

Shunned at home, some Australian cleantechs shine abroad

Australia is risking its place in the low carbon economy by pushing innovative companies offshore.

Cover story by OLIVER WAGG

Source: eva serrabassa/istock

The US, China, Germany and others are moving quickly to build large clean technology industries to benefit economically from global efforts to combat global warming, water scarcity and poor quality, and to reduce waste and pollution. But while Australia is home to many companies with world-class technologies, big gaps in government policy and in key skillsets mean many businesses still must commercialise offshore, leaving Australia missing the benefits, for example the associated engineering and manufacturing jobs.

Some senior executives complain that Australian policy settings just aren't conducive to commercialisation of their products, which can be a result of 15 to 20 years of research and development work. As a result, many cleantechs are heading overseas in search of public and private investment and a better appetite for their planet-saving innovations.

Countries such as Germany offer technological expertise unmatched by Australian industry; the relatively small economy of Denmark has become the wind energy capital of Europe; while even crisis-torn Ireland has committed to significant state investment in marine energy, attracting one of our leading wave energy developers to its shores.

Lucky or clever?

In an address to the Committee for Economic Development of Australia in February, Prime Minister Julia Gillard described Australians as great innovators, speaking of how Australia could move beyond its 'lucky' endowment and develop a "high tech, high skill, clean energy economy that is self-sustaining beyond our reliance on mineral exports".

But a February survey by GE, the owner of the ecomagination green products brand, painted a somewhat less rosy picture than the Prime

Minister. GE concluded that to compete with the rest of the world in the cleantech industry, Australia will need a wholesale change in mindset.

Researchers interviewed 1000 senior business executives in 12 countries, including 100 respondents in Australia, asking them to nominate the top three countries that they felt were innovation champions. Australia ranked fifteenth, with just 2 per cent of votes, while the US ranked first with 67 per cent of votes and Germany second with 44 per cent.

"The research shows that the biggest barriers to effective innovation in Australia are an inherently traditional view of what innovation is and a lack of technical expertise and ability to commercialise," Ben Waters, GE's commercial director for Australia and New Zealand, said in a statement.

"While government policy plays a role in shaping the innovation environment in

a country, it's up to businesses to take a leadership role here."

In an interview with *Ethical Investor*, Waters says implementation of good ideas remains a big concern.

"The great differentiator is how well [good ideas] are implemented and the processes, systems and operating rigour you have to commercialise them. That's the real discipline; you can't be off researching stuff that doesn't matter."

"You need the businesses to pay for that research so it is very focused on getting products and solution to the market," he said.

To overcome some of the local barriers to innovation, GE has established an alliance with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) worth a combined investment of \$20 million over five years in R&D projects in the areas of healthcare and cleaner technology for energy and aviation.

The projects align closely with GE's so-called healthymagination and ecomagination initiatives, which aim to dramatically increase the delivery of healthcare services and to provide low-carbon technology to minimise climate change.

Casting an envious eye abroad

Ramy Azer, managing director of Papyrus Australia (ASX: PPY), says Australia certainly doesn't suffer from a lack of creativity.

Referring to the GE survey, Azer says, "If you look at how many innovations were commercialised and made a financial success in Australia, of course the score is low. But if you look at how many ideas came out of Australia and were successful somewhere else, then the result is totally different."

The Adelaide-based developer of technology that converts the waste trunk of the banana palm into wood alternatives is facing a number of challenges in scaling up its technology.

"It is expensive to go into regional Australia to establish factories, where there is no labour



Papyrus Australia (ASX: PPY)

Papyrus Australia is the developer of a technology that converts the waste trunk of the plantain and banana palm into alternatives to forest wood products to be used in the paper, packaging, furniture, building, construction and other industries.

Share price (23 Feb)	13 cents
12 month share price range	12-43 cents
Market capitalisation	\$13.51 million
Net cash (30 June 2010)	\$3.12 million

with the right skills – no electricians, no welders and no spare parts.

"Generally speaking it's not an environment where people have the right manufacturing skills in 'new' manufacturing – that is innovation and building of our machines."

The problem doesn't just lie in a skills shortage in regional Australia. As a nation, Australia's technological capability pales in comparison with countries such as Germany.

"In Germany innovators are surrounded by a huge number of companies that are involved on a daily basis – and have been involved over the last 50 years – in the design and development of new machine and processing technologies," Azer says.

Germany, says **Carnegie Wave Energy** (ASX: CNG) managing director Dr Michael Ottaviano, is a "fantastic example of a wealthy, first-class country, much like Australia, which can somehow manage to develop industry like Australia has never done."

Brendan Dow, CEO of **Ceramic Fuel Cells** (ASX: CFU) agrees. "We don't have a history of successful technological development. Anyone who's done it is an exception."

"The thing that galls me as an Australian and as a Victorian is that our technology was developed here, grew up here, and was manufactured here," Dow says. Yet despite this, the company has "been shunned" in Australia.

As a result, Ceramic Fuel Cells in January moved its entire manufacturing operations to Germany.



Carnegie Wave Energy (ASX: CWE)

Global owner and developer of proprietary wave energy technology (CETO), capable of producing zero-emission renewable power and desalinated freshwater from the ocean's waves. Headquartered in Perth, Western Australia, it has a private wave energy research facility in Fremantle, WA

Share price (23 Feb)	10 cents
12 month share price range	8-15 cents
Market capitalisation	\$79.8 million
Net cash (30 June 2010)	\$5.98 million

Richard Caldwell, executive chairman of **Dyesol** (ASX: DYE), a supplier of third-generation photovoltaic technology, says its domestic market is limited.

"To achieve the economies of scale and commercial position that we'd like to establish, the Australian market is certainly not big enough to justify a viable business, so really we are forced to tackle global markets," Caldwell says.

"The Dyesol product tends to be one which is more suited in, and certainly has a competitive advantage in, climates where there are less specific light conditions. Australia is suited better to first- and second-generation solar, whereas third-generation Dyesol technology is more a 'north of the Alps' technology."

Caldwell doesn't feel shunned by Australia. "I get inquiries every week wanting to know if our product would be available for everything from schools and churches to industrial applications and residential housing."

Dyesol has partnered with Tata Steel in Wales (formerly Corus Steel), where the two companies are developing sheet steel used in roofing for warehouses, offices and other buildings treated with a sensitive coating. Solar cells would be sprayed onto the surface of the steel.

The company said 31 January in an update to the stock exchange that a demonstration facility for the jointly developed roofing product is scheduled for release at the end of the current quarter and will show that Tata "is leading the world in high tech, low energy building product innovation."

This project is supported by the Welsh Assembly-funded Sustainable Building Envelope Centre and the UK government.

The company also has been able to pick up state support in Ohio – it will receive a US\$1 million grant to help develop its technology.

All at sea

As Carnegie's Ottaviano explains, the lack of a clearly articulated renewable energy strategy here means developers don't know which way to turn.

With investment so scarce, companies are naturally flocking to where they get the maximum bang for their investment buck. In the case of renewable energy developers it looks like the destination of choice is Europe. In Carnegie's case it's Ireland, which has a dedicated wave-energy grant pool.

"The challenge in Australia is there has never really been a long-term strategic approach to how we're going to develop renewable technology," Ottaviano says.

"Does Australia want to be a renewable energy developer? Or is it happy to deploy technology that is developed elsewhere?"

"Both models are of course fine. But it needs

to be articulated which one we want. We are trying to do both, but doing neither particularly well."

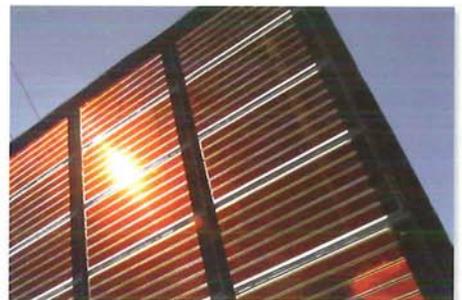
In September Carnegie agreed to collaborate with Sustainable Energy Authority Ireland's (SEAI) Ocean Energy Development Unit (OEDU) to jointly develop a wave energy project.

The cash-strapped Irish government agreed to provide grant funding to support research, development and deployment of ocean energy and has established a feed-in tariff of €220 per megawatt hour for ocean energy.

Ottaviano says Ireland is effectively paying for half the cost of finding a viable site for a project.

"I don't know of any country that's done that in the world," Ottaviano says, adding Carnegie has found seven sites in Australia "and every one was a battle to secure".

Ireland has also set a national target to produce a third of its energy from renewable sources by 2020, including specific ocean energy targets of 75 megawatts in installed capacity by 2012 and 500MW by 2020.



Dyesol (ASX: DYE)

Dyesol was formed in 2004 to commercialise dye-sensitised cell (DSC) technology, developed over the previous 14 years by STI, Greatcell Solar and EPFL.

DSC technology is described as "artificial photosynthesis", using an electrolyte, a layer of titania (a pigment used in white paints and tooth paste) and ruthenium dye sandwiched between glass. Light striking the dye excites electrons which are absorbed by the titania to become an electric current many times stronger than that found in natural photosynthesis in plants.

The technology is being integrated into a range of commercial product solutions. Dyesol establishes partnerships with global market leaders, such as Tata Steel, where its DSC technology can be incorporated into its partners' core product lines.

Share price (23 Feb)	70 cents
12 month share price range	66 cents-\$1.41
Market capitalisation	\$96.02 million
Net cash (30 June 2010)	\$13.14 million

SEAI and Invest NI in February released a report that concluded up to 69,000 jobs and turnover of £7.5 billion could be generated through the effective development of marine energy resources on an all-Ireland basis.

The report argues that government support of £50 million is needed to assist the development of the sector, but that it would generate revenue of many times that, with substantial inward investment likely to follow.

An October 2010 report, *Channelling the Energy*, by RenewableUK was based on Denmark's experience in the wind industry. It found the equivalent of nearly £800 million of support, through a combination of R&D grants and feed-in tariffs over about 20 years, generated a global export market worth nearly £6 billion in 2008.

With a 20 per cent share of the global wind turbine market, the Danish wind industry provides employment for 28,000 workers and contributes €1.5 billion in gross value added (GVA) to the Danish economy each year.

"This isn't governments taking an altruistic view. This is about solid industry development and generating GDP. That argument just doesn't gain any traction in the Australia context," Ottaviano says.

"There is always this implication in Australia that renewable energy is something that will cost us money. That of course has to be part of the conversation - you have to be realistic about it. But there is also this huge opportunity that's forgotten in Australia."

Poor FIT



Ceramic Fuel Cells (ASX: CFU)

CFC wants to be the supplier of choice for reliable and high electrically efficient solid oxide fuel cell products, which manufacturers can easily integrate into micro generation appliances for the European market. CFC is listed on London's Alternative Investment Market (AIM) as well as the ASX.

Share price (23 Feb)	13 cents
12 month share price range	13-24 cents
Market capitalisation	\$144.18 million
Net cash (30 June 2010)	\$11.47 million

Ceramic Fuel Cells' situation is perhaps a typical example of where domestic government policy is failing to support promising home-grown start-ups.

"The Labor government does not see our technology as renewable. If it's not renewable then you don't get any financial assistance. It's as simple as that," Dow says.

CFC has been lobbying for a mandated feed-in tariff (FIT) for 18 months now.

"If you have one of our units and you're generating excess power to be exported to the grid, you should be paid something because it has substantial value."

The marginal cost of generation is lower than that already on the grid; greenhouse gas emissions are substantially lower; and it is actually contributing to the decongestion of the network, Dow says.

CFC has a small number of domestic BlueGen units operating in Australia, some of which are supported by Origin Energy (ASX: ORG) with a one-for-one feed-in tariff.

"We don't need a government subsidy, we don't need a capital incentive, and we don't need a premium feed-in tariff. The business case stands in its own without a government subsidy so long as householders get paid for the value they create for the grid."

Carnegie Wave Energy feels the same sense of disappointment.

The Perth-based developer of wave energy systems has pressed on with plans to establish a wave power project at Garden Island, 50 km from Perth without the support of the federal government.

Despite federal energy minister Martin Ferguson launching the government's \$300 million Renewable Energy Demonstration Program at Carnegie's pilot plant in April 2009, the company missed out on government funding.

One of the four grants was awarded to US-based Ocean Power Technologies and Leighton. A total of \$65 million from the fund was not allocated.

In October 2010 Ottaviano told *The Age* newspaper: "We certainly aren't saying that we are packing our bags and heading offshore, but all of our business development activities and investments are focused offshore and three of our directors are in Europe. That is no accident because the market there is about 10 years ahead of us in terms of wave power."

In its 25 January submission to Victoria's Department of Primary Industries, CFC noted two European markets with extended feed-in tariffs: Germany and the UK.

In Germany fuel cell power and heat generators of up to 50 KW capacity receive a gross premium feed-in tariff of about 15 Australian cents for every KW hour generated.

The total benefit for electricity consumed on-site, including the avoided retail cost, is about 38-40 cents per KW hour.

From April 2010 the UK introduced a gross premium feed-in tariff for small-scale combined heat and power units. Households there receive a cash tariff of 17 cents per KWh for all electricity generated, as well as avoiding the retail price of about 18 cents - a total benefit of about 36 cents per KWh.

The result is plain to see. Orders have been flowing to European customers, with the company announcing orders for four of its BlueGen units from the UK's EON and up to 200 from German energy service provider EWE in the past couple of months.

The right price

Ceramic Fuel Cells' Dow cites continued uncertainty over a domestic price on carbon and lack of interest from the big power-generating utilities here as the two major hindrances to the full commercialisation of CFC's technology.

"Without the certainty of a carbon price [electricity generators] are not making investments in any kind of clean technology at the moment and there won't be until we have a carbon price. They don't do anything unless the government is kicking the tin as well."

Things are perhaps looking up in this respect.

In her February address, Prime Minister Gillard stressed her determination to put a price on carbon, which she described as a fundamental structural reform as significant in our own



BluGlass (ASX: BLG)

BluGlass is developing a unique process using Remote Plasma Chemical Vapour Deposition (RPCVD) for depositing semiconductor materials. BluGlass' technology targets the LED and solar PV industries.

Development and manufacturing facility in Silverwater, Sydney

Share price (23 Feb)	14 cents
12 month share price range	8-20 cents
Market capitalisation	\$31.23 million
Net cash (30 June 2010)	\$3.02 million

time as the reforms of the Hawke-Keating government a generation ago.

"This will drive another sweeping technological revolution like information technology did in the 1980s and 90s," Gillard said.

Carnegie Wave Energy's Ottaviano says a carbon price is certainly no panacea, although it will benefit the industry primarily by improving sentiment.

"For a new technology that is capital intensive and expensive, initially \$10 a tonne of CO2 is immaterial.

"Investors will be able to see it is a real industry and it will get them interested again. At the moment they have been turned off because there have been too many policy changes," Ottaviano says. "In the short term, all a carbon price will do is allow the flick from coal to gas."

Matthew Warren, CEO of the Clean Energy Council, said a comprehensive response to climate change requires a price on carbon, support for energy efficiency and investment in clean energy generation to deliver affordable clean energy at scale as quickly as possible.

"The government has a choice – it can either build a cleaner economy, or it can continue to add carbon risk and investment uncertainty," Warren said in a statement following the government's decision to cut its renewable energy funding to pay for the January floods.

A licence to print money

A possible way forward for companies that are struggling to find sufficient technological skills here is to licence their technology to suitable foreign partners.

Papyrus Australia, for instance, wants to establish banana veneer and banana fibre production lines in locations where bananas are grown.

In December the company entered into such an alliance with Egyptian investment company Tawazon For Solid Management, to establish Papyrus Egypt and Papyrus Europe.

Ted Byrt, company chairman, said the preliminary agreement represented a tangible step towards establishing a factory in a prolific banana-growing province with the prospect of selling product into Europe.

"Significant work still needs to be done before any operations in Egypt become a reality, but the memorandum of understanding is an important step in the process," Byrt said.

Managing director Ramy Azer says: "It is very hard to commercialise anything developed in Australia.

"But on the other hand maybe we shouldn't be nationalistic about these things. After all, we don't live in sovereign countries any more. We live on one planet. By definition, anyone involved in cleantech as such must understand that." 

Listing problems

Given the hurdles and the unwillingness of customers to embrace green products here, there are perhaps a surprising number of cleantech companies listed on the Australian Stock Exchange. But, for some companies, listing is the only viable route.

Papyrus Australia's (ASX: PPY) managing director, Ramy Azer, admits that listing the company on the stock exchange was a last resort. "It's totally the wrong environment for us," he says.

"There are two main problems: We have to reveal information because we are a listed company; and the information we want to divulge we cannot because it will impact on the stock price."

The huge costs of compliance remain an issue for pre-revenue companies such as Papyrus.

"At the end of the day we put a huge amount of effort into raising a small amount of money [through a listing] and what's left out of this money to really invest in technology is a tiny percentage," Azer says.

"However, we do not have venture capital to speak of in this country. We have the appearance, yet the practice is not there.

"They either want something that's already proven and hence low risk, or they want something that has just begun so they can have the maximum out of it. But something in the middle that really needs the support to grow in that very risky period, it's very hard to find support."

BluGlass (ASX: BLG) also shunned venture capital in favour of an early listing.

The Sydney-based company develops semiconductor processes and equipment for the manufacture of next-generation lighting technology, light-emitting diodes (LEDs) and solar cells.

"Rather than going down the VC path or taking the business offshore, it seemed appropriate at the time to use the ASX as a means of getting the risk capital into the business,"
Giles Bourne, BluGlass

"Rather than going down the VC path or taking the business offshore, it seemed appropriate at the time to use the ASX as

a means of getting the risk capital into the business," says CEO Giles Bourne.

Dyesol (ASX: DYE) executive chairman Richard Caldwell thinks the Australian listed market has a greater appetite for risk than any of the international markets, while the relative scarcity of venture capital here again means listing is a popular way of raising capital.

"So we are really forced by the nature of the Australian market to tap retail funds from an earlier date."

He signalled the possibility that Dyesol may seek to raise additional funds through foreign stock markets.

"I would imagine a company such as Dyesol, if it did have additional funding requirements, might explore the broader international capital markets. But that would be at a time when we have further de-risked the business model by further developing our existing relationships with international partners such as Tata Steel."

BluGlass's Bourne says: "There are pros and cons with being listed here. The advantages are that being a listed company we are very good about how we manage our business – obviously we have to comply with the regulations. On the downside there is a large cost associated with being listed in Australia."

Bourne says the company would be interested in attracting institutional investors with a sustainability mandate, but the reality is most of the funds have a mandate that prevents them investing in pre-revenue companies such as BluGlass.

"We said in September that we would anticipate penetrating the market within 16 to 18 months from now (February). It helps enormously that we have a technology partner on board (SSPT)."

The company, founded in June 2005 as a result of more than 15 years' research at Sydney's Macquarie University, has no market in Australia, explains Bourne.

"Geographically being located here is only because we came out of an Australian university. All of our market is offshore, predominantly in Asia," he says.

BluGlass's finished product is a reactor that makes LEDs and solar cells, which is sold to a chip manufacturer. There are no domestic LED manufacturers in Australia and no domestic solar cell chip manufacturers in the nitrite space.

BluGlass's strategic partners are also abroad, including SSPT, a rapidly growing semiconductor business wholly owned by Sumitomo Precision Products.