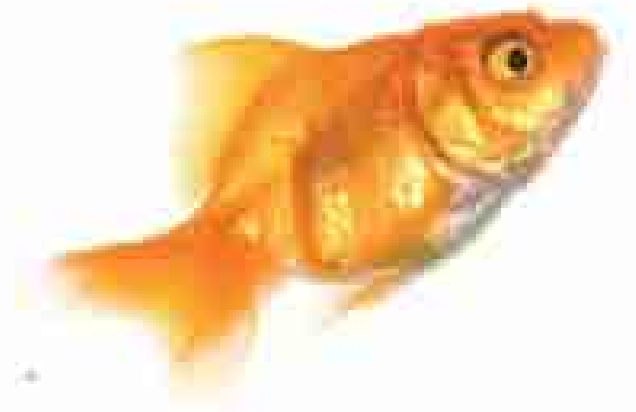


Australian Innovation:
Towards a
sustainable
future **people • planet • profit**



**Entrepreneurs and innovators
who dare to be different**

The business of the environment
Supply chain, product stewardship and design
Social change and sustainable communities
Social entrepreneurship and community partnerships
Financing a better world

Author **Valerie Khoo**

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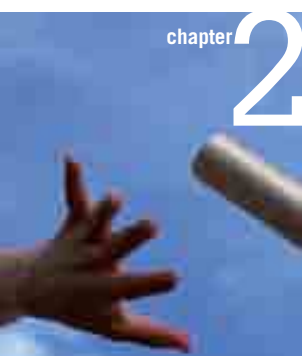
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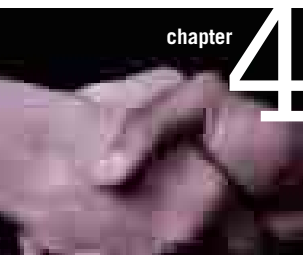


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COMMENTARY

MIKE HAWKER



Inspiring future generations

There is one central consideration for fully understanding why business must engage in sustainability. Simply put, no business will survive unless it takes into consideration the community in which it operates, delivers consistent value to customers, maintains the highest standards of governance and ethics, and mitigates its overall impact on the environment.

For this reason, my view of sustainability is that it is not in addition, or peripheral, to the way we do business. It is fundamental to it.

Being sustainable is about being a well managed company. Our purpose and values are at the core of who we are, how we operate and build relationships. It is the quality of these relationships that will distinguish us in the long term.

It is important to remember that the prime drivers of sustainability have been the demands and high standards set by the community itself. We should never forget the public outrage directed at destructive polluters and the vocal protests against banks that withdrew services in the mid 1990s. These campaigns were powerful reminders that boards and senior managers of companies must never lose touch with the people who are their customers, employees and shareholders and who, combined, give any company its licence to operate.

It has been interesting to follow the transition of corporate sustainability thinking and practices in Australia over the last decade. Much of this began as well meaning philanthropy but some of the spend by corporations lacked clear accountability to shareholders. My view is that it is impossible to get the sustainability equation wrong if all the actions undertaken in the name of sustainability are central to the core purpose of the business. In IAG's case, our focus is on reducing risk in society, which in simple terms reduces risk to ourselves as an insurer. For example, by assisting society to reduce the risk of young people getting into crime, not only are we helping to make those communities

safer and more productive places to live, but we are directly reducing the cost to our company in claims for household break-ins and car thefts.

My sense is that Australia is increasingly a world leader in corporate sustainability. We still have some way to go in relation to our efforts to reduce carbon dioxide emissions and combating the devastating effects of climate change. In 2006, six leading corporations along with the Australian Conservation Foundation formed the Australian Business Roundtable on Climate Change which advocates that achieving a 60% reduction in greenhouse gas emissions from year 2000 levels by 2050 is possible while maintaining strong economic growth.

I commend the individuals and companies who have contributed to *Australian Innovations: Towards a Sustainable Future*. In putting together this important book, the authors have documented for posterity vital work across a broad range of industries. I hope this will inspire future generations of Australian business and community leaders.

Michael Hawker has more than 18 years experience in the financial services industry. Before joining Insurance Australia Group Limited as Chief Executive Officer in 2001, Michael was Group Executive, Business and Consumer Banking at Westpac Banking Corporation. Previous positions include Executive Director of Citibank International PLC in Europe and Deputy Managing Director of Citibank Limited in Australia.

Michael was listed by *Euromoney* as one of the Top 50 Bankers under 40 and, in 2000, he was awarded the *Australian Banking & Finance Magazine* – Millennium Banker of the Year Award.
www.iag.com.au

The emerging carbon market – a new economy



Carbon trading. Carbon Tax. Carbon price signal. Whatever the term used, it refers to using market forces – by putting a price or tax on carbon – so that large emitters will either have a financial imperative to reduce their emissions, or pay up. Corporations that do not reach their quota in carbon emissions, or who undertake activities that are carbon positive, could possibly trade their “credits” with those that need them.

One of the key recommendations of the Australian Business Roundtable on Climate Change is the design of a “long, loud and legal” framework to establish a price signal; “a national market-based carbon pricing mechanism to deliver cost-effective emission reductions.”

The carbon economy is in its infancy in Australia. The New South Wales (NSW) Greenhouse Gas Abatement Scheme is currently Australia’s only mandated carbon trading system. All electricity providers in the state need to meet greenhouse reduction targets either by reducing emissions or purchasing NSW Greenhouse Gas Abatement Certificates.

Although Australia can’t yet participate in the international market for carbon trading, the domestic framework has spawned innovative players in the carbon credit market such as CO2 Australia, Carbon Planet and Easy Being Green, the latter being the brainchild of Paul Gilding, former Executive Director of Greenpeace International and now head of Ecos Corporation. ■

How does the Kyoto Protocol impact carbon emissions or trading in Australia?

While Australia is a signatory to the Kyoto Protocol, the Australian Government has chosen not to ratify it. Developed countries that ratify the Kyoto Protocol will be bound by international law to achieve certain emissions reduction targets.

Countries that agree to these emissions reductions targets can participate in a carbon trading system to reach these targets.

How does the NSW Greenhouse Gas Abatement Scheme work?

The NSW Greenhouse Gas Abatement Scheme was established in NSW through an Act of the NSW Parliament. The Scheme began on 1 January 2003 in NSW and on 1 January 2005 in the Australian Capital Territory (ACT). According to The NSW Greenhouse Gas Abatement Scheme it “establishes an annual state-wide greenhouse gas benchmark for the electricity sector and then requires individual Benchmark Participants (who buy or sell electricity in NSW) to meet their allocation of the mandatory greenhouse gas benchmark, based on their share of the NSW electricity demand.”

Offset thyself

Carbon Planet allows individuals and businesses to offset their ecological footprint – from one-off events or plane trips to comprehensive emissions audits of an organisation’s activities.

Ross Williams's passion for skydiving was the driver behind the creation of Carbon Planet. It was the late 1990s and Williams was a frequent skydiver. But a chance viewing of a *Four Corners* television program on carbon emissions made him question his personal contribution to the harmful greenhouse gases in the Earth’s atmosphere. Not quite ready to give up the adrenalin rush of jumping out of planes, Williams wanted to find a way to offset the carbon emissions he was responsible for.

“I decided that if I was responsible then I should clean up my own mess,” says Williams, who was then working in the information technology industry. When he realised there was no one offering individuals the opportunity to buy carbon credits, Williams recognised a business opportunity and approached friend and fellow South Australian Dave Sag with the idea to form a company to retail carbon credits.

Coincidentally, Sag, who was then working in IT in London, had been researching issues associated with climate change. “It took all of two seconds to convince me,” says Sag. They founded Carbon Planet on 12 January 2000, and spent much of the next four years researching the complex world of carbon trading, implications of the Kyoto Protocol and the challenges of marketing an emerging environmental service.

Carbon Planet finally began trading on 3 June 2005. Its first year of trading was slow and steady. The company initially purchased a small parcel of 2,000 carbon credits from Forests NSW, which it on-sold predominantly through its website. “Normally a minimum parcel of carbon credits would be in the tens of thousands,” says Sag. “But Forests NSW was supportive of the idea and allowed us to dip our toes in the water with a smaller parcel.”

Offset your personal footprint

Unlike companies such as CO2 Australia, who have targeted big corporate emitters from day one, Carbon Planet has initially focused on individuals – people who wanted to offset their personal footprint on the environment either on an ongoing monthly subscription basis or for one-off activities such as air travel.

Sag, who is now based in Adelaide, says that the company is rapidly ramping up its activities. While it only sold around 2,000 credits in its first year of operation, Sag is ambitiously aiming to sell one million credits in 2007. One of Carbon Planet’s credits equates to removing exactly one tonne of carbon dioxide from the atmosphere and storing it for 100 years.

“Initially the bulk of Carbon Planet’s customers were individuals,” he says. “Now we have a different offer for corporates – ranging from SMEs to large emitters.”

The company has also consulted – and sold credits to – major events such as the WOMAD Festival in Adelaide, which offset 1,290 tonnes of carbon dioxide through Carbon Planet. This took into account everything from the energy used to produce the event to air travel for performers.

“If we do the audit up front, before an event, we can also make recommendations on how to reduce emissions naturally,” says Sag. “Even though we are in the business of retailing carbon credits, the bigger picture is to combat climate change. We would prefer people to change their behaviour – then what they can’t naturally reduce, we’ll offset.”

Auditing emissions from film festivals to weddings

Carbon Planet has also been asked to audit a film festival in the United Kingdom, a blog from Canada – which only produced two tonnes of carbon dioxide – and Sag even audited his own wedding and honeymoon (47 tonnes of carbon dioxide).

“As we grow my ambition is that we will be the world’s biggest retailer of properly certified carbon credits,” says Sag, who is also working towards a certification process. “It’s like gold jewellery which can be labelled environmentally safe, or dolphin-free tuna. Ultimately, we’d like to see a CO2-free badge on everything from toothpaste to timber.”

Both Williams and Sag have now wound down their IT careers to concentrate on Carbon Planet, with Williams injecting about A\$1 million into the company.

“On one hand, this can be a global mega-business and, on the other, it can also save the planet. That’s what gets me out of bed in the morning,” says Sag.

As for Williams, his penchant for jumping out of planes has been usurped by Carbon Planet. Sag says: “Ross isn’t skydiving much these days.” ■

www.carbonplanet.com

How does Carbon Planet make money?

Carbon Planet buys carbon credits in bulk – currently from Forests NSW – and on-sells them in much smaller parcels to people and organisations who would otherwise not be able to buy them in small quantities. Carbon Planet adds a gross margin of about 30% which covers operating costs and a profit. In 2006, Carbon Planet’s retail price for one credit was A\$23 (including GST). Carbon Planet also provides an emissions auditing service and functions as a carbon credits broker, linking up producers of carbon credits with companies that need them.

Closing the loop

In order to fulfil a promise made by a sales gimmick, an innovative recycling process was developed by Close the Loop, resulting in “zero waste to landfill”.

In the late 1990s, Steve Morriss sat in his shopfront in Nicholson Street in the Melbourne suburb of Carlton trying to figure out how his humble store – which retailed toner, inkjet and fax cartridges – was going to win customers against his bigger competitors.

Knowing he wasn't going to be able to compete on price, he formulated a unique selling proposition: that all used cartridges from customers would be recycled.

“I ended up with a warehouse full of cartridges because there was no one who would recycle the whole product,” says Morriss, who then tried to figure out how he could do it himself.

“In the early days, I recycled small volumes, manually disassembling the cartridges – putting metals in one bin, toner powder in another, ink in another. I did it all in the back of the shop in Nicholson Street. It's not something I suggest that other people do!”

Although Morriss was able to find markets for some of the materials to be reused, other materials such as contaminated plastics, toner powder and foam didn't have ready markets willing to accept them for reuse or recycling.

This resulted in a “growing mountain” of waste that was stockpiling in Morriss's warehouse. “I kept looking at that pile of cartridge waste – which could have filled an Olympic swimming pool – and thought there had to be a better way,” he says. “We'd often work through weekends and into the night just disassembling toner cartridges. I wondered how we could get a machine to do the process.”

The birth of Close the Loop

In 1999, Morriss was at a conference about business and the environment when he heard the term “close the loop” – referring to the practice of buying products made from recycled materials and thus creating a demand for recycling. “I thought ‘that's it!’” says Morriss. “I ducked out of the conference and registered the name straight away.”

For the concept to be commercially successful, Morriss knew he had to engage the big guns in the imaging consumables industry, such as Ricoh, Lexmark, Brother and Epson.

Morriss says while the companies were keen on his idea, they wanted him to invest in the research and prove the viability of the concept before they became involved.

To build the company – and to invest in the research and development required – Morriss and his wife, Melinda, knew they were unable to fund the venture on their own. So the company began in 2000 as an unlisted public company with about 50 shareholders investing around A\$500,000.

One of the first steps in turning Morriss's recycling dream into reality was to commission an engineering

company to build a machine. Working with a team of engineers in Wollongong, the first incarnation of Close the Loop's Green Machine was created. “That was made by September 2000 and was bolted down in our factory in Thomastown,” says Morriss. The first Green Machine was about 30 metres long and six metres high.

The last six years has seen Close the Loop undertake more R&D and Morriss has worked closely with recycling expert Dr John Scheirs, a director of ExcelPlas Australia Ltd, resulting in continuous improvement of the machine, which is now in its sixth version.

Since then, Close the Loop has become a partner of Planet Ark's successful “Cartridges 4 Planet Ark” program, which collects used cartridges from over 9,000 businesses across Australia and sends them to Close the Loop for recycling.

Morriss also cites global legislative trends to cut the volume of imaging consumables going to landfill as further pointers to the need for a service such as Close the Loop.

There are now almost 500 shareholders investing over A\$6 million. Morriss says the company finally reached break-even point around the beginning of 2006.

Problem-solving innovation

In the early days of Close the Loop, the Green Machine was successful in automating what had been a laborious manual process. It was able to separate outputs such as aluminium, stainless steel, and pure plastics – for which there were markets for reuse or recycling. However, Morriss and Scheirs were still left with mixed and heavily contaminated plastics that no one wanted.

“I tried to find somebody to buy our mixed plastics,” says Morriss. “But after about a year, I realised that no one could use them for anything. So we had to develop our own end-use application.”

Morriss and Scheirs experimented for two years. “In the early days, it was just John and I,” says Morriss. “John refers to it as bucket chemistry, chemistry experiments on a small scale and a low budget. We had to characterise the waste stream, analyse the different plastics and work out their compatibility. Then we started extruding, injecting and moulding various grades and mixes of plastics under laboratory conditions in our factory. We also spoke to a lot of people about what we were doing – science and innovation is just as much about networking and research as it is about actually doing things.

“It didn't take us long to buy a little processing plant and have it custom built. Then we made some tools, bolted it all together, and ran some plastic through it to see what came out the other end.”

After much testing and experimentation, Morriss, Scheirs, and a growing band of enthusiastic Close the Loop employees, felt they finally found a solution, a useful material that could be created from the mixed plastics that were otherwise going to landfill. They called it eWood.

Although essentially a black-coloured plastic, it has the same natural characteristics as wood. The first batch of eWood was sold in 2003. It can be used for garden furniture, fences, retaining walls and more. "We sell every bit of eWood that we make," says Morriss. "A horse trainer in Tasmania has used it to build a horse-breaking ring. And Lexmark in Sydney's Frenchs Forest have used it for outdoor furniture."

Morriss emphasises that although eWood contributes a small amount of revenue to the company, it is "a solution to a problem, not a profit centre." The innovation has also won a *New Inventors Award* from ABC TV.

Global expansion

It's the company's innovations in recycling and separating a complex and hazardous waste stream where Morriss sees demand. "Our preferred model is to expand our business globally," says Morriss. "We've got two contracts in the UK and will be bolting down our machines there in 2007. In 10 years, we hope to have five factories operating in strategic locations around the world and global contracts with all the photocopier and printer companies to divert their used consumables from landfill."

According to Morriss, Close the Loop has undertaken detailed research and knows the business model is applicable on a global scale. He says the company has over 90% of the Australian original equipment manufacturers market as clients, including global brands such as Brother, Canon and Epson.

An emotional journey


However, the road has been paved with both triumphs and frustrations. "Our whole team has been challenged," says Morriss, who now leads 45 staff including two based in the UK and several who travel the world on the Close the Loop crusade. "We've gone through the gamut of emotions on this journey. It can be hard to manage shareholder expectations and ensure there is enough cash to grow the business. As the business grows and you have to employ more leaders, it's natural that you then have to deal with politics and a whole raft of issues that were never there when it was just John and I sitting around doing bucket chemistry.

"I've always had the belief that while the solution may not be in front of our nose, we have a business that tries to find those solutions.

"I'm just a simple guy. But I kept learning and my eyes kept getting wider and wider. Now we're a multi-million dollar organisation that's gone global." ■

www.closestheLoop.com.au

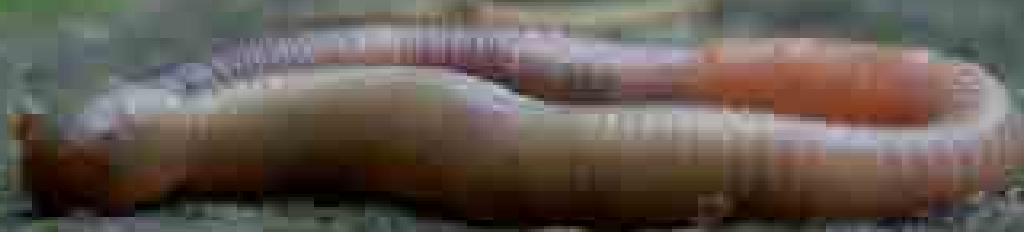
Cartridges arrive at Close the Loop to be sorted, then recycled with zero waste to landfill.



I kept looking at that pile of cartridge waste – which could have filled an Olympic swimming pool – and thought there had to be a better way

Worms and insects purify water

Australian company Biolytix has developed an effective award-winning wastewater treatment system which now is being used in Australia and around the world. BY VALERIE KHOO



While other systems don't work when the power goes off – the Biolytix worms are working overtime.

It's been a long journey for Biolytix founder and the brains behind the treatment process, Dean Cameron, who didn't initially set out to create a wastewater treatment system. He says it was a case of "chance favouring the prepared mind" when he figured out the ecological reasoning behind how the Biolytix system works.

In 1983, Cameron and his family were moving to country Queensland, to a property not connected to sewerage. In searching for an appropriate septic system, he decided against the standard available systems and chose a design using a composting method.

"I went through the hassle of getting this non-standard treatment system approved," says Cameron. "And that would have been worth it if the system actually worked the way it was supposed to – but it didn't. So I started tinkering with it to make it work. In the process, I discovered a few things about the ecological process that could have been improved so I got in touch with the manufacturers and suggested ways they make their system work more effectively." Instead of listening to Cameron's suggestions, the manufacturer simply told him that he had voided his warranty by making adjustments to their system.

The birth of Biolytix

Knowing his suggested principles would work, Cameron created his own treatment system and, before long,

friends and colleagues wanted one of their own. "At one stage, there were 30 people who wanted a treatment system based on the principles I developed," says Cameron, who describes himself as a natural ecologist and was once the head of drainage at the Melbourne Botanical Gardens.

Cameron's accountant suggested it was time to take his invention more seriously. "So I did," he says. "I registered a company and started making and selling them in 1992."

At first, he operated on a very small scale, mainly selling to friends and people in the area. But then someone set him the challenge of developing a treatment system that would also produce methane from household waste. They wanted to use the methane for cooking.

Intrigued by the idea, Cameron played around with the system further. "I knew it was theoretically possible but, after several months of frustration being unable to generate methane, I decided it was time to pull it apart to find out what was going on.

"I realised there were little insects – beetles and fly larvae – which were surviving quite happily in the material and they had created little channels that were an identical pattern to cow manure.

"I had initially tried to create an anaerobic environment, but the flushing toilet that input the material let in enough air to keep the process aerobic. So I figured I'd

keep the environment aerobic and put in creatures that live in cow manure, like worms, because they survive particularly well in an aerobic environment.” Cameron concedes that the idea seemed completely counter-intuitive. “The regulators thought I was mad,” he says. They weren’t the only naysayers. Others told him the worms would drown, but Cameron knew his system could work. By 1996, he gained approval from the Queensland Department of Health, which enabled him to take the next step in commercialisation.

Finding investment partners

It was time to develop the product and do some serious R&D. But that required serious cash. It was at that time Cameron was contacted “out of the blue” by a South African company who wanted a wastewater treatment system for a resort they were developing at Stellenbosch, near Cape Town. After getting to know Cameron and seeing his system in action, they also expressed an interest in taking a share in the business. It took 10 months of discussion but they eventually invested A\$3.5 million for 50% of the company.

This investment allowed Cameron to do the necessary R&D to get to the next stage. “We had looked at Australian Government funding and investment funding but Australia was a difficult place to get venture capital for a start up business,” says Cameron. “People either wanted the technology for nothing, or they wanted to wait until it was developed and proven in an established business. It was a difficult climate.”

Cameron agrees that having South African partners means they have easier access into another country. However, he concedes “it would have been nice if there had been Australian interest in it.”

Biolytix’s R&D phase lasted until 2003, after which they successfully installed the systems on Queensland’s Macleay Island, taking sewerage from 20 homes and a golf clubhouse and using the treated water to irrigate the local golf course. The first commercial sales were at the beginning of 2004, with about 80% of sales to individuals for domestic use, but Cameron says the percentage of sales for larger projects such as resorts or sub-divisions is growing. “We have 270 lots in Tamworth that will be using our technology,” he says. “They’re not going to be connected to sewerage. I envisage there will be more newly-developed areas that will not connect to sewerage. Another big market for us is to retrofit septic tanks. We are the only system able to retrofit septic tanks to provide irrigation water.”

A real alternative to sewerage

Cameron emphasises that the Biolytix system is both cost efficient and energy efficient. “Few people are aware that often 70% to 80% of the cost of conventional

sewerage goes into transporting the raw waste to the treatment plant. That means only 20% goes into the cost of treating it. We’ve turned that on its head because our system minimises the cost of transport – the treatment is done on site.” Cameron also says that the Biolytix system uses one-tenth of the energy of comparative treatments. “It’s a simple system that’s very low-tech. It doesn’t have pumps and blowers that are delicate and mechanically driven. The simpler it is, the more reliable it is.”

Currently, the treated water can be used for irrigation and watering the garden. However, Biolytix’s next phase – due to be commercially available by the end of 2007 – will enable the treated water to be used for clothes washing, toilet flushing and eventually hot water.

An answer for developing countries

Cameron is now also working on adapting the Biolytix system into one that can be used for developing countries. “If we are going to make an impression on the 2.5 billion people in the world who don’t have sanitation, it’s got to be a system that’s easy to transport, modular and able to be produced in large numbers,” says Cameron. “That’s my primary focus now.”

The Biolytix journey has faced numerous obstacles and frustrations. Cameron says it can be hard to attract the investment capital needed to grow and also difficult to attract the right team to move the company forward. Although he has now created a strong multi-talented team that are all part owners of the company in an Employee Ownership Scheme.

What Cameron enjoys most are the “A-ha!” moments. “It’s those ‘Eureka’ moments where you realise you’ve done something significant. Our R&D team continues to have those and that’s very exciting.” ■

www.biolytix.com

How does Biolytix work?

Effluent, bath and laundry water, kitchen water – including food scraps from insinkers – are put into the treatment system. A combination of beetles, worms and other micro-organisms convert this waste into useable water. As Dean Cameron says: “It’s magic to see dirty water coming in and brilliantly clear water coming out the other end. It’s very satisfying to know you’re working that magic – with nature’s help.”

Behind the veil

Mapping the supply chain of local and international operations has revealed a range of ethical issues facing the Brotherhood of St Laurence.

In 2000, the Brotherhood of St Laurence (BSL) – an organisation that works towards the alleviation of poverty – received an unexpected gift by way of a donation. Instead of receiving a cheque, the donation came in the form of an established business called ModStyle, an importer and wholesaler of optical frames with a 20-year history in Australia.

While this was a significant opportunity to establish a social enterprise, the BSL was faced with an ethical dilemma. With the majority of ModStyle's frames sourced from China, the BSL had to wrestle with the implications of sourcing from an unmapped supply chain out of a country where labour laws are not always followed.

BSL's Ethical Business Manager, Serena Lillywhite, says this resulted in the organisation embarking on a journey to consider ethical business practices, investigate their supply chain and the issue of responsible supply chain management. Ultimately, they have also contributed to the corporate responsibility debate in both Australia and internationally. "When the gift was received, the board of BSL had to ask what that meant for us as an organisation committed to social justice and poverty alleviation?" says Lillywhite. "What does it mean for an NGO to own an enterprise which generates profits, even if those profits support the core activities of BSL as a welfare organisation, if that income is derived from importing and wholesaling spectacles that are made under conditions which don't comply with China's labour law? It was a dilemma."

An ethical dilemma

The BSL realised they had three options. "We could divest ourselves of the responsibility of that company," says Lillywhite. "But we didn't feel entirely comfortable doing that as it had been a gift to the organisation with the aim of continuing to operate as a small business and providing ongoing employment opportunities for the staff.

"The second option was to ignore the entire issue of responsible supply chain management and adopt a position that, as we didn't own the factories in China, therefore they weren't our responsibility. But we didn't feel comfortable with that approach either.

"The third option was to accept ownership of the enterprise, embrace the challenge of responsible supply chain management and invest in understanding and mapping all aspects of the supply chain and corporate social responsibility issues in both China and Australia."

In November 2000, the board of BSL decided on the third option. To do this they established an ethical business advisory group and quarantined ModStyle's

profits for a two-year period while they undertook an 18-month research project to investigate the business' supply chain, develop partnerships with international NGOs, and develop a long term strategy to ensure ongoing consideration of ethical business practices.

Mapping the supply chain

Although much research was done during the 18 months, Lillywhite emphasises that it's an ongoing process. "It was the first time we had really ventured into international or global issues," says Lillywhite. BSL's work is largely all within Australia, headquartered in Melbourne.

At the end of the 18-month investigation, BSL chose to continue with its ownership and operation of ModStyle as a social enterprise, and a commitment to fully integrate the business into the organisation.

Understanding the supply chain responsibilities has not been easy. "We are an SME with limited purchasing power, and face geographic limitations as a result of not having a registered office in Hong Kong or China," says Lillywhite. "There are language challenges and the difficulties of understanding the complexities of China's labour law.

"This started as a short term project in 2000 with the aim that we may be able to solve our ethical dilemmas by simply developing a BSL code of conduct – something we could give to all our suppliers in China, ask them to comply, and then hope that everything would be squeaky clean.

"However, it quickly became apparent that while codes of conduct are useful in harnessing organisations into thinking about issues such as corporate social responsibility, a code doesn't necessarily protect workers' rights or guarantee fair and decent working conditions or compliance with the law."

Lillywhite's investigations unveiled some surprises. The factories were typically clean, modern, large, well lit and well heated or cooled. But while employees often worked in reasonably comfortable and safe environments, the same attention wasn't always given to overtime, entitlements, wages and worker discrimination.

The BSL's experience with its international supply chain has provided important lessons which it has applied to its domestic social enterprises

The BSL has consolidated the number of their suppliers from approximately 20 to eight. “The consolidation was based on both commercial decisions – such as which ones supplied quality spectacles, price, delivery time – as well as which factories had managers and owners who were willing to have open discussions with us around labour standards and human rights.”

The BSL also hopes to engage with other stakeholders – for example, other international buyers such as Reebok, Timberland or Levis – about responsible supply chain management issues. “If we can find other buyers who use the same factories as we do then, through a process of collaboration, we might jointly be able to encourage the factories to improve working and living conditions for workers.”



Global issues applied to local enterprise

The BSL's experience with its international supply chain has provided important lessons which it has applied to its domestic social enterprises. For example, its clothing label, Hunter Gatherer, is designed and manufactured in Australia under NoSweatShop Label certification. “We realised we had to give the same level of critical assessment to the Hunter Gatherer supply chain as we had done with Mod-Style,” says Lillywhite. “When we mapped out this supply chain we discovered that, despite the fact the wholesalers and subcontractors were all in Australia, there was a lack of transparency about the real conditions under which the garments were being made, particularly where home-based outworkers were employed.

“It's not that we didn't want to use home-based garment workers, we wanted to ensure that whoever manufactured the garments – whether in a factory or on their kitchen table – received all their due employee entitlements under the Australian clothing award.”

The BSL's incumbent supplier was unwilling to disclose the information required by the BSL to ensure a transparent supply chain and meet the Home Workers Code of Practice accreditation process. “We reached a point where we could go no further with that supplier so we stopped giving work to them,” says Lillywhite. “We had to find a new manufacturer who would be prepared to disclose all aspects of their supply chain, open their salary books to the textile, clothing and footwear union, provide superannuation and Workcover, and be committed to ensure safe working conditions.”

It was no easy task. The BSL spoke to twelve manufacturers before they found one who was prepared to work with them and provide a transparent map of their supply chain. Despite this commitment, the manufacturer ultimately did not meet these responsibilities and the BSL had to start all over again to find a local manufacturer prepared to disclose business, outsourcing and employment practices.

Whether working with an international or domestic supply chain, progress does not happen quickly when aiming for ethical business practices.

“It's slow work,” says Lillywhite. “It's very difficult to make sweeping changes particularly when you are dealing with countries and sectors of industry that are poorly regulated. The best we can do is contribute to corporate social responsibility through incremental improvements in our own practices and operations.”

Lillywhite emphasises that creating a responsibly managed supply chain is a vision that must come from leaders in an organisation. “Sustainable and innovative business practices have to come from the top,” she says. “Whether you are a welfare organisation or a publicly-listed company, it's the only way to really affect change.” ■

www.bsl.org.au

The BSL is mapping its supply chain, including suppliers like this optical factory in Donguan China

From banking to biodiesel

Bendigo Bank's innovative biodiesel initiative is helping to boost regional communities and develop local enterprise.



Peter Niewand is walking through his farm looking at his canola, wheat and barley crops. "Today, I'm Peter the primary producer. On other days, I'm Peter the managing director. And now, there are days when I'm Peter the oil baron," says Niewand. With tongue firmly in cheek, Niewand is referring to his town's involvement with Bendigo Bank's biodiesel Community Enterprise.

Community Enterprise is a Bendigo Bank initiative designed to help communities provide essential services such as telecommunications or energy. It's a concept that has evolved out of the bank's innovative Community Bank model. There are now 185 Community Bank branches in Australia. Under this model, local communities invest in and operate their own Bendigo Bank branch. Profits are shared by the community company and Bendigo Bank.

There are already numerous Community Enterprise schemes providing telecommunications. The most recent initiative is the provision of biodiesel. Niewand is the chairman of the Central Wimmera Community Enterprise Steering Committee, a volunteer community group working on the biodiesel pilot in the towns of Rupanyup and Minyip. "We've already seen that the Community Bank model works," says Niewand. "Our Community Bank branch has thrived here for the last eight years."

In early 2006, the community also came together to found a Community Enterprise for telecommunications. Bendigo Bank negotiates bulk rates on behalf of many

communities, supplies the service to the Community Enterprise, which can then determine the price it sells to the community.

"We can grow our own fuel"

"It worked for the bank, it worked for the telco. So we thought why not use the same model for biodiesel?" says Niewand. "If we can grow our own fuel, which is the ultimate objective, we don't need to be reliant on anyone else for our oil supply."

However, Niewand says there are a few steps to take before getting to that stage. Members of the community – of which Niewand estimates to be around 300 farmers – are asked to do two things: buy a share in the company and pledge to use the fuel.

"You can buy shares for A\$1 to a maximum of A\$50,000 which means that no one will ever have more than 10% of the company," explains Niewand. "And if the community can pledge to use the biodiesel – around 4.5 million litres a year – then we know there is a ready market for it."

The Community Enterprise will need to build a distribution facility where petroleum diesel can be blended with biodiesel. Although using 100% biodiesel is possible in the summer – a blend must be used in the winter due to freezing issues – they will continue using a blend until changes in excise tax make 100% biodiesel more affordable.



Biodiesel can be made from crops such as canola, soy, oil seeds and animal fats. “Once we have a groundswell of users, we can go to the next phase,” says Niewand. “If we’re going to use the fuel in our tractors, we may as well grow the crops to power the tractors. As a community, we can vertically integrate our products.”

If this occurs, the Community Enterprise will then need a crushing plant, to process the crops so it can be used for biodiesel. “The crushing of the oil produces both oil and meal. The oil can be used in biodiesel. And the meal can be used to feed sheep or cattle. So we’ll not only have an oil industry, we’ll have a feed industry that will help the meat industry. We’ll feed the nation – as well as drive the nation!”

Niewand’s enthusiasm is obvious as there is potential for many positive outcomes: the Community Enterprise schemes will eventually create jobs, transportation costs could be reduced if crops are going to a local buyer, and the community shareholders reap the financial returns.

“Initially the biodiesel will come from Australian Biodiesel Group in Sydney. It’s trucked in,” says Niewand. “If we have our own crushing plant then, as we get a delivery of biodiesel, we can load up the truck with oil back to the refinery to be processed. Once we have enough volume, we may even be in a position to put in our own refinery.”

Returning profits to the community

Bendigo Bank Community Energy Operations and Support Manager Leigh Watkins says there is enormous potential for the project as more farmers come on board.

“Like our Community Bank model, a percentage of any profits from the enterprise would be returned to community organisations and projects, building a sustainable income stream to provide for community needs,” says Watkins. “It would provide an off-farm investment for local people and there are enormous environmental benefits that come from using biodiesel.”

While it’s still early days for the towns of Rupanyup and Minyip, Niewand is confident about the future of biodiesel in his community. “This is a chance to create our own destiny,” he says. “It’s a new market that will give us good returns. If we can retain ownership then the value-adding effects are enormous. It’s great for the whole community. If the town prospers, we’ll celebrate and go to the pub. Then the publican makes a dollar too!” ■

www.bendigobank.com.au

A civic example

Melbourne City Council's new office building, CH2, has been heralded as a leader in sustainable design and construction.

CH2 – the new building of Melbourne City Council – began as a blank canvas. Now occupying the site of the former Tivoli car park in Little Collins Street in Melbourne, the building was completed in September 2006.

With the opportunity to build from scratch, the Council decided to incorporate sustainability principles in all aspects of design and construction. Lord Mayor of Melbourne John So says: "The City of Melbourne decided to build CH2 when it was faced with a pressing need for more office space and a desire to breathe life into an underused section of the city next door to Town Hall.

"Rather than build a regular office building, the Council seized the opportunity to put its environmental credentials into action with a building that was at once innovative, creative, technologically advanced, environmentally sustainable and financially responsible, while setting an example for others to copy."

Innovative design in heating, cooling, water and air quality

Awarded a 6 Green Star rating from the Green Building Council of Australia and a 2005 United Nations Association of Australia World Environment Day Award, CH2 features louvres powered by photovoltaic cells that also track the sun. The 10-storey office building cost a total of A\$51 million and has a series of inter-related components that all work together to heat, power, cool and water the building. CH2 is the working environment for 540 City of Melbourne workers who all breathe 100% fresh air, which is controlled by a complex system of ducts and vents all designed to work with nature. The extraction ducts on the building's north facade are dark in colour, designed to absorb heat and to help stale air to rise up and exit the building. Meanwhile, the south facade features light coloured ducts which draw fresh air from the roof to distribute down into the building. The building isn't just a self-contained entity. Its innovations contribute to the city. For example, an innovative water treatment process results in 100,000 litres of toilet water being extracted from the sewer in Little Collins Street everyday. This water is treated to remove solids, which are returned to the sewer. The rest of the water is treated through a micro-filtration system for reuse for non-drinking purposes such as toilet flushing, plant watering, water cooling and for use in the city's fountains.



Leading sustainable development

"Beyond meeting the City of Melbourne's office accommodation needs, CH2 is intended to provide a leadership example of effective sustainable development," says So. "We decided to promote sustainable building practices in Melbourne by demonstrating what could be done rather than through a regulatory role." So believes the project is an example of a unique collaborative process. "All those involved in the building, from the sub-contractors to consultants, have taken CH2's ethos to heart and worked together to solve issues," he says. "The desire of all concerned to learn from the process and promote sustainable building in general has created an atmosphere of collaboration rather than a client-contractor relationship." ■

www.ch2.com.au

A matter of ethics

Australian Ethical is a fund that bases investment decisions on dollar returns as well as an innovative ethical charter.

People used to tell us that government should be responsible for influencing the ethics of companies ... we think people are meant to do it



Now established as an award-winning fund with investments based on strong ethical principles, Australian Ethical has grown from an idealistic concept to a vehicle with A\$460 million funds under management. Recognised as winner of the Standard & Poor's 2005 Australian Fund Award in the Balanced Funds (Neutral Category), it's been a long journey for those behind the fund.

In 1985, a group of idealists came up with the concept of creating a fund that would base its investments on ethical principles. The group, led by funds manager and share trader Damien Lynch, raised capital among friends and associates. About 50 people invested between A\$2,000 and A\$50,000 each.

One investor was James Thier, who was then an economist/town planner and is now executive director of Australian Ethical. By 1987 they created a private investment trust, with an investment philosophy based on an ethical charter still used today. The charter espouses seeking out investments that alleviate poverty, preserve eco-systems and develop sustainable land use and food production, among others. It also seeks to avoid investments that unnecessarily pollute, waste non-recurring resources, entice people into financial over-commitment and other criteria.

The group worked with the then-NSW Corporate Affairs to obtain the necessary licences for a public capital raising, resulting in a public launch in 1989. It first operated out of an office in Broadway in Sydney. "We had initial inflow projections that we would receive A\$10 million of investment in the first six months," says Thier, reflecting on the group's optimism. "But it took six years – not six months – to get to that level of investment."

"We almost went out of business"

Thier concedes that although the fund's investments were sound, the venture's operating costs were onerous. "We almost went out of business in 1991," says Thier. "Costs were running above revenues. There were a lot of people who loved the company but who didn't have the abilities or knowledge to run it as an investment company."

The board was revamped, and, to cut costs, headquarters moved from Sydney to Canberra, where most of the new board were located.

The fund needed more money to continue and existing shareholders managed to raise about A\$150,000. The extra funds were enough to pay for an office administrator and operating expenses. The five executive directors were largely unpaid.

Considering its low starting base, growth has been exponential. In 1987, funds under management were A\$500,000. By 1989, this had grown to A\$2 million. In 2006, the figure was A\$460 million.

James says there have been three waves of investment. "In the early days, the first generation of people were investors who liked the idea but who almost treated it like a charity. The second generation of investors realised our returns were pretty reasonable but also liked the fact we had ethics, so they wanted to get involved. The third generation is far more from people who are attracted by the great returns first and then they learn about the ethics. It used to be the other way around.

"It's taken perseverance. It's been a slog to keep on going sometimes. We had to change people's mindsets, to show people this can be profitable."

One of the reasons it's been a long road for Australian Ethical is because its funds are largely derived from individual investors – the mums and dads of the investment world – as opposed to institutional investors.

Thier points out that most other funds which now label themselves socially responsible or sustainable are spun off from a parent fund from a mainstream institution – with the exception of Hunter Hall. "Also most funds still only invest in large listed companies but we invest in smaller companies as well, internationally and locally. We also invest in some unlisted private companies and we do loans and property too."

From permaculture to profits

Most of the people in the core group of initial investors had known each other through their interest in permaculture – referring to systems of land-use based upon ethics for caring for the earth and using resources in a sustainable way. According to James Thier, this posed the question: "If we care for the earth in an ethical way and, for example, don't want exogenous inputs such as fertiliser and pesticides, why doesn't our capital do the same thing?"

Thier says this was the kernel that formed the first trust, which was initially called August Investments, followed by the tag line: An ethical investment.

The name changed to Australian Ethical in 1994.

Influencing business practices

Apart from the knowledge that investment dollars go into ethically-run businesses, Australian Ethical also hopes to influence investment thinking and practices of mainstream companies. "There are some major blue chip companies who continually ask us if their sustainability reports are okay, who ask us to invest in them because now they want the imprimatur of Australian Ethical," says Thier.

He also points to how the fund may influence the business decisions of companies in which it currently invests. "Australian Ethical has a long tradition of engagement with the companies that we invest in," says Thier. "In 2000 we became aware that Timbercorp had cleared remnant timber that had been marked as nesting sites for an endangered species of cockatoo. Following discussion with Birds Australia, Australian Ethical notified Timbercorp of our concerns about their remnant timber policy, and subsequently divested.

"This situation was explained to our unitholders through a newsletter, and our divestment was reported in local newspapers. We continued to monitor Timbercorp's activities, and were pleased to note in 2004 that the company had become the first plantation manager in Australia to achieve the highly regarded Forest Stewardship Council certification.

"This program is an international initiative involving NGOs as well as industry and government interests, and represents best practice in terms of environmentally friendly plantation management. Timbercorp's certification motivated Australian Ethical to review our position on the company, and we have held shares in them at various times since then."

Thier adds: "Initially, people used to tell us that government should be responsible for influencing the ethics of companies. We think people are meant to do it."

He summarises Australian Ethical's aim with a quote from anthropologist Margaret Mead: "Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has." ■

www.austethical.com.au

FACING PAGE: The displacement of a rare species of cockatoo was enough for Australian Ethical to rethink their investment.



Global Reporting Initiative

If you saw the documentary film *Enron: The Smartest Guys in the Room* you will know for certain that truth can sometimes be stranger than fiction.

Over the last 10 years, in Australia and the rest of the world, there have been too many examples of similar corporate behaviour that have led ordinary citizens to think that unless companies can demonstrate otherwise, they should assume that self-interest and pushing ethical decision-making boundaries to breaking point, is the boardroom norm rather than the exception to the rule. We have moved from being believers to sceptics.

In 1987 a new standard for company transparency was emerging by which triple bottom line reporting moved from an idea to a well articulated guideline. The Global Reporting Initiative (GRI) developed a tool that assisted stakeholders including civil society and business, articulate what transparency and accountability means in a leading 21st Century company.

Company reporting was not however a new phenomena. Occupational Health, Safety and Environment reporting in the 1980s and 1990s responded to the NGO's voice for disclosure on these issues. Companies decided that what was relevant was usually governed by the legislative baseline.

The Global Reporting Initiative process

So what was so different about GRI? Answer: The multi stakeholder process that forms the basis of indicator development within the guideline, and the process by which it advises companies to begin their own reporting journey, revolutionised standard setting.

It starts with, and I would like to suggest ends with, your stakeholders. All of them.

Indicators are developed from an outside in perspective.

For the first time, companies and the industry standard-setting bodies were not completely in control of what they were being asked to disclose.

Was the list of indicators that stakeholders developed so impossibly scary? Not really. In my experience, 85% of the data is already being collected though business management systems inside well-managed companies. The big leap of faith for companies is in honestly releasing data into the public domain, in a meaningful way for stakeholders. Transparency.

A corporate responsibility report is an outcomes document. Results are what really matter.

For the last few years, there has been a worrying trend globally when it comes to reporting. I hear many people – report writers and report readers saying the same thing. The number of reports is rising but unfortunately, that has not necessarily meant that the quality of reports is improving.

Analysts are still reticent to use non-financial information because reports can often concentrate on meeting some management consultancy or reporting awards formula that promotes form over substance. Such things as: Was every indicator in the GRI reported? How comprehensive is the report?

GRI actually requires reporting against only relevant indicators and the notion of how comprehensive a report is, is quite possibly the wrong question. This cannot be judged solely by the number of indicators a company reports against.

What is material?

The main game is: what is material? The quality of the content, not how much content there is. Here is the GRI definition of what material is:

“The information in a report should cover topics and indicators that reflect the organisation’s significant economic, environmental, and social impacts, or that would substantively influence the assessments and decisions of stakeholders.”

Stakeholders will want to know what your goals were last year and what your aspirations next year are concerning relevant sustainability issues. How did you improve or change your business processes to give you a better sustainability outcome? How much improvement have you made? What was your non-financial performance?

Judy Kuszewski from Sustainability UK says:

“Materiality matters because it goes to the heart of what is meant by corporate accountability. Stakeholders, whether NGOs, investors or employees, have the right to expect a company to be accountable for their decisions and performance ...”

My advice to companies is that if you would like to understand how good your sustainability report is – revisit your stakeholders, including employees and analysts. Ask them if you met their expectations on all the material issues. How can you improve in the following report? Were you open honest and transparent about the things that really matter to them?

G3 – the third generation of the Global Reporting Initiative Guidelines – gives us a timely reminder on this issue. The revised standard emphasises what has been forgotten in the rush to get an award for the biggest, brightest and best report.

What is the Global Reporting Initiative?

The Global Reporting Initiative (GRI) uses a Sustainability Reporting Framework to encourage companies to report on economic, environmental and social performance. With its secretariat in Amsterdam, the GRI is “a large multi-stakeholder network of thousands of experts, in dozens of countries worldwide, who participate in GRI’s working groups and governance bodies, use the GRI Guidelines to report, access information in GRI-based reports, or contribute to develop the Reporting Framework in other ways – both formally and informally.”

How to begin?

Start with your stakeholders then look to the GRI for sustainability key performance indicators in the relevant economic, social or environmental areas and then use the technical protocols that will ensure that on that issue, your data will be comparable to other companies. This helps analysts using your report understand that you are a strategic company with strong management frameworks around material sustainability issues. Not a ‘box ticker’.

If after building your report around disclosures on material issues important to your stakeholders, you also win a report award – fantastic!

In 2006, the Australian governments Parliamentary Joint Committee report *Corporate Responsibility: managing risk and creating value* agreed with the majority of the submissions they received: companies that develop business strategies in response to all of their stakeholders are acting with enlightened self-interest.

They also recommended that the Australian Stock Exchange Corporate Governance Council provide guidance under their Principles of Good Corporate Governance to the effect that companies should inform investors of material risk in their top five non-financial sustainability risks.

At present only 44 of the ASX 200 companies, produce sustainability reports. Compare this to the fact that in Australia, 120 private companies, public utilities and privatised or government owned institutions report publicly. Compare this also with Europe where 90 of the top 100 companies produce sustainability reports.

Corporate responsibility reports are not a panacea to bad behaviour, they will not guarantee that a reporting organisation will never make a bad decision or ever act against environmental and social sustainability principles.

From an ordinary citizen perspective, corporate responsibility reports are a window into the hearts and minds of the organisation. I want to understand the companies that I am investing in.

Increasingly from an analyst’s perspective, they are a review and strategic direction document. Just as important as your full year financial results.

A recent report from the Enhanced Analytics Initiative shows that ignoring non-financial information can lead investment managers to lose sight of stock performance above the benchmark index – that is to “leave alpha on the table.”

CIO of Investec Hendrik du Toit says: “When an investor systematically integrates all relevant variables into their decision making there is no such thing as an extra-financial factor: just enhanced analytics.”

There is a growing movement away from tomes to summary reports and web links for detailed data. Indeed, after the launch of G3 and with implementation of its thinking on materiality into future company reports, the emphasis of quality over quantity will increase.

As a citizen and investor with much of my superannuation invested in Australia and International companies through my superannuation portfolio – I’m still concerned about two things:

1. Are the mainstream analysts and investment advisers, who are custodians of my superannuation (and the rest of Australia’s superannuation) keeping up to date with the sustainability data that in the end separates the ordinarily managed companies from the ‘outperforming’ companies globally. Are they leaving Alpha on the table?

2. In Australia and globally, mainstream analysts are operating under very difficult conditions – not all companies believe in being transparent. In Australia, analysts only have one quarter of the information they need to make the best investment decisions for us. It is the equivalent of expecting them to invest in companies when the only financial information they have is the revenue data. The best companies are the ones with the biggest revenue. Right? Wrong.

And so, I humbly ask, will the remaining 156 companies on the ASX 200 who don’t do sustainability reports, please come forward and join the other leading Australian companies who have discovered that sustainability reporting can be a strong bridge to rebuild trust with all of their stakeholders. ■

Linda held senior managerial positions with three of Australia’s top 10 corporations (National Australia Bank, Westpac Banking Corporation, Lend Lease Corporation) in developing strategic change programs to enhance the organisation’s ability to recognise and respond to relevant business risks and opportunities concerning environmental, social and reputation issues.

Linda was the Director of her own company Corporate ResponseAbility advising boards and senior executives of Australia’s top companies on how to make sustainability a business reality, not business rhetoric.

Linda joined Energetics Pty Ltd in January 2007 as their National Director Sustainability and Reporting. Linda provided leadership in her role in the development of reporting frameworks globally within the finance industry through the United Nations Environment Program for Finance Institutions, including a significant role in the development of Australian benchmarks on sustainability. From 2002 to December 2006, Linda held the position of Chair of the Global Reporting Initiative Stakeholder Council based in Amsterdam.

www.energetics.com.au
www.globalreporting.org



Biomimetic innovations

One of the new strategies and examples of sustainable innovation in Australia is biomimicry or biomimetics, the application of methods and systems found in nature.

The CSIRO website states: "Biomimetic engineering mimics natural systems, utilising molecular self-assembly as the key link between physics, chemistry and biology, creating novel advanced structures, materials, and devices."

With over 3.8 billion years of research and development, nature has evolved highly efficient systems and processes that can inform solutions to many of the great sustainability challenges of our time. Author Janine Benyus commented that, per capita, Australia is producing more innovations for sustainability inspired by nature than any country in the world.

Moment of inspiration

One example is the PAX Impeller, which could revolutionise fluid-moving machinery as pumps, fans, propellers, mixers, and turbines. Cameron Burns from Rocky Mountain Institute wrote in 2002 that "Pax's impeller design is based on a logarithmic spiral known as a Phi Ratio or Fibonacci Sequence that occurs in many places in nature, yet few designers have ever mimicked them. When rotated in water or air, the impeller makes the fluid flow smoothly in a vortex, like water exiting a bathtub. In contrast, the most common kinds of conventional pumps and fans sling the fluid outward and bounce it off a curved wall to make some of it move in the desired direction."

Now based in the US, Australian Scientist Jay Harman, CEO of PAX Scientific is designing new fan technology that claims to have energy savings of 50%, and be around 75% quieter compared to fans, impellers and propellers using traditional shapes and designs. Harman had his moment of inspiration when he was 10-years-old, swimming off the coast in Western Australia. Like almost every young Australian he wanted to swim faster, so he watched how fish moved through water and how seaweed moved against the reef when a wave crashed. He noticed that kelp moved in the shape of a spiral to withstand the force of the waves and noticed spirals as a common design pattern in nature.

Until Harman's work, no one had used this natural design shape for fans, impellers or propellers, even though it is used widely to reduce friction for air and water flows in nature.

Whale dynamics

Baleen Filter technology is another example of biomimetic engineering. This is an adaptation of the technique used by filter-feeding whales to keep their baleen clean and free of debris. The baleen is the filter mechanism that allows the whale to collect plankton, small fish and other marine organisms from the water during feeding.

The Baleen filter is a highly efficient, non-pressurised self-cleaning separation technology that achieves reliable filtration to 25 microns without chemical assistance. It offers significant cost and environmental benefits. The company Baleen Filters was established in 1999 after a four-year industrially applied research and development program from the University of South Australia. The technology is based upon an internationally patented (by the University of South Australia) combination of fluid-particle dynamics and mechanical principles to instantly separate fine suspended solids from all types of water based streams. The Baleen Filter is already successfully performing wastewater treatment processes in the food, wine, meat and livestock, transport and fruit and vegetable packing industries in Australia.

Yuri Obst was the originator of the idea and is now Managing Director of Baleen Filter. "The mechanism used by the Baleen filter works much the same way the Baleen whale strains (its prey from seawater) and swallows. This mechanism allows industrial wastewater with higher pollutant loads to be filtered than was previously possible with conventional industrial filters."

Inspiring innovations in renewable energy

There is a wide network in Australia of researchers in CSIRO and universities investigating renewable energy possibilities through artificially mimicking the process of photosynthesis. These scientists are seeking to mimic the photosynthetic centres active site and thereby create more efficient ways to harness the sun's energy than current solar cell design.

Dyesol Limited has been formed based on mimicking aspects of plants' photosynthesis. Its headquarters and manufacturing centre are in Queanbeyan, NSW. Dyesol's technology, a form of artificial photosynthesis, is based on Dye Solar Cell (DSC), which has been identified in the Japanese and EU Photovoltaic Roadmaps as the emerging solar technology.

In August 2005, Dyesol Limited was listed on the Australian Stock Exchange (ASX). Dyesol manufactures and supplies a range of DSC products comprising equipment, chemicals, materials, components and related services to researchers and manufacturers of DSC.

Heavy industry can learn from nature

Nature manufactures in ambient temperature, under everyday pressures, and produces no waste, let alone any toxic waste. Everything is re-used and is a resource for something else. At Monash University, the Green Chemistry Institute is researching ways that industrial chemistry can be made benign like nature.

Green chemists are designing new reaction pathways that optimise the environmental sustainability of the chemical process. They are using novel catalysts, benign solvents, alternative chemical reaction pathways and even bacteria and micro-organisms to invent new ways to meet society's needs. Western Australian based Titan Resources Ltd's BioHeap technology is an example of bioleaching. BioHeap utilises proprietary bacteria which directly oxidises primary sulphide minerals. This allows the process to operate at low temperatures compared to traditional approaches and hence produces minimal greenhouse emissions. A new company, BioHeap Ltd, has been set up to expand the use of the technology globally. It was launched on the UK stockmarket in 2005. The company is involved with the development and commercialisation of the innovative BioHeap process through a number of initiatives around the world including in China.

Biomimetic possibilities

How do you prevent bacterial build-up or biofilms (bacterial colonies) on boats or any surface in water, using an environmentally benign approach with no heavy metals or harmful chemicals? Sydney-based Professor Peter Steinberg found such a solution. Steinberg explains how they came across their discovery: "Shallow marine organisms are subjected to a rain of fouling organisms from the water column – bacteria, algal spores, larvae – and so the ones with clean surfaces in those habitats are worth paying attention to.

Steinberg and his colleague Staffan Kjelleberg discovered that the *Delisia Pulchra* plant didn't kill bacteria. Instead, it emitted a molecule to dissuade bacteria from colonising on its surface, effectively jamming the bacteria's communication networks.

Using this insight, they mimicked the chemical and have subsequently invented an environmentally friendly anti-fouling substance that can be used on surfaces in hospitals, contact lenses and paints to reduce slimy build-ups in an environmentally benign manner. The company they founded to commercialise this technology, Biosignal, was incorporated in 1999 and listed on the ASX in early April 2004.

Peter Steinberg and Staffan Kjelleberg are also investigating ways their discovery could revolutionise medicine. The potential for these naturally derived chemicals is enormous, from treating cystic fibrosis, fighting staph infections and replacing antibiotics.

These examples show that biomimicry is an important area of innovation for sustainability in Australia. Janine Benyus has created the Biomimicry Guild to create databases of examples where nature has evolved sustainable design solutions of relevance to humanity. It is time for such a database to be done for Australia featuring Australia's unique flora and fauna in partnership with the Biomimicry Guild to further help stimulate much needed innovations for sustainability. ■

The Natural Edge Project (TNEP) is a not for profit partnership for research on innovation for sustainable prosperity. Established in November 2002 with in-kind administrative hosting from The Institution of Engineers Australia, the project is now hosted by Griffith University.

TNEP has developed a range of projects focused on education and training for sustainable development, including working with universities, industry groups, government agencies, companies, and touring international keynote speakers such as Janine Benyus author of the bestselling *Biomimicry – Innovation Inspired by Nature* in 2006. Together with Benyus, TNEP have developed a 'Biomimetic Design' training program as part of The Natural Edge Project's Engineering Sustainable Solutions Portfolio (ESSP). The program will be free access and open source and was launched with UNESCO and the Institution of Engineers Australia.
www.naturaledgeproject.net/ESSP.aspx