

R&D

REVIEW

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*Linking Australian Science,
Technology and Business*

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Climate: the Oz response

By Jenifer North

The **Australian Government's** Green Paper on a Carbon Pollution Reduction Scheme is causing much discussion but held little information about research and development initiatives. However, there are several complementary initiatives taking place that do offer support for increased R&D.

The Government will establish the Climate Change Action Fund to help business transition to a cleaner economy, by providing 'in partnership' funding for a range of activities, including:

- capital investment in innovative new low emissions processes;
- industrial energy efficiency projects with long payback periods; and
- dissemination of best and innovative practice among small to medium sized enterprises.

The Government has committed \$46.2 million for a new Climate Change Research Program to help prepare Australia's primary industries for climate change by closing gaps in research and development. The new fund is part of the \$130 million Australia's Farming Future initiative, announced in the Federal Budget.

The program will target three key priorities: reducing greenhouse pollution; better soil management; and adapting to a changing climate. The announcement followed the release of a joint report by the **CSIRO** and **Bureau of Meteorology** showing that in the worst scenario droughts could occur twice as often and cover twice the area. The report found there was a need for better ways of getting information about climate change preparedness to farmers. In December 2007, the **Australian Bureau of Resource Economics** released a report showing Australian production of key commodities could fall by up to 10% by 2030, worth around \$4.2 billion in today's terms, if we fail to act on climate change.

The Climate Change Research Program will support research with an emphasis on showing how it can be applied on the ground in agriculture, fisheries, forestry and food industries. Research that could be funded includes how carbon is stored in soil, new technology, helping primary producers reduce greenhouse pollution and improving productivity in response to climate change. Expressions of interest will be called shortly for collaborative research proposals that help primary producers to



reduce emissions and adapt to climate change. Large-scale collaborative research proposals covering multiple industry sectors will be encouraged, including partnerships between research providers and farmers using new technology on their properties.

In a complementary initiative, projects to boost the sustainable management of Australia's farms, rivers and oceans and national icons can now apply for a share of \$25 million in funding under the Caring for our Country package announced in March. Regional and farming groups are now encouraged to apply for the Open Grants funding, including for projects to tackle weeds, promote sustainable farming practices and restore threatened species habitat.

Grants of between \$80,000 and \$400,000 are available to councils, schools, groups, individuals, companies, partnerships, Indigenous groups, incorporated groups, trusts and unincorporated groups sponsored by a legal entity. Projects must meet key criteria under the Caring for our Country program, including:

- protecting the nation's biodiversity;
- improving water quality of critical aquatic habitats;

- increasing take-up of sustainable farming practices;
- addressing environmental and sustainable land management outcomes in remote and northern Australia;
- improving the national reserve system; and
- improving community skills, knowledge and engagement.

An important focus of the \$25 million Open Grants fund will be projects that promote sustainable farm practices. These projects could address a range of issues, including reducing farm greenhouse gas emissions, animal and crop production, managing organic waste, climate change, water quality and salinity.

The Australian Government will also provide \$2 million for the first stage of a major review of the main reference manual for engineering works in Australia – the Australian Rainfall and Runoff Handbook. The handbook is the key source of technical information in Australia for designing infrastructure to withstand the impact of extreme rainfall, flooding and storm surge. It was last reviewed in 1987.

The Government will work with **Engineers Australia** to complete the handbook in three stages over four years. The first stage will involve 10 projects with a focus on rainfall intensity, frequency and duration. The revised handbook will incorporate new data and technical and scientific advances in hydrology engineering to account for the potential effects of climate change on water resources, infrastructure planning, flood prediction and emergency management.

► **More information:** www.maff.gov.au; www.nrm.gov.au

CSIRO warming up

CSIRO has launched its **Climate Adaptation National Research Flagship**, aimed at producing a better understanding of and preparation for the impacts of climate change.

“The quantity of greenhouse gases already in the atmosphere, together with natural time-lags built into the climate system, mean that some ongoing climate change is now unavoidable,” Flagship director **Dr Andrew Ash** says. It is predicted that Australia’s average temperature will rise by between 0.7 and 1.2 degrees by 2030, while rainfall is likely to decrease by 2% to 5% over much of the continent.

Funding for the Climate Adaptation Flagship was first announced just over a year ago. Since then CSIRO has been expanding its research

into climate adaptation and establishing new collaborations and partnerships around the issue. In the 2008-09 financial year the Flagship’s research budget will be close to \$30 million.

► **More information:** **Andrew Ash, 07 3214 2346, Andrew.Ash@csiro.au**

Smart dedication

Senator Kim Carr, Minister for Innovation, Industry, Science and Research, has launched a Cooperative Research Centre (CRC) aimed at significantly increasing productivity in Australia’s services industry and enhancing its global competitiveness. The **Smart Services CRC** was awarded \$30.8 million of CRC program funding until 30 June 2014 to develop work by its predecessor, the **Smart Internet Technology CRC**.

“The Smart Services CRC will focus its research in three sectors – finance, media, and government – to develop high-value, sophisticated digital services delivered over internet and mobile platforms,” Senator Carr says. It will work in six strategic areas: global services futures, user-focused services, service aggregation, multi-channel content delivery, trust and privacy issues, and collaborative service interfaces.

According to Senator Carr, the Smart Internet Technology CRC had resulted in the Collaborative Services Network technology that had operability across multiple service economy sectors. This will be used by the Smart Services CRC in trials involving health services and other government and finance service delivery areas.

“The new business models will result in new ways of doing business and will enable Australian service industries to increase the export of digital services by capturing and utilising the knowledge of their highly skilled workers,” says Senator Carr.

► **More information:** **Patrick Pantano, 0417 181 936**

Biomarkedly ambitious

The new **Cooperative Research Centre for Biomarker Translation (CRC-BT)** has started up at **La Trobe University** in Victoria under chief executive officer **Michael Kleinig**. Core partners in the new CRC are La Trobe University and the **Macfarlane Burnett Institute for Medical Research and Public Health** in Melbourne; the **Mater Medical Research Institute** and **Mater Health Services** in Brisbane; and the **Women & Children’s Health Research Institute** and **Institute of Medical and Veterinary Science** in Adelaide. US-based biotechnology corporations, **Amgen** and **Becton Dickinson Biosciences** are the commercial partners.

The CRC-BT will receive \$30 million in cash funding from the **Australian Government**, \$6 million from participants, and more than \$100 million ‘in-kind’ funding from its partners over seven years.

The CRC will conduct a ‘pipeline’ project in five stages, which will simultaneously target the discovery, development, clinical and diagnostic efficacy and commercialisation of new biotechnologies for diagnostic and therapeutic applications.

The project aims to develop highly specific diagnostic tests and therapies to treat cancer and auto-immune diseases such as rheumatoid arthritis, Type 1 diabetes, inflammatory bowel disease, psoriasis, and lupus. The objective is to identify and profile a great number of yet unknown ‘biomarkers’ correlated to diseases - including 35 immune cell ‘biomarkers’ already identified in a previous CRC. These will be used to

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EDITOR
Dr Gerd Winter
08 8370 2778
editor@elwinmedia.com

DESIGN
Elwinmedia

WWW
www.arldr.com.au

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info@elwinmedia.com or visit www.arldr.com.au

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generate specific monoclonal antibodies which potentially will provide better diagnosis and treatment of disease. Within the first seven years, the researchers aim to identify at least five 'biomarkers' with potential for new therapeutic applications, and at least eight with potential for highly refined diagnostic therapies.

The CRC will also run a \$500,000 research and practitioner-oriented education program including 40 PhD research scholarships.

► **More information:** Michael Kleinig, 0425 76 1997, michael.kleinig@biomarkercrc.com.au

Nano rules

Two documents released recently identify areas for further work on nanotechnology and the way the **Australian Government** will address emerging nanotechnology issues.

According to **Senator Kim Carr**, Minister for Innovation, Industry, Science and Research, "Nanotechnology is developing very quickly on a global scale. Governments, industry and research need to be flexible and active to keep pace with these developments. We need a long-term effort across multiple Government agencies and we are committed to that."

A Review of *Possible Impacts of Nanotechnology on Australia's Regulatory Framework* was conducted by the Centre for Regulatory Studies at **Monash University**. The review found that whilst there is no immediate need for major changes to the regulatory regime, there are many areas that potentially will need amending.

Six areas of concern have been highlighted in the report in terms of 'regulatory triggers'. These are:

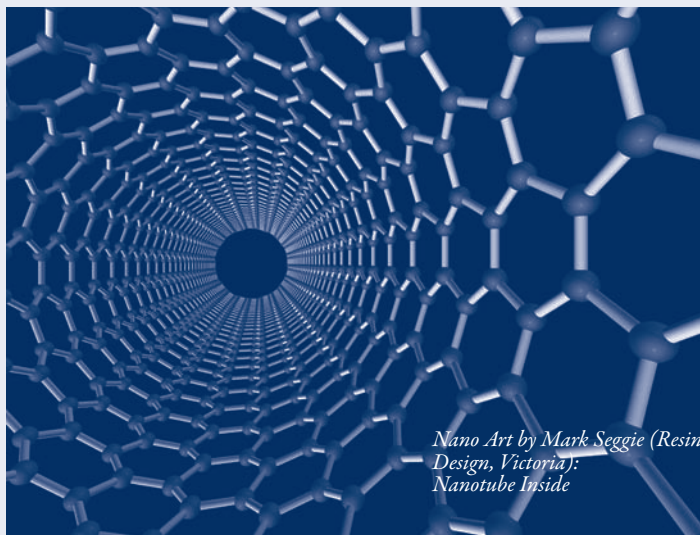
- 'New' or 'existing' substances or products? – The most significant potential gap concerns the uncertainty as to whether new nanoforms of conventional products will be considered as 'different' to traditional products.
- Weight or volume – Many regulatory triggers currently exist on the basis of a threshold weight or volume. For nanomaterials such thresholds may not be meaningful.
- Knowledge of presence or implications of presence of nanomaterials – In some instances appropriate regulation requires particular knowledge of either the presence of nanomaterials and/or the risks posed by nanomaterials.
- Risk assessment protocols or conventional techniques – Australia's current regulatory regimes often rely on risk assessment protocols as a means of ensuring human or environmental safety of products or applications. However it is uncertain whether the current risk assessment methodologies being employed by various regulatory agencies are suitable for goods that contain nanomaterials.
- Research and development exemptions – There are some gaps relevant to research and development, which although not unique to nanomaterials may apply when there are regulatory exemptions for R&D purposes that are based on weight thresholds.
- International documents – Many of our regulatory frameworks refer to international documents or documents sourced outside regulators. If these documents themselves do not adequately address health, safety and environment concerns raised by nanomaterials, this may lead to a further potential regulatory gap.

The second report is the *Australian Government Approach to the Responsible Management of Nanotechnology*. This document identifies three guiding objectives for nanotechnology management:

- protect the health and safety of humans and the environment;
- foster informed community debate; and

- achieve economic and social benefits from the responsible adoption of nanotechnology.

► **More information:** www.nanotechnology.gov.au



*Nano Art by Mark Seggie (Resin Design, Victoria):
Nanotube Inside*

Design Council needed

A new report *Between a hard rock and a soft space: design, creative practice and innovation* from the **Council for Humanities, Arts and Social Sciences (CHASS)** argues that Australian innovation can be enhanced by bringing design into the mainstream of policy and industry thinking. It calls for the formation of a **National Council for Design and Creative Practice**, as a body where industry, research and government can work together to contribute to innovation policy.

According to **Professor Stuart Cunningham**, president of CHASS, internationally there is a growing convergence of technology, engineering and the applied arts, as well as the enabling inputs of science, the humanities and social sciences.

The report uses design and creative practice as examples of how the humanities, arts and social sciences can contribute to innovation. International innovation policy is increasingly concerned with design and creative practice, increasingly recognizing the contribution of creativity and the 'creative' industries to economic prosperity, particularly in cities and regions.

► **More information:** www.chass.org.au

Whale deal

Australia and Chile are to cooperate on whale research and whale conservation. The program of work includes regional research partnerships, a research exchange program, conservation management activities and building capacity in the area of regulatory environmental management.

Australia will also host a workshop, open to all scientists, in early 2009 to develop a research plan for the Southern Ocean research partnerships. Australia and Chile will establish a steering committee to organise the workshop and invite participation from other countries. The research exchange program will be managed by the **Australian Marine Mammal Centre** in Hobart and be linked to universities in both countries.

► **More information:** www.environment.gov.au/minister/garrett/2008/pubs/mr20080627.pdf

Cash to keep it going

Twenty two independent health and medical research institutes across Australia are about to receive up to \$29 million to support their essential work. The grants, made through the **National Health and Medical Research Council (NHMRC)** Independent Research Institute Infrastructure Support Scheme, support the indirect costs of maintaining internationally competitive research. Funds will be used to provide non-capital support services such as laboratory staff, libraries, computer services and maintenance for the high tech equipment required for contemporary research. The grants vary from \$28,671 to \$6.26 million, based on the total amount of NHMRC research grants funding held by each institution.

► **More information:** Carolyn Norrie, 0422 008 512

Food science upgrade

The **Australian Government** plans to invest around \$3.5 million in the redevelopment of the Defence food science facility in Scottsdale. Final approval of the redevelopment plan is expected in October 2009 for works to begin in 2010. Managed by the **Defence Science and Technology Organisation (DSTO)**, the food science facility in north eastern Tasmania focuses on two areas of research and development – nutrition for soldiers' performance enhancement and the development of improved rations and rationing. It also produces specialised food items for combat ration packs. Among the facilities requiring redevelopment are the chemistry and nutrition laboratories, and the food technology area used for the pilot production of new meal options.

► **More information:** www.dsto.defence.gov.au/

Enlightened semiconduction

Environment Minister **Peter Garrett** has opened a new facility for the development of technology for improving energy efficiency in lighting. The **BluGlass** company in Sydney was formed to commercialise technology developed by **Macquarie University** to produce the semiconductor material gallium nitride.

The BluGrass technology represents a highly promising way of reducing the cost of producing high brightness light emitting diodes, a market which is expected to grow to US\$9 billion by 2011. Light emitting diodes are already in use in applications such as traffic signals, mobile phone screens and street lighting and offer a more efficient, less energy intensive alternative to traditional forms of lighting.

Mr Garrett says lighting currently represents around 25% of greenhouse emissions from the commercial sector and around 12% of emissions from households.

BLG was awarded a \$5 million **AusIndustry** Commercial Ready grant from the **Australian Government** in September 2007 to fund commercialisation of its technology.

► **More information:** www.bluglass.com.au/

Banksia awards

The **Banksia Environmental Foundation**, a national not-for-profit organisation that promotes environmental excellence and sustainability, has announced the winners of the 2008 Banksia environmental awards.

Winners include:

- Banksia International Award – **Dr Zhengrong Shi**, founder,



GaN is critical to the production of a range of high performance electronic devices, particularly high-brightness (HB) light-emitting diodes, commonly known as LEDs.

chairman and chief executive officer, **Suntech**, China. Dr Zhengrong Shi's company is world leader in the design and manufacture of innovative solar energy solutions and a pioneer of technology advances in solar power generation products. A former student at the **University of New South Wales**, Dr Shi moved to China to head solar-cell start-up company **Suntech Power**, investing heavily in developing a world-class research and development centre, patenting new technologies and improving the efficiency of solar cells to 18 to 19%.

- Mercedes-Benz Australian Environmental Research Award – **Professor Matthew England, University of New South Wales**. Following a marked decline in rainfall over parts of Australia in recent years, particularly over southwest Western Australia, the east coast, and parts of Tasmania, Professor England has discovered a pattern of Indian Ocean temperatures that lead to drought seasons over Australia, Indonesia, and Africa. The discovery of an oceanic precursor to drought periods over Western Australia will lead to improved predictions of the region's seasonal rainfall cycles. This work is providing the science to underpin improved water management practices in Australia, while also making an international impact through improved knowledge of rainfall variability and extremes in neighbouring regions. Underpinning improved water management practices in Australia, the work has also international impact through improved knowledge of rainfall variability and extremes in neighbouring regions.
- Banksia Land and Biodiversity Award — **Biodiversity in Grain and Graze (BiGG)** project, **Kiri-ganai Research Pty Ltd** and **University of Tasmania**. BiGG is Australia's largest ever evaluation of biodiversity on mixed farms. A community-government-industry partnership, BiGG's innovative combination of science and participatory research has achieved an unprecedented understanding of biodiversity on mixed farms and the social, economic and production relationship between farm management and the biodiversity of rural landscapes. Partners – **Meat and Livestock Australia, Grains R & D Corporation, Australian Wool**

Innovations, Land and Water Australia and the 62 member organisations of the Grain and Graze Program.

- **Banksia Indigenous Award** – *North Australian Indigenous Land and Sea Management Alliance - Dugong and Marine Turtle Project* (NAILSMA). A management and protection program run by Aboriginal people, Torres Strait Islanders and scientists, the project has created Indigenous Ranger programs to combine traditional knowledge with modern research and training to monitor populations and habitats and track the migration of turtles and dugongs on the north Australian coast. Partners - **Cooperative Research Centre for Tropical Savannas Management, Kimberley Land Council, Northern Land Council, Carpentaria Land Council Aboriginal Corporation, Cape York Balkanu Development Corporation, Torres Strait Regional Authority.**
- **Banksia Eco Innovation Award** — **Dulux** (Powder Coatings) and **CSIRO** (Materials Science and Engineering) *100 per cent eco-sustainable coatings technology*. This Orica-CSIRO technology platform provides nearly 100% eco-sustainable coating technology for plastics. Estimated savings in the Australian automotive industry alone through wet paints substitution will reach approximately \$100 million each year.

► **More information:** www.banksiafdn.com:

From dirty to clean

The Minister for Resources and Energy, **Martin Ferguson**, has announced the formation of a **National Low Emissions Coal Council** and a **Carbon Storage Taskforce**, backed by an **Australian Government** commitment of \$500 million and more than \$1 billion from industry and the states.

According to Mr Ferguson, the Council will deliver a national approach to R&D and develop a national strategy aimed at accelerating the development and demonstration of low emission coal technologies.

“The National Low Emissions Coal Council will bring together key stakeholders from government, industry, and the coal research community to provide guidance and advice on the development and implementation of the National Low Emissions Coal Initiative.”

The Council will be chaired by **Mr Dick Wells**, former chief executive with both the **Minerals Council of Australia** and the **Australian Petroleum Production and Exploration Association**.

A National Carbon Mapping and Infrastructure Plan will be developed by a Carbon Storage Taskforce, says Mr Ferguson, which will incorporate representatives from the coal, power generation, petroleum and pipeline sectors, expertise from Australia’s geological community, and representatives from the workforce and ENGOS.

“The Taskforce will examine the work already underway in Australia and indicate priority issues going forward. It will make recommendations to the National Low Emissions Coal Council on a forward work program for geological mapping, infrastructure and storage locations,” he says.

► **More information:** **Michael Bradley, 0420 371 744**

CRCs in the spotlight

The release of the review of Australia’s **Cooperative Research Centres** (CRC) program was welcomed by the Minister for Innovation, Industry, Science and Research, **Senator Kim Carr**, as an important contribution to the broader examination of Australia’s National Innovation System.

The CRC review was undertaken by **Professor Mary O’Kane** supported by the Collaboration Working Group of the National Innovation System Review. The innovation review is now due to report to the Government by 29 August 2008, providing a Green Paper to be released shortly thereafter.

The Government will be considering the recommendations of the CRC review along with those from the review of the National Innovation System, and will respond with a White Paper later this year.

“This review has provided a timely opportunity for all stakeholders to assess the focus of the program. It has given everyone a chance to think about how we can improve CRCs to ensure they deliver the best possible outcomes for researchers, industry and the entire Australian community,” says Senator Carr.

According to the review, there were 168 CRCs launched since inception of the program by the Hawke government in 1990. In 2007-2008 there were 58 CRCs, nine of which reached end of funding in June 2008. The objective of the CRC program was to encourage collaboration in research and development between private and public sector research and prepare PhD candidates for non-academic careers.

The review makes a total of 22 recommendations in relation to:

- funding and frequency of selection rounds;
- objectives of the program;
- broadening participation;
- co-funding arrangements;
- program administration;
- evaluation arrangements; and
- the positioning and integration of CRCs within the National Innovation System.

The review also recommends the creation of a new program to support the development of closer relationships in those industries and sectors where little collaboration currently occurs.

In an early response to the release of the review, the president of the **Federation of Scientific and Technological Societies** (FASTS), **Professor Ken Baldwin**, says the review has recognised that Australia needs big, risk-focused, collaborative research efforts directed at significant national economic, environmental and social issues.

“The recommendations make it clear that the purpose of the CRC program is to support collaborative research aimed at challenges identified by end-users within a fixed time frame, as distinct from building research institutions for their own sake,” Professor Baldwin says. “While the detail will need close examination, the recommendations are intelligent and sensible, and address the well articulated concerns of researchers, universities, industry and Government with the current program,” he concluded.

Key recommendations of the review identified by FASTS are:

- continue the program with some additional funding;
- position CRC research in the pre-competitive/pre-application space to encourage wide adoption rather than a narrow focus on commercialisation;
- more flexible time frames (4–7 years) including a maximum funding life of 10 years.
- CRCs to tackle significant risks and challenges as identified by users; and
- public good research re-instated as a selection criteria, where the need has been identified by Government, industry or other end-users.

► **More information:** **DIISR: Catriona Jackson, 0417 142 238; FASTS: Bradley Smith, (0408) 511 261**

Shared heritage

Research by a team of international scientists including the **University of Melbourne's** Department of Zoology, has established an identical mechanism of genetic imprinting, a process involved in marsupial and human fetal development. This mechanism, which evolved 150 million years ago, is shared despite the differences in reproductive strategies between marsupials and humans, says **Professor Geoffrey Shaw** of the Department of Zoology, a coauthor on the paper.

According to **Professor Marilyn Renfree**, who led the University of Melbourne research team, genomic imprinting regulates gene expression in the developing fetus and plays a major role in regulating its growth.

Normally both copies of every gene in our DNA, one inherited from our mother and one from our father, are used for development, but in some special cases the gene from either our mother or father is switched off, so we only have one active copy.

"This phenomenon is known as genomic imprinting," says **Dr Andrew Pask**, also from the Department of Zoology. "Because there is no back up copy, when errors occur in this process, it results in many human genetic diseases mainly affecting growth and brain function."

A key gene regulating fetal growth is the Insulin-like-growth-factor-2 or IGF2 which is an imprinted gene. "We inherit a single working copy of this gene from our fathers, while the copy we inherit from our mothers is switched off," says Dr Pask.

The switch for this gene is controlled not by protein but microRNA.

"MicroRNA genes have been sought in marsupials for years, and now for the first time one has been discovered," Dr Pask says. The MicroRNA structure is virtually identical to that of mice and humans, but there was no evidence of this gene or a similar microRNA in the more distantly related platypus. "Understanding how genetic imprinting evolved is important," says Dr Shaw, "It helps us to determine how the mechanism works and what we can do to avoid the development of a number of human diseases."

► **More information:** uninews.unimelb.edu.au/mediareleases.php

Cheaper sleeper

Innovative research by engineers at the **University of Wollongong** (UOW) is set to change the design concept for railway tracks' concrete sleepers and possibly save the industry millions of dollars.

Dr Alex Remennikov, from the School of Civil, Mining and Environmental Engineering, and his PhD student (and teaching academic) **Sakdirat Kaewunruen** are completing the research in collaboration with **Queensland University of Technology** and have been sponsored by the **CRC for Railway Engineering and Technologies** (RailCRC).

The railway sleeper, which distributes the load from the rails to the underlying ballast bed, can be made of timber, steel, or concrete, although the current trend is the large utilisation of the concrete sleepers because of its high durability and high benefit cost ratio.

"Concrete sleepers can last from 50 to over 100 years under extreme environmental conditions – for example weathering, temperature, or moisture," says Kaewunruen. "The high mass of the sleepers also help stabilise the railway tracks from thermal expansion of rails and vibration of rolling stocks." According to Kaewunruen, concrete railway sleepers have reserves of untapped strengths, a notion that initiated the project.

"The current design concept of concrete sleepers has been guided by experience – with little science or theory to back it up. This has resulted in an overestimation of strength requirement, and a consequent high cost for their extensive use."

A new high capacity drop-weight impact machine was constructed at UOW, currently the largest of its kind in Australia, with the maximum drop height of up to 6m. High technology sensors and devices are in place to measure and monitor the behaviour of



Photo: HART - BEAT

Concrete Sleepers

any test specimen under a variety of dynamic impact loading spectra. An estimate by **STEM partnerships** (2006) showed that the new design concept could save over seven million dollars in the short run.

"Saving a few dollars per sleeper seems insignificant, but when considering the millions of sleepers used for rail network construction and maintenance, this research project is highly significant for the economic viability and future of rail," says Kaewunruen.

► **More information:** media.uow.edu.au/news/latest.html

Size matters

Sydney researchers have discovered and modelled the key factors responsible for offspring and family size. Their model published in the journal *The American Naturalist* predicts the size of the offspring favoured by evolution. It will help conservation biologists understand why species become endangered.

And it may help explain why human families tend to become smaller, rather than larger, as parents become richer and live longer.

Why do mammals invest so much time and energy in their offspring? "It's all to do with abundance of energy, safe environments, and intense competition," says **Daniel Falster**, a doctoral student at **Macquarie University**.

He and his colleagues studied the family size for hundreds of animal and plant species from dingos, to gum trees and whales.

At the centre of Falster's work is a mathematical model which mimics the evolutionary process. By estimating the evolutionary pressure on a particular characteristic, such as the level of parental expenditure on each offspring, he can predict how that character will change.

The model can make predictions across the plant and animal kingdoms from butterflies to fish to gorillas and even humans. The key process in the model is competition among rival offspring. The better an offspring is cared for and fed, the larger it tends to be, giving it an evolutionary advantage.

"Our work shows that without competition, evolution would favour parents having many, tiny offspring," Falster says. "Elephants would be having thousands of little babies instead of one large one."

In reality many species have small families, making their populations more vulnerable to extinction. "A lot of endangered species also have very large offspring. They have low population growth rates, and this makes it hard for them to endure, or recover from, any sort of harvesting or loss."

► **More information:** www.pr.mq.edu.au/events/index.asp?ItemID=3422

Lasting atom laser

Australian researchers have shown how to refuel an atomic laser with 'quantum foam' allowing continuous operation. The results, reported in *Nature Physics*, hold great promise for future practical applications of atom lasers.

Ten years ago, Nobel prize winning US inventors discovered how to use 'quantum foam' (also known as Bose-Einstein condensate) to produce a beam of matter waves, essentially an ultra-bright beam of atoms, just as lasers produce an intense light beam. The 'atom laser' could form the basis of a swathe of new devices, some offering staggering improvements in measurement sensitivity. However, until now the atom laser quickly drained the source material, and the device switched off, a dead end for practical applications.

"We discovered how to refuel the material, potentially allowing continuous operation of the atom laser," says **Nick Robins** from the **Australian National University**. "We had to overcome a series of theoretical and technical hurdles, mainly related to the delicate nature of the Bose-Einstein condensate. It only exists at near absolute zero and is hard to maintain," he says. "Our work paves the way for a potentially unlimited source of ultra-high brightness atoms. It's like going from a trickle of atoms leaking from a thimble to turning on an atom tap."

The atom laser offers the possibility to measure magnetic fields, electric fields, gravitational fields, rotations and accelerations with a sensitivity undreamt of a few years ago. Applications can be expected in medical research, mineral exploration, and navigation both on earth and in space.

► **More information:** www.scienceinpublic.com/sciencenow/

No sex please

A new study has found that agricultural environments drive insects to reproduce without sex – a trait uncommon in most of the animal kingdom – but may provide methods for controlling their damaging effects.

Researchers at the **University of Melbourne** have found that when insect pests have a stable environment with abundant resources – such as grain crops, orchards, vineyards, pastures and plantations where the same crops are grown every season – they were four times more likely to reproduce without sex compared to insects overall.

"So increasing the complexity and variability of agricultural environments provides a way of potentially controlling asexual pest species," says **Professor Ary Hoffmann** from the **Centre for Environmental Stress and Adaptation Research, Bio21 Institute** at the University of Melbourne.

These pests include species like aphids that suck sap, mites that eat leaves, scale insect pests that feed on plant sap, beetles that eat plants and thrips that puncture plant cells.

"The advantage farmers have is that asexual pests will have difficulty overcoming control methods that require the evolution of changes at multiple genes, which is more easily achieved with sexual reproduction where two sets of genes combine to produce a more variable genetic make-up than just cloning," says **Dr Andrew Weeks** from the Department of Genetics at the University of Melbourne.

This means that asexual pests should be slower at adapting and becoming resistant to chemical controls, and should be susceptible to biological controls such as fungi that can be released like pesticides.

The study was published in the journal *Proceedings of the Royal Society B*.

► **More information:** uninews.unimelb.edu.au/mediareleases.php

Fast abalone genes

The world's fastest growing abalone – the tropical donkey's ear abalone, *Haliotis asinina* – can be bred to grow rapidly and reliably for aquaculture,

Queensland biologists have found. And that makes it potentially a high value alternative crop for struggling prawn farmers.

The researchers looked at whether they could speed up breeding of abalone for aquaculture using modern technology to identify and select genes that are activated in fast-growing animals. By linking the abundance of specific genes with fast growth rates, they have now shown their proposal is practical.

Tim Lucas from the **Queensland Department of Primary Industries and Fisheries** worked on the project with **Professor Bernie Degnan** of the **University of Queensland**, which has already demonstrated that growth rate is highly heritable – fast-growing animals from the wild are likely to lead to fast-growing progeny in aquaculture. And the researchers have also developed methods for a simple blood test to measure the abundance of rapid-growth genes in wild abalone. This opens the possibility of pre-selecting fast-growing broodstock, reducing the level of undesirable genes from the start.

The availability of these molecular tools increases the feasibility of farming donkey's ear abalone in Australia, leading to rapid improvements in profitability. "Not only are donkey's ear abalone potentially of high value, but they are also plant-eaters," Lucas says. "This is important because it means they could provide a sustainable alternative option for tropical prawn farmers who are currently struggling to compete with cheaper imports and the soaring price of fishmeal."

► **More information:** www.freshscience.org

TB key

Close to 50 boxes of human and animal bones excavated in Jericho and held in the **University of Sydney's** Nicholson Museum could hold the key for an international medical team to unlock the causes of tuberculosis.

The bones were excavated by British archaeologist **Dr Kathleen Kenyon** between 1952 and 1958 and were brought to the Nicholson in the 1950s. They remained largely untouched until about eight years ago when one of the world's leading medical archaeologists, and University of Sydney medical alumnus, **Professor Mark Spigelman**, accidentally discovered the bones while looking through the stores of the Nicholson Museum.

"It was like the proverbial pot of gold at the end of the rainbow for him," says senior curator of the Nicholson Museum, **Michael Turner**.

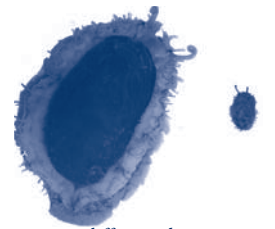
The discovery was to be hugely significant and began an international attempt to begin expert DNA examination of the bones from Jericho – one of the earliest towns on earth, dating back to 9000 BC.

By examining these remains, researchers would be able to see how communicable diseases first developed and could possibly give clues about how diseases such as TB could be combated.

"The Nicholson Museum's bones had remained unresearched for many years, but now through medical breakthroughs such as DNA, they could be used for ground-breaking research," says Turner.

Today, the bones, along with bones held by **Cambridge University** and the **British Museum** are being studied by a joint Israeli-Palestinian-German research group and will be tested for tuberculosis, leprosy, leishmania and malaria, but primarily TB.

► **More information:** www.usyd.edu.au/news



Genetic difference between two abalone grown in the same tank.

Photo: Tim Lucas

Sleepy learners

Grumpiness and lethargy are well recognised behaviours in schoolkids with insufficient sleep. A new study at **Flinders University** shows that lack of sleep also impairs children's 'working memories', negatively affecting their academic ability.

According to sleep researcher **Dr Michael Gradisar**, the study shows that levels of sleep affect the performance of complex tasks that require information to be retained while other information is processed.

Adolescents who had insufficient sleep displayed an impaired ability to encode, store and retrieve information. In the school setting, these difficulties affect tasks such as dictation, which requires information to be retained while writing, and multi-step problems in mathematics.

The study, published in the journal *Sleep and Biological Rhythms*, found eight to nine hours sleep appeared to be optimal: the researchers observed a plateau effect, with no further improvement in performance associated with more than nine hours. Further research aims to test the effect of shortened sleep on performance in areas such as abstract thinking and novel problem-solving.

► **More information:** www.flinders.edu.au/?newsall

Diabetes increasing

The incidence of type 1 diabetes continues to increase at an alarming rate according to a report released by the **Australian Institute of Health and Welfare** (AIHW).

In responding to the report *Incidence of Type 1 diabetes in Australia 2000-2006*, **Diabetes Australia** national president **Dr Gary Deed** says that type 1 diabetes in Australia has gradually increased for some time which mirrors trends internationally where Australia ranks fourth behind the Nordic countries of Finland, Sweden and Norway.

Type 1 diabetes, which accounts for about 13% of all diabetes cases, usually develops during childhood or youth, though it can occur at any age and is characterised by the inability of the body to produce insulin. There is no known cure for type 1 diabetes and, says Dr Deed, more research is needed to find possible controllable risk factors that may contribute to the onset of type 1 diabetes.

"Currently research is looking at both genetic and environmental factors involved in the development of the disease. Some environmental risk factors being researched include viruses, nutrition possibly including early consumption of cow's milk and vitamin D deficiency."

► **More information:** www.diabetesaustralia.com.au

Avoiding scarring

Research at the **Queensland University of Technology** is setting the scene for a better understanding of why some serious wounds lead to unsightly and debilitating scars and how they can be avoided.

A mathematical model developed by PhD researcher **Cameron Hall**, describes the conflicting forces at work when healing cells arrive at the site of a burn or cut to do the work of closing the wound. His research will help explain how normal wounds heal as well as exploring how "overheating" can lead to the creation of hypertrophic scars, which happen when the cells in the skin try too hard to close a wound.

"In order to understand how hypertrophic scars and keloids develop, we need to look at the healing processes that happen in the dermis or deep layer of the skin," Mr Hall says. "This is very complicated because of the competing effects of chemical and mechanical signals."

He investigated the way these signals affect the process of wound repair. "When the skin is burned or lacerated, some of the cells deep in the wound begin to act like muscle cells. They pull on the fibres around them in order to drag the rest of the wound closed. Importantly, these cells can change how hard they pull depending on what's going on around them."

"The process of cell pulling has been seen in experiments, but we need to use mathematical models in order to really understand what's going on."

Mr Hall's research could potentially shed light on the mystery of how pressure bandages promote healing with less scarring.

► **More information:** www.news.qut.edu.au/

Double trouble

The number of plant species now growing in Australia has more than doubled since European settlement in the 1780s, largely due to new plants introduced for gardeners, according to a new publication from Australia's weed scientists. And thousands of them are just 'weeds in waiting', say the researchers.

The *Introduced Flora of Australia*, now available on-line as a printable document and as a searchable database, was compiled by **Rod Randall** of the **WA Department of Agriculture and Food** and the **Cooperative Research Centre for Australian Weed Management** (Weeds CRC).

Begun in 2001, the recently completed project lists all 26,242 introduced plant species in Australia. This number exceeds the likely number of native plant species in Australia. Of the introduced species, 2739 are listed as weeds, and a further 5907 that are here, are not yet weedy, but have a history of becoming weeds overseas.

Most of our worst weeds were imported in the nineteenth and twentieth century through the demands of gardeners, Randall says. Examples include Paterson's curse, blackberry, willows, bridal creeper, gorse, lantana and soursob. Many other plants were introduced for agriculture, especially for pasture, and simply abandoned to go weedy when they failed to perform, he says.

► **More information:** www.weedscrc.org.au/publications/media.html



Photo Department of Agriculture and Food, Western Australia

One of Australia's worst weeds, Paterson's curse (*Echium plantagineum*), introduced during the mid 19th century from Mediterranean Europe as a garden plant.

Virus killer

HIV patients who have not responded to traditional treatments could benefit from a new type of anti-retroviral drugs called integrase inhibitors, according to research published in the **New England Journal of Medicine**. The study is co-authored by a team at the **UNSW National Centre in HIV Epidemiology and Clinical Research** (NCHECR).

The integrase inhibitor raltegravir, the first of its kind and listed on the Pharmaceutical Benefits Scheme since July, was found to lower the amount of virus in the blood to undetectable levels in 62 percent of patients when taken in combination with other anti-HIV medicines. Only one in three people who received a placebo plus other anti-HIV medicines had the amount of virus in the blood reduced to similar levels.

► **More information:** Susi Hamilton, 0422 934 024, susi.hamilton@unsw.edu.au

No simple matter: Carbon trading and Ag

The agricultural sector contributes around 16% of national greenhouse gas emissions, mainly as methane lost during rumen digestion (enteric methane) and nitrous oxide lost from nitrogen fertilisers, animal excreta and soils (see Figure), both potent greenhouse gases.

In its Green Paper released in July 2008 the Federal Government proposed a Carbon Pollution Reduction Scheme (CPRS) to start in 2010, but suggested delaying the inclusion of the agricultural sector until 2015, with a final decision by 2013. However the Federal Government has indicated that if agriculture was not covered by the CPRS, other policy options will need to be considered if Australia is to achieve its overall targeted emissions reduction of 60% by 2050. The agricultural sector will be expected to play its role in any targeted reductions and intensive research will be required to achieve this while sustaining a viable industry. So what are the options?

Enteric methane is produced by microbes - methanogens - in the fore stomach (rumen) of ruminant animals. It is not only a potent greenhouse gas but represents also a high-energy source. A single beef steer, for example, releases between 50-90 kg/year of methane, enough potential fuel to drive a 6-cylinder LPG car for 450-800 km/year. Instead of ending up in the atmosphere this represents a substantial loss of energy that ideally should support meat or milk production.

Research in Australia and NZ has demonstrated some possible strategies for methane abatement:

- Individual animals differ in their feed conversion efficiency, thus breeding for more efficient animals, of profit to the industry, can also reduce methane losses.
- Improving feed quality and certain dietary supplements (eg. oils, tannins, enzymes) can reduce methane production, with potential profitable production benefits.
- Minimising the number of unproductive animals on the farm, for example through earlier finishing of beef or extended lactation in dairy cows, effectively reduces the number of animals, improves profitability, and reduces methane produced.
- Finally, altering microbial populations in the rumen can reduce methane production, either through chemical means, or by introducing competitive or predatory microbes or vaccination approaches.

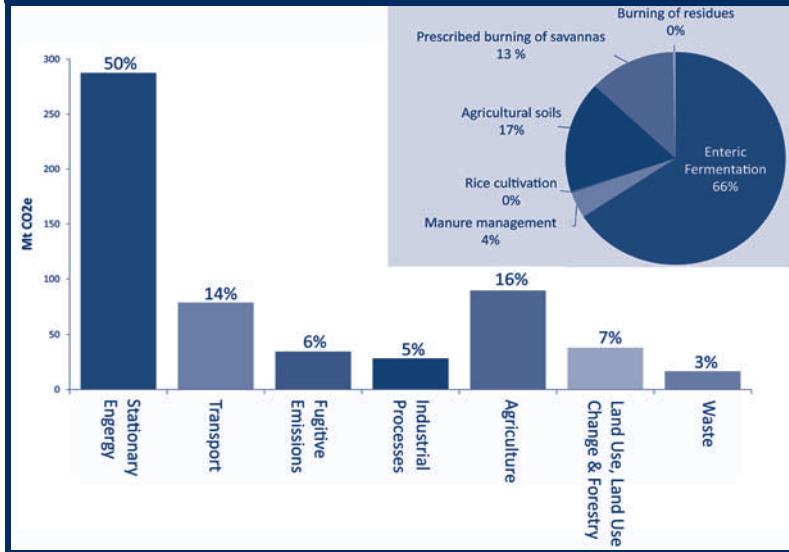
Nitrous oxide (N₂O) accounts for 2.8% of national emissions, but its release has exponentially increased with the increased usage of nitrogen fertilisers in Australia over the past 25 years. Apart from managing the rate, source and timing of fertiliser application, the only commercial N₂O abatement strategy available is to coat the fertiliser with an inhibitor. However, few options exist to manage the large nitrogen losses from animal urine. While commercially available for a number of years, inhibitor products have not seen widespread adoption due primarily to cost. The manufacture of nitrogen fertilisers also requires significant energy, inextricably linking its production cost to fuel prices. The foreseeable impact of the CPRS on the cost of manufacture, plus the liability created when spread on farms, could be a considerable economic challenge for agriculture in the years to come.

The proposal to include agriculture in the CPRS raises a number of significant questions and issues:

- We may accept that there are abatement options for reducing emissions from agriculture but how fair is it to be imposing the purchase of emission permits on the agricultural sector also coping

with an extreme and protracted drought? Amid escalating world food prices and food shortages, should we be imposing new costs onto agricultural production when we desperately need more and lower cost food?

Australian national sectoral greenhouse gas emissions (left) and the apportionment of emissions within the agricultural sector (right) (Department of Climate Change 2006)



- There are over 130,000 farms in Australia, each with their own unique production systems and management approaches. In addition, greenhouse gas emissions from these farming systems are biological processes that are inherently variable. While it may be relatively easy to measure emissions from vehicles or power stations, it is far more challenging to measure emissions from millions of hectares of farmland and millions of head of livestock across the country.
- One of the major challenges for the CPRS is, therefore, to identify practical methods for the inclusion of agriculture, and to develop reliable and cost-effective methods of emissions estimation and reporting, that also do not place unrealistic burdens on relatively small farm businesses.
- While the outlined abatement options appear promising, most still require at least 10 to 20 years research and development before commercially available to the farming community.
- Investment in agricultural research has also been in decline for at least 20 years, with a corresponding decline in research graduates, making it difficult in the current environment to fill key research positions.
- Research on greenhouse gas emissions has also not been popular with the agricultural industries until recently and consequently the total number of researchers, with proven capability in methane and nitrous oxide research, are far less than the task at hand.
- On the positive side, reducing methane and nitrous oxide emissions will also plug some of the few large gaps remaining in agricultural efficiency, thus presenting us with potential win-win outcomes which we should use the opportunity to achieve.

In conclusion: there are a number of challenges to achieving abatement from Australian agriculture, and perhaps this provides us with an opportunity to make a long-term commitment to re-building our research capability, not only to reduce emissions, but also build a more efficient and resilient agricultural industry for a more uncertain climate in the future.

Informed scratch

Due to a small scratch on a piece of glass our Internet is set to become 60 times faster than current Telstra networks. The scratch will mean almost instantaneous, error free and unlimited access to the Internet anywhere in the world.

“This is a critical building block and a fundamental advance on what is already out there. We are talking about networks that are potentially up to 100 times faster without costing the consumer any more,” says federation fellow **Professor Ben Eggleton**, director of the **Centre for Ultra-high Bandwidth Devices for Optical Systems (CUDOS)** at the **University of Sydney**. Professor Eggleton says that up until now information has been moving at a slow rate but optical fibres have a huge capacity to deliver more. “The scratched glass we’ve developed is actually a Photonic Integrated Circuit,” he says. “This circuit uses the ‘scratch’ as a guide or a switching path for information – kind of like when trains are switched from one track to another – except this switch takes only one picosecond to change tracks. This means that in one second the switch is turning on and off about one million million times. We are talking about photonic technology that has terabit per second capacity.”

The work is the result of a highly fruitful scientific collaboration between CUDOS teams at the University of Sydney and the **Australian National University**, with the **Technical University of Denmark** and supported with **Australian Research Council (ARC)** funding.

► **More information:** www.usyd.edu.au/news

Unwired

Australian researchers have proven the viability of a new, yet untapped radio frequency band which will increase the speed and capacity of data transfer to wireless devices like laptops and iPods, and potentially



Photo: modified from source4imagedemo

between a home DVD player and high-definition TV.

The GLIMMR (Gigabit Low-Cost Integrated Millimetre-Wave Radio) project is one of the first in the world to use the ‘millimetre wave technology’, which according to **Professor Bill Cowley** from the **University of South Australia**, is a new frontier in electronic communications. “Every time we make a wireless connection, we’re using the radio spectrum and basically we’re running out of bandwidth due to such high uptake of wireless technologies.”

Increasingly used applications need to move large amounts of data in a relatively small time and one way to achieve that is to use millimetre-wave radio spectrum, where, says Professor Cowley, the “frequencies are higher than we have normally employed, and there’s significantly more free spectrum.” The project has proven that the prototype chip technology developed will work and that it provides enormous potential for high speed radio communications in the future, says Professor Cowley, and collaboration with university and industry partners has been critical.

“Most of what UniSA is doing is computer simulation...,” he says. “The team at **Macquarie (University)** is doing most of the integrated circuit

design and **Adelaide University’s** role includes the antenna design.”

► **More information:** www.unisa.edu.au/news/releases.asp

Easy property buy

The **Council of Australian Governments (COAG)** has agreed to the establishment of a national platform to settle all property transactions electronically. Australia’s first national electronic conveyancing system – to be operational by March 2010 – will provide an efficient online platform to settle property transactions, lodge instruments with land registries and meet associated duty and tax obligations all electronically.

The agreement to establish a national electronic conveyancing system is only possible because all states and territories have agreed to cooperate. It will mean consumers across the country will use the same electronic system to settle all property transactions.

Under the current system every state and territory has their own unique property conveyancing system with different processes and procedures, based on an antiquated system of paper-shuffling.

Industry groups estimate a national electronic conveyancing system could reduce the costs of buying and selling property by \$250 million a year. Consumers will save money by spending less on expensive legal and conveyancing fees and transaction costs such as bank cheques.

This national system means consumers will use the same online system to lodge and exchange all the documents, certificates and contracts needed to buy their new house.

► **More information:** www.pm.gov.au/media/Release/2008/media_release_0339.cfm

Safe surf

The Minister for Broadband, Communications and the Digital Economy, **Senator Stephen Conroy**, has welcomed the release of the Content Services Code, a new industry code of practice for providers of online and mobile phone content.

“This is the first industry code under the new Schedule 7 of the Broadcasting Services Act, which commenced in January 2008,” says Senator Conroy. The legislation establishes a framework for the regulation of new content services, such as content delivered through Internet streaming and 3G services to mobile phones.

The scheme provides a means for addressing complaints about certain types of content, and also provides protection to children from exposure to unsuitable content across a range of delivery platforms. The code sets out requirements for content providers in relation to the classification of content and also best practice guidance on how to comply with the new laws.

“The code is an important part of the co-regulatory approach intended by Schedule 7, and is part of the Government broader strategy to promote online safety for Australians,” says Senator Conroy. “Online safety is critical for children to enjoy positive internet experiences, and to protect themselves from danger.

“I commend the **Internet Industry Association** taskforce for its involvement and recognition of the importance of ensuring the internet is a safer place,” says Senator Conroy.

► **More information:** www.minister.dbcde.gov.au/media/media_releases/2008/057

Government Green Paper: Expert review

The federal government's response to the Garnaut Review was released in a green paper, the 'Carbon Pollution Reduction Scheme', on 16 July. Reaction from experts was mixed. The Green Paper is available at www.climatechange.gov.au/greenpaper/index.html

Professor Barry Brook, *Sir Hubert Wilkins chair of climate change and director of the Research Institute for Climate Change and Sustainability at the University of Adelaide.*

"The Government's ETS Green Paper is somewhat of a Curate's egg – good in parts, off in others..."

...Overall, it strikes me that there was too little scientific input and consultation into this 'ideas paper', yet contributions are needed from a wide diversity of disciplines (from agricultural science to ecology to climate science). So if I had just one recommendation to make to the Government before this evolves into a White Paper and is legislated, it would be this: get the Australian scientific community more actively and formally involved in the next stage of this crucial policy strategy."

Professor Rod Keenan, *head of School of Forest and Ecosystem Science at the The University of Melbourne*

"In relation to forest-based sources and sinks, the proposed design is much more limited than that proposed in the draft Garnaut report. Credits will be limited for new forests established since 1990, on an 'opt-in' basis. It recognises the need for risk management and pooling arrangements for forest growers..."

...Overall, the proposed model for the forest sector is conservative and internationally-consistent. It presents few financial risks for forest managers and some opportunities for those who have the land and resources to establish new forests and manage them primarily for greenhouse benefits."

Professor Philip Jennings, *professor of energy studies at Murdoch University.*

"Australia will miss out on economic rewards if we fail to invest in renewable energy research and education - years of neglect have reduced our capacity in this area and major new investments are urgently needed. The Government could achieve the least-cost path to a renewable energy future by investing heavily in speeding up the deployment of low or zero-emissions technologies. As experience is gained, the cost of these technologies will fall and make it even easier politically to achieve a big reduction in emissions."

Rather than exaggerating the 'pain' that may be involved in social change, we should look at how businesses can take the initiative and develop our vast renewable energy resources using locally developed technology."

Naomi Standing, *senior economist with The Centre for International Economics, a private company specialising in global economic analysis.*

"...the Green Paper still does not provide the full story. The economic modeling by Treasury has been delayed. Minister Wong suggests that

informed discussions can occur based on just design. However, it's the details that matter. The Paper asserts that the costs of inaction will be greater than the costs of action. That remains to be seen. Information about how much is the scheme going to cost is needed, as is information to assess whether the transition measures are adequate. The Paper asserts that the Scheme is the answer to the need for a responsible policy – both economically and socially. Australia faces the significant risk that abating carbon in isolation of other major emitters (e.g. US, China) will not deliver economic benefits. If this is the case, Australia may need to think beyond mitigation to adaptation, which the Green Paper does not address"

Dr Matthew Clarke, *director of International and Community Development at Deakin University.*

"...the proposed cuts in emissions are not determined by science but rather political expediency."

...The greatest challenge faced by the international community in designing the next international protocol on climate change is to develop a framework that includes all countries, wealthy and poor, including

China and India. A Kyoto Protocol approach (that excludes these countries) which bases future emissions on past emissions will fail by entrenching the 'emissions-gap' between poor countries and wealthy countries. Allocation of future emission rights must not be based on previous emissions (as with Kyoto) but on a per capita basis - as an Australian has no greater right to emit carbon than someone living in China, India or any other

developing country.

If Australia was to reduce its per capita emissions to a level in accordance with the scientific need for a global reduction of 80% by 2050, Australia would need to reduce its current emissions by over 90% by 2050 - a far cry from that currently being recommended politically."

Kevin Goss, *chief executive officer of the Future Farm Industries CRC*

"The Australian Government has taken a commonsense approach with agriculture in its proposed Carbon Pollution Trading Scheme. However it leaves farmers exposed to rising costs from input suppliers covered in the Scheme without incentive for cost savings through new technologies in the short term. Farmers now face the double jeopardy of early impacts of increasing drought frequency and now a jump in costs."

...the Government with the agricultural industry must accelerate its efforts to improve the economic position of farmers, through even greater investment in R&D, through trade negotiations and through incentives for energy efficiency."

► For full quotes go to www.ARDR.com.au



Photo: Greenpeace-Pratten

Access for free

Australia has joined **SCOAP3**, an international consortium that aims to provide free access to major particle physics journals world-wide. Six of the **Group of Eight** universities in Australia have agreed to participate in the consortium: **Melbourne, Sydney, Adelaide, Western Australia, New South Wales** and the **Australian National University**. The Australian partnership will be coordinated by the University of Melbourne.

SCOAP3 members are high-energy physics funding agencies and laboratories, leading national and international libraries and library consortiums. They represent the US, 12 countries in Europe and the multinational **European Organisation for Nuclear Research (CERN)**.

With the accession of Australia, SCOAP3 has received pledges for one-third of its budget. Once it is fully subscribed, SCOAP3 will make a tender offer to the current publishers of high-energy physics journals. The publishers would be guaranteed operating money to cover the cost of editorial work. In return, the publishers would make the journals freely available to the entire world.

With increasingly powerful IT and communication technologies, the pace of discovery in high-energy physics has increased immensely. Communication among researchers occurs mainly through arXiv.org, an Open Access repository of working papers and pre-print versions of articles. With arXiv, researchers can learn about new discoveries within 24 hours. However, the top refereed journals remain essential to the scholarly communication process. The peer-review process helps to ensure the quality of published scholarly work.

The SCOAP3 partners hope to ensure that the top peer-reviewed journals maintain their integrity while remaining financially viable.

► **More information:** [Linda O'Brien, 03 8344 5382](#)

Prosthesis hot spot

A **Centre for Implantable Bionics** is to be established at the **University of New South Wales (UNSW)** in Sydney in a partnership between the **NSW Government**, the university and philanthropic supporters. Research efforts will include the commercialisation of a bionic eye, refined bionic hearing devices and artificial heart technologies, and development of electronic stimulation technology which could restore movement to the limbs of people who have suffered paralysis.

A new leading research chair, the Paul M Trainor Chair in Biomedical Engineering, will be affiliated with the centre and an international search is currently underway for the inaugural holder of the position.

One of the centre's first projects will be a collaboration with leaders in the biomedical industry on the commercialisation of a bionic eye. UNSW's Advanced Vision Prosthesis Group has been working on a bionic eye since 1997, and has produced over 70 peer-reviewed scientific publications and filed multiple patents.

► **More information:** www.business.nsw.gov.au

Amalgamated faculty

Queensland University of Technology has announced plans to strengthen and renew its undertaking in science and technology by forming a major new faculty that will seek to significantly reform its approach to this field. A proposal is currently before the university to amalgamate QUT's Faculty of Science and Faculty of Information Technology and establish a new Faculty of Science and Technology in time for the 2009 academic year. The proposal coincides with the advancement

of plans for QUT to develop a major new Science and Technology precinct at its Gardens Point campus. The proposed new faculty also will promote a closer interaction between areas of established strength at QUT, such as information technology and mathematics research.

► **More information:** [Janne Rayner, 07 3138 2361, j2.rayner@qut.edu.au](mailto:j2.rayner@qut.edu.au)

Focus: sustainability

The **University of Sydney** has established the **Institute for Sustainable Solutions** to be a focal point for research on issues such as climate change, renewable energy, population growth, health, food and energy security, providing new ways of thinking about solutions. The Institute has been funded by a multi-million dollar endowment from the University of Sydney and philanthropic donations. Using a range of approaches, from new technology to economic analysis and policy research frameworks, the Institute will focus on four main research themes: energy, environment, development and health.

► **More information:** [Andrew Potter, 02 9351 4514](tel:0293514514), [Kath Kenny, 02 9351 2261](tel:0293512261)

No chicken feed

The **Australian Poultry Cooperative Research Centre (Poultry CRC)** based at the **University of New England** has won a major international award from the **World's Poultry Science Association (WPSA)**. The award, presented every four years, recognises "an outstanding contribution to the development of the poultry industry," according to **Dr Roel Mulder**, general secretary of the WPSA. He says there were many organisations throughout the world doing great work in advancing poultry science, but the Poultry CRC was "well ahead of its nearest rival for the award."

► **More information:** blog.une.edu.au/news/category/news/



Connect online

With competition for talented postgraduate students at an all-time high, the **University of Sydney** has launched an important new resource: the Research Supervisor Connect (RSC) database. This is a web-based tool for the recruitment of research higher degree students, principally PhD and Research by Masters students. It includes enquiry management capability, and will make it easier for prospective postgraduate research students to find projects at the university.

► **More information:** www.usyd.edu.au/research/opportunities/opportunities

Model engineering

The Academic Board of the **University of Melbourne** has endorsed the proposal for the Melbourne School of Engineering to fully implement the Melbourne Model. Students can complete a major or sequence in engineering through a Bachelor of Commerce, Science, Environments or Biomedicine, followed by a two year Master of Engineering. Students will graduate after five years with a Bachelor degree and Masters qualification, leading to professional accreditation with Engineers Australia. The final commencing student intake for the four year Bachelor of Engineering will occur in first semester, 2010. The University is also introducing new opportunities for existing graduates to study engineering at Melbourne. Beginning in 2010, non-engineering graduates can study engineering by completing a three year Master of Engineering.

► **More information:** rebeccas@unimelb.edu.au, 03 8344 0181, 0417 164 791

IP specialty

Senator Kim Carr, Minister for Innovation, Industry, Science and Research, has announced significant changes to the way patent and trade mark attorneys operate when advising Australian innovators.

Patent and trade mark attorneys play an important role in Australia's intellectual property (IP) system. They advise on a range of IP such as patents and trade marks and help IP owners register and maintain their property, in Australia and overseas.

The new regulations change the pre-registration requirements for patent attorneys with a focus on a more skills-based approach. This will result in attorneys being better placed to provide high-quality assistance.

Registered patent and trade marks attorneys will need to undertake compulsory continuing professional development activities each year to ensure they remain skilled to provide the best IP advice to Australian innovators.

"The intellectual property environment is always changing. It is important that innovators have access to professional services which keep pace with these changes. Continuing professional development is essential," Senator Carr says. "Whilst many Australians seek to obtain IP protection without assistance from an attorney, the value of an attorney should not be underestimated. In the area of patenting, there is a real skill in ensuring the patent application is drafted in a way that offers the best protection for the inventor.

► **More information:** minister.industry.gov.au/SenatortheHonKimCarr/Pages/BETTERSERVICEFORAUSTRALIANINNOVATORS.aspx

IP applications up

Australian intellectual property applications have grown steadily since 1999, according to an **Australian Government** IP scorecard.

"Activity concerning intellectual property (IP) protection is one of the few measurable indicators of innovation across a range of industries," **Senator Kim Carr**, Minister for Innovation, Industry, Science and Research, says. Although the figures showed steady growth in Australian innovation, Australia still lagged behind on a global basis.

"Boosting local innovation is one sure way to create competitive advantage in a globalised economy – and Australia's innovation effort in recent years has been ordinary," Senator Carr says.

Medical engineering has replaced transport as one of the top five technology patenting areas in Australia since the first scorecard was created in 2006. More recently, the handling and printing technology areas have overtaken civil engineering, building and mining which have traditionally been Australia's leading area of technological advantage in terms of patenting intensity.

According to Senator Carr, Australia has improved in terms of patents granted by the **US Patent and Trademark Office**, up from 12th in 2004 to 10th in 2006. "The overall ranking of Australians receiving patent grants by the **European Patent Office** (EPO) remains the same in 2006 as in 2004 at 17th but the number of patents granted to Australians by the EPO grew by 77.5% between 2002 and 2006," says Carr.

► **More information:** minister.industry.gov.au/SenatortheHonKimCarr/Pages/default.aspx

Missed opportunities

A **University of Western Sydney** study of Australian organisations, the first of its kind in Australia, has revealed that while there is growing awareness of Business Process Management (BPM) only half the

organisations are committed to BPM.

BPM helps to improve the efficiency and effectiveness of an organisation by bringing the full operational picture of the business into view and using software and systems to automate business processes.

Mr Dash Forghani from the School of Management and the **UWS Centre for Innovation and Industry Studies** (CInIS) says modern Australian businesses in a global economy are no longer able to manage their organisation based on a traditional functional-focus management style. "Now the supply chains processes transcend companies and even countries – shifting management focus from functions to processes," says Forghani, one of the authors on the study. "This change represents a paradigm shift in both management approach and technological solutions."

The survey of 111 organisations – ranging from small to large across government, business and IT – found a majority believe, with appropriate resources, BPM can help them increase their business competitiveness.

Mr Forghani and colleague **Dr Vijay Khandelwal** from the UWS School of Computing and Mathematics discovered only a minority of the organisations use BPM technologies and methodologies for their sophisticated processes such as supply chain management, sales and marketing, and are thus missing out on business opportunities. Most organisations, the study found, are still using simple tools, such as Visio and PowerPoint for their process modeling.

"Lack of finance and time, and shortage of appropriate skills have been identified as major factors hindering the use of BPM," Dr Khandelwal says.

► **More information:** pubapps.uws.edu.au/news/index.php; www.uws.edu.au/cinis/bpm (full report);

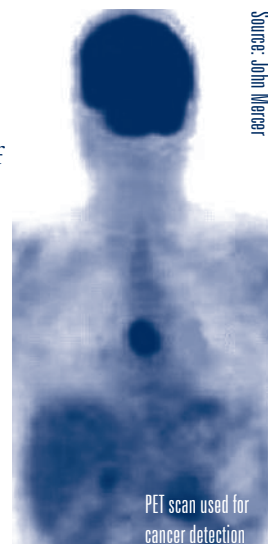
Zapping cancer

CSIRO and **ANSTO** are to collaborate on developing radiopharmaceuticals which will ultimately help in the early diagnosis and treatment of diseases like cancer and Alzheimer's.

The two scientific organisations have signed an agreement to jointly screen and evaluate the chemical properties of new imaging agents developed by ANSTO. The agents will be used for Positron Emission Tomography (PET) and Single Photo Emission Tomography (SPECT) imaging, in conjunction with Computed Tomography (CT).

"ANSTO will bring expertise in small animal imaging and provide data using existing and new molecular imaging agents, while CSIRO has the technological expertise to develop software to help analyse these agents and identify the successful ones," says **Dr Marie Gregoire** of ANSTO's **Radiopharmaceutical Research Institute**. "At the moment it takes a great deal of time to analyse imaging agents. This is delaying the development of new and more sophisticated radiotracers to aid quick diagnosis and ultimately faster treatment of major diseases."

The CSIRO biomedical imaging team at the **Australian e-Health Research Centre** will focus on image processing algorithms and software tools that are dedicated to in-vivo functional and anatomical imaging techniques. CSIRO team leader **Dr Olivier Salvado** says: "We will develop new imaging analysis methods to accelerate the discovery of imaging agents by automatically identifying organs from small rodents, and compute their affinity with tissues and targets."



PET scan used for cancer detection

Source: John Mercer

The collaboration has the objectives of accelerating the screening of newly developed ANSTO radiotracers, and improving the characterisation of the best existing radiotracers through their ability to detect early changes in diseases and to follow-up the progression or recovery of diseases in animal models.

► **More information:** www.ansto.gov.au/information_for/for_media.html

Guided carbon claims

Australian Competition and Consumer Commission chairman (ACCC) **Mr Graeme Samuel** has launched a suite of ACCC guidance materials on carbon offset claims.

“There is a growing trend of marketing claims about the ability to ‘neutralise’ the carbon footprint of, for example, cars, flights and households using carbon offsets,” he says. “Consumer concerns about the veracity of claims on carbon offsets have led the ACCC to develop guidance for consumers and industry on the Trade Practices Act implications of carbon offset claims.”

“The ACCC consulted broadly with stakeholders including consumer groups, accreditation agencies, offset providers and corporate participants in carbon offsets schemes,” Mr Samuel says. “The difficulties in understanding and verifying carbon claims give rise to concerns that consumers may be facing misleading and deceptive conduct associated with this emerging market.”

Mr Samuel says the released *Carbon claims and the Trade Practices Act* is a guide for business and industry. “It is intended to educate businesses about their obligations under the Act and to alert them to potentially problematic areas.” It examines areas of concern identified in the consultation and submission process, including forward credited offsets, double counted offsets, low quality offsets and carbon neutrality, he says.

► **More information:** www.accc.gov.au/content/index.phtml/itemId/833354

Records on the fly



Royal Flying Doctor Service (RFDS) health professionals will be able to access essential medical histories while attending patients in remotest Australia, with the creation of a centralised Electronic Medical Record (EMR).

According to RFDS national chief executive officer **Nigel Milan**, the broadband EMR, believed to be the world's first accessible from remote locations, would greatly enhance the already high level of patient care delivered by the Service's health professionals.

RFDS's EMR solution will be created by specialist health information technology company **IBA Health** through its healthcare division **iSOFT** in close consultation with RFDS health professionals.

“Unlike city-based GPs, who have ready access to their patients' records in their surgery, our health professionals conduct consultations at numerous locations, many of them remote,” Milan says.

“The RFDS EMR will allow them to access a patient's medical history remotely while attending patients at different locations and update that history as they examine and treat each patient.”

► **More information:** www.ibatech.com/html/

Olympic bio-wrap

Melbourne-based manufacturer **Biograde Ltd** has secured a landmark deal to supply official biodegradable packaging materials to the **Beijing Olympic Organising Committee** (BOCOG).

In an official signing ceremony this week in China's manufacturing hub of Nanjing, Biograde and BOCOG will confirm a deal to supply 5.5 million biodegradable bags. The products meet or exceed all global biodegradability standards, including stringent requirements set by the European Union.

The Acting Minister for Trade, **Martin Ferguson**, says Biograde's success was potentially the largest deal of its kind in the world this year and demonstrated that an increasing commitment to sustainability by China could deliver real export opportunities for Australian business.

“The challenge China faces in terms of environmental management practices as a result of economic development and rapid urbanisation represents an opportunity for innovative Australian companies to not only help China achieve its goals, but in turn expand trade and create jobs for Australians,” says Mr Ferguson. “The deal will extend beyond the Olympics, with Biograde partnering with the **Beijing Advanced Materials Development Centre** to further educate and work with the Chinese manufacturing sector to help improve standards in sustainability.”

► **More information:** www.trademinister.gov.au/releases/2008/sc_080708.html

Opening doors

Australian biotechnology company **Arana Therapeutics Limited** has opened a new R&D facility in Sydney.

The new facility is designed to accommodate Arana's on-going business growth, which has seen its Sydney workforce double in the last two years, with the support of almost \$7 million over two years from the Government's \$150 million Pharmaceuticals Partnerships Program (P3).

According to the Minister for Innovation, Industry, Science and Research, Kim Carr, “this new facility shows what can be done when the government works in partnership with industry.”

“It is these types of successful partnerships, and the lessons learnt from P3, that we need to feed into the Government's ten year plan for the pharmaceutical industry – being developed by the Pharmaceuticals Industry Strategy Group,” Senator Carr says. “The Rudd Government is committed to the pharmaceuticals industry and to capturing the benefits for Australia. That is why we have tasked the Strategy Group with providing a plan for increasing pharmaceuticals investment that would make a net economic and social contribution by 2020.”

Arana is one of Australia's largest biopharmaceutical companies with a market capitalisation of \$220 million. Arana specialises in developing technology for treating cancer and inflammatory diseases, such as arthritis.

► **More information:** www.arana.com/news_media.htm

Liver up, yet on hold

Giaconda Limited has suspended its Phase IIa trial of Hepaconda® for the treatment of Hepatitis C in people with “genotype 1” infection that do not respond to current therapy. While significant improvement was

demonstrated in liver function among participants in the study, total normalisation was not achieved and further formulation is warranted before continuing the study.

The effectiveness of Hepaconda® in this trial was measured using the following parameters: viral load, (the amount of Hepatitis C Virus (HCV) in the patient's bloodstream) and three markers of liver damage: alanine aminotransferase (ALT), aspartate transaminase (AST), gamma-glutamyl transpeptidase (GGT). All were expected to be reduced if Hepaconda® was effective.

While GGT showed an immediate and lasting return to the normal range, and AST came back close to normal, there was minimal effect on viral load and ALT. Importantly for the planned dose ranging study, no adverse effects were reported at the dose used in this study.

The next step will be to carry out a dose ranging trial to ascertain an optimum dose. This study will be carried out once Giaconda has secured further funding.

Patrick McLean, chief executive officer of Giaconda, says, "We are very encouraged by the observed improvement in liver function that Hepaconda® has produced and intend to take advantage of this data to improve our formulation. The results, especially among this group of patients who have exhausted all of their options, give us confidence in the future of Hepaconda®, and may open the door to an even better understanding of the application of the therapy."

► **More information:** www.giacondalimited.com

License to grow

The UK Patent Office has granted a patent covering **Stem Cell Sciences'** new range of stem cell culture media. The new Culticell iSTEM™ range uses the inhibitor based technology discovered by **Professor Austin Smith** and recently published in *Nature* (vol. 453, pp.519-523).

The culture media covered by this patent contain the key combination of two or three types of enzyme inhibitor. Professor Smith discovered that by inhibiting certain key enzymes in specific combinations, pluripotent (or embryonic) mouse stem cells can be grown reliably without feeder cells, growth factors, leukaemia inhibitory factor or serum.

The UK patent, number GB2436737B, covers any use of this media, and also the use of the media for culturing stem cells, especially pluripotent stem cells. This gives Stem Cell Sciences the exclusive right to market cell culture media containing these inhibitor combinations.

Dr Tim Allsopp, chief scientific officer, says these new inhibitor-based media will offer pharmaceutical companies and university researchers a simple and elegant way to minimise variability in their stem cell cultures.

"This has the potential to deliver significant advantages in terms of both scientific accuracy and cost," he says.

Dr Alastair Riddell, chief executive officer of Stem Cell Sciences, believes that as the stem cell reagents market approaches US\$100 million, annually growing at 20-25% per year, the product will make a significant impact.

► **More information:** www.stemcellsciences.com/pressoffice/releases/95.html

Fighting flu

Select Vaccines Ltd's ANAVAX™ H5 Avian Influenza Vaccine candidate has demonstrated positive results in a recent preclinical study. ANAVAX™ H5 successfully produced an immune response in mice when administered in combination with a traditional aluminium adjuvant.

These results were achieved using vaccine material from the proof-of-

concept manufacturing study that Select Vaccines recently completed with **ARTES Biotechnology GmbH**. The company has now confirmed that the Virus-like Particle (VLP) material produced using the ARTES yeast system can stimulate an immune response.

VLPs are small packages of artificially produced viral protein. They are assembled either spontaneously using high concentrations of viral protein, or by embedding the protein in a lipid membrane during protein synthesis.

This vaccine candidate, created using Select Vaccines' ANAVAX™ technology, is based on the A/Vietnam/3028/2004 strain of bird 'flu. It was administered at a low dose (five micrograms) in combination with an aluminium oxide adjuvant. In seven out of eight mice, two doses were sufficient to produce an immune response (i.e. antibodies to the H5 bird 'flu protein were elevated). A lower proportion of animals responded when the vaccine candidate was administered without adjuvant (five of eight mice after three doses), while responses were seen in all positive control groups (given one microgram of purified H5 protein) whether or not an adjuvant was used.

► **More information:** www.selectvaccines.com.au/

Reduced lesions

A novel antisense drug, ATL/TV1102, has significantly reduced disease activity in patients with relapsing-remitting multiple sclerosis (RRMS), according to **Teva Pharmaceutical Industries and Antisense Therapeutics Limited**.

MS is a progressive, demyelinating disease of the central nervous system affecting the brain, spinal cord and optic nerves. The trial, conducted with 77 patients at multiple sites across six European countries, aimed to obtain preliminary evidence of ATL/TV1102's effectiveness in reducing MS-related brain lesions and assess its safety profile.

A randomised, double-blind, placebo-controlled Phase IIa study of the antisense drug ATL/TV1102 met its primary endpoint showing a significant reduction by 54.4% (p=0.01) in cumulative number of new active lesions in patients taking the drug for 8 weeks, compared to placebo. Antisense drugs block specifically disease-causing proteins from being produced by interacting with their intended target based on information in the genetic code.

Based on these encouraging results, Teva intends to conduct additional pre-clinical and clinical research before continuing to a Phase III study with this unique and promising molecule.

► **More information:** www.antisense.com.au/_home.asp

Discharged risk

NeuroDiscovery Ltd, a specialty neuroscience services provider and drug development company, has successfully completed its Phase I multiple ascending dose clinical trial of NSL-043, for the treatment of neuropathic pain.

This trial is the second of two Phase I trials, designed to test the safety, tolerability and pharmacokinetics of an oral formulation of NSL-043. Successful completion of the first, single ascending dose trial was announced 9th April 2008. Both trials were undertaken in collaboration with the company's 50/50 partner, **Sosei Co. Ltd**.

In this trial, healthy male volunteers were given a repeated twice daily dose of NSL-043 in capsule form for 10 days. There were four treatment groups, each with nine participants, who received doses of between 100-2000mg of NSL-043 or placebo twice daily. The adverse event profile of NSL-043 demonstrated good safety and tolerability. At the highest dose

tested, there were reports of mild events on the sensory system which may be consistent with the therapeutic use of NSL-043.

As well as monitoring for adverse events, this study has enabled NeuroDiscovery to assess the pharmacokinetics of NSL-043 in humans after repeated oral dosing for 10 days. The concentration of NSL-043 found in patients overlapped with concentrations effective in preclinical models of neuropathic pain, representing a discharge of one of the major risks in clinical development.

The positive data from these Phase I trials facilitates the ongoing enabling work required to examine the efficacy of the compound in patients.

► **More information:** www.neurodiscoveryltd.com/

Starting out

pSivida Corp., a global drug delivery company is pleased to announce that a Phase IIb clinical trial has commenced on a potential new brachytherapy treatment for inoperable pancreatic cancer.

The first patient has received treatment with BrachySil™ (P32 BioSilicon™) at **Guy's and St Thomas' NHS Foundation Trust** in London. A total of six patients will be entered into this trial at two centres in the UK (Guy's and St Thomas' NHS Foundation Trust, and **University Hospital**, Birmingham). The study will determine the safety of escalating radiation doses of the BrachySil™ device, with tumor response as a secondary end point.

The results of the recently completed safety study presented earlier this year at the **American Society of Clinical Oncology-GI** showed that BrachySil™, in combination with standard chemotherapy (gemcitabine), was well tolerated with no clinically significant adverse events related to the device.

Data showed disease control in 82% of patients and an overall median survival of 309 days. BrachySil™ was found to be easily deliverable by endoscopic ultrasound. BrachySil™ is a novel oncology product which comprises a combination of BioSilicon™, a proprietary porous silicon, and the isotope ³²Phosphorus, a proven anti-cancer therapeutic.

Pancreatic cancer is the fourth most frequent cause of cancer death, and at least 80% of patients present with inoperable locally advanced or metastatic disease.

► **More information:** www.psvida.com/news/ASXAnnouncements.asp

Investing in separation

NuSep has raised \$1.75 million via the recent Share Purchase Plan and an associated share placement.

Over \$900,000 of this was raised via the Share Purchase Plan which closed on Monday 23 June 2008. The balance of \$850,000 was raised via a share placement to a number of sophisticated investors and DFS Equities.

NuSep is a publicly listed life sciences company that sells products into the global bioseparations market. The company has offices in Sydney, Australia and Atlanta, USA.

NuSep has developed innovative biological separation techniques including the world's first IVF sperm separation device. The company currently manufactures, distributes and sells 55 products to customers in the USA, Europe, Asia and Australia.

NuSep offers precast gels and has also developed two unique biological separation instruments. The first instrument released in February 2008 can separate biological samples into 8 fractions for use in the proteomic market. The second instrument separates sperm for fertility

treatments such as IVF and is presently undergoing clinical trials and is supported by a \$2.2m **AusIndustry** Commercial Ready Grant.

► **More information:** www.NuSep.com

Pigs breathing easy

Trials to evaluate **Imugene's** revised and optimised PRRS vaccine have commenced at a specialist pig trial facility in the USA.

PRRS is a highly damaging viral respiratory and reproductive disease in pigs for which there is no effective treatment. It is an increasing economic problem for the major pig producers worldwide causing industry losses of up to \$1 billion each year.

This trial is evaluating an optimised vaccine candidate using components selected from previous Imugene PRRS vaccine trials. The optimised vaccine has undergone a series of modifications and improvements aimed at increasing its effectiveness and commercial value.

This improved vaccine candidate has now successfully been modified and fully laboratory tested and sufficient material has now been exported to the USA trial site. The initial vaccination administration of the 45 pigs has also now occurred. A second dose will be administered prior to exposing the pigs to the PRRS virus.

The PRRS vaccine is based on Imugene's Porcine Adenoviral Delivery Vector that delivers selected genetic material to the pig to stimulate the immune system to protect against the PRRS virus.

► **More information:** www.imugene.com/investor_announcements.asp

Clearly positive results

The regenerative medicine company **Mesoblast** has announced preclinical trial results of the adult stem cell technology platform for the treatment of eye diseases associated with abnormal blood vessels. These diseases include diabetic retinopathy and age-related macular degeneration (AMD), the leading causes of blindness in the western world.

The current standard of care therapy for AMD is repeated eye injection using an anti-Vascular endothelial growth factor (VEGF) agent. Two of these agents are currently marketed under the names Lucentis and Mcugen by **Genentech**, **Novartis** and **Pfizer**. These agents are injected into the eye every 4-6 weeks on an ongoing basis as maintenance therapy to prevent reversal in visual improvement.

The results of the trial in 42 non-human primates, conducted in conjunction with Mesoblast's New York-based sister company **Angioblast Systems Inc**, indicate that combining an anti-VEGF agent with the company's proprietary stem cells may lead to improved vision and a reduction in the frequency of subsequent anti-VEGF injections into the eyes. A single intra-ocular injection of the company's proprietary allogeneic, or "off the shelf" adult stem cells was as effective at reducing blood vessel leakage after laser-induced damage as Genentech's Lucentis, the most effective anti-VEGF agent in use. The trial showed similar effectiveness with each of the three escalating cell doses used, without any significant cell-related adverse events.

More importantly, the trial showed that combining Lucentis with a single injection of the company's stem cells resulted in a highly synergistic, and significantly superior, outcome to Lucentis alone in preventing development of severe blood vessel leakage, preventing disease recurrence, reducing formation of new blood vessels and preventing retinal detachment.

► **More information:** www.mesoblast.com/

Clean coal moves

Three States are progressing work on clean coal technologies:

The **New South Wales (NSW) Government** has passed legislation to fund research into clean coal technologies and form the **NSW Clean Coal Council**. The aim is to fund research, demonstration and commercialisation of clean coal technologies and to increase public awareness of the importance of reducing greenhouse gas emissions through these technologies. In addition to the \$100 million Clean Coal Fund the State Government has also committed \$22 million to two clean coal projects signalling its commitment to further reduce greenhouse gas emissions.

The new Clean Coal Council will receive applications for project funding and advise on policies to encourage the development and implementation of clean coal technologies. It will also make recommendations concerning opportunities for NSW involvement in interstate, national and international research projects. There will be five NSW government agency members on the Council and five members jointly nominated by the **Australian Coal Association** and the **NSW Minerals Council**.

The **Lake Munmorah Pilot Carbon Capture plant**, a research facility designed to capture about 3000 tonnes of carbon dioxide a year from the nearby power station, has been commissioned. This is the first time the technology, developed on the State's Central Coast by **Delta Electricity** and the **CSIRO**, has been seen in action in Australia.

In Victoria, the construction of the first new power station to be built in the Latrobe Valley for 12 years is a step closer as the **Victorian Government** signed a contract to facilitate the clean coal \$750 million HRL development near Loy Yang B. The project uses a Victorian-developed integrated and gasification combined cycle process that can reduce emissions of CO₂ from brown coal-fired power generation by 30% and reduce water consumption by 50%, compared to current best practice for brown coal power generation in the Latrobe Valley.

Western Australia could soon become the home to a coal testing and education facility following an agreement between the **Western Australian State Government's** Coal Futures Group and the **Curtin University of Technology** to investigate the establishment of a carbon capture and sequestration centre of excellence. The proposed **WA Centre for Carbon Capture and Sequestration** would look at the potential for carbon capture and storage, or geosequestration, as well as deliver professional and technical training programs in clean coal technology.

► **More information:** NSW - Jenny Ward, 02 8289 3925, Vic - www.dpc.vic.gov.au, WA - 08 9222 8950.

Innovative constellation

The **South Australian Government** has allocated \$1 million for **Constellation SA**, a government initiative to enhance collaboration between research organisations and industry in the State and to provide a framework for investment in research and innovation.

According to SA Science Minister **Paul Caica**, the injection of funds will enhance collaboration between South Australian research organisations and industry and will be designed to drive innovation in key sectors:

- Agriculture, Food and Wine;

- Defence and Advanced Manufacturing;
- Health and Medical Science;
- Minerals and Energy;
- Natural Resource Management and Climate Change;
- Society and the Citizen; and
- Visual and Performing Arts.



photo: Jayne

"Constellation SA has already helped support the development of the Wine Innovation Cluster which brings together five of Australia's key agencies in grape and wine research to create a formidable entity that will build wealth along the grape and wine value chain," Minister Caica says. "In 2008/09, other areas primed for development under Constellation SA include the mining and energy sectors, intergenerational health and medical devices."

► **More information:** www.ministers.sa.gov.au/news.php?id=3369&page=1

On the (hot) rocks

The **South Australian Government** is to provide \$250,000 for the development of hot rock technology. An agreement between the State Government and the **University of Adelaide** provides further support for focused research to accelerate progress in the development of geothermal resources in South Australia. Geothermal research will form a significant node of the University of Adelaide's recently announced **Institute for Mineral and Energy Resources**.

The Government also expects to make further progress toward the establishment of a **Research Centre of Excellence in Geothermal Energy in South Australia**, which is an important step in realising the commercialisation of geothermal energy in Australia. In South Australia 23 companies have already applied for 237 geothermal licences and can be expected to invest \$686 million in the period 2002 to 2013.

► **More information:** www.ministers.sa.gov.au/news.php?id=3346&page=4

Victoria-Israel collaboration

VISTECH, the Victoria-Israel Science and Technology R&D Fund, has provided \$970,000 for three new projects and is calling for more applications. Launched in 2006, VISTECH is a three-year program with Israel and Victoria each providing US\$3 million to facilitate collaborative science and technology research projects. VISTECH provides matching grants of up to US\$500,000 to help innovative Victorian companies commercialise their research and development and break into Australian, Israeli and world markets.

To date VISTECH has awarded almost \$2 million to Victorian companies supporting eight projects worth around \$7.8 million.

The three new projects to be funded through VISTECH are:

- **Sustainability Ventures** in Victoria and **Aqwise** in Israel collaborating on new technology to help farmers better utilise resources such as effluent water and saline bore water;
- Northcote-based company **Floorbotics** and Israeli company, **Kanitti Engineering** developing and manufacturing a new water efficient Industrial Floor Cleaning Robot; and
- a collaboration between Melbourne based **Anadis** and Israel's **Maya-Biotech** to co-develop a new medical product to help patients through the painful side effects of chemotherapy and radiotherapy.

The fifth round of the applications is now open and will close on 5 September 2008. Companies working across the life sciences sector as well as advanced manufacturing, nano, water, environment, information communications and synchrotron technologies are encouraged to apply.

► **More information:** www.business.vic.gov.au/vistech, or roland.diggens@iird.vic.gov.au, 03 9651 8170.

NSW chief scientist

The **New South Wales Government** (NSW) is to appoint a Chief Scientist and Scientific Engineer to build on the State's strengths in science, engineering, medical research and innovation.

The NSW Chief Scientist and Scientific Engineer will:

- champion science and scientific education in the community;
- provide expert advice to the Government on scientific and innovation policy matters;
- establish a new channel of engagement between the Government and research groups, including universities; and
- be a key figure in advancing NSW interests in the National Innovation Review.

The role will be supported by a **Ministerial Advisory Council for Science Engineering and Medical Research**.

► **More information:** David Boyd, 0404 944 550

Biosecurity paper

The **Queensland Government** has issued a discussion paper on biosecurity, which will take account of Queensland's obligations to national biosecurity policies, actions and priorities, and provide the framework for decision-making and actions at the state level.

The Queensland biosecurity strategy will:

- articulate a vision and outcomes for a modern, integrated biosecurity system;
- set some broad policy principles to underpin actions;
- identify areas for immediate and longer-term action;
- describe the roles and responsibilities of key stakeholder groups – government, non-government, industry and community; and
- define how success will be evaluated and reported.

Proposed strategy outcomes include:

- biosecurity threats in Queensland are effectively managed through a proactive, biosecurity system where responsibilities are shared and decision-making is based on sound risk management principles;
- new exotic pests and diseases are prevented from entering, spreading or becoming established in Queensland;
- contaminants are managed through the development of nationally consistent standards, systems and regulatory frameworks;
- biosecurity incidents are detected, prioritised and responded to

on the basis of sound risk management principles and emergency response frameworks; and

- significant established invasive animal and plant pests, diseases and existing contaminants are contained, suppressed or managed to reduce negative economic, social and environmental impacts.

A series of strategy principles are proposed which include:

- prevention – early recognition and intervention of biosecurity threats provide the best return on investment;
- risk management approach – there is no such thing as zero risk and acceptable levels of risk will mean there will be biosecurity incidents; these incidents and their impacts require mitigation within a risk and cost-benefit framework;
- responsiveness – biosecurity stakeholders respond quickly and confidently to new and emerging biosecurity threats and opportunities;
- science and knowledge – Queensland's biosecurity decision-making frameworks and associated investments are well informed; and
- accountability and transparency – responsibilities for biosecurity are known and respected by all stakeholders and decisions are transparent, justified and well understood.

In a section relating specifically to R&D, the paper suggests that the strategy could include:

- developing a biosecurity science action plan;
- building social science capacity; and
- establishing centres of excellence for niche biosecurity science.

Comments on these and other issues discussed in the paper are invited by 30th September.

► **More information:** www.dpi.qld.gov.au; 13 25 23

CORS sites

The mining hub of Kalgoorlie and the coastal city of Albany have become the first Western Australian continuously operating reference station (CORS) sites to be completed as part of **Landgate's** CORS project. Both sites have started streaming data to Canberra.

In April, WA Land Information Minister **Michelle Roberts** announced that a network of 26 CORS sites would be built across WA to gather information about the earth's surface across the continent. The **State Government**, through Landgate, would contribute more than \$2 million over five years to fund the CORS project. In addition, the **Australian Government**, through the **National Collaborative Research Infrastructure Strategy** (NCRIS), would contribute a further \$1 million. According to Ms Roberts, WA was also the first State to start sending data to Geoscience Australia under a national initiative that aimed to build 100 CORS sites.

"The generated data from Albany and Kalgoorlie will be used for research that will lead to better decision-making in the fields of hazard management, environmental protection and resource development," says Ms Roberts. "It will also support research in the areas of seismic monitoring, sea level variation and atmospheric modelling for improved weather forecasting. The CORS infrastructure will also form the basis for a future continent-wide, real-time positioning system, with applications in surveying and mapping, precision agriculture, vehicle navigation and tracking, location-based services and speed limiting systems."

► **More information:** www.landgate.wa.gov.au

Beazley factor

Former leader of the opposition, **Professor Kim Beazley**, has been appointed Chancellor of the Australian National University. Beazley, who held ministerial portfolios including education, defence, aviation, finance and transport, is currently professor of political science and international relations at the University of Western Australia.

Neurodegeneration helper

The University of Queensland's **Dr Trent Woodruff** has been recognised for his research into a new drug to help sufferers of neurodegenerative diseases. Dr Woodruff was recently awarded the Queensland Premier's Award for Health and Medical Research (post-doctoral category) for his work into an anti-inflammatory drug. The new drug class aims to ease suffering for the victims of neurodegenerative diseases including Huntington's, Motor Neuron and Alzheimer's disease. The \$5000 cash prize was awarded for excellence in post-doctoral (up to five years post-PhD) medical research in Queensland.

Oxyfuel leader

The University of Newcastle's **Professor Terry Wall** has been selected to lead an international working group to push forward the global introduction of a new clean coal technology. Oxyfuel combustion

The Certificates of Distinction are recognition by the International Congresses of Entomology and its council of exemplary achievement in entomology. Professor Simmons' work has revolved around exploring sexual selection and the evolution of mating systems. Winner of the UK's 1998 Scientific Medal of the Zoological Society of London, Professor Simmons is an ARC federation fellow with the Faculty of Natural and Agricultural Sciences and is director of the West Australian Centre for Evolutionary Biology at UWA.

Innovation driver

Griffith University's commercialisation arm, Griffith Enterprise, has appointed a new leader to drive innovation and enterprise. Griffith Enterprise director **Nicholas Mathiou** has a track record in establishing and managing entrepreneurial, high growth, technology-based companies. Mr Mathiou co-founded and directed Australian Stock Exchange listed investment fund Medica Holdings Limited and its subsidiary life sciences company Cytopia Ltd.

Health dean

Murdoch University has appointed **Professor Rhonda Marriott** as Faculty Dean, Health Sciences. Professor Marriott was previously the School Dean and professor of nursing at Murdoch University's Peel

Surveillance leader

An expert in using artificial intelligence to enhance video camera surveillance, **Professor Mike Brooks**, has been appointed to lead the research operations at the University of Adelaide. Professor Brooks has been appointed to the position of Deputy Vice-Chancellor (Research) to provide leadership and vision on research and research education across the University. Professor Brooks is Research Leader of Video Surveillance within the Australian Centre for Visual Technologies at the University of Adelaide and is a former Head of the School of Computer Science, where he holds the Chair in Artificial Intelligence.

Glowing achiever

University of Technology, Sydney (UTS) infectious diseases researcher **Associate Professor Liz Harry** received the Australian Society of Microbiology Frank Fenner Award for researchers in the formative career stages contributing in Australian microbiology research. Professor Harry works in the UTS Institute for the Biotechnology of Infectious Diseases. She was the first person to identify and reveal cell division genes in a harmless strain of bacteria which she worked with – *Bacillus subtilis*. Later she developed a new way of seeing proteins inside the bacteria by immunofluorescence, which makes the protein glow.



Trent Woodruff



Leigh Simmons



Rhonda Marriott



Mike Brooks



Liz Harry



George Earl

technology involves burning coal with oxygen rather than air, producing a concentrated stream of carbon dioxide which is easier to capture and store. The Asia-Pacific Partnership on Clean Development and Climate has awarded \$500,000 to Professor Wall to lead the Oxyfuel Working Group and identify opportunities for global collaboration as the technology is demonstrated.

Mammal expert

Christopher Dickman, professor in terrestrial ecology at the University of Sydney's School of Biological Sciences, is the first Australian to receive the C. Hart Merriam Award for outstanding and sustained research contributions in mammalogy, awarded by the American Society of Mammalogists. Professor Dickman's main research has focused on vertebrate ecology in arid Australia, where he is working to achieve practical conservation goals through a deeper understanding of the complex ecological relationship between plants, invertebrates and vertebrates.

Bug-sex expert

Professor Leigh Simmons, an evolutionary biologist at The University of Western Australia (UWA) received a Certificate of Distinction at the opening ceremony of the 23rd International Congress of Entomology in Durban, South Africa.

campus. Professor Marriott was the first Indigenous Dean of a university School of Nursing in Australia and was recently named Indigenous Nurse/Midwife of the Year by the Nurses and Midwives Board of Western Australia.

Pitman medal

Professor John Robinson, from the School of Mathematics and Statistics at the University of Sydney, has been awarded the 2008 Pitman Medal. The medal is awarded by the Statistical Society of Australia and recognises outstanding achievement in and contribution to the discipline of statistics. Prof Robinson has sustained research of the highest level for over 40 years and is acknowledged by his colleagues as a world expert on saddlepoint methods and asymptotic approximations.

Faculty consolidator

Professor George Earl has been appointed Dean of the Faculty of Business, Technology and Sustainable Development at Bond University. Formerly Deputy Dean of the Faculty and Head of the School of Sustainable Development, Professor Earl was appointed to Dean at the end of June. Professor Earl said his plans for the Faculty revolved primarily around consolidation, following the significant expansion undertaken in the previous two years.

Bioceptre head

The Board of Directors of Sydney-based biotechnology company, Bioceptre International Limited, has appointed **Mr Alan Bootes** as the company's new chairman. In his 37 year career with pharmaceutical giant, Pfizer, Alan established a reputation for excellence in the development and commercialisation of therapeutic pharmaceutical technologies. His extensive knowledge of this sector will prove invaluable as Bioceptre moves to convert its well-advanced cancer diagnosis technology toward a range of therapeutic applications for introduction into the global oncology market.

Marine fellowships

The 2008 Tasmanian Marine Science Fellowships were awarded to University of Tasmania students: **Helena Phoenix Baird** (Population dynamics of amphipods common to the Antarctic near-shore benthos), **Joana Cubillos** (Coccolithophores evolution and calcification patterns of the late Quaternary in the Southern Ocean) and **Martin Marzloff** (Dynamics of rocky reefs and fishers in eastern Tasmania: Modelling using a complex systems approach). The Fellowship program enables early career scientists and researchers to travel to France to undertake further study and research.

Early storage success

The CO₂CRC Otway Project has reached the first major milestone with the storage of 10,000 tonnes of carbon dioxide two kilometres underground in a depleted natural gas reservoir.

“We are closely monitoring the carbon dioxide through one of the world’s most comprehensive geosequestration monitoring programs and every indication is that the carbon dioxide is behaving just as researchers have predicted. The injection process is proceeding very well and we are now starting on our next 10,000 tonnes,” says CO₂CRC chief executive **Dr Peter Cook**.

“Through our monitoring program, researchers track the behaviour of the carbon dioxide in the storage reservoir using very sophisticated geophysical and geochemical techniques,” says Dr Cook. “Soil, groundwater and atmospheric monitoring complement the subsurface activities. The use of such a wide variety of monitoring techniques gives us a high level of confidence that the compressed liquid carbon dioxide is stored safely and securely.”

The CO₂CRC Otway Project is Australia’s first demonstration of geosequestration. During the project, carbon dioxide, the world’s most common greenhouse gas after water vapour, is compressed to a fluid-like state, piped, injected and stored two kilometres underground in a depleted natural gas field, where the rocks had previously held natural gas for possibly millions of years. One of the most important features of the project is the demonstration of new geosequestration subsurface monitoring techniques.

► **More information:** www.co2crc.com.au/media/

Gotya, carbon!

In a first for Australia, carbon dioxide (CO₂) has been captured from power station flue gases in a post-combustion-capture (PCC) pilot plant at **Loy Yang Power Station** in Victoria’s Latrobe Valley.

According to **CSIRO Energy Technology** chief **Dr David Brockway**, the milestone followed the Garnaut Report’s recognition that Australia has an important role to play in developing low emission coal technologies: “PCC uses a liquid to capture CO₂ from power station flue gases and can potentially reduce CO₂ emissions from existing and future coal-fired power stations by more than 85%.”

“This is the first time anyone in the southern hemisphere has captured CO₂ using the PCC process at a power station and we are thrilled we’ve been able to prove this technology,” Dr Brockway says.

The 10.5 metre-high pilot plant is designed to capture up to 1000 tonnes of CO₂ per annum from the power station’s exhaust-gas flues. Future trials will involve the use of a range of different CO₂-capture liquids.

The project is part of the Latrobe Valley Post Combustion Capture Project – a joint collaboration between **Loy Yang Power**, **International Power Hazelwood**, Government and researchers from **CSIRO’s Energy Transformed Flagship** and the CO₂CRC (including Monash and Melbourne Universities).

► **More information:** **David Brockway**, 02 4960 6046, David.Brockway@csiro.au

Big players, big spoils

ExxonMobil and **BHP Billiton** have announced a \$1.4 billion investment in the Bass Strait Turrum Phase 2 gas and liquids project, a move welcomed by Minister for Resources and Energy, **Martin Ferguson**.

“Turrum is just the start of what I hope will be a new generation of oil and gas developments in Bass Strait,” he says. Since 1964, Bass Strait has contributed \$2.2 billion annually to Australia’s gross domestic product in real terms and it has contributed more than \$300 billion in taxes as well as supported more than 50,000 jobs in Victoria for 44 years.

“It is worth noting that this is also a great venture between a home grown Australian company and a foreign investor – both of which are international corporate icons of the highest quality,” Mr Ferguson says.

► **More information:** **Michael Bradley**, 0420 371 744



Adapting farming

CSIRO has released a national overview of climate change impacts and adaptation options for Australian agriculture.

Bringing together the latest science from research groups around Australia, the report includes chapters on each of Australia’s major agricultural sectors, with a focus on steps that can be taken to adjust to the ongoing changes in our climate.

Co-editor of the report, **CSIRO** scientist **Dr Mark Howden**, says it was time for agriculture to start focussing on proactive solutions. “Adapting to climate change will involve everything from changes in crop varieties, through to improved seasonal forecasting, up to revised national policies and programs,” he says. “For many agricultural businesses incremental changes may be enough, but some regions and industries will need to be open to more transformative changes.”

Prepared for **Land and Water Australia** (LWA) the report *An overview of climate change adaptation in the Australian agricultural sector – impacts, options and priorities* updates and expands the previous national synthesis done by **CSIRO** in 2003.

“We’ve applied the latest climate change projections to build a picture of the challenges that will affect all types of agriculture in all corners of the nation,” Dr Howden says. The report also emphasises the importance of building adaptive capacity among farm managers, agri-businesses and industry groups. Dr Howden says: “The past climate is no longer a good guide to the future climate, so having the skills and resources to respond flexibly will be essential.”

► **More information:** www.csiro.au/news/MediaCentre/whatsnew.html

Doing it right

Farmers in the dairy industry in Victoria’s South West are trying to do the right thing by the environment, a **Deakin University** researcher has found.

Dr Mary Graham, from Deakin’s Faculty of Business and Law, who has just completed her PhD incorporating economic and environmental impacts of dairy farming into farm performance analysis, believes big is not necessarily bad.

Dr Graham explains: “As well as assessing the farms’ economic impact, my research also looked at their environmental impacts. I used nitrogen leaching and runoff from each farm as a measure of environmental impact so things like soil, the slope of the land and the farming practices used on the farm were important.”

Dr Graham talked to 24 farmers in the WestVic Dairy region, in south west Victoria. She obtained data over a four year period.

“Ultimately, the impacts of the farm, both from an environmental and an economic point of view, comes back to the farmer and how they manage things, not just the farm’s size,” she says.

“They and the industry are trying to do the right thing. There is a difficulty though when you introduce environmental considerations into performance analysis. Farmers can’t be expected to look after the environment for us without giving them some assistance.”

Dr Graham believes the research also offers economists and scientists greater opportunity to collaborate on more related research.

► **More information:** www.deakin.edu.au/news/media.php

Up not enough

In 2004-05, \$987.57 million was spent on energy R&D according to *Energy Research and Development in Australia 2008*, a profile of Australia’s expenditure in energy research and development. When the categories of ‘prevention and treatment of pollution’ associated with energy is included, the total increases by a further \$87.6 million to more than \$1,075 million.

According to the Minister for Energy and Resources **Martin Ferguson**, Australia compares favourably against other OECD countries in some research fields but more needs to be done in the areas of applied and experimental energy research, which is where the **Australian Government** is making significant investments. “We have allocated \$150 million to the Energy Innovation Fund, \$500 million to the Renewable Energy Fund and \$500 million to the National Clean Coal Initiative.”

► **More information:** minister.ret.gov.au/TheHonMartinFergusonMP/Documents/RET08-033%20Energy_RandD_Book_Final.pdf

Gold agreement

A framework for future cooperation between **CSIRO** and **Gold Fields Australia** (GFA) has been formalised. The agreement is expected to result in a closer linking of the strategic planning of both parties, a closer working relationship in specific areas, and new R&D projects of interest to both parties. In particular, it will allow GFA to provide its mines as beta test sites for new CSIRO technologies.

► **More information:** **Peter Lilly**, 08 6436 8613, Peter.Lilly@csiro.au

More with less

Latest data from the **Australian Bureau of Agricultural and Resource Economics** (ABARE) shows Australian ‘energy intensity’ is improving and Australian industry is becoming more efficient.

The Minister for Resources and Energy, **Martin Ferguson**, says growth in energy consumption since the early 1990s has generally remained below the rate of growth in GDP. He says greater efficiencies are being achieved by improved technology and energy management, supported by programs such as Energy Efficiency Opportunities, as well as fuel switching. There has also been rapid growth in less energy intensive sectors such as trade, commerce and service provision, relative to the more moderate growth of the energy intensive manufacturing sectors.

ABARE statistics show the fuel mix in Australia’s domestic energy use was largely unchanged between 2005-06 and 2006-07. Black and brown coal accounted for the greatest share (40 per cent) followed by oil (34 per cent), natural gas (20 per cent) and renewables (5 per cent). Increased use of natural gas contributed most strongly to the rise in energy consumption in 2006-07.

Despite the decline in the production of hydroelectricity, renewable energy maintained its share of the fuel mix in 2006-07 with a rise in biogas,

bioliquids, solar and wind energy. However, these new energy sources only accounted for around 1 per cent of Australian energy consumption.

► **More information:** **Michael Bradley**, 0420 371 744

Fuelling thoughts

The **CSIRO** has released a report on the future of transport fuels addressing two serious issues – the need to dramatically reduce the transport sector’s greenhouse gas emissions and how to deal with the economic risks associated with increasingly costly and scarce oil supplies.

The report *Fuel for Thought* summarizes a year of deliberations by the **Future Fuels Forum** (FFF), on a range of plausible scenarios for establishing a secure and sustainable transport fuel mix to 2050.

The FFF, which was convened by the CSIRO and engaged leading community, industry and government bodies, forecasts a major shift in Australia’s transport fuel mix.

In the near term it predicts the expanded use of diesel, gaseous fuels such as LPG and hybrid electric vehicles, with even greater diversity beyond 2020 that might include hydrogen, synthetic fuels from coal or gas and advanced biofuels that will not impact food production.

According to **Dr John Wright**, director of CSIRO’s **Energy Transformed**

Flagship, the Forum’s scenario modelling shows that if oil production peaks, prices could climb as high as \$8 per litre by 2018 in the most extreme case. “This outcome could result in significant social impacts that are likely to adversely affect low income Australians,” he says. Scenarios like this could catalyse the development and roll-out of alternative fuel options, low emission vehicle technologies and infrastructure that supports sustainable transport. “The Forum also modelled the inclusion of retail transport fuel in the emissions trading scheme and found prices are expected to be only moderately impacted – an increase of around 10 cents per litre at a price of \$40 per tonne of carbon dioxide. Even with this relatively small impact, our modelling indicates a steady shift towards low emission fuels and vehicles.”

► **More information:** **Dr John Wright**, 02 4960 6080, John.Wright@csiro.au



Photo: CSIRO

Agri-Food Fellowship

An international fellowship is being offered for the first time by the **Agri-Food Industry Skills Council** and **International Specialised Skills Institute** (ISS) to promote the acquisition of new skills and innovation overseas and to see these findings delivering benefits to the Agri-Food Industry in Australia. The closing date for applications is 5th September and the winner will be announced during the Agri-Food National Conference in Melbourne on 25 September.

The fellowship is aimed particularly at established, highly capable and experienced industry practitioners who may have broad technical expertise or a record of achievement in their fields. The successful applicant receives a maximum of \$10,000 towards overseas travel costs such as airfares, accommodation, living allowance and course fees. Should costs exceed \$10,000 the recipient raises the additional funds.

► **More information:** www.agrifoodskills.net.au/display_announce.php?id=2

By Gerd Winter

Changing habits of urban living

Australia is a lucky country - in love with the idea of living in a warm environment and almost unlimited spaces, and a lifestyle supported by cheap electricity. We used to not care too much about the gap below our front doors, entry point for wind and weather sending regular chills down the spine of Northern Europeans coming here? We have made almost a tradition out of living by this principle, in the way we built houses and we planned – or not planned - our cities. But it may now come back to haunt us.

In part, we have already woken up to reality as the price for energy has increased, and our neglect starts to bite. We think now of double glazing and proper insulation of our homes. The immanent price tag on carbon will most likely become another potent driver in the ecological make-

anywhere else....”

Peter Newton, professor at the Institute for Social Research at Swinburne University of Technology, attributes part of the complacency of city managers and governments to the regular ranking of Australian cities among the top 10 most liveable in the world. “Liveability, however, does not equate to sustainability,” he says. Prior to 2006, Newton was chief research scientist at CSIRO leading the Urban Systems Program and also program director, Sustainability, in the CRC for Construction Innovation. Drawing on more than a decade of experience he has embarked on a series of books that are to lead the way to more sustainable urban planning. The first in the series, *Transitions: Pathways to More Sustainable Development in Australia*, was just released in July, with contributions from more than

90 leading scientists. Newton says that what motivated him to compile the book were insights he gained working on the *Australian State of Environment: Human Settlements Reports* prepared for the Federal Government in 2001 and 2006. These showed a growing pattern of resource consumption and decreasing sustainability of our urban settlement systems, where problems and vulnerabilities start to emerge that are bound to become quite critical with climate change, peak oil and dwindling food supplies.

The challenge is, he says, how to begin winding back the unsustainable ecological footprint of our major cities, which is about 8 hectares per capita, 3-4 times the global average. It can be done, he says, through technical innovations that facilitate future urban systems which see waste as a resource, make better and more

photo: Cyron Ray Macey



The urban sprawl of Australian cities: a focus area of sustainable urban development. The photo shows Brisbane suburbia.

over of Australian residential and commercial buildings. That at least is the message of Maria Atkinson, director of the Green Building Council Australia and head of Sustainability at the global corporation Lend Lease, delivered at the recent UK Think08 conference:

“Using existing technologies... I can make you a building a 100% more efficient for no cost if you give me \$34 a ton for carbon.” (The speech is currently on Youtube: www.youtube.com/watch?v=lkBV_cB0XPM).

However, as heartening as these developments are, the layout of our burgeoning cities is where decades of poor planning may resist the quick fix. In a recent interview with the ARDR, Professor Ian Lowe, president of the Australian Conservation Foundation, pointed out that “Brisbane with ~1.25 million people has roughly the same surface area as Greater London and Greater Tokyo with, ~8 and ~12 million people respectively. This makes it, for example, almost physically impossible to provide an efficient public transport system for all the journeys that people are forced to make because of poor urban planning. Because of this, he says, we are going to have more difficulty adapting to a world of scarce and expensive oil than almost

integrated use of land and transport and create green buildings.

His book outlines solutions in each of these areas. They require product processes or technology that Newton broadly categorises as ‘Horizons of innovations’. The first two Horizons comprise innovations that are commercially available and ready for universal application (Horizon 1) or have been used in a number of cases but may need to be adapted and performance assessed for different purposes (Horizon 2).

The challenge is how to begin winding back the unsustainable ecological footprint of our major cities, which is about 8 hectares per capita, 3-4 times the global average.

Energy efficient light bulbs and hybrid cars, respectively, are examples of Horizon 1 and 2 innovations.

Horizon 3 innovations bear the greatest challenges but promise also the greatest impact on sustainable urban living. These innovations may already exist in laboratories – like the hydrogen fuel cell - but need to be

further developed and performance assessed. Horizon 3 innovations will have the capacity to provide key aspects of a sustainable urban future built on decentralised, distributed renewable energy systems, integrated urban water systems using city catchments and recycled water systems, and eco-industrial complexes which use waste as a resource.

Newton sets out four main pathways towards sustainable urban development by mid century. The first two pathways comprise the adoption of (1) technical innovations in the construction process and (2) virtual construction design to assess performance before the actual construction of a building begins – a major focus of a second book to be released in autumn next year.

The greatest challenges, says Newton, lie with the next two pathways requiring Horizon 3 solutions. These pathways will (3) encourage a refocus of urban planning on rebuilding our existing occupied built environment - our sprawling city suburbs - and (4) address attitudes and behaviours of city dwellers towards consumption. Our consumption patterns hold the key to sustainable living and change may be conflicting with our economic growth and consumption oriented system.

Our consumption is, however, in parts determined by the environment we live in. Newton just received an ARC discovery grant to research how consumption is affected by the built environment and hopes to find clues how to effectively intervene. "I couldn't imagine that manufacturers would put a product out unless it had been fully examined, yet we tend to think that we do not need to do that in terms of constructing our cities," he says. "This complex system which is our 21st century city, one of the most complex things that exist, has been virtually ignored, from a research perspective, in terms of trying to better understand it, let alone manage it."

The transition to sustainable urban developments will require national leadership which, much to his frustration, has been missing for at least the last 15 years. "I believe there is a critical role for Federal Government to play, in particular for the long term critical infrastructure planning of our

Photo: Envirowise. UK



Sustainable urban development requires changes in waste management: "moving from the current extract-process-assemble-use-dispose paradigm to one where waste, once minimised, is seen as a resource stream for cradle-to-cradle and eco-industrial manufacturing processes" [from 'Transitions: Pathways towards sustainable urban development', edited by Peter W Newton, published by CSIRO Publishing, 2008]

mega-metropolitan regions," he says. "John F Kennedy said we neglect our cities to our peril because in neglecting them we neglect the nation." Regrettably, in Australia there hasn't been the connectivity at the federal level in understanding how significant our metropolitan regions are to the nation in terms of their economic health, their social health and their environmental sustainability, he says.

The inertia observed in sustainable urban planning is to some extent dictated by the way we approach it, which is incremental and restricted by short electoral cycles. Hence there is absence of a longer term perspective. "Within an electoral cycle we do not even get to articulate that vision," he says. "There needs to be a different thinking in an organisational, planning and political sense which is reflected a new kind of organisational governance body."

There were House of Representative enquiries.... "Not one of the recommendations was ever implemented."

Likewise, there is a good case for a research body that integrates the existing fragmented expertise.

In 2005 the Australian Technology Network (ATN) of Universities outlined a proposal for a Cooperative Research Centre for Sustainable Cities declaring that "setting up such a CRC is particularly timely as it coincides and would interact positively with the Solar Cities Program being implemented by the Australian Greenhouse Office." The proposal did, however, not proceed.

Why has it not been implemented? Newton says that the CRC has been on the cards ever since the CRC program came up but "there was simply not a receptor in Canberra." There is the idea, he says, that these issues are too hard to be dealt with, a view not shared in other parts of the world. There were House of Representative enquiries into sustainable cities in 2005 and an enquiry into a sustainability charter end of 2007. "Not one of the recommendations was ever implemented," says Newton. There needs to be a change and it has to come soon if significant hardship is to be avoided. "There is an urgency to the process."

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Events & Reports

16-24 August – National Science Week

More information: www.scienceweek.info.au/Pages/index.aspx

End of August – Review of the National Innovation System, Green Paper (followed by a Government White Paper before Christmas)

More information: www.innovation.gov.au/innovationreview/Pages/home.aspx

3 September - ARC College of Experts nominations close

More information: www.arc.gov.au/about_arc/expert.htm

10 September – Submissions and comments to the Carbon Pollution Reduction Scheme Green Paper close

More information: www.greenhouse.gov.au/greenpaper/consultation/index.html

End of October - Higher Education Review report on priority action (final report by the end of the year)

More information: www.dest.gov.au/sectors/higher_education/default2.htm

Grants and programs

French Australian Science and Technology (FAST) Program: Applications close 18 August

More information: www.feast.org.au

The Climate Ready Program (\$75m over 4 years) - grants from \$50,000 up to \$5m on a matching funding basis. Round one closes 4 September.

More information: www.ausindustry.gov.au

The Climate Change and Productivity Research Program as part of Australia's Farming Future - funds climate change research and development activities to assist the agriculture sector. Expressions of interest close 5 September

More information: www.daff.gov.au/agriculture-food/australias-farming-future

Australian Research Council: Linkage Learned Academies Special Projects for 2009: Applications Close 4th week of August

Linkage Projects: (Round 2) for July 2009: Applications close 21 November

ARC Federation Fellowships for July

2009: Applications close 4th week of November

More information: www.arc.gov.au/media/important_dates.htm

Australia-India Strategic Research Fund (AISRF): Round three closes 26 September.

More information: www.innovation.gov.au/aisrf

South Australia Innovation and Investment Fund (SAIIF) - supports innovative job creation projects in the manufacturing and technology sectors. Round one closes 17 October.

More information: www.innovation.gov.au/ProgramsandServices/SAIIF/Pages/SAIIF.aspx

Conferences

3rd Australian International Green Build, Design & Technology Show

15 to 17 August 2008, Sydney, NSW

Food Innovation: Emerging Science, Technologies and Applications - FIESTA 2008

17 to 18 August 2008, Brisbane, QLD

Coast to Coast 2008

18 to 22 August 2008, Darwin, NT

12th Sustainable Economic Growth for Regional Australia (SEGRA) Conference

18 to 20 August 2008, Albury, NSW

2nd Australian Lung Cancer Conference 2008

21 to 24 August 2008, Gold Coast, QLD

6th International Symposium on In Vitro Culture and Horticultural Breeding

24 to 28 Aug 2008, Brisbane, QLD

Endocrine Society of Australia & Society for Reproductive Biology Annual Scientific Meeting

25 to 28 August 2008, Melbourne, VIC

Automated Minerology '08

27 to 28 August 2008, Brisbane, QLD

12th World Congress of the World Federation for Ultrasound in Medicine and Biology

30 to 3 September 2008, Sydney, NSW

Fire, Society and Environment 2008: from Research into Practice

1 to 3 September 2008, Adelaide, SA

Bushfire CRC National Conference

1 to 3 September 2008, Adelaide, SA

Brain Injury Australia National Conference 2008

1 to 3 September 2008, Melbourne, VIC

11th International Riversymposium

1 to 4 September 2008, Brisbane, QLD

5th World Conference on Promotion of Mental Health and Prevention of Mental and Behavioural Disorders

10 to 12 September 2008, Melbourne, VIC

12th International Lupin Conference

14 to 18 September 2008, Perth, WA

2008 Excellence in Mining & Exploration

14 - 16 September 2008, Sydney, NSW

2008 World Congress of WATOC (theoretical and computational chemists)

14 to 19 September 2008, Sydney, NSW

Australasian Sexual Health Conference 2008

15 to 17 September 2008, Perth, WA

46th Annual Scientific Conference of the Australasian Association of Clinical Biochemists

15 - 18 September 2008, Adelaide, SA

11th International Conference on Principles of Knowledge Representation and Reasoning (KR 2008)

16 to 19 September 2008, Sydney, NSW

4th Innovative Foods Centre Conference

17 to 18 September 2008, Brisbane, QLD

Leura VI International Breast Cancer Conference 2008

18 to 21 September 2008, Sydney, NSW

World Sustainable Building Conference

21 to 25 September 2008, Melbourne, VIC

14th Australian Society of Agronomy Conference - Global Issues, Paddock Action

21 - 25 September 2008, Adelaide, SA

43rd APS Annual Conference

23 - 27 September 2008, Hobart, TAS

Open Access and Research Conference 2008

24 to 25 September 2008, Brisbane, QLD

A Climate of Change in the

Rangelands

28 September to 2 October 2008, Charters Towers, QLD, Australia

eResearch Australasia 2008

29 September to 3 October 2008, Melbourne, VIC

2008 Australian Systematic Botany Society (ASBS) National Conference

29 September - 03 October 2008, Adelaide, SA

3rd Annual Conference of the Aus and NZ Chapter of the Society for Risk Analysis

30 September to 1 October 2008, Canberra, ACT

26th Annual Conference of the Australasian Primate Society

3 - 5 October 2008, Adelaide, SA

34th Annual International Conference of the Australian College of Mental Health Nurses

6 - 10 October 2008, Melbourne, VIC

Drilling for Geology Conference

8 - 10 October 2008, Brisbane, QLD

3rd Australian and New Zealand Falls Prevention Conference

12 - 14 October 2008, Melbourne, VIC

Australian Institute of Medical Scientists (AIMS) 2008 National Scientific Meeting

13 - 17 October 2008, Melbourne, VIC

Third IAPR International Conference on Pattern Recognition in Bioinformatics

15 - 17 October 2008, Melbourne, VIC

Asics Conference of Science and Medicine in Sport

16 - 18 October 2008, Hamilton Island, QLD

Terry Leach Symposium 2008: The application of Petrology to Geological Models in Mineral Exploration

17 October 2008, Sydney, NSW

6th Australasian Viral Hepatitis Conference

20 to 22 October 2008, Brisbane, QLD

Nurse Practitioners: A Solution for the Future

26 to 28 October 2008, Melbourne, VIC

Carbon Market Expo Australasia 2008

30-31 October 2008, Gold Coast, QLD

JOBS

	INSTITUTION	CLOSING DATE
Lecturer / Senior Lecturer / Associate Professor Health Sciences	University of Queensland QLD	31 Aug
Dean of Science	University of Melbourne VIC	18 Aug
Lecturer in Nursing	RMIT University VIC	20 Aug
ARC Senior Research Associate - Extract and Characterise DNA	University of Adelaide - Australian Centre for Ancient DNA SA	15 Aug
Assoc. Prof/Prof Human Movement Studies	Charles Sturt University NSW	15 Aug
Lect/Snr Lect in Vet. Public Health & Epidemiology	Charles Sturt University NSW	01 Sep
Lecturer/Snr Lecturer in Equine Medicine	Charles Sturt University NSW	01 Sep
Lecturer/Snr Lecturer in Veterinary Reproduction	Charles Sturt University NSW	01 Sep
Director - Monash Animal Research Platform	Monash University VIC	15 Aug
Lecturer/Senior Lecturer In Power & Energy Systems	University of Queensland QLD	18 Aug
Discipline Head, Mechanical and Automotive Engineering	RMIT University VIC	31 Aug
Lecturer/Senior Lecturer - Chemistry	Monash University - Physical Chemistry VIC	29 Aug
Director - Electron Microscopy Unit	Australian National University College of Science ACT	15 Aug

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