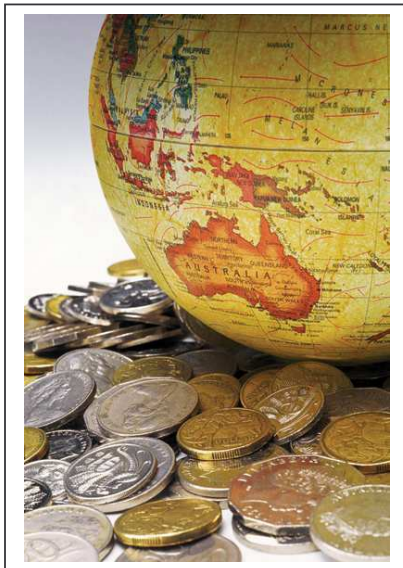


# The Australian Cleantech Map

## 2005 Benchmark Report



Principal Author:  
Michael Walsh  
Executive Director

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Cleantech AustralAsia is very pleased to present this initial benchmark report which is available for free download on [www.cleantechforum.com](http://www.cleantechforum.com). The report will be the basis for further research and reports in subsequent years. We welcome your feedback and input.

Contact:

Jeffrey Castellás  
Chief Executive Officer  
Cleantech AustralAsia Pty Ltd  
P.O. Box 1790 Melbourne, Victoria Australia. 3001  
Tel: 0401 067 252  
Email: [jeffcastellas@cleantechforum.com](mailto:jeffcastellas@cleantechforum.com)

Research and Review Committee:

Nick Bruse, Strike Consulting  
Jeffrey Castellás, Clean Technology AustralAsia  
Peter Castellás, Blueshift Consulting Pty Ltd  
Bill Hartnett, CEO, Innovest Strategic Value Advisors (Australia) Pty Ltd  
Richard Milroy, Clean Technology AustralAsia

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## 1 EXECUTIVE SUMMARY

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The objective of this study is to map the publicly available dimensions of Cleantech investments in Australia. Cleantech AustralAsia Pty Ltd will be using this study as a starting point from which to track investments and identify investment trends and performance in future years, including Australia's investment activity nationally and internationally.

For this first benchmarking survey, it was decided that largely independent and publicly available sources would be used for data collection, rather than individual companies. The data series spans from July 2004 to latest available at the time of the survey (usually mid-November).

Cleantech can be considered a theme for investments across a range of industry sectors such as: alternative energy generation and storage; smart power; new materials and nanotechnology; green buildings; water purification and conservation; recycling and waste management technologies.

There are 3 essential components that serve to define Cleantech:

1. It is an investment activity geared to produce a commercial return;
2. That investment must support a degree of technological innovation to meet market demand; and
3. It must have additional benefits directed at improving the environment and society.

In total, the survey identified 131 companies and pooled funds involved in the Cleantech investments and over 100 government funded grants and programs.

Key findings:

- 71 ASX listed companies, with a business model that is related to Cleantech, were identified. In total they had a market capitalisation of \$7.8 billion and they had raised nearly 15% of their value (\$1.1 billion) by way of new capital since July 2004.
- In total market share terms, the 71 listed companies comprise about 4.1% of ASX listed companies but only 0.8% of the total stockmarket capitalisation. However, they accounted for 2.2% of all stock exchange capital raising.
- Of the 71 companies, only 3 are constituents of the benchmark S&P/ASX 200 Index. A further 11 are included in the 500 strong All Ordinaries Index.
- There is a microcap orientation with 60% (\$4.7 billion) of the market capitalisation of this segment falling outside of the All Ordinaries Index. This means that most of the companies involved would simply fall outside the research scope of the great majority of stockbroker analysts and institutional investors.
- A restricted list of 15 larger ASX listed companies that have originated investments in Cleantech, mainly as an adjunct to their core business, were identified. While a number have made major commitments, the extent of this investment could not be quantified at this time.

- 30 dedicated Cleantech businesses, and another 6 businesses with partial involvement, based on a review of the BRW Top 500 Private Companies listing, were identified. In addition, a list of smaller Cleantech businesses was compiled from various environmental publications. Again, the level of investment could not be established at this time due to their private company status.

Apart from direct investment, other sources of funding for Cleantech were examined with the following results:

- Cleantech businesses attracted a total of 51 government grants in 2005 totalling \$185 million.
- Seven new government funds totalling \$1 billion will support clean technologies in future years (mainly until 2009);
- With new government funds, plus the level of recurrent funding, government grants supporting Cleantech are set to double in the next 5 years. The areas of focus for this future government funding are likely to be emissions reduction, renewable energy and alternative fuels. This suggests that the ability of individual companies to attract future government funding for their respective technology is likely to be an increasingly important success factor.
- Funding for university research into clean technologies comprised 43 grants totalling \$8.7million. This represented 5% of Australian Research Council grants and 10 of the grants related to nanotechnology. While this funding is not significant in dollar terms, the number of grants demonstrates a positive environment for new research and early stage commercialisation.
- The development of pooled funds that invest in Cleantech businesses has made a notable contribution to the emergence of Cleantech investments during 2005. The survey identified 9 such funds with a total value of \$1.7 billion. New capital raised by those funds in the research period was \$1.4 billion. The main areas of investment made were renewable energy, sustainable forestry, green building, and private capital funds.

From the limited available data on Cleantech's investment performance, the study found the following:

- The Ethinvest Environmental Index achieved a return of 19% per annum for the period from its inception (September 1996) to September 2005.
- The UBS Integrated Utilities Index achieved an impressive 23.4%, over 10 years ending June 2005, from 3 energy utilities with significant Cleantech involvement. This compares with 12.2% for the benchmark S&P/ASX 200 Index. Another relevant sub-index, UBS Generation, had 2 dedicated Cleantech energy generation companies as its sole constituents and showed a return of 17.8% over that same 10-year period.
- The Australian Ethical Equities Trust achieved a total return of 10.4% per annum since its inception in September 1994, slightly under the return on its benchmark S&P/ASX300 Index of 11.6%. Smaller Australian Cleantech companies have dominated this portfolio.

## 2 INTRODUCTION

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*by Peter Castellás, Managing Director Blueshift Pty Ltd<sup>1</sup>*

As worldwide efforts to address environmental problems such as global warming, air pollution, water security and increased energy use are on the rise, a new industry based on innovative clean technologies has begun to emerge and capture the attention of savvy investors.

With Australia's its proximity to large regional markets, vibrant entrepreneurial culture, R&D base and history of technology innovation. Australia is in excellent position to capitalise on this new growth market. Add to this, the economic reality of highly volatile oil prices, impending water shortages and extreme weather events resulting from climate change, and it seems a 'perfect storm' may be brewing for Australian investors one that could result in significant investment, job growth and economic activity.

Clean technology (Cleantech) is a relatively new industry encompassing economically compelling and environmentally friendly technologies, products and services. The Cleantech industry includes: renewable energy generation and storage—solar, wind, geothermal, hydro, biomass; water purification and conservation; waste recycling and processing; advanced materials and nanotechnology; and green building technologies.

Although some of these industries are very different, all share a common thread: they use new, innovative technology to create products and services that compete favourably on price and performance, while reducing or eliminating environmental problems.

According to Nicholas Parker, Chairman of US-based Cleantech Venture Network, 'Increasingly, clean technologies are developed primarily to meet an economic need; their environmental benefits are a significant but secondary consequence.' Parker's organisation tracks investment in Cleantech and, in a recent report, they found that Cleantech markets represent annual global revenues greater than US\$150 billion. Segments such as wind and solar power boast 5–10 year compound annual revenue growth rates as high as 35%.

The OECD estimates that the global market for environmental goods and services was worth US\$550 billion in 2003 and projects growth at 3–5% annually in developed countries and 8–12% in developing economies.

The last few years have seen significant activity in Cleantech investing, particularly in the USA and Europe, and deal flow is encouraging. The Cleantech Venture Network estimates that, since the beginning of 2002, in each quarter North American investors have committed, on average, approximately US\$300m in 50 deals, representing more than 7% of overall venture flows. In Europe, according to the Carbon Trust, there has been over £1 billion of investment across 223 transactions in UK clean technology companies since 2000.

Some of the global forces shaping the market attractiveness for Cleantech investing are sky rocketing oil prices, climate change, ever tightening environmental regulations, more sustainable industry practices and a greater consumer awareness and appetite for environmentally sensitive products. There

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<sup>1</sup> Blueshift Consulting is a management consulting firm specializing in the area of corporate sustainability. Blueshift's work is focussed on the finance and investment sector as well as clients in the infrastructure, resources, energy and manufacturing sectors. Peter Castellás is also the Fund Manager of the Sustainable Melbourne Fund.

has also been a fundamental change in the economics of the environmental industry. Advances in technology, research methods, manufacturing and communications have lowered the costs of clean technologies, bringing many into the mainstream.

In addition, there are the energy and resource hungry, environmentally fragile, and fast-growing economies of China and India. It is estimated that, by 2008, China will have spent an estimated US\$85 billion on environmental cleanup projects alone.

Cleantech is of interest to an expanding global audience of investors interested in making money. In North America, there are some very active investors including NGEN partners, Expansion Capital Partners, Enertech Capital Partners, and the Global Environment Fund. In Europe, Sustainable Asset Management, TechFund Capital Europe and Kleiner Perkins Caulfield & Byers are currently managing or raising funds for Cleantech.

A source of investment has come from the big energy companies, including Chevron, Shell and BP, who are developing a portfolio of Cleantech investments. Shell has now opened its first hydrogen station in North America and BP continues to make significant investments in solar power technology.

For these companies, the price of crude oil is clearly a catalyst for the investment in cleaner alternative energy sources. Other global players are also involved. Toyota is trying to push gas/electric hybrid technology into much of its product range. Sharp Electronics is now the world's leading manufacturer of solar PV. The biggest company in the world, GE, has unveiled a grand plan to invest US\$1.5 billion annually in research in cleaner technologies by 2010.

Last year, CalPERS (California Public Employees' Retirement System) and CalSTERS (California State Teachers' Retirement System), the largest and third largest public pension funds in the US, promised, through the Green Wave initiative, to invest US\$1.5 billion in clean technologies.

Clearly, to drive the Cleantech sector in Australia (and globally) it will be critical to harness the investment capital of institutional investors. Australian institutions are demonstrating a leadership position. Recently, this has begun to materialise, as discussed at the first Cleantech Forum 2005 in Melbourne, organisations such as Industry Fund Services (IFS), Babcock & Brown Environmental Investments, Macquarie Funds Management and James Fielding Funds Management were all in agreement that Australia's institutional investors are serious about increasing allocations to Cleantech, particularly in private equity and funds-of-funds. Garry Weaven, Founder and Executive Chair of IFS says "Cleantech is by definition, investing in a sustainable long-term future for our society – something that is important to industry funds and most pension and superfunds around the world." Australia's institutions are also potential partners and key source of capital for international Cleantech funds and companies.

To date, however, the investment market in Australia has shown less interest in Cleantech than counterparts in countries like the USA, Germany, and the UK. Australian Superannuation funds are large by global comparisons, yet asset allocations to alternative investments, private equity and infrastructure, are relatively low. This is due in part to federal government policy and regulatory framework limitations. However, based on local and overseas trends, it is expected to increase significantly in the coming years and Cleantech AustralAsia is going to provide the international link to national and international deals; and human resources for the Australian Cleantech Network members to capitalise on the opportunities.

But, not everyone evangelises about the potential for Cleantech investing. A US study looking at venture capitalists' reluctance to enter the clean technology sector conducted by management consultant, Jeffrey Steen, found that 'there's a belief that there are no returns available for investors in these industries. They believe that either capital requirements are too big, or the time horizons too long or that there are not enough opportunities for successful exits.' Certainly there is a lot of education to do before everyone understands the Cleantech investment opportunity.

Biotech investing, which also typically requires significant capital and a long time span prior to exit, through progressive learning of the opportunity hasn't stopped global dollars chasing deals in that sector. But can investors be blamed for being cautious? If solar and other technologies in the Cleantech space have been around for decades why haven't investors yet cashed in big on Cleantech?

Ira Ehrenpreis, of California based venture capitalist firm Technology Partners, believes that 'one of the key reasons why Cleantech investments have historically failed is the issue of market timing. There have been many good technologies that came before their time in this sector. Many companies were trying to make a product development timeline meet a market development timeline. Well, that is exponential risk.' Savvy investors like Ehrenpreis, and others like Wal van Lierop of Chrysalix Clean Energy Fund, are investing in technologies that provide a better solution for markets of today.

The unfamiliarity of the market for environmental goods and services has been a historical barrier to the growth of Australian businesses. People will invest in things they understand, and 'money flows to where money knows'. The investment market in Australia is not overly populated with fund managers or advisors that understand Cleantech or environmental experts or former energy or water company executives. This indicates a need for more capacity building and market education of the opportunities and drivers. This need for knowledge is exactly what Cleantech AustralAsia intends to address as it builds the Australian Cleantech Network membership.

Australian government policy is often cited as a reason for deferring investment in Cleantech opportunities, particularly the refusal to raise the Mandatory Renewable Energy target and to sign the Kyoto Accord. Yet policies change quickly to reflect global market developments, particularly in the environmental area. Conservative political ideology is also no barrier to clean technology development; as demonstrated by the Republican Governors Schwarzenegger of California and Pataki of New York who have both initiated aggressive clean energy initiatives. Schwarzenegger has launched the Hydrogen Highway network to 'support and catalyse a rapid transition to clean hydrogen transportation economy' in the state. The Governor envisions a network of 150 to 200 fuelling stations within 5 years.

The Australian Commonwealth Government is keen to counter criticism and to stimulate market activity by establishing a series of initiatives such as the Low Emission Technology Demonstration Fund, Renewable Energy Development Initiative, and Solar Cities program—all designed to support and promote the demonstration of new sustainable energy technologies.

Although wind, solar and even hydrogen technologies are capturing the headlines, other more nascent technologies, such as nanotechnology and solid oxide fuel cells, are also promising significant growth potential. Green building technologies are another area where Australia can take a leadership position. However, perhaps the greatest market for innovation and growth in the Cleantech space is water.

The World Health Organisation estimates that 1 billion people in the world have no access to clean water and that in 20 years, severe water shortages will affect up to 2.8 billion people. The recent awakening in Australia to the potentially disastrous effects of water scarcity in this country has jolted government policy makers and the investment markets alike to recognise that increasing pressure on water risks is not just the domain of the developing world. 'We think of water in many ways as the oil of the 21<sup>st</sup> century,' says Ehrenpreis. 'We believe start-ups and companies with innovation have the opportunity solve huge fundamental and gaping problems related to water.'

Australia boasts a long pedigree in the area of innovation in water quality control and wastewater treatment. But, although water infrastructure investment has been front-page news recently, many entrepreneurial companies seeking to commercialise R&D water technologies are struggling for capital.

Australia has a leading position as an investment hub in the Asia-Pacific region, with a culture of innovation that ensures there is a continuous pipeline of projects. But the rest of the world is more aggressively embracing the market for Cleantech and the risk is that more great Australian technologies will go offshore to be profitably commercialised.

Ultimately, Cleantech may be a tech boom to rival the growth of information and communications technology. Australia is well positioned to be a major player in this space; and with leadership, vision and the ability to leverage our knowledge base; Australia could be the Silicon Valley of Cleantech.

### 3 SURVEY OBJECTIVE

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The objective of the survey is to map the publicly available dimensions of the Cleantech investment sector in Australia. This will show how the sector is funded and where this level of investment activity is focussed. In this way, Australian Cleantech investing is defined, segmented and introduced.

It is anticipated that future benchmarking surveys would enable a greater degree of quantification of activity levels, explore gaps in data collection and begin to analyse trends.

### 4 METHODOLOGY

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After examining how the survey process for benchmarking Cleantech operates in North America, it was decided to develop a distinctive process for the Australian market. There were two main reasons for this:

1. In the North American market, Cleantech's capital accumulation process is dominated by the venture capital and private equity markets. But, in Australia, there is a greater tendency for these businesses, and the funds that support them, to have a stock exchange listing.
2. The process of measuring Cleantech investing is more established overseas and so companies are more able, and willing, to provide relevant data. In Australia, the process is new and the concept of Cleantech as a dedicated investment sector is just being introduced.

Therefore, for this—the first Australian Cleantech benchmarking survey—it was decided that largely independent and publicly available sources would be used for data collection, rather than to survey individual companies.

The limitations associated with this methodology are as follows:

- For ASX listed companies that were partially involved in Cleantech, the study was able to identify many of their projects but was not able to qualify that level of involvement.
- Coverage of private equity and venture capital investment was limited to the transactions that were publicly disclosed.
- In the case of larger private companies, the research relied on relatively basic analysis of their business activities. In addition, as private companies, data on their asset values and investments was not publicly available.

Within these constraints, the survey was able to do the following:

- Identify each company involved in Cleantech.
- Determine and describe their level of involvement.
- Calculate the most recent market value of the business (or fund).
- Calculate the level of new investment into the business since July 2004.
- Identify dedicated sources of committed funding or current public offers that would support Cleantech investing in the near future.
- Categorise companies under various sub-categories.

The specific data sources used include the following:

- Announcements and registers from Australian stock exchanges.
- Government websites that detail funding and grants for environmental or commercialisation purposes.
- Australian Research Council website that details university grants.
- BRW Magazine's table of the Top 500 private companies.
- Data on the environmentally positive activities undertaken by the Top 200 ASX listed companies contained in the Corporate Monitor database. This information is in turn gathered from a range of public sources, mainly company specific.
- News and information services dedicated to reporting on environmental business activities. This includes Ethical Investor, Centre for Greenhouse Technologies, EcolInvestor and ReNew magazine.

In situations where a capital raising was in progress at the time of the survey (eg an IPO offer), it was assumed that that capital raising was successfully completed as planned and the data was included in the analysis.

## 5 CLEANTECH DEFINED

There are 3 essential components to Cleantech:

- 1 It is an investment activity geared to produce a commercial return.
- 2 That investment must support a degree of technological innovation to meet market demand
- 3 It must have an additional benefit directed at improving the environment and society.

To clarify this, Table 1 presents some examples of what is, and what is not, Cleantech.

Examples of Cleantech Investments			
Yes		No	
<u>Activity</u>	<u>Company</u>	<u>Activity</u>	<u>Company</u>
Renewable energy generation	Pacific Hydro	Sale of green electricity	Jackgreen
Coal seam gas	CH4	Natural gas pipelines	Investa
Aquaculture technology	Cell Aquaculture	Aquaculture farming	Tassal
Clean coal technology	GE	Coal fired power generation	Macquarie Energy
Engine efficiency	Orbital	Engine parts	Repco
Alternative fuels manufacture	Australian Ethanol	Petrol refining to new standards	Caltex
New waste technology	GRD	Waste transfer	Brambles
Plantation forests certified by FSC	Timbercorp	Broader scale agribusiness & milling	Gunns
Dedicated scrap recycler	Sims Group	Use of recycled materials in manufacture	Smorgon Steel

**Table 1 - Examples of Cleantech Investments**

A number of judgements were made in order to make the distinctions outlined above. It is emphasised that this categorisation process is not based on any ethical criteria. Nor is it to delineate what is, or is not, environmentally acceptable. Rather it is to set up an understandable and credible framework under which Cleantech investing can be studied in more detail.

A further distinction is made between a *dedicated* Cleantech business (or fund) on the one hand and a business undertaking *partial* Cleantech investments on the other hand. A *dedicated* Cleantech business has its activities dominated by investments within the category. The *partial* category may have one or more projects that fall within the definition.

Some pooled investment funds are dedicated to Cleantech investing and have been included in the survey. Almost any other managed investment fund (including socially responsible investment funds) has a more open investment mandate. These funds have an incidental level of Cleantech exposure and so they are ignored in this survey.

The various sub-categories of Cleantech activities used in this survey—such as Energy Generation and Energy Efficiency—follow the categorisation process used in North American studies. Again, their purpose is to indicate areas of focus or concentration. It is recognised that categorisation is difficult at times. For example, consider the distinction between energy enabling technology and energy generation.

## 6 AREAS OF INVESTMENT

The survey identified 72 ASX listed companies with a business model dedicated to Cleantech industries. In total they had a market capitalisation of \$7.8 billion when the survey was undertaken in mid-November. Further, those companies had raised nearly 15% of their value (\$1.1 billion) by way of new capital since July 2004.

New capital to meet market demand raising includes Initial Public Offers, share placements, rights issues, share offers and the exercise of options. There were no Cleantech companies listed on the other 2 stock exchanges in Australia.

According to the Australian Stock Exchange 2004-05 Year End Statistics, the domestic market capitalisation of the ASX was \$975 billion at June 2005 comprising 1774 companies. They also raised \$37 billion in equity capital during the year. The market share statistics of the Cleantech segment as shown in Table 2.

	ASX Listed Cleantech	Total Market	Percentage
Number of companies	71	1,774	4.1
Market capitalisation (\$billion)	7.8	975	0.8
New equity (\$billion)	1.1	50*	2.2

*\*Estimate to include the period July–October 2005.*

**Table 2 - Market Share Statistics**

## 6.1 Dedicated ASX listed Cleantech companies

Table presents a list of dedicated ASX listed companies with a Cleantech focus.

<b>ASX Listed Companies dedicated to Cleantech investment categories</b>			
<b>Code</b>	<b>Co Name</b>	<b>Market Cap (\$m)</b>	<b>Cleantech Category</b>
AAE	Australian Ethanol Limited	12	Alternative fuels
AAQ	Australis Aquaculture	18	Agriculture & Nutrition
AEI	Aeris Technologies Limited	60	Air Quality
AJL	AJ Lucas & Co Limited	58	Energy Infrastructure
AMU	Amadeus Energy Limited	186	Energy Infrastructure
ANO	Advanced Nanotechnology	25	Materials & Nanotechnology
AOE	Arrow Energy Limited	117	Energy Generation (renewables)
ARW	Australian Renewable Fuels	55	Alternative fuels
AUX	Ausron Limited	17	Agriculture & Nutrition
AXE	Axiom Energy	45	Alternative fuels
BAX	Baxter Group Limited	215	Materials Recovery and Recycling
BBW	Babcock & Brown Wind Partners	843	Energy Generation (renewables)
BEI	Babcock and Brown Env. Invest.	178	Materials Recovery and Recycling
CAQ	Cell Aquaculture Limited	25	Agriculture & Nutrition
CAU	Colltech Limited	9	Manufacturing/Industrial
CBD	CBD Energy Limited.	4	Energy Efficiency
CDX	CDS technologies Limited	85	Materials Recovery and Recycling
CFU	Ceramic Fuel Cells Limited	60	Alternative fuels
CHX	CH4 Gas Limited	120	Energy Generation (renewables)
CMV	CMA Corp Limited	94	Materials Recovery and Recycling
COF	Coffey International Limited	257	Water Purification & Management
COI	Comet Ridge Limited	7	Energy Generation (renewables)
COZ	CO2 Group Limited	45	Energy Efficiency
CTF	Citrofresh International Limited	10	Materials & Nanotechnology
DMX	Dolomatrix Limited	5	Manufacturing/Industrial
DYE	Dyesol Limited	5	Energy Generation (renewables)
EGL	The Environmental Group	9	Air Quality
ENE	Energy Developments	594	Energy Generation (renewables)
ESG	Eastern Star Gas Limited	51	Energy Generation (renewables)
EVM	Enviromission Limited	18	Energy Generation (renewables)
EVZ	Envirozel Limited	8	Materials & Nanotechnology
GAP	Gale Pacific Limited	82	Energy Efficiency
GDY	Geodynamics Limited	169	Energy Generation (renewables)
GPE	Green Pacific Energy	6	Energy Generation (renewables)
GRD	GRD Limited	337	Materials Recovery and Recycling

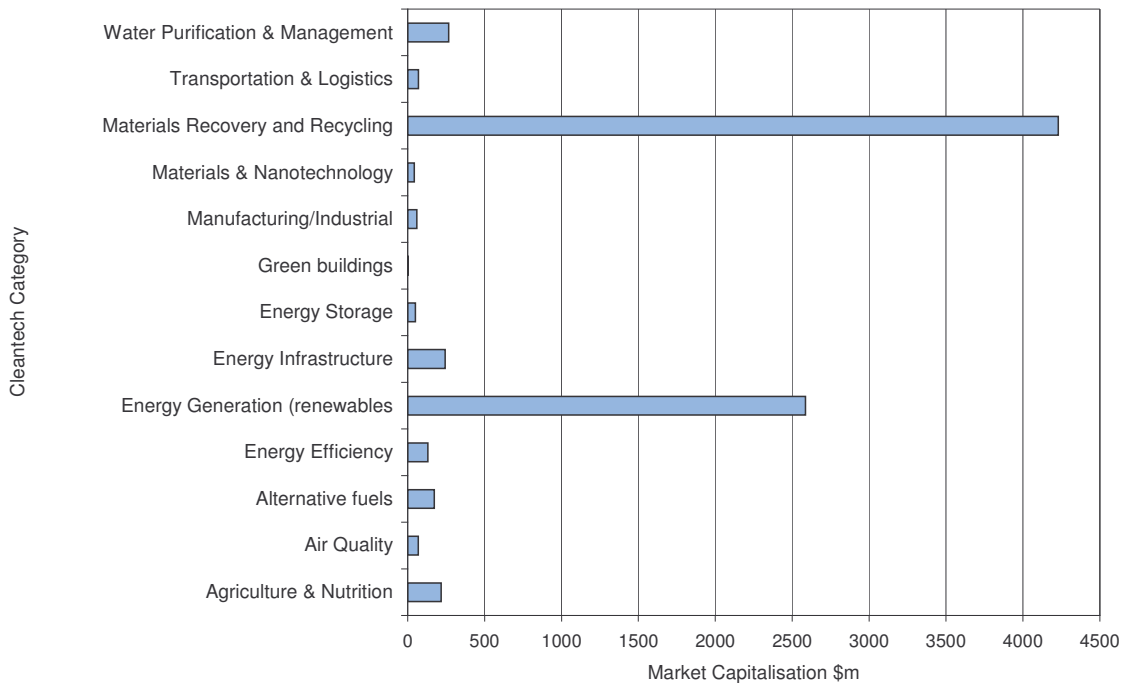
*continued*

**Table 3 - ASX Listed Companies dedicated to Cleantech investment categories**

<b>ASX Listed Companies dedicated to Cleantech investment categories</b>			
GRK	Green Rock Energy Limited	9	Energy Generation (renewables)
HAL	HydroAuditing	9.7	Water Purification & Management
HMC	Hydromet Limited	15	Materials Recovery and Recycling
LNG	Liquefied Natural Gas	22	Energy Storage
MDV	Medivac Limited	6	Materials Recovery and Recycling
MEL	Metgasco Limited	16	Energy Generation (renewables)
MPA	Marine Produce Australia	14	Agriculture & Nutrition
NVE	Novera Energy Limited	79	Energy Generation (renewables)
ODY	Odyssey Energy	6	Energy Generation (renewables)
OEC	Orbital Corporation Limited	47	Transportation & Logistics
ORT	ORT Limited	6	Materials Recovery and Recycling
PCE	Pinnacle VRB Limited	7	Energy Storage
POH	Phosphagenics Limited	125	Agriculture & Nutrition
PPG	Pro Pac Packaging Limited	19	Manufacturing/Industrial
PPY	Papyrus Aust Limited	5	Materials Recovery and Recycling
PTR	Petratherm	7	Energy Generation (renewables)
PUR	Purus Energy Limited	15	Energy Generation (renewables)
QGC	Queensland Gas Company	197	Energy Generation (renewables)
REL	Renewable Energy Corp	33	Materials Recovery and Recycling
REV	Revetec Holdings Limited	9	Transportation & Logistics
SGL	Sydney Gas Limited	111	Energy Generation (renewables)
SKY	Skydome Holdings Limited	4	Green buildings
SLD	ShieldLiner Limited	6	Materials Recovery and Recycling
SMS	Sims Limited	1,521	Materials Recovery and Recycling
SNF	So Natural Foods Limited	18	Agriculture & Nutrition
SOO	Solco Limited	23	Energy Generation (renewables)
STP	Stericorp Limited	23	Manufacturing/Industrial
SYP	Style Plantations Limited	4	Manufacturing/Industrial
TOX	Tox Free Solutions Limited	47	Materials Recovery and Recycling
TPI	Trans Pacific Industries	940	Materials Recovery and Recycling
TTI	Traffic Technologies Limited	14	Transportation & Logistics
VIR	Viridis Clean Energy Group	190	Energy Generation (renewables)
VTI	Virotec International Limited	190	Materials Recovery and Recycling
WGP	Westralian Gas & Power Limited	3	Energy Generation (renewables)
WNZ	Waste Management NZ	552	Materials Recovery and Recycling
ZBB	ZBB Energy Corp Limited	21	Energy Storage
<b>Total</b>		<b>\$ 7,828m</b>	

**Table 3 - ASX Listed Companies dedicated to Cleantech (continued)**

An analysis by Cleantech Category is presented in Figure 1. Of the 71 companies, only 3 (Energy Developments, Transpacific Industries and GRD) are constitutions of the S&P/ASX 200 Index. A further 11 are included in the 500 strong All Ordinaries Index. To put this in context, 60% (\$4.7 billion) of the market capitalisation of this segment falls outside of the All Ordinaries Index. In a nutshell, Cleantech to date is “microcap-land” and most of the companies involved would simply fall outside the research scope of the great majority of stockbroker analysts and institutional investors.



**Figure 1 – Market Capitalisation by Cleantech Category**

From the above the following observations are offered:

- Cleantech is a small but growing sector of the stock market.
- The sector is dominated by small companies (notwithstanding that large diversified companies also make Cleantech investments).
- The sector is raising proportionately more capital given its size (in market capitalisation terms).

## 6.2 Large listed companies with some Cleantech investments

A large number of major companies now undertake some level of environmentally responsible activity; like energy conservation, waste management or recycling. But the majority of these have not developed or invested in the technology or services that help this process to be achieved. As 'buyers', they are not in the Cleantech investment business.

The survey identified a smaller list of 15 companies, shown in Table , that are involved in the Cleantech, mainly as an adjunct to their core business.

ASX Listed companies with partial Cleantech investments	
ASX Code	Company name
AGL	Australian Gas Light Co
AAI	Alcoa
ALN	Alinta
AMC	Amcor
APA	Australian Pipeline Trust
BHP	BHP Billiton Limited
BIL	Brambles Industries Limited
BLD	Boral Limited
CEY	Centennial Coal
CSR	CSR Limited
DOW	Downer EDI Limited
LEI	Leighton
RIC	Ridley Corporation Limited
SSX	Smorgon Steel
WPL	Woodside

**Table 4- ASX Listed companies with partial Cleantech investments**

A number of these investments are obviously quite substantial and, in many cases, seem larger than the undertaking of many smaller, dedicated Cleantech companies. Unfortunately, due to the limited scope of this initial survey, the level of Cleantech investment made by these larger companies was unable to be quantified at this time.

## 6.3 Unlisted companies

Given it is a cottage industry legacy, the Cleantech sector is probably still dominated by a large number of small private businesses. But for research purposes, private companies are a difficult area to scope and gain information. In this survey the BRW Top 500 Private Companies listing was reviewed for any significant Cleantech interests. In addition, a list of smaller Cleantech businesses was compiled from various environmental publications. Table 2 shows the 30 dedicated businesses, and another 6 more diversified companies with partial involvement, that were identified.

<b>Unlisted Companies involved in Cleantech</b>	
<b>Company Name</b>	<b>Cleantech Category</b>
<b><i>Dedicated</i></b>	
Air Cell	Manufacturing/Industrial
Atlantis Energy Systems	Energy Generation (renewables)
Advanced Energy Systems	Environmental IT and Enabling Technologies
Black Earth Resources	Materials Recovery and Recycling
Cartridge World	Materials Recovery and Recycling
Comenergy	Environmental IT and Enabling Technologies
Design Habitat	Green buildings
Energetech	Energy Generation (renewables)
Fodder King	Agriculture & Nutrition
GHD	Environmental IT and Enabling Technologies
GridX Power	Energy Infrastructure
HRZ Wheats	Agriculture & Nutrition
Hydrodec	Materials Recovery and Recycling
Illum-a-lite	Energy Efficiency
Incident Screen	Materials Recovery and Recycling
Intellection	Environmental IT and Enabling Technologies
Latronic Sunpower	Energy Storage
Manildra Group	Alternative fuels
Paarhammer	Manufacturing/Industrial
Plantic Technologies	Manufacturing/Industrial
PolyNovo Biomaterials	Manufacturing/Industrial
PV Solar Tiles	Manufacturing/Industrial
Rota Loo	Manufacturing/Industrial
Rotec Design	Energy Efficiency
Sea Power Pacific	Environmental IT and Enabling Technologies
Selectronic	Energy Storage
Soilwise	Materials Recovery and Recycling
Solar Systems	Energy Generation (renewables)
Wattagan	Environmental IT and Enabling Technologies
World Wide Coatings	Manufacturing/Industrial
<b><i>Partial</i></b>	
Bayard Metering Group	Energy Efficiency
Craig Mostyn	Materials Recovery and Recycling
JJ Richards & Sons	Materials Recovery and Recycling
MG Kailis	Agriculture & Nutrition
Paspaley pearling	Agriculture & Nutrition
Visy Industries	Materials Recovery and Recycling

**Table 2 - Unlisted Companies involved in Cleantech**

The Cleantech Forum in Melbourne confirmed interest in private equity, as Cleantech is viewed as a new category. This area requires further research along with classifying the Venture Capital investments from Australia's 140 managers. The Australian Bureau of Statistics, in 2004-2005, noted \$11.2 billion of venture capital was committed with \$3.5 billion invested as reported by 210 venture capital investment funds and companies. However, as the sector matures, it would be anticipated that publicly listed entities could grow strongly given their ability to easily and quickly raise public capital compared to venture capital in Australia but this may change.

## 7 OTHER SOURCES OF FUNDING

### 7.1 Government grants

Australian governments, both State and Federal, are an important and growing contributor to the Cleantech sector. Funding sources include commercialisation grants and funding from established environmental programs. More recently dedicated environmental schemes that will provide grants mainly to Cleantech related projects.

Cleantech companies stand to benefit from the expected increase in government grants. The study identified 51 Cleantech grants made in 2005 totalling \$185million. These fall into sub-categories as shown in Figure 2.

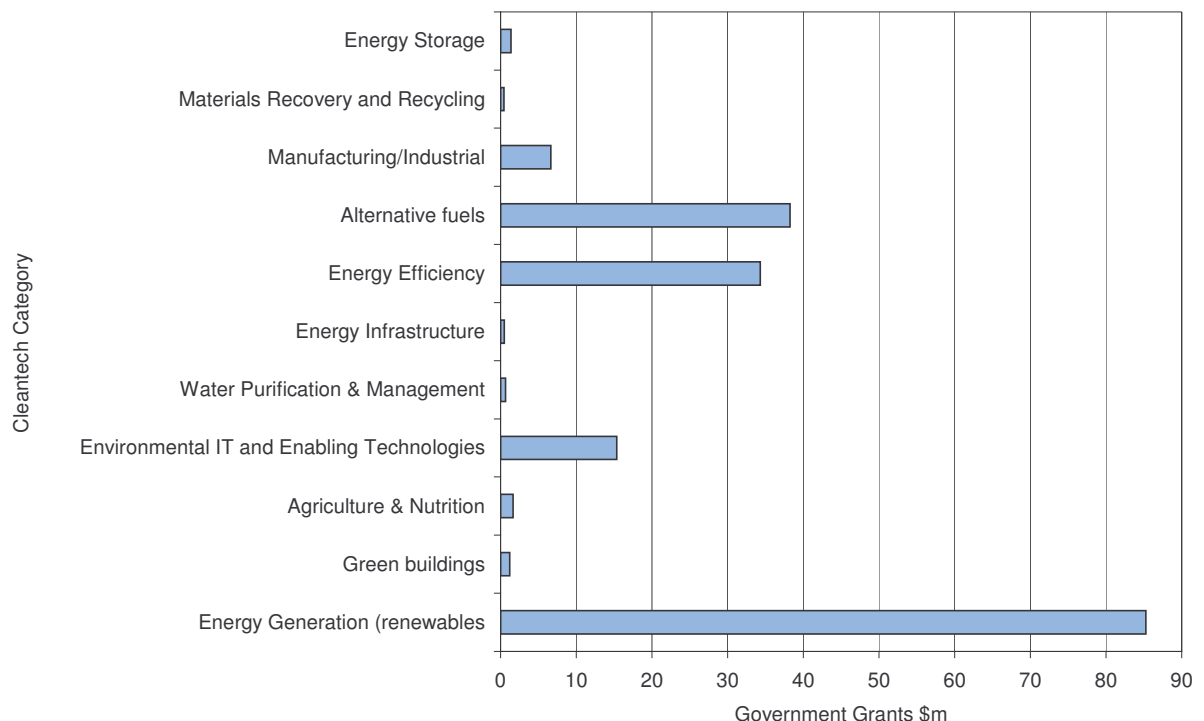


Figure 2 - Government grants by Cleantech category

## 8 GOVERNMENT INITIATIVES TO FUND CLEANTECH

The study also identified 7 new government funds totalling \$1 billion that are set to support clean technologies in future years, mainly until 2009. These are shown in Table 3.

Government Fund/scheme	Funds Committed \$m	Until
NSW Water Savings Fund	150	2009
NSW Energy Savings Fund	200	2009
VIC Renewable Energy Support Fund	8	2006
VIC Centre for Energy and Greenhouse Technologies	15	N/A
Federal Low Emissions Technology and Abatement Fund	27	2009
Federal Low Emissions Technology Demonstration Fund	500	2020
Federal Renewable Energy Development Initiative	100	2012

**Table 3 – Government Cleantech Funds and Schemes**

In addition, recurrent funding is apparent from sources like Sustainability Victoria, AusIndustry, Commercial Ready, Commercialising Emerging Technologies and R&D Start Grants, Greenhouse Gas Abatement Program, Queensland Sustainable Energy Innovation Fund, South Australia's Sustainable Energy Research Advisory Committee and Victoria's Energy Technology Efficiency Strategy.

So, these new funds plus the level of recurrent funding mean that government grants are set to double in the next 5 years. This suggests that the ability of individual Cleantech companies to attract future government funding for their respective technology is likely to be an increasingly important success factor that will attract private investment.

The areas of focus, in dollar terms, for this future government funding are likely to be emissions reduction, renewable energy and alternative fuels.

### 8.1 Funding for university research and commercialisation

A number of university based research centres are involved in developing clean technologies to the stage where they can be commercialised. The main avenue for this type of funding is Australian Research Council (ARC) Discovery Grants.

The survey reviewed grants approved in 2004 that were relevant to the environment, waste and recycling. In total, 43 grants were identified totalling \$8.7m in funding for 2005. Interestingly, 10 of those projects involved the use of nanotechnology. In total, the ARC approved 875 grants for funding. Cleantech accounted for 5% of grants

Also, most projects were allocated funding in future years. Other grants approved by the ARC in 2002 and 2003 also have an allocation for 2005 funding. So the total amount in ARC grant funding to Cleantech projects in 2005 is probably in excess over \$20 million.

A new round of ARC grants was announced in 2005 and its statistics indicate that 131 projects address environmental sustainability and 340 were for new industry based technologies. These 2 areas combined account for more than half of the total number of approved grants (917). This is a good environment for projects that are aimed at commercialising new clean technologies.

Overall, while university funding is not significant in comparative dollar terms, the number of relevant grants demonstrates that there is a healthy level of Cleantech-related research being undertaken, and supported, in Australia.

## 8.2 Pooled investment funds

The development of new pooled funds targeting (at least some aspect of) Cleantech investing has made a notable contribution to the emergence of this sector during 2005. The survey identified 9 such funds as shown in Table 4, with a total value of \$1.7 billion (note that Pacific Hydro, which is now owned by industry superannuation funds, was included in this figure at its takeover valuation of \$788million).

New capital raised by those funds (including the takeover valuation) in the period was \$1.4 billion. The main areas that attracted funds were renewable energy, sustainable forestry, green building, and private capital funds.

Pooled Cleantech Funds		
Fund Name	Capital raised \$m	Fund objective
CVC Sustainable Investments	9*	PDF investing in mid-stage environment enabling businesses.
Australian Sustainable Investments Fund	100	Sustainable forestry and later renewable energy investments.
Timbercorp	50	FSC certified forestry schemes
ITC	83	FSC certified forestry schemes
Investa Commercial Property Fund	109	Sustainable building fund
Investa Diversified Office Fund	35	Sustainable building fund
Pacific Hydro	788	Renewable energy portfolio, valuation on takeover
CVC REEF	0	Venture capital fund investing in renewable energy and enabling technologies
Macquarie Clean Technology Fund	203*	Targeting clean technology generally.
<b>TOTAL</b>	<b>1,377</b>	

\* Target fundraising at survey date.

**Table 4 – Pooled Cleantech Funds**

Note that some other pooled investment vehicles, such as green infrastructure funds, are listed on the ASX. These have been included in the ASX listed Cleantech section of the survey.

## 9 INVESTMENT PERFORMANCE

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Calculating the investment returns of all companies named in this survey is outside the scope of this report. So, to gain some indication of the investment performance of the sector, the performance profile of 2 established indices and the most relevant ethical investment fund were examined.

The Ethinvest Environmental Index is an equally weighted share price index of 40 ASX listed companies with positive environmental impacts. The index was originally developed by ethical investment specialist financial advisers Ethinvest in September 1996. Nowadays, its performance is calculated quarterly and published in Ethical Investor magazine. Most of the constituents of the index are dedicated Cleantech companies. A few have partial Cleantech involvement and a few others are gas pipeline businesses and ethical fund managers that fall outside the Cleantech definition. For the period from its inception in September 1996 until September 2005, the index achieved a return of 19% per annum. In the last year the return was 17.1%. These figures do not include dividends.

The second indicator, that provides a guide to some aspects of the performance of Cleantech, is contained in the UBS Utilities Index - Infrastructure Sub-Index series. Results of these indices were last published for the period to 30 June 2005.

The first sub-index UBS Integrated Utilities has 3 constituents, all having a significant degree of Cleantech investment: AGL, Alinta and Origin Energy. UBS calculated the total return of the index at an impressive 23.4% over the last 10 years and 39.4% over 1 year. This compares with 12.2% and 26.4% respectively for the benchmark S&P/ASX 200 Index. Another relevant sub-index, UBS Generation, had 2 dedicated Cleantech energy generation companies as its sole constituents—Pacific Hydro and Energy Developments. It shows returns of 17.8% over 10 years (again well above the market benchmark) and 26.4% over 1 year.

Finally, the most established ethical investment fund whose portfolio has been dominated by smaller Australian Cleantech companies, the Australian Ethical Equities Trust, has achieved a total return to 31 October of 10.4% per annum since its inception in September 1994, slightly under the return on its benchmark S&P/ASX300 Index of 11.6%. Its return for the last 3 years has been 16.6% per annum.

The risks of investing in new technology companies like Cleantech should also be acknowledged. Some companies languish or even fail due to unrealised promises, mismanagement or through their technology being overtaken by newer and better methods. For example, smaller ASX listed Cleantech companies that have fallen into this category in recent years include: Airboss, Allgas, Environmental Recovery Services, Enviostar Energy, Eco Air, ForBio, Metalcorp, RibLoc and Sustainable Technologies.

Overall, while there is incomplete performance data available, existing indicators suggest that a portfolio oriented towards Cleantech companies would have produced handsome returns over the last 5–10 year period, with some risks to be noted.

## 10 CONCLUSION

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*By Jeffrey Castellas*

This benchmark report has presented a panoramic view of the Cleantech investing landscape in Australia with investments made since July 2004. The Australian Cleantech Map currently spans 71 small public companies dedicated to Cleantech market opportunities that raised \$1.1 billion, 15 large ASX companies whose businesses are partially involved in Cleantech and 36 unlisted companies. The Australian scene also includes 9 new pooled investment funds that raised \$1.4 billion, 51 government grants of \$185 million, 9 new government funds totalling \$1 billion of commitments to 2009, and over \$20 million invested in university Cleantech initiatives.

A key finding is the ground swell of solid investments being made in micro/small cap listed companies dedicated to Cleantech. However, of the 71 ASX listed companies, only 3 were included in the SP/ASX 200 Index. Thus, most large investors would not consider these stocks in their research and investment decisions.

Importantly, Australian institutional investors are beginning to understand the longer-term opportunity of Cleantech investing. With significant and increasing capital to deploy, further Australian institutional investment in Cleantech is expected, particularly in private equity direct investments and fund-of-funds.

Although some evidence points to investments in unlisted companies and venture capital investments, the scope of this initial survey did not enable a thorough investigation into these areas. However, in this following year, the Australian Cleantech Map will be improved by undertaking research to identify and classify these private investments in Cleantech deals. Similarly, the performance of Cleantech investments and associated trends is an area planned for more research to help better inform Cleantech savvy investors.

This report has identified that Australia has a solid pipeline of new deals. Cleantech initiatives will be eligible for about half of the future university grants. In addition, government grants for innovation and new clean technological solutions are increasing, as well as early stage government funding available through organisations dedicated to Cleantech investments, such as the Centre for Energy and Greenhouse Technologies.

Generally, this report has identified that Cleantech investing is active in Australia and poised for significant growth. As the Cleantech theme becomes better understood by investors and companies, and with improved government frameworks in place, Australia can be positioned as a regional leader and investment hub for Cleantech investing. There are both national and international market opportunities in developed countries, such as the USA, and the developing countries of Asia, all of which need Cleantech solutions to achieve sustainability of the ecosystem and communities. Cleantech AustralAsia is focussed on building these international links to accelerate the growth of Cleantech investing for the benefit of Australian's. Australia has the capital and technologies to meet this global market demand.

Cleantech AustralAsia Pty Ltd recognises that Cleantech is in its infancy and there is considerable knowledge to be gained and education of the investment community to do. Accordingly, this report will be built on in subsequent years with the results presented at the Cleantech Forum 2006. Your feedback and future input is most welcome.