufacturing sugar. The capacity of each unit was related to the processing capacity of the factory. The total installed generating capacity was 800MW or about 5MW per factory on average. This is on the basis of low-level technology (low and medium pressure boilers). The generation of electricity and steam for the factory was seen as a means of disposing of bagasse that was available at the factory in very large quantities, essentially as a waste product, so generation plant efficiency was not important.

Since 1992, following the disintegration of the Soviet Union, the principal commercial partner of Cuba, there has been a sustained decline in sugar output. This year's harvest is unlikely to produce more than about 1.2 million tonnes. The fortunes of Cuba, in common with other major sugar producing countries, have also been severely impacted by the decline in the world market price of sugar over recent years.

Painful choice

This situation forced the Cuban government to initiate a programme of sectoral adjustment which sought to lower costs and diversify productive capacity to achieve improved economic efficiency. A crucial but painful element of this programme was the closure of around 70 sugar factories, leaving about 85 in operation. Consequently, about 350MW of bagasse-fired generating capacity is currently lying idle.

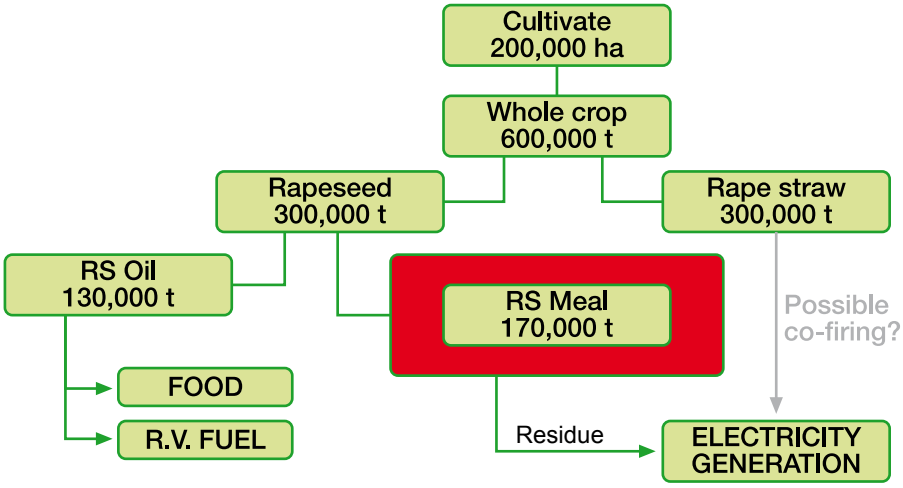
Cuba has demonstrated its determination to sustain the cultivation of sugar cane, albeit at lower levels than previously and hence preserve rural employment.

The crop is now seen as the raw material for a variety of uses, ranging from food products for human and animal consumption, alcohol (mainly for

ABOVE: The interior of Cuba's Hector Molina sugar factory.
TOP RIGHT: The exterior of the factory.

rum production) and pharmaceutical products. The biomass residues can be burned in modern and efficient plant to produce process steam and electricity for export to the grid. Another interesting area of Cuban research is the development of 'energy cane', a fibrous form of sugar cane specifically for combustion to produce energy in the form of heat and electricity rather than for sugar production.

- tion of sugar biomass in new state of the art power stations associated with existing sugar mills.
- Increased generation of electricity and steam through improved efficiency of existing installations.
- Increased capacity for export to the grid based on improved efficiency of sugar processing plant, leading to reduced internal demand for steam and electrical energy.



OILSEED RAPE CULTIVATION AND PRODUCTS

The global environmental benefits of biomass cogeneration in Cuba are significant because every kilowatt-hour exported to the grid displaces generation using heavy fuel oil. It is estimated that a single bagasse-fired power station could avoid carbon dioxide emissions of more than 200,000 tonnes per annum.

Ambitious

On active sugar mill sites, the Cuban government has embarked upon an ambitious, renewable energy programme, comprising three elements:

- Continuous generation of electricity for export to the grid via the combus-

The challenge of unlocking these opportunities lies not in the technology, which is well proven and understood, but in the financial structuring of the projects to enable them to move ahead under the peculiar economic and financial constraints which apply in Cuba.

UK manufacturers have historically supplied plant to many of the Cuban sugar factories and they are well respected. Much of the existing equipment is of British manufacture and remains operational after more than 50 years in service. In principle, the UK is well-placed to supply the new market for high efficiency plant, especially the demand for high temperature and pressure steam turbines. However, there is strong competition from Brazil, India and China, each offering low-cost alternatives.

In conclusion, as concerns grow internationally about the impact on food security of an agricultural revolution that is leading to many farmers growing crops exclusively for biofuel production, there are lessons to be learned from the middle way strategy adopted by the Cubans. Rather than food OR biofuel, the approach is to maximise the socio-economic benefit of the crop for food AND sustainable energy production.

Versatile

This approach can be applied to a wide range of crops. Considering those cultivated in the UK, oil seed rape is an interesting example. This can be cold crushed to produce high value food oil, then hot crushed with solvent extraction to produce biodiesel. Finally, the residual rapeseed meal 'cake' (typically with 1% oil content) can be efficiently used as a fuel for cogeneration.

The process is shown diagrammatically (left) with approximate quantities for a processing plant fed by 200,000 ha of rapeseed cultivation. Recent studies have shown that the generation of electricity using rapeseed meal can be economically competitive with gas-fired generation at current price levels.

PETER GARRATT (Civils 68) has 35 years' experience in international infrastructure projects. With considerable exerience of promoting trade and cultural links in Latin America, he is chairman of Canning House and director of the Caribbean Council.

DESPITE first impressions, the global mining sector is far from homogenous. The industry could actually be described as a continuum with the more familiar, large-scale, industrialised sector with multinationals such as BHP Billiton, Rio Tinto and De Beers at one end and the often overlooked artisanal and small–scale mining sector at the other. So what exactly is this forgotten poor relation?

Artisanal miners are often defined as those who use rudimentary tools and archaic and crude methods leading to inefficient mining and processing thereby perpetuating haphazard and dangerous mining with very low overall mineral recoveries. Most often it involves individuals, families or communities who are usually considered informal or, by many, an illegal social nuisance that needs to be suppressed

Poorest areas

Small-scale miners, on the other hand, can have some degree of mechanisation, hold a legal licence and be organised in some form of mining workers' group. For convenience, however, most people discuss the sector collectively using the acronym ASM. This sector is *'typically practised in the poorest and most remote rural areas by a largely itinerant, poorly educated populace, men and women with few employment alternatives'.*

Notwithstanding the low visibility of this poor relation, the ASM sector produces substantial percentages of the world's valuable minerals, generates some export earnings, and provides employment for many millions of impoverished people. Globally it produces up to 31% of industrial minerals, 10–15% of gold, 20% of coal, 12% of metallic minerals, 10% of diamonds and 75% of other gemstones. Conservative estimates claim that well over 100 million people depend upon the ASM for their livelihood. That workforce includes a high proportion of disadvantaged women and many millions of children, forced to work in unacceptably dangerous conditions.

ABOVE: Children using mercury in Tanzania.
TOP CENTRE: Women mining barytes in Nigeria.
RIGHT: Gold processing in Ghana.

Regrettably, in sub-Saharan Africa, the ASM sector is also often associated with conflict minerals, fatal diseases, smuggling, criminal activity and even perpetuating civil wars in fragile states like Angola, the DR Congo, Liberia and Sierra Leone. Indeed, the impact of artisanal diamond mining in the latter country was the subject of the recent Hollywood blockbuster *Blood Diamond*.

The sector is seen in a negative and distorted manner with little appreciation or understanding for the realities and hardship of artisanal miners, their impoverished families and communities. Miners often earn less than US$1 a day and rely on ASM as basic coping strategy in an increasingly demanding socio-economic environment.

The reality is that the sector is plagued with challenges ranging from abject poverty, endemic child labour, gender inequality, the spread of HIV/AIDS, environmental devastation, appalling health and safety, mercury poisoning, uncontrolled migrants, indiscriminate extortion, indentured labour, exploitative trading and growing conflict with the commercialised large-scale mining sector.

However, from a livelihood perspective, ASM often provides the only means of obtaining an income and often constitutes the principal source of economic activity in many remote rural areas, where there are few income-generating alternatives. What must be remembered is that ASM is really about vulnerable people who struggle on a daily basis to eke out a meagre subsistence under unbelievably gruelling and arduous conditions in some of the most fragile areas of the world.

Opportunities

Having worked as a consultant in the ASM sector for over a decade in over 30 countries, the complexity is evident, as are the multitude of challenges, constraints and opportunities that characterise this neglected sector.

Until recently, this complexity has deterred many from intervening and it has simply been ignored. Key issues, such as institutional capacity, governance, assistance schemes, enabling legalisation, miners' organisation, gender mainstreaming, occupational health and safety, environmental protection, mineral marketing, adding value, microcredit and the co-existence with large-scale mining, are all themes frequently espoused by policy-makers or benevolently proposed for assistance and intervention schemes.

Many challenges of artisanal s strengthening to child labour elim pioneered by RSM alumni Kevi Africa's most fragile areas inspire He outlines the sector and t

Fortunately, some international aid agencies and donors, including the UK's own Department for International Development (DfID) and the World Bank, have now realised that the ASM sector is worthy of attention. Many of the social and environmental challenges are actually aligned with internationally agreed Millennium Development Goals aimed at alleviating global poverty. Moreover ASM was acknowledged as an 'extractives industry' sub-sector that warrants urgent attention and aid assistance at the last G8 summit.

The recent buoyancy in mineral commodity prices has been a blessing for the commercial mining sector and their shareholders. However, this buoyant market, combined with state mining company retrenchments, high levels of unemployment and numerous fragile economies recovering from conflict, have driven huge numbers of desperate people away from traditional rural livelihoods into the ASM sector; including areas close to large-scale mining operations.

Such ASM activity on, or at the periphery of, commercial mining concessions has moved beyond being just an uncomfortable

isanal mining – ternational challenge

mall-scale mining (ASM), from governmental policy and institutional mination, environmental protection and poverty alleviation, have been n D'Souza. Although a staunch mining engineer, his work in some of ed him to work in community-focused projects within the mining sector. the challenges it gives the mining world, governments and society.

and recalcitrant neighbour. Although ASM is an important social and economic livelihood in many African countries, the current activities in the vicinity of many commercial mining operations compromise site safety and security. They are exceedingly dangerous, exploitative, socially disruptive and essentially sustain an illegal trade.

For many, the standards and practices of ASM are entirely at odds with those of the modern, commercial, responsible mining industry that most African governments are so keen to attract, develop and retain. Unfortunately, throughout Africa the relationship between mining companies and the ASM sector is misunderstood. It has been characterised by mutual mistrust, antagonism, resentment, intimidation, threats and increasing violence.

Both sides of the resource conflict have their own misguided preconceptions and strong feelings regarding the other and their alleged rights. For example, many companies have viewed the ASM sector as blatant malefactors and trespassers on their legally endorsed concessions; while the artisanal miners may see the granting of such concessions as dispossessing them of their traditional land and rightful livelihoods.

Given the fact that the economic, social and environmental costs and potential liabilities of uncontrolled ASM activity are starting to get out of hand on many minesites, there is hopefully a strong case for a paradigm shift towards a more innovative, non-confrontational, non-competitive, consensual and pragmatic strategy for dealing with ASM and their communities. However, given the rise in the number of incidents of conflict between the two sub-sectors - regardless of how they started – the irrefutable challenge remains of how the mining companies can constructively engage and attempt to coexist with the increasingly vulnerable, and in many cases volatile ASM sector and thereby maintain the social license to operate.

Ultimate challenge

Thereby lies the ultimate challenge facing the international development agencies, civil society, large-scale mining companies, and national governments – how to harness the clandestine ASM sector as an activity that could contribute responsibly towards the achievement of international development objectives, integrate into community development plans and enhance corporate social responsibility schemes. It has been discussed and procrastinated upon for decades. Obvious issues such as better governance, social and environmental management and protection of communities' and miners' rights have long been recognised as crucial if ASM is to be galvanised successfully as an economic force. It is hoped that, finally, a concerted effort will be made to help overcome the multitude of constraints and challenges that plague the sector whilst capitalising on the inherent opportunities to raise the sector from mere subsistence levels and integrate it into the formal rural

KEVIN D'SOUZA (Mining 93), a principal mining consultant and associate director with consultancy Wardell Armstrong LLP, has worked extensively in Africa pioneering social investment projects and with many of the biggest mining companies is helping empower and develop sustainable communities in the vicinity of mining operations. He has gained a reputation as a leading authority on mining-related social impact, minesite community affairs and ASM.

Kevin regularly advises the World Bank and the UK's Department for International Development on mineral sector development. He also advises and assists many mineral sector initiatives that have an element of international development and works with key international NGOs on community issues that have mining related impacts.

Recently, Kevin has focussed on helping define and implement mineral developmental projects in post-conflict and fragile states, particularly the DRC and Angola, with international donors and many of the multi-national mining companies wishing to develop, in a truly sustainable and socially responsible manner, the mineral resources of such countries.

POLYMATH POLITICIAN

Imperial Engineer *managing editor Bill McAuley talks to Lord Monckton of Brenchley – Christopher Monckton – about the research which lead him to question the current, popular view of global warming*

IN LATE May 2007, four weeks after the *Observer's* reporter had ventured to Christopher Monckton's stronghold in Rannoch, Perthshire, my wife and I were heading north after a Falkirk family wedding with the same destination in view. But whilst the reporter had gone with the mission of debunking Monckton's politically inconvenient views on global warming (of which more later), I had a more general objective.

I wanted to get inside the mind of a man who, on the basis of our previous conversations, had demonstrated an encyclopaedic command of his current brief,. combined with an ebullient self-confidence most of us have had beaten out of us by the time we get to 30!

We had a mental picture of a Victorian granite laird's castle towering over the loch but reality is a very liveable waterside house packed top to bottom with books on every conceivable subject. Christopher's wife, Juliet, is a superb hostess and our overnight stay proved to be as enjoyable as it was informative. A rare endocrine disorder restricts his travel and necessitated our visit north.

Before the health issues intervened, he had been a rising star in the worlds of journalism and politics. After classics at Cambridge, he followed a newspaper career until joining Margaret Thatcher as a policy advisor in the early 1980s. He then returned to journalism – the final job being a consulting editor of the Evening Standard (1987-92).

Maths puzzle

He has since produced several Sudoku books and two mathematical prize puzzles. His latest puzzle, Eternity II, with 256 pieces and a $2 million prize for the first solver, is now on sale.

His extended family includes the jeweller Rosa Monckton (sister), her husband and father-in-law Dominic and Nigel Lawson, her sister-in-law the celebrity cuisiniste Nigella *etc etc*. No shortage of outlets, both public and private!

Readers of the last *Imperial Engineer* may recall that my first discussions with Christopher concerned the cause-or-effect question of atmospheric CO_2.

In this interview I wanted to explore a broader theme, namely the quality of contemporary scientific research in areas where there are major public policy implications.

Misguided?

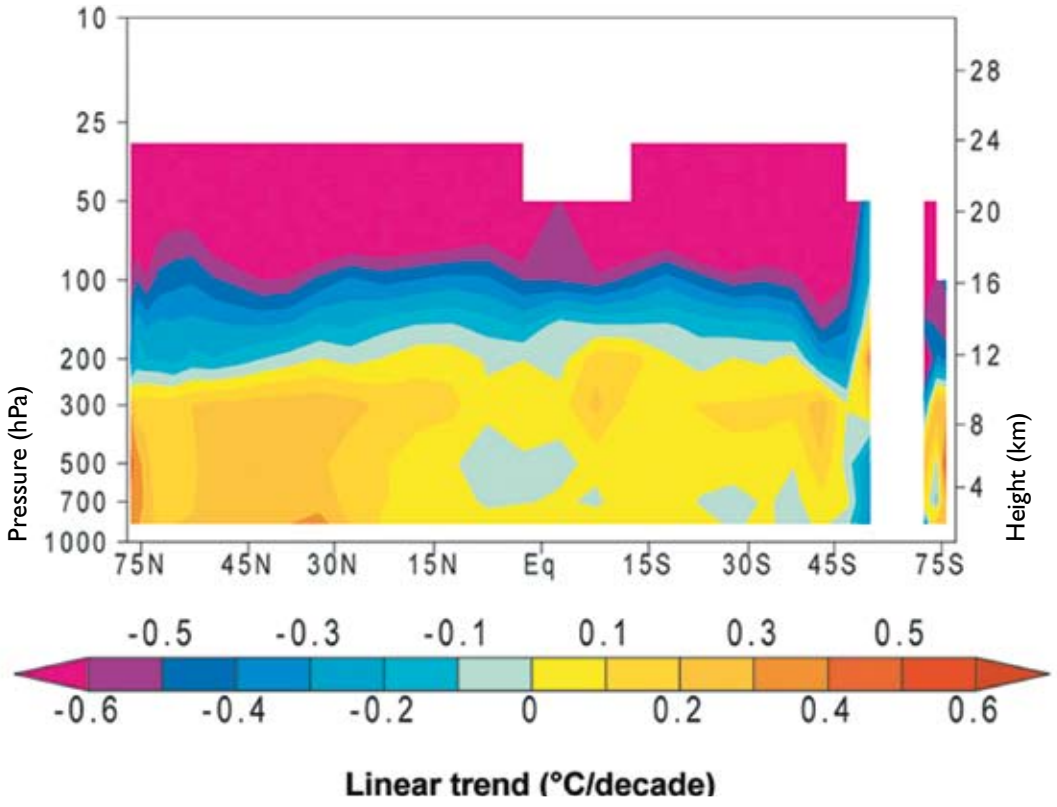
Frequently, results are produced that are disappointing and, in some cases, just plain wrong. Christopher's major example is the misguided abandonment of DDT on environmental grounds. He contends that this has led to more deaths (mostly infants) than several of the major wars of the 20th century. (My personal favourite is the gross overestimation of the projected death toll from Chernobyl.)

Christopher's analysis of this phenomenon is simple :

- major research topics require very large financial and human resources.
- only large institutions (*ie* big business and governments) can provide these resources.
- there is consequently great pressure on the researchers involved to produce results consistent with what they think their paymasters want. When uncertainties arise, the temptation is very great to interpret the results in the desired direction.
- "good behaviour' is rewarded with more resources, and so the spiral continues.

Ill-informed stories by news media

Christopher Monckton (left) in his Perthshire garden with interviewer Bill McAuley.



INCONVENIENT FACTS: Radiosonde data from the Met Office Hadley Centre showing a relative lack of warming in the tropical troposphere. This is contrary to CCSP modelling data. (Notes for the uninitiated: A radiosonde is an instrument used in weather balloons to transmit data to a fixed receiver. CCSP is the acronym for the US Climate Change Science Program.)

looking for the next crisis also have a political effect which increases pressure for action. Before long, the seeds are sown for a major (and frequently misguided) policy initiative.

Commonsense

How to avoid this path? One answer would be to get governments out of bankrolling big science. But this is probably unrealistic and might result in unintended consequences. A scientifically more literate public would help but education policies do not seem to be able to deliver that. Meanwhile all we like-minded renaissance types can do is to plead for balance and common sense!

And so back to CO_2 and global warming. Christopher's enforced confinement due to his illness has inspired him to take a degree in mathematics from the Open University.

As part of his research work, Christopher has produced a paper – *Quantification of Climate Sensitivity* – in conjunction with Jarl Ahlbeck of the Swedish University in Finland.

The mathematics are quite challenging but for those who want to read it in full, the link is published below. If correct, however, the paper's main conclusion is significant. It is that the overall global warming attributable to a doubling of the atmospheric CO_2 concentration would be about 1.6° Celsius. According to Christopher this is exactly the value calculated by Svante Arrhenius in a 1906 paper published in German.

Christopher also points out that a recent paper by Schwartz puts climate sensitivity at just 1.1°; that Professor Richard Lindzen of MIT says it must be less than one-third of the IPCC's 3°, and that several future papers by atmospheric physicists will suggest similarly low figures.

Slower change

The consensus, he says, is moving rapidly away from the International Policy for Climate Change (IPCC)'s high climate sensitivity prediction. Since the present CO_2 concentration is about 385 ppmv and the present rate of increase is 1-2 ppmv per year, it would take a couple of hundred years of fossil fuel burn to induce this quite modest change.

Still a minority view, certainly. However, in matters climatological clear verities are rare. Christopher has challenged Al Gore to a TV debate on the subject, which Al has wisely ignored.

As we made our way back to Edinburgh and the urban jungle further south, I reflected that illness may have slowed Christopher Monckton but not dented his intellectual energy. I am sure we will be hearing more from him.

Background to this article can be found at the following: www.climatescience.gov/Library/sap/sap1-1/finalreport www.scienceandpublicpolicy.org for *Greenhouse warming, what greenhous warming, Concensus, what concensus* and others.

AN ALTERNATIVE VIEW... Sir David King, chief scientific adviser to the government, gave another view of climate change in his keynote speech during September's alumni reunion. For a synopsis, see page 21.

His grandfather was a miner and Brad Mills (below) followed in his footsteps. At the age of 53, he has been chief executive of platinum giant Lonmin for three years. After a degree in geology and a masters in mineral economics, he applied his training to explore for new deposits for Magma Copper. Later at BHP, he played a key role in that company's merger with Billiton. Brad discusses with RSMA hon sec Paul Holmes how the industry is tackling the shortage of skilled people and graduates entering mining.

Keep hold of the dream

BRAD: Unfortunately when times are hard, like in the 70s and 80s, often the first thing to go is training and investment in the future. Currently, there is certainly a huge growth of opportunities but the whole sector is suffering from a lack of good earth science graduates. Added to this the emphasis has switched from the traditional American and European institutions to the continents where the mining actually happens, in Africa, South America and Australia. At Lonmin we provide about 30 new scholarships per year, mainly in Africa, but we are not averse to looking wider afield and giving people different experiences to help in their development.

PAUL: What does Lonmin do to attract graduates?

BRAD: The scholarships we operate are a major step for us but if you're talking about graduates from Imperial, they are probably going to be working overseas if they want to get real experience. London is the financial centre of the mining industry. For new graduates, particularly the entrepreneurial ones, every start-up is looking for an exploration geologist and the city is a big attraction. The industry offers a great career for individuals if they have a passion for earth sciences, but as an industry I don't think we do enough to publicise ourselves; to show the depth of experience we can offer.

PAUL: Should universities such as Imperial which closed its undergraduate course at the RSM a few years ago, re-enter the sector, maybe by offering a specialist master's course? Could this also be a way for people who have had a career in another industry but now want to convert to the mining industry?

BRAD: For places such as Imperial I think that's a great idea: it's got a good reputation. In my own experience, studying mineral economics after my geology degree certainly provided a good balance for the broader understanding needed in business. We need more skilled people and anything that encourages people to consider mining is helpful.

PAUL: How does Lonmin manage graduate careers?

BRAD: If you're going to become a leader you need to appreciate what

mining's all about. I remember my own experience as a rock-drill operator. You can't expect to lead people in the future if you don't know about what you are asking them to do. So we let people see the different elements of the business – six weeks here six weeks there, through production, refining etc. *Then it's up to the individual to follow a specialised route or a broader business path. Quite often, people swap from one to the other as they work their way up. We encourage this as it provides a depth of experience. Lonmin is very much a learning organisation with continuous development and I encourage this right up to executive level.*

PAUL: Could a Lonmin graduate trainee become chief executive?

BRAD: Absolutely. Lonmin has the backing available if individuals have the passion and determination to get there. Although, I'm not sure you'll see people come to the top nowadays by staying in one company, it is more often a case of moving between companies to get different experiences. I've certainly found that working in different companies you see different cultures and face new challenges. Pulling this all together helps with the wider picture.

PAUL: What's one thing you've learned in your career that you weren't taught at university, and should it be taught?

BRAD: There's a couple but the main thing is how to manage and interact with people. Technically you can know all the answers but if you can't get your point over it's not going to work. I remember a eureka moment when a senior exploration geologist I was working for took me aside and explained in pretty simple terms how I came across and how to get the best out of what I was trying to say. Now to present ideas I discuss them in a productive way. It's about working with people and having an ability to build relationships. You do have to experience this interaction, but you can teach people about themselves and give them some self-awareness of how they come across and how people may react to their style.

PAUL: What advice would you give to a newly-qualified graduate entering the mining industry?

BRAD: The biggest thing for this industry is the responsibility that goes with the wealth that the most basic elements create. What you do with that wealth is important. It has the ability to change lives, particularly in the countries where many of the resources are. There is also, of course, a responsibility to shareholders. I would hope that a graduate who wants to change things and do the best in the countries where he or she works can keep hold of that dream. Whilst they may become more pragmatic in their outlook as they understand corporate life, it is only by people keeping hold of their dreams that we will continue to change this industry, improve it and move it forward.

Atkins plans to safeguard city's industry

Rupert Kruger writes about a Californian project he took to tender stage to improve an industrial wastewater plant

IN 1849, gold lured thousands to California where they built hundreds of miles of flumes and ditches to divert water to sluice out the gold. As the gold boom depleted, the miners turned to farming and, with the development of major urban centres such as San Francisco and Los Angeles, the need for secure water supplies grew.

In the late 1950s the State Water Project was born involving the construction of what is now the USA's largest state-built water and power development and distribution system. Today the farmers and industry in the San Joaquin Valley still depend on water transfer schemes developed over the last 100 years.

Up-rating an industrial wastewater treatment plant at Tulare in the valley will be part of a general trend as regulators move to enforce effluent standards prescribed 30 years ago.

Standards have not changed since, but the pressure for investment by the City of Tulare has grown since a new waste discharge requirements order, accompanied by a 'cease and desist order' was issued by the California Regional Water Quality Control Board.

Tulare describes itself as the 'agri-center' of the world and is a massive cattle grazing, milk production region. Major dairy processors have chosen to locate close to their raw material and join a huge array of food producers and processors based in one of the most fertile regions on the planet.

Unique challenges

Although the valley has a wonderful climate for agriculture, a number of unique challenges exist. There is no natural river with an outlet to the sea so wastewater is essentially contained in a closed loop. As rainfall is scarce, the population and farmers rely on massive irrigation schemes to transfer water from the north of the state.

In Tulare, the treated industrial and municipal effluents are mixed and the output goes to percolation basins for non-crop irrigation on municipal land. The milk-processing wastes make for high BOD and COD loadings (about 2000mg/l and 4000mg/l respectively) in the incoming wastewater but the biggest challenge is to protect groundwater from electrical conductivity (in layman's terms, salinity). Control at source has been an important focus for manufacturers and great strides have been made to reduce the mineral load passing to the industrial treatment plant.

Pressure from environmental groups to have the standards fully enforced means keeping effluent conductivity to about 700 microSiemens/cm and limiting both BOD and total suspended solids to less than 40 mg/litre. Extensions to the industrial wastewater plant, costing upwards of $15million, were completed recently, but the existing facultative aerated ponds were not designed and cannot be uprated to meet the suspended solids limit.

The industrialists, whose user charges in effect pay for upgrades to the plant, face a strategic dilemma. The cost-effectiveness of siting manufacturing facilities next to the supply of raw material (milk) begins to be questioned as on-site and off-site effluent treatment costs escalate. Atkins, based close to Los Angeles, has been working with City of Tulare since October 2005 and the first phase of the project was to consider the treatment options needed to raise the plant flow capacity, from 26,000m3/day to 45,000m3/day, and to treat this larger flow to Basin Plan standards.

In conjunction with its subsidiary Faithful + Gould, Atkins prepared bid documents for the subsequent design stage of the work and advised on the options for type of contract. It also worked as Tulare's representative, overseeing the detailed design phase prior to preparing bid documents for construction. A traditional design-bid-build was selected for the upgrade, an approach that is familiar to Tulare, with a completion target of October 2009.

After completion of 60% design documents, the estimated cost for the new plant is about $80 million and the construction bid documents were released in July.

Replacement system

The improvements will add vitally needed aeration capacity, based on sequencing batch reactor technology, with waste activated sludge treated in anaerobic digesters before solar drying and spreading on land owned by the municipality adjacent to the treatment plant. At present sludge is transported to the next county for co-composting with municipal green waste before spreading.

Dissolved air flotation (DAF) has been successfully tested by Atkins at pilot scale to remove fats, oils and grease from the influent wastewater. This will provide for a future option to install high-rate, upflow, anaerobic sludge digestion (UASB) pre-treatment capacity at the head of the works for future expansion. A biothane digestion pilot unit has been demonstrated in series, providing a challenging MSc project for a student from Birmingham University. Expressions of interest from Imperial students for future projects will certainly be considered!

See www.atkinsglobal.com

RUPERT KRUGER (Biochemistry 88, MSc Environmental Engineering 03, MBA Tanaka 04) is now back in the UK as divisional director for Atkins Water Operations, part of the multi-disciplinary consultancy. His early career in the water and environment industry was with ICI, followed by four years at United Utilities, developing wastewater process technologies within the environment team. In London, he joined Water UK as environment and science adviser, representing the water industry in regulatory and policy development at national and European level. Before returning to the UK he was vice president for Atkins Water and Environment, North America.

Fuel cell powers energy store in rural South Africa

by Henri Winand
Intelligent Energy

A FUEL cell and battery hybrid electric power system, one of three of the world's first-ever in rural applications, completed a continuous run of two years this year. It is continuing to provide off-grid power within an 'energy store' in the remote and rural township of Mkuze, in KwaZulu, Natal.

This clean and efficient means of electricity generation, supplied by Intelligent Energy, has the potential to provide power at the point of consumption to millions around the globe. Electrification is considered a fundamental driver to economic growth in the developing world, where grid electricity is often cost-prohibitive.

Background

In 2003, the Business Linkages Challenge Fund (BLCF), and the UK's Department for International Development (DFID), asked for initiatives to benefit the rural poor within a number of regions. At Intelligent Energy, we responded to a request for a South African initiative and received 50% sponsorship. We provided the rest with local partner Afrox (African Oxygen Ltd, a subsidiary of Linde).

The company, Nuon RAPS (NuRa) already used photovoltaic modules to power more than 10,000 solar home systems in the Mkuze region and was interested in exploring other energy sources to optimise the match between technology and energy services need. It was enthusiastic to participate in a rural trial when we offered to provide the fuel cell system.

Industry specialist Douglas Banks of RESTIO Energy (and a director of NuRa), who was involved in the early stages of setting up this project, commented: 'Fuel cells, with their potential for long life, low maintenance and high efficiency, may become an important component of the fuel/ technology mix needed to supply energy services in remote rural applications. Technology field trials like these are critical'.

Two 100W fuel cell systems, hybridised with batteries, were used in a UPS (uninterruptible power supply) configuration at the site. During the day, the fuel cells trickle-charged the batteries and, were the grid supply to fail, the battery/fuel cell system would ensure continuous running of the critical desktop computer within the energy store.

An important feature of this set-up was that batteries alone would only supply a limited amount of back-up power before failing, whereas this system with the fuel cells extended the back-up potential of the batteries significantly. At night time, once the computer had been turned off, the fuel cells were also used as a primary energy source to provide power to the external security lighting.

Electricity consumers often walk tens of kilometres to reach the energy store, where they pay to get their solar power control box token charged (above) before walking home. If the grid is down and the Energy Store computer cannot re-charge their tokens, it's a big hassle', explained Dr Sakib Khan. managing director of Intelligent Energy's South African office. 'We are delighted that the back-up power provided by our fuel cell system can have such a useful real-life application for the people around Mkuze'.

After the end of the trial period, the fuel cell system stayed in place with continued support in terms of hydrogen provision from Afrox. The plan is now for the fuel cell to run for as long as this support is forthcoming.

All fuel cells have been fuelled by hydrogen from pressurised bottles supplied by Afrox. However, Intelligent Energy and its local partners have also been exploring the use of LPG (widely available in many rural areas), to power fuel cells via reforming technology.

This will be particularly helpful for Intelligent Energy's R&D department in assessing the performance impact of an increased time period on the fuel cell stack itself.

'This location has been a real test for the fuel cell systems', commented Dr Khan. 'Conditions go from extreme heat to extreme cold, from very humid to very dry, with a lot of dust at all times.'

Local training

Another important aspect of this installation is that Intelligent Energy was able to train one of the energy store employees to maintain the fuel cell at all times.

George Ngcobo of NuRa summed up: 'Intelligent Energy's fuel cells have been installed at our Mkuze Energy Store for over two years and have provided vital back-up power for our desktop computer, a critical part of our customer management system. This has enabled us to continue operations even during power outages.'

HENRI WINAND (Materials 91) is CEO of Intelligent Energy plc whose strap line is 'clean fuel and power'. He previously worked with Rolls Royce, latterly as vp of corporate venturing, mergers and acquisitions. Intelligent Energy's firsts include a fuel cell powered manned aircraft with Boeing; a hydrogen fuel cell motorbike, and a proton exchange membrane fuel cell powered MPV with PSA/Peugeot Citroën.

Global challenges of climate change

SIR DAVID KING, chief scientific adviser to the government, gave the keynote speech on the Saturday of September's alumni reunion weekend. As a reasoned and articulate exponent of the majority view on climate change, he would be hard to better.

Furthermore, one does not have to be a carbon emissions zealot to endorse a great number of his proposals.

He began with an almost Malthusian overview of the state of the world. While populations have stabilised in many developed countries (and are shrinking in some), the developing world will contribute a further 3 billion before global population stabilises at about 9.5 billion by mid-century. This growth will combine with increasing living standards to impose enormous strains on planetary resources.

He singled out three to talk about. Fresh water, which *Imperial Engineer* has highlighted in previous editions, will be an enormous challenge and, along with world warming, has the capacity to spark serious conflict. He is less concerned about running out of energy. The higher energy cost platform has already stimulated alternative technologies and, with world coal reserves at several hundred years demand, the issues are manageable provided carbon emission problems can be controlled.

His final major issue is, of course, climate change. Before diving in to this, he made some other philosophical points. A big one was that, as well as measuring GNP growth, economists should also focus on whether the global assets are growing or shrinking.

Future inheritance

Our moral responsibility to generations yet unborn is to leave an overall asset base at least as robust as the one we inherited. Deciding how to measure this and then monitor it is a major task.

Turning to global warming, he traced how Arrhenius and others developed a climate model that relates how the quantities of trace, large molecule gases (principally water vapour, methane and CO_2) cause the earth to retain more solar heat. The growth of CO_2 concentration (now at 385 ppmv and increasing at about 2 ppmv per year) will probably contribute as much as 3.7°C to mean global temperature if it peaks at 450 vppm and higher if it goes to greater levels.

While stressing the inherent uncertainties in the forecasts, Sir David feels a global goal should be to stabilise as close to the 450 figure as possible and in no event higher than 550 wppmv.

In a well argued presentation, he demonstrated that this is possible, largely with the application of existing technologies, in which conservation plays the biggest single role. Most importantly, this can be done with a net global cost of close to zero, which the graphic illustrates.

The first five blocks demonstrate the value of the energy savings available from insulation, fuel efficiencies *etc*. The remaining blocks show the net costs of the other activities itemised. It can be seen that the areas under the two sections are roughly equal, leading to the zero overall cost conclusion.

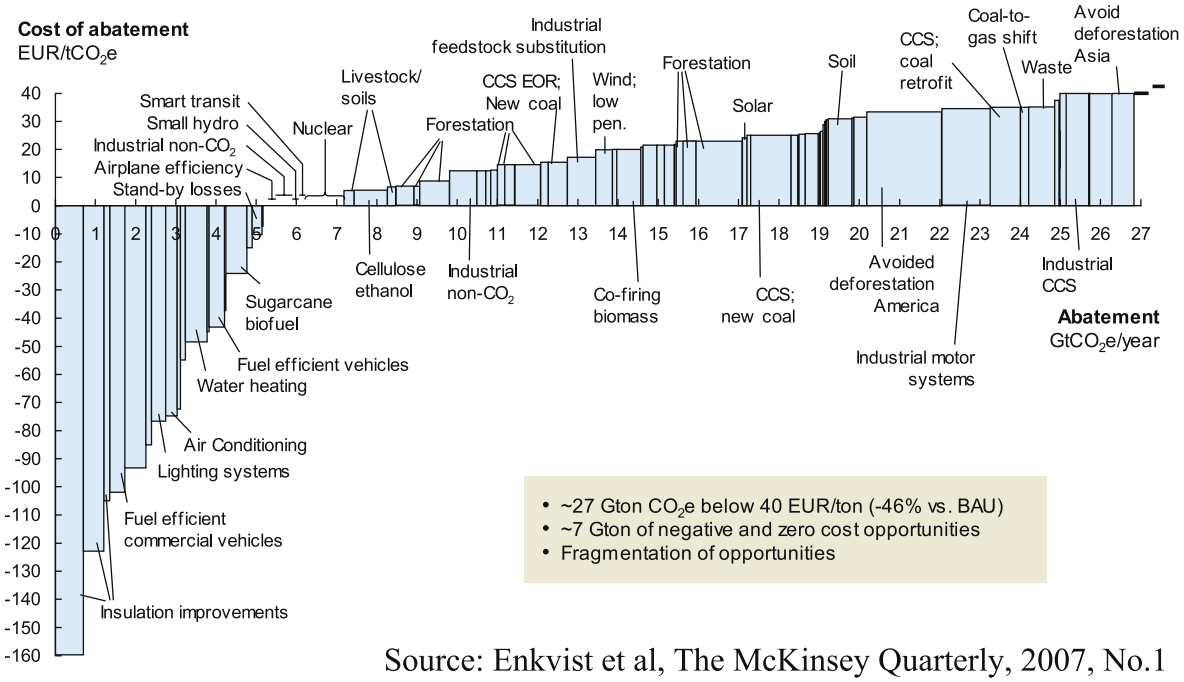
The major problem, as Sir David pointed out, is that the savings will be mainly achieved in developed countries while the costs will be primarily incurred in the developing world. The solutions are technically achievable, he concluded. But do we have the collective political will to implement them?

Bill McAuley

Go to www.imperial.ac.uk/ to download Sir David's speech.

Global cost curve of GHG abatement opportunities beyond business as usual

2030



- ~27 Gton CO_2e below 40 EUR/ton (-46% vs. BAU)
- ~7 Gton of negative and zero cost opportunities
- Fragmentation of opportunities

Source: Enkvist et al, The McKinsey Quarterly, 2007, No.1

Alumni share their views...Alumni share their views...

Parking a joke

FROM ADRIEN STURGEON
(Civils 1956)

IN THE autumn 2005 issue you published a review of *Saving Oil in a Hurry* by Dr Bob Noland. In it you quoted his idea for saving a million barrels of oil a day by cars with odd and even number-plates being driven on alternate days. It was tried in Nigeria in the mid-1970s and the result was that wealthy owners equipped themselves with an additional car with an appropriate number plate. It was a joke. The proposal might work for a week, but no longer.

I am surprised that the IEA allowed this proposal to go forward for debate by energy ministers. In my experience they are a serious body with much experience of practical knowledge of oil transportation and refinery blend mixes and have a simulation programme to advise on revised optimum oil movements if there is significant disruption anywhere.

Since writing this, Adrien has suffered a severe stroke. We wish him well. Ed

Nothing's cut and dried

FROM ED ASHFORD
(Aeronautics 87)

I HEARD an interesting snippet on *Farming Today* this morning about the re-emergence of the wood lark and brown hare as a result of set-aside. Apparently there is a push to drop setaside payments to zero (effectively ending it) and the RSPB are worried this is being done without looking at conservation. (*No wonder the RSPB is appalled at the decision to allow its recultivation. Ed*)

Set-aside hits a lot of alternate fuel sources, including ethanol and rape (bio-diesel), and much of the setaside was treeplanting which would be felled.

In Ireland a lot of schemes started up, but as far as I can tell they are destroying peatland (which traps CO_2) in order to grow willow.

There are similar issues with soy being planted on felled areas of the Amazon and elsewhere.

The other thing you might consider is that planting a tree to offset your CO_2 emissions is merely delaying the problem by about 200 years.

If one person travels from Edinburgh to London the carbon footprint is lower to be on a full 737 than in a car (even without the carbon cost of building the motorway). Does anyone actually have figures for trains? (Why is EasyJet so much cheaper than the railway?)

The Antarctic ice core (Nat Geog map a few years back) seems to show regular glaciation over a period of 100k years with a 10k year warm gap. We are nearly 10k years since the last ice age! Time to move to Gibraltar. (It nearly worked for the Neanderthals.)

Do we really know what triggered the last ice ages? I realise our CO_2 levels seem to be way, way up but the average temperatures the ice core suggested didn't seem to far different. Run-away tree growth might have been a cause. (Really needs someone from RSM to comment as I am not a paleo-geologist.)

I think we can expect a rather large war in the next 20 years if we are not careful. China needs natural resources and Russia and the Middle East have them.

Edward.Ashford@uk.fujitsu.com

RAEng discusses biofuel problems

FROM JOHN BANYARD
(Civils 66)

THERE was a very good seminar on biofuels at the RAEng some weeks ago. The material is posted on their website (raeng.org.uk/policy/reports/future of biofuels). One of the big issues is that the fertiliser to grow the plants means that they are not sustainable, and they are taking away foodstuff production. Prof Roland Clift is a big opponent. There was general agreement that we need a second generation of biofuels, what we have now is really just playing to the political agenda.

jkbanyard@dial.pipex.com

Leading technology

FROM ROGER NETHERCOT
(Civils 63)

MY PARTNERS and I designed a fuel alcohol plant that was built in Michigan in '85. One third of the corn made alcohol, one third went to cattle feed and drink and then to a biogas plant to help fuel the boiler and one third to carbon dioxide, planned to enrich green houses for tomato production. That is renewable energy. By the way, the solids from the biogas plant went on the corn fields as fertiliser. This facility was on a 300-head dairy farm. It was killed by the Reagan administration as MTBE could replace the lead in gasoline. MTBE has since proven to be a carcinogen.

I detest being 20 years ahead of the economy!

rnethercot@cogeco.ca

WE NEED YOUR NEWS

Let us know your news and stories.
Or have you an idea for a feature? Or want to air your views? Editorial assistance is available!
Contact is Teresa Sergot (address on page two).

COPY DEADLINE FOR NEXT ISSUE IS MONDAY FEBRUARY 11 2008
Any pieces not published in this issue will be published next time

Alumni share their views...Alumni share their views...

Are nuclear costs too prohibitive?

FROM SIMON WYNN (Mining 75)

I NOTICED in a recent *Independent* article, the comment by Engineering's Professor Tom Burke (an aide to three past environment secretaries) on the costs of government plans to build a new generation of nuclear plants.

He suggested that it was possible that none would ever be built, especially if no one knows how much building the reactors will cost.

He told the paper that present 'guesses' by nuclear advocates range from $1,000 to $2,083 per kilowatt. As he said it 'certainly looks like "I don't know" to me'. The real cost of eight reactors built in Asia is more than twice as high as the most expensive estimate, he added.

I'd be interested to hear the views of some fellow alumni.

simon@onlib.com

It's all a matter of timing

FROM ALAN CLEUGH (Chem Eng 1960)

IN THE last issue there was an email from Peter Ackers on the Severn Estuary Tidal Power Scheme. I was the engineer responsible for evaluating the generation security implications of the Severn Barrage at the CEGB in the early 1980s. Our Monte Carlo simulations based on tidal equations from the Admiralty, astronomical data, tidal modelling data from Bidston Research Centre and turbine data from CEGB Engineering Laboratories, Marchwood, showed that the solar component of the tidal equations caused the minimum generation to occur at times of maximum demand and minimum generation to occur at noon or midnight. This not only worsened the economics (the value of electricity generated was less) but required considerable peaking capacity. In fact the fossil equivalent capacity was less than 10%. Even dedicating Dinorwic and Festiniogg pumped storage to the barrage had little effect. It is unforfunate that the site providing the highest tides in the UK and I think the second highest in the world has its springs at the wrong time.

alan_cleugh@yahoo.co.uk

What about clean coal?

FROM ROBIN RANKIN (Mining Production MSc 88)

WHILST everyone seems to be charging straight on to renawables etc, the focus on improving efficiency of existing consumption is ignored.

Suggestion: Maybe something could be done to look at the enormous progress made by firms such as Australia's White Industries in clean coal burning.

Phone/Fax: +61 (0)2 4872 4654
robin.rankin@geores.com.au
Robin is consulting geologist with GeoRes, NSW, Australia

Working with waste in Shropshire

FROM DENNIS TWIST (Chem Eng 51)

I'VE HAD a life-long interest in the energy business and am currently a member of The Wasteless Society , a not-for-profit company which operates from Bishop's Castle, Shropshire. Its object is encouraging responsible use of the earth's resources. Because I'm long-retired, your articles provide info that I wouldn't necessarily get otherwise. I'd be interested to hear about similar local groups and their work.

In my view, the three most important issues facing the world are global warming/climate change, oil availability and population growth. The first two are energy matters – hence the value of your series and why I'm involved with the Wasteless Society.

Initially, the Society's activities were directed mainly to recycling and, because the local council didn't recycle plastic waste, it set up (and still operates) a local plastics' collection facility. Latterly it has devoted most of its efforts to energy saving.

In 2004, the Society, in partnership with the Marches Energy Agency (MEA), won a £10k grant from The Energy Savings Trust (EST) to assess, for the Bishop's Castle area, the total carbon footprint and the potential for its reduction. Society volunteers carried out the surveys and MEA provided technical input.

In late 2005, the Society, again in partnership with MEA, won a £100k grant from EST to provide free home energy surveys with detailed reports and energy-saving advice. Nearly 400 surveys will have been completed when the project ends in November 2007.

The Society has employed part-time technical and administrative staff to oversee the work but all the surveys have been carried out by unpaid volunteers, trained for the purpose. MEA again provided technical support.

In 2006, the Society was awarded a £60k grant by DEFRA to communicate climate change threats and opportunities to different sectors of the population in Hereford, Kington and Ludlow.

The project, to be completed in March 2008, involves the recruitment and training of volunteer climate communicators and the writing and staging of an entertaining and thought-provoking play on climate change.

dennistwist@onetel.com>

ALUMNI NEWS & VIEWS

Four pages of who's doing what and where

A plea for the other hemispere

A TWO-hemisphere outlook immersed in a sea of predominately right or left brain souls, depending on which side of Exhibition Road you were on, was the problem quoted by Mike Young (Civils 61) during his studies in the late 50s.

As a result, he founded an art society and arranged contact with the Royal College of Art over the road, where they had access to their open studios for life drawing. Members met once a month in a pub and mutually consoled each other over their two hemispere plight.

After retiring from engineering, Mike attended Ontario College of Art and Design and graduated with honours in sculpture and installation.

Now he's written to suggest that *Imperial Engineer* runs a regular section about alumnis artistic bents with 'perhaps a shot of one student/alumni work. It should also give room for artists past (and present?) to give a link to websites illustrating their work. Just a hint that Imperial students and alumni are not all left brain dominant.'

So to start off, Mike's email is my.sculptor@sympatico.ca and his website is http://web.mac.com/mikeyangeloh.

Now we're looking forward to hearing from other alumni with an artistic bent.

Mike is pictured with a replacement piece for Waverley Park, Thunder Bay which

Centenary downunder

ENGINEERS, miners and scientists (and maybe a medic or two) will be celebrating Imperial's Centenary on October 29 at Vivace, in Brighton, Melbourne 'It was hard to find a big enough venue', says David Bishop.

Part of the festivities will be a 20-minute DVD of the mid-September alumni weekend at Imperial. David was present with camera running.

+61 3 9596 1532
db@numerousbenefits.com

Top flight contact made

ALTHOUGH no longer working on the Collahuasi project in northern Chile, Jim PLatt (Min Geo 60) has written to Ian Dun to offer his old work site (from 1986 to 1991) as a rival to Ian's in Peru at 4500 masl. (*Imperial Engineer* Spring 2007).

'Our camp utilised the old Quebrada Blanca buildings (4,250 masl) and the project itself was located at about 4700 masl', wrote Jim. 'Our highest point on the project was the top of Cerro La Grande which was 4,995 masl. We didn't quite make 5,000 meters! Perhaps we should have built ourselves a big cairn of rocks to round the figure off!

'The thoughts of working at high altitude with all the challenges that it brings always interest me, as it all had a strong influence on me at the time. I wrote about this in a chapter of a book entitled *Your Reserves or Mine* that was published a couple of years ago. Tel +31 715615206. jim.platt@planet.nl See www.creightonbooks.nl

Rob takes the high road

ROB CLIFFORD (Civils 83) has been appointed Lancashire County Council's director of Highways and Environmental Management. He takes over when the present director, Cliff Matthias (Civils 63) retires in October.

robandpat@oberon.fsnet.co.uk

Like father like son

CIVIL engineering degrees from Imperial were the springboard into adventurous lives for a father and son duo who were present at CGCA's annual dinner this March.

Kevin Walton (Civils 39) and Jonathan (Civils 72) were wearing their decoations as instructed. They both sported the coveted Polar Medal, probably the only father and son pair to have won it.

War record

Apart from a little roof climbing at Imperial, Kevin, who learnt from Everest climber Howard Somervel, found adventure in earnest in the wartime navy. He was on HMS Rodney when it helped sink the Bismarck and won a DSC for bravery in the Battle of the Barents Sea.

Kevin won the Albert Medal (later the George Cross) during his first two years in the Antarctic. He made one of the earliest crevasse rescues, mostly in the dark and for quite a while suspended upside down.

The rest of the time he spent training and working with the first British huskies shipped from Greenland. He later kept and bred huskies in the Royal Geographical Society (RGS) garden when British secretary of an international Antarctic Expedition.

Various teaching roles followed, interspersed with work in the fledgling nuclear industry and as instructor on the first Outward Bound course.

While lecturing at Britannia Royal Naval College he gained another passion – sailing. This lead to the setting up of The Penguin Cruising Club which is still very active.

Inspiration

Kevin also started 'Opening Windows on Engineering', the scheme which sent bright young engineers into schools to enthuse 14-year-olds.

Following his degree with a diploma in land surveying,

Jonathan set out to be as adventurous as Kevin. His career has seen him as a glaciologist/surveyor, chief surveyor on the RGS's 150th anniversary expedition, lecturer at UCL and on board ship in the Antarctic, teacher and founder partner of land surveyors, The Severn Partnership in Shrewsbury.

Jonathan was awarded the Polar Medal after his third stint with the British Antarctic Survey.

Jonathan is also a keen offshore sailor, being club commodore for Penguin Cruising for seven years. He's about to sail to Antigua before another surveying job in the Antarctic.

For a more complete story, see www.imperial.ac.uk/engineering/about/alumni/ It includes a list of books by Kevin,

Email:jonathan@the-waltons.co.uk

Thanks for the memories...

THIS picture of the elite Chaps Club after the end of WWII was submitted by Iris Pritchard-Davies for the Centenary collection of memories now on Imperial's website (www.imperial.ac.uk/centenary). Iris remembers how she met her husband, Edward, who is front right on the picture. Centre, Pete Harding holds the famous bottle fought for each year by RSM and Camborne School of Mines.

Also on the website is Joe Soul's (Elect 48) account of the differences between Sweden and England when he went there in 1946. He's pictured (right) with Nils Wahlström, 24, his host, an ex-pilot of the Swedish Air Force. Joe's email is: jsoul@aei.ca.

An embodiment of style

FOND memories of Sir Hugh Ford by John Sharp(Mech Eng 61) came to our notice when he wrote to say how sad he was not to be able to come to the alumni reunion weekend. Sir Hugh spoke during Mechanical Engineering's events.

Since being a student, John has met Sir Hugh twice and on each occasion talked about the splendid post-war Bentley he drove to College. 'He seemed to me to be the embodiment of sartorial, never mind professorial style', wrote John. 'He said he still drove a Bentley. (I gather he'd had more than one and that it was the only car for him.)

SHARPJFranklin@aol.com

IN TOUCH...

Box of tricks

BARNEY RHYS JONES (Civils 94), on behalf of Low Energy Accelerators Ltd (LEA) has just invested in Energy Cabin, an Austrian business delivering carbon neutral heating units for buildings. This adds to LEA's low-carbon business portfolio.
+44 7971 032 734
barney@rhysjones.com

Things some people do

KEITH GUY (Chem Eng 65), who is now senior partner and director, Spiritus Consulting, made contact to chide managing editor Bill McAuley – 'The things some people do to see their name in print. Reminds me of Phoenix'. (Bill was editor in the 60s).
+44 1420 562802 or +44 7802 223 000 *Guykw@aol.com*

Swiss ahoy!

BOB WORRALL (Mech Eng 68) has written from Swiss Geothermal Explorers Ltd www.geothermal.ch http://www.geothermal.ch
+41-793118493
bob.worrall@geothermal.ch

Like father, like daughter

CAROLINE CHASEY (née Barnes, Mech Eng 79) has written to say son Chris has graduated in the same subject from Reading University. 'It's significant because I am a lecturer there and have taught him, just as my father, John Barnes, taught me at Imperial. wSadly, John died last September and so was not there to celebrate this coincidence.

'If any friends from IC days are in the Reading or Hartley Wintney areas, it would be great to see them.
j.c.a.ellick@reading.ac.uk

A well-remembered teacher

JOHN BARNES, who died last year is still remembered for his lectures on mine coolers.

His grandson has inherited his interested in engines, combustion and thermodynamics, so John's workshop with lathe, milling machine and a family of stationary engines doesn't lie idle

JOHN BARNES

He's even increased the productivity of his beloved garden.

Pre-Imperial, John worked in gas turbines, first for the National Gas Turbine Establishment and then for Frank Whittle's company, Power Jets, where he became an authority on the pressure exchanger. He also taught at the Gas Turbine School which enabled an easy transition into lecturing at IC, where he very much enjoyed teaching students from the mid 60s to retirement in the early 90s.

Esteemed at RSM

FRANK Cassidy was born in 1910 and died this August nearly a century later. He was at the Royal School of Mines from 1928 – 1932 as a Kitchener Scholar where he qualified with first class honours in mining engineering and mining geology. Whenever he returned he was always hailed with enthusiasm and great esteem.

He was also awarded the Murchison Medal for geology from which he retired in 1980 although he was still actively

FRANK CASSIDY

interested in mining matters, As a student he worked for Rio Tinto in Spain. Later he worked for Thetford Mines in Quebec and Canada. He also worked in Cyprus, Ghana and Columbia.

Frank joined the Civil Service in 1935 where he was appointed inspector of mines in Sierra Leone and subsequently Nigeria. His last appointment was as chief inspector of mines in Zambia and metallurgy in Sun City in 1992.

Colleen Richardson

THE LORD GARDEN

IT IS with great sadness that we learned of the recent death of Air Marshal Lord Garden after a short illness.

Tim Garden was a good friend to CGCA, supporting his wife Sue in her work for the City & Guilds of London Institute and its fellows. He will be greatly missed.

Courteous with a formidable talent

BOB LANGFORD

BOB LANGFORD, who died in June, aged 87, was a familiar face at CGCA functions for over 50 years. He was president in 1983.

Bob gained a Kitchener Scholarship to read electrical engineering at Imperial but the course was shortened by the onset of war and he graduated with first class honours in 1940 after only two years.

The bulk of Bob's war was involved with degaussing and demagnetising ships and ended the war on the staff of the superintendent inspector at Rosyth Dockyard.

Bob spent 36 years with Humphries and Glasgow, whose forte was the design and installation of gas-making plant, and Bob's early career was as the electrical engineer for various contracts. Later he was involved with schemes for underground gasification of coal and was appointed associate director with responsibility for leading H&G's work at two experimental sites in Derbyshire. He also established fruitful links with the USSR which culminated in developing a new gasification technique. This enabled a small CEGB power station to be continuously fired by the in-situ gasification of the coal seam. Despite its promising performance, the NCB declined funding for further developments.

Bob travelled widely and negotiated major contracts in Australia, India, Canada, Eastern Europe, Italy, France and Germany. He was managing director commercial until retirement in 1982 when he was appointed director of the British Chemical Engineering Contractors Association.

A fellow of the Institution of Electrical Engineers and the Institution of Gas Engineers he was proud of his permanent commission as lieutenant commander in the RNR. In retirement he was a loyal supporter of various naval associations

Bob was a kindly, courteous but quite private man, whose formidable intellect was masked on first acquaintance by his self-deprecating manner. He was a committed Christian and renowned for putting service to others before himself.

Nigel Knowles

ROGER BARNES

Distinguished

ROGER BARNES (Mining 50), one of the RSMA in SA's longest standing and most popular members, died on August 13 from a heart attack brought on by complications from the kidney problems he had suffered from for some time.

Roger had a long and distinguished career with, amongst others, Ashanti and Anglovaal and was active in the consultancy business until last year . His autobiography was published a couple of years ago.

Dave Proctor, RSMA, SA.
daveproctor@xsinet.co.za

Not such a placid reunion

THE ICENAE (Imperial College Exiles North America East) had a great time in Lake Placid this year. The weather was warm and attendees were able to get their golf games in. Hikes and boat rides were also organised, writes Harry Sewell. 'There was top-notch singing with very notable contributions from the Olleys and from Angela Hey (who flew in from California).

'I've done my two year stint as 'stucky', so the volunteers for next year were lined up. The baton now passes to Michael Barron (Mech Eng 62). He will contact everyone about 2008's reunion.
hlsewell@sbcglobal.net

Update on 'an amazing life'

A RELATIVELY thorn-free bed of roses is how John Gardiner (Civils 70) described his and wife Christine's life after moving from their loved farm in Tickle Creek, Oregon. Its eight acres of pasture were not capable of carrying a large enough herd of alpacas to be their main source of income.

They are now part of a small community nearly 300 miles south, called the Riverside Farm Family Land Trust. 'We have lifetime use of 15 acres of flat pasture on an abandoned river terrace of the gorgeous Illinois river', writes John. 'Our alpaca compost production will invigorate the community's gardens to enhance food production.'

While Christine managed the herd in difficult circumstances on the old farm, John used all his engineering and management skills to convert the weed-ridden land into a ploughed, disked, harrowed and seeded pasture while also building their own house and erecting a large barn.

The alpaca herd was moved on December 30, including one of the most renowned breed alpaca suri sires in North America.. Although 'in his golden years', as John says, Pperuvian (*sic*) Bruxo has already proved his worth and they now have a herd of over 50. 'It takes most of the day to feed and muck 'em out.'

John and Christine have continued to teach about sustainability at Portland State University and also team-taught their first full course in fluvial geomorphology. They've also continued to win top prizes for their fleeces.

'This is such an amazing lifestyle – we love it and hope that sales will soon pick up to sustain it! ' wrote John. We're enjoying the opportunity to work towards sustainability in agriculture, fibre and our food supply and towards a more just American society'.

John is on +1 541 592 6696 alpacas@suri-futures.com and www.suri-futures.com

Doors always open

AT A special 'sundowner' in August (they normally meet for the first Friday evening of the month) RSM student Rob Phillipps was special guest of RSMA in Western Australia. Rob was doing geological vacation work with Rio Tinto and took this picture of (from left) himself, Mike Sandy, Roger Pooley and Alan Dickson in a local Indian restaurant in West Perth. 'You can use this piece to encourage students to contact RSMA alumni when they travel overseas', says Alan Dickson (Mining 68). **alan@dickson.com.au**

Learning to win

JEREMY HALL (Elect Eng 63) won the prestigious 2006 World of Learning award for 'outstanding contribution to the training industry'. Judged by an independent industry experts, it rewards organisations and people who have significantly advanced workplace productivity and performance within the training industry.

Jeremy (above right) creates learning simulations which involve business people running

a simulated business where they make decisions (about price, production *etc*) that are entered into computer software that assesses outcomes (in terms of sales, costs, profits etc).

Ring 020 7537 2982 or *jeremyhall@simulations.co.uk*

Dufile – student findings accurate

ARCHEOLOGICAL investigations, which started with an Imperial project in 1965, took another step forward early this year when Nigel Fitzpatrick (Met 65) returned to Fort Dufile Uganda.

In between, the site has been preserved by being in a game reserve. There have been various delays in excavations, particularly in late 2006 when it was thought violence in Sudan was affecting the area.

Now, as Nigel says, the area can be safely visited by air, road and river and there is a good place to stay (www.nileperch.org/lodge.htm. The Moyo area is unspoilt and needs tourists.

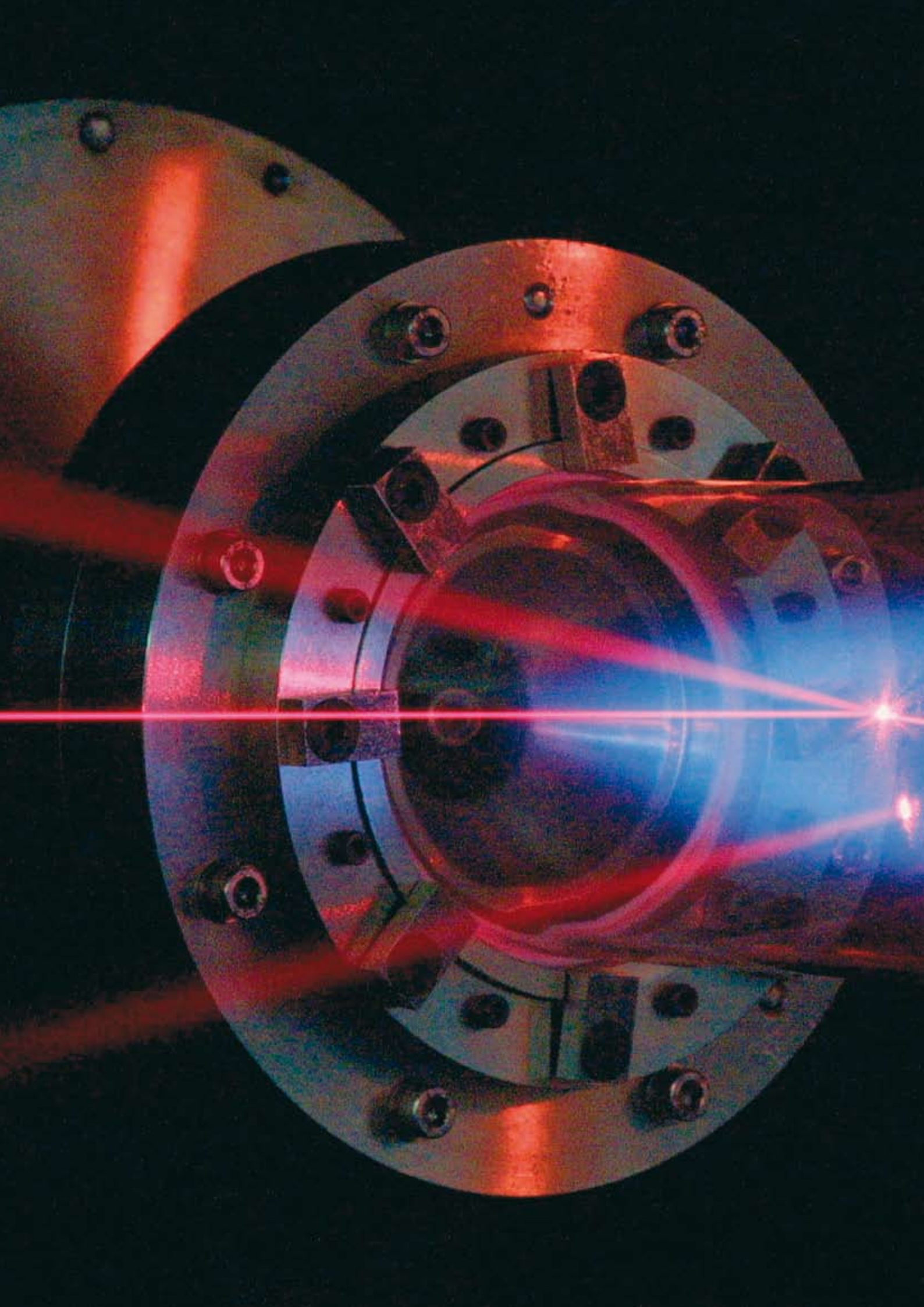
Nigel returned with Merrick Posnansky, who was chair of the Uganda National Monument Commission in 1965. Merrick has now produced a comprehensive report for the Royal Geographic Society (http://en.wikipedia.org/wiki/Dufile).

In conjunction with the Egyptian rulers, Fort Dufile was developed in the mid-1870 by Charles Gordon (later killed at Khartoum) as a series of military stations to control the slave and ivory trade.

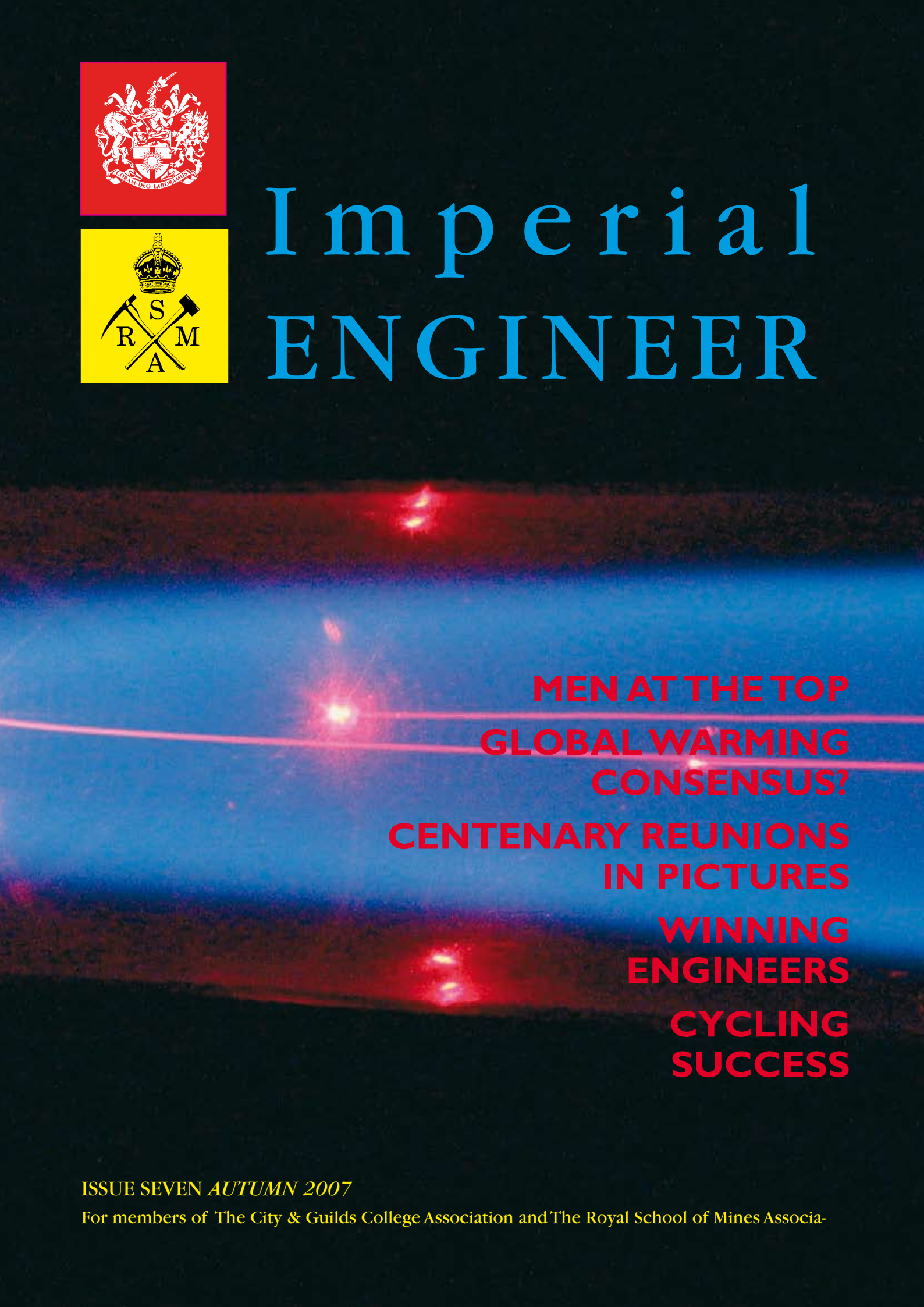
Excavations are now concentrated on an extensive five-hectare site used by Emin Pasha from 1879-88 and later by the Belgians (below). It includes the first brick buildings in Uganda and the first dockyard for steam boats.

The team has identified specific Egyptian and Belgian buildings (below) and found bullets in an area which would have been attacked in the 1888 Battle of Dufile.

And the 1965 findings? Nigel is pleased to say that they proved accurate when overlaid with a satellite image.



Imperial ENGINEER



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