

Australia's Renewable Energy Use, Technologies and Services



September 2006

Disclaimer

The views expressed in this report are those of the authors and the information is believed to be accurate at the time of writing. The Australian Business Council for Sustainable Energy (BCSE) does not in any way guarantee the accuracy of any information or data contained in this Report and accepts no responsibility for any loss, injury or inconvenience sustained by any users of this publication or in relation to any information or data contained in this publication.

The views expressed herein are not necessarily the views of the Commonwealth, and the Commonwealth does not accept responsibility for any information or advice contained herein.

In the compilation of this report we have endeavoured to provide a comprehensive snapshot of the renewable energy industry and explain the developments and achievements of the industry over the 2005 calendar year.

Acknowledgements

The funding for this project was provided by the Australian Government, through the Australian Greenhouse Office within the Department of the Environment and Heritage, and the Australian renewable energy industry through the Australian Business Council for Sustainable Energy.



Australian Government

Information on photovoltaics (PV) for this report has been provided by industry, as well as through the International Energy Agency Cooperative Program on Photovoltaic Power Systems Task 1, *Exchange and dissemination of information on PV power systems, National Survey Report of PV Power Applications in Australia, 2005*. This was prepared by Dr Muriel Watt, School of Photovoltaic and Renewable Energy Engineering, University of NSW, Sydney, NSW 2052, Australia, May 2006 and supported by the Australian PVPS Consortium

Australian Business Council for Sustainable Energy
3rd Floor, 60 Leicester St Carlton
Victoria 3053
Australia
Tel. +61 3 9349 3077
Fax. +61 3 9349 3049
Email: bcse@bcse.org.au
Website: www.bcse.org.au

ISBN 0-9802806-2-1

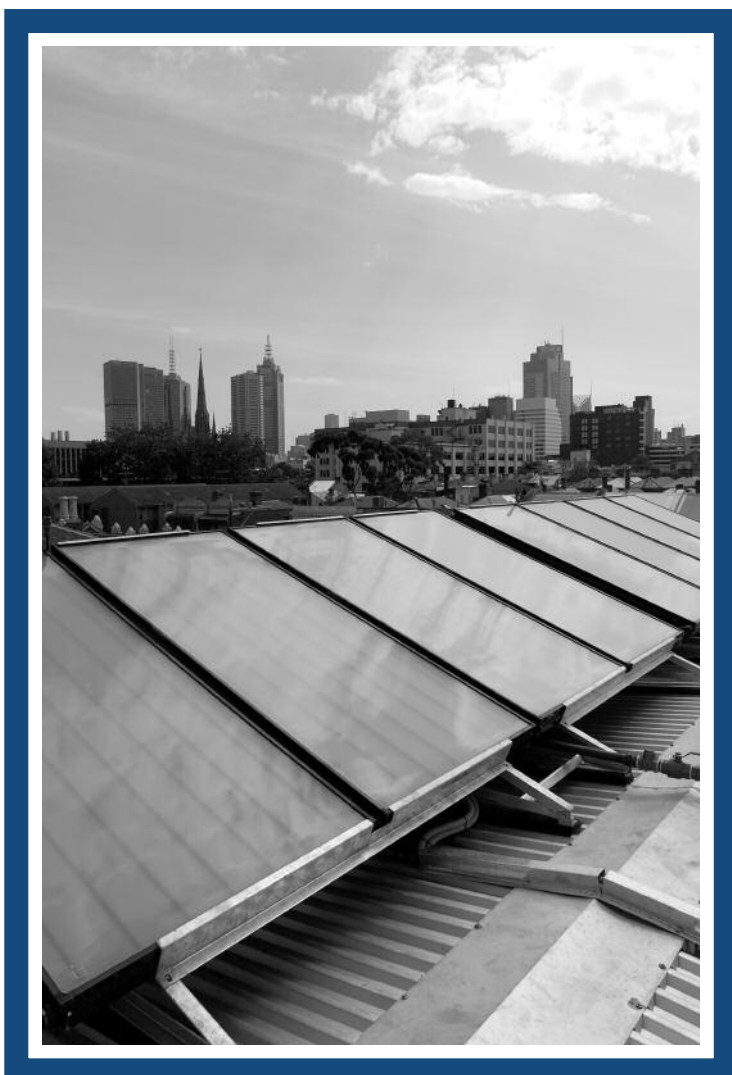
September 2006

Contents

Part 1	3
1 Background	4
1.1 The “Doing Business in China” project	4
1.2 Profiling Australia’s Industry	5
2. Renewable power generation in Australia	6
2.1 Large-scale power generation	6
— Renewable Projects Commissioned during 2005	7
— Cogeneration and Waste-to-Energy Projects	8
— Wind energy	8
— Geothermal resources	9
— Ocean Energy	9
2.2 Smaller-scale bioenergy opportunities	9
2.3 Solar energy – Photovoltaics and Solar Water Heaters	10
— Photovoltaics	11
— Solar Water Heaters	13
Part 2 Australian Renewable Energy Businesses	15
Glossary and Definitions	52
Background information on Australia and its system of Government	53
Annex A Australian Government programs and policies	54
Overview	54
The Mandatory Renewable Energy Target (MRET)	54
Photovoltaics Rebate Program (PVRP)	55
Renewable Remote Power Generation Program (RRPGP)	55
Renewable Energy Development Initiative (REDI)	56
Low Emissions Technology and Abatement (LETA) initiative	56
Advanced Electricity Storage Technologies	56
Solar Cities trial	56
Wind Forecasting Capability initiative	57
The Renewable Energy Action Agenda	57
International Measures	57
Annex B Australian State and Territory Government Initiatives	59
NSW Greenhouse Gas Abatement Scheme (GGAS)	59
Victorian Renewables Scheme	59

Figures and Tables

Table 1	Sustainable power generation capacity by fuel type	6
Table 2	Renewable power generation projects commissioned during 2005	7
Table 3	Renewable energy projects commissioned in 2005	7
Table 4	Renewable power projects committed and/or under construction (but not installed) at 31 December 2005	8
Table 5	Renewable cogeneration projects	8
Table 6	Status of wind energy in Australia to date	8
Table 7	Major Australian manufacturers of PV cells/modules and system components	11
Table 8	Total Australian manufactured SWH unit sales	13
Table 9	Australian manufactured water heater unit production	13
Table 10	Major Manufacturers of SWHs in Australia	13
Table 11	SWH Employment in Australia in 2004	14
Figure 1	Cumulative RECs to 2020 by Eligible Source	54



Part 1

1 Background

1.1 The “Doing Business in China” project

This publication is part of the “Doing Business in China” project, funded by the Australian Government through the Australian Greenhouse Office, Department of the Environment and Heritage. The project is looking to improve renewable energy market opportunities between Australia and China and to increase the capacity of Australian industry to take advantage of opportunities in the Chinese renewable energy industry as well as the reverse situation.

This publication provides information on Australia’s renewable energy use, technologies and expertise as well as information on the installed capacity, the policy drivers at a national and state level, and the companies and businesses which are operating within the renewable energy sector.

The project has been managed by the Australian Business Council for Sustainable Energy (BCSE) in conjunction with the Chinese Renewable Energy Industry Association (CREIA), and with assistance from IT Power (Australia) and Mallesons Stephen Jaques, Hong Kong.

The BCSE is a member-based industry association representing the sustainable energy industry in Australia. It covers renewables, waste-to-energy, gas-fired generation and energy efficiency. The BCSE has over 290 member organisations, including installers and designers of renewable energy systems; large project developers and project service providers (such as consulting engineers, economists, financial and legal advisors); equipment and component manufacturers and suppliers; researchers and academics; energy retailers; and energy service providers. In addition to the development of policy and advocacy activities, the BCSE runs numerous events for members during the year and undertakes projects which aim to develop the industry. It has also hosted the Secretariat and provided the Chair for the Renewable Energy Action Agenda¹. The BCSE administers the national solar photovoltaic (PV) design and installation Accreditation program.

CREIA was set up in 2000 under the support of the Capacity Building for Rapid Commercialization of Renewable Energy in China project. As an industrial association, it enjoys independence over its programs and operations.

Since its establishment, CREIA has been serving as a window to bring together national and international project developers and investors, a bridge between regulatory authorities and the industry, and a network for enterprises, drawing together renewable energy experts on research and development, production and sales, professionals and entrepreneurs to accelerate the development of renewable energy in China.

As an industrial association, CREIA has over 100 corporate members and about 160 individual members. These cover all areas of renewable energy in China, such as Solar Thermal, Solar PV, Wind, Biomass (Biogas Plant), Bagasse, Hybrids, Geothermal, Small Hydro and Ocean Energy.



1. <http://www.industry.gov.au/content/itrinternet/cmscontent.cfm?ObjectID=D5DAC0BC-6D49-4CC3-9A6AED013142802F>

1.2 Profiling Australia's Industry

Australia has a strong and diverse renewable energy industry from large scale baseload power supply (such as hydroelectricity) to small scale stand alone power systems for use in remote areas or site specific application, research and development into new technologies, and the development and implementation of training programs to support deployment and use of renewable energy technologies.

The industry has particular strengths in niche markets such as solar hot water, photovoltaics, biomass waste-to-energy conversion, small-scale wind turbines and stand-alone power systems. Australia has a leading edge in developing, manufacturing and deploying these technologies. Australia's consultancy services, project management and installation of renewable energy systems are increasingly being recognised world-wide.

Australia is endowed with considerable fossil fuel resources and has among the lowest electricity prices in the OECD, about half those in Europe and North America. As cost competitiveness of renewable energy has increased through technological advances and government assistance, certain renewable energy technologies now compete directly in the electricity market with traditional grid based suppliers.

In addition to developing and supplying renewable energy products and services, there are several Australian companies now operating internationally as renewable energy investors, financiers and developers. These firms facilitate and/or provide bulk generating solutions in a wide range of options. Furthermore, many Australian firms provide important components for renewable systems, and so play an intrinsic role in renewable energy systems from around the world.

Australia has also developed considerable expertise in the development, implementation and accreditation of renewable energy training programs. Australian companies have successfully designed and implemented programs throughout the Asia-Pacific region for solar, wind, micro-hydro and hybrid systems. In addition Australia has facilities that provide independent high quality testing services to the renewable energy industry, and specialises in testing inverters, stand alone power supply systems, solar home systems and battery charge controllers for solar photovoltaic systems.

The renewable energy technologies² utilised in Australia include:

- Bioenergy
 - Bagasse
 - Cogeneration
 - Digesters
 - Pyrolysis
 - Landfill Gas
 - Municipal Solid Waste
 - Sewage Gas
- Hydropower
- Power from the ocean
 - Tidal
 - Wave
- Photovoltaic and associated technologies
 - Flat plate modules
 - Concentrating systems
- Solar Water Heating
 - High temperature solar thermal
 - Residential systems
- Wind energy

Bulk power generation technologies such as wind, hydro, bioenergy and geothermal which provide power into electricity grids are included, as well as smaller generating units such as solar PV and solar water heaters. In Australia renewable power generation provides around 8% of electricity consumed in Australia, gas provides 14%, oil 1% and coal 77%³.

In capacity terms 8,229 MW of renewable power generation (254 projects) were in place at 31 December 2005 which was 16% of total installed capacity in Australia⁴.

Based on a 2005 survey undertaken by the BCSE, the renewable energy industry in Australia supports the direct employment of nearly 6,000 people.

2. For the purposes of this report we have limited our focus to the definition of renewable energy included under the Australian Government's Renewable Energy Action Agenda and also the Mandatory Renewable Energy Target.

3. *Energy in Australia 2005*, Australian Bureau of Agriculture and Resource Economics (ABARE)

4. *Clean Energy Report 2006*, BCSE, May 2006

2 Renewable power generation in Australia

Australia has a wealth of renewable energy resources that could be developed to meet its growing power needs. Resources and potential in Australia can be summarised as follows:

SOLAR – Australia has been an industry leader and innovator in a number of solar technologies – solar PV, solar concentrator systems and solar thermal technologies. Australia has the best solar resource of any continent.

WIND – Australia's extensive coastline and exposure to strong trade winds coming across southern Australia from the Indian Ocean provide a vast energy resource. South Australia will have 15% of its energy needs met by wind by end of 2007.

GEOTHERMAL – significant geothermal potential exists in central Australia. CSIRO's 2002⁵ report estimated that Australia has sufficient geothermal resources in central and south eastern Australia to meet more

than 800 years of Australia's power needs. The extensive distribution of high heat bearing granites under the Eromanga and Cooper Basins make this area the largest Hot Dry Rock (HDR) resource in Australia, estimated at 19 million PJ (2.5 million PJ within accessible sites).

SUGAR COGENERATION – Australia is one of the largest sugar exporters in the world and has over 400 MW of generation capacity that is operating or under construction at present. According to the Sugar Research Institute the realistic potential electricity production based on the under utilised bagasse and trash resources of the present sugar mills, is 10,300 GWh per annum. In total this is equivalent to 5% of Australia's current power needs.

OTHER AGRICULTURAL SECTOR – Australia's extensive agricultural sector is a source of considerable biomass potential. According to the 2004 *A Clean Energy Future for Australia Report*⁶, over 48 million tonnes per

annum of agricultural residues could be available to generate 47 TWh per annum of electricity. In addition, Australia's extensive fertile agricultural sector can also be used to grow energy crops. Of most potential is to use plants that can assist in restoring degraded land while also offering a crop that could be used for electricity generation. Such crops do not divert land from other productive uses because, through their restorative function, they are actually required to maintain the amount of land available for productive uses. An analysis of this resource potential undertaken for this Report estimated that electricity generation from energy crops could be in the order of 67 to 80 TWh per annum.

OCEAN TECHNOLOGIES – Australia's extensive coastline also provides a good resource for marine based renewable energy such as wave and tidal power.

2.1 Large-scale power generation

In this section we are looking at renewable energy power generation capacity in Australia at 31 December 2005. At this time, generation amounted to some 8,229 MW (excluding small-scale PV). This amounted to 16% of Australia's total installed power generation capacity of approximately 51,200 MW. A breakdown of this generation capacity by fuel type is summarised in Table 1.

Renewable energy accounts for around 8% of Australia's power production in energy terms, with gas providing 14%, oil 1% and coal the balance⁷.

TABLE 1:
RENEWABLE POWER GENERATION CAPACITY BY FUEL TYPE

Fuel Type	Installed Capacity (MW)	Number of Projects
Bagasse Cogeneration	406.3	28
Black Liquor	76.5	3
Crop Waste	1.5	1
Food And Agricultural Wet Waste	4.1	2
Hydro	7,096.0	99
Landfill Gas	130.1	49
Municipal Solid Waste Combustion	1.4	1
Photovoltaic	3.5	23
Sewage Gas	17.9	10
Wave	0.5	1
Wind	482.6	35
Wood Waste	8.5	2
Renewable Total	8,228.7	254

5. *Energy and Transport Sector – Outlook to 2020*, CSIRO, September 2002

6. *A Clean Energy Future for Australia*, Saddler, H, Diesendorf, M and Denniss, R, WWF, 2004, http://wwf.org.au/publications/clean_energy_future_report/

7. *Energy in Australia 2005*, Australian Bureau of Agriculture and Resource Economics for the Australian Government Department of Industry, Tourism and Resources, 2005

There were 254 renewable power generation projects operating at 31 December 2005, representing 8,228.7 MW of installed capacity. The largest renewable fuel source is hydropower, accounting for 86% of total renewable generation capacity. The vast majority of this hydro capacity was built prior to 1997, and operates as scheduled generation in the National Electricity Market (NEM).

Renewable power generation capacity makes up 16.1% of total Australian electricity generation capacity, with sustainable fossil fuel generating capacity (electricity generated with greenhouse emissions below the market average) making up another 22.7%. In terms of energy generated, renewables accounts for around 8% of generation and natural gas accounts for 14% (based on ABARE's most recent projections).

TABLE 2:
RENEWABLE POWER GENERATION PROJECTS COMMISSIONED DURING 2005

Fuel Type	Installed Capacity (MW) ⁸	Number of Projects
Bagasse Cogeneration	68.0	1
Hydro	44.7	4
Landfill Gas	12.1	6
Photovoltaic	0.7	3
Sewage Gas	0.1	1
Wave	0.5	1
Wind	230.0	6
Renewable total	356.2	22

2.1.1 RENEWABLE PROJECTS COMMISSIONED DURING 2005

A total of 1,008.0 MW of sustainable power projects were commissioned during 2005. Of this, 35% (356.2 MW) is powered by renewable fuel. This is over three times the 116 MW total capacity of projects

commissioned in 2004. Table 3 shows that renewable capacity commissioned in 2005 was dominated by wind projects (230 MW or 65%) and bagasse cogeneration projects (68 MW or 19%). During 2005 Energetech commissioned Australia's first wave energy project, a 500 kW capacity plant at Port Kembla in New South Wales.

TABLE 3:
RENEWABLE ENERGY PROJECTS COMMISSIONED IN 2005

Owner	Location	State	Primary Fuel	Installed Capacity (MW)
CSR	Pioneer II	QLD	Bagasse Cogeneration	68.0
AGL	Banimboola	VIC	Hydro	12.2
Hydro Tasmania	Trevallyn II – upgrade	TAS	Hydro	19.4
South West Development Commission	Pemberton	WA	Hydro	0.1
Stanwell Corporation	Kareeya II	QLD	Hydro	13.0
Global Renewables	Eastern Creek UR-3R	NSW	Landfill Gas	2.0
Landfill Management Services (LMS)	Atlas (Mirrabooka)	WA	Landfill Gas	1.1
LMS	Rochedale	QLD	Landfill Gas	3.3
LMS	Shoal Bay	NT	Landfill Gas	1.1
LMS	South Cardup	WA	Landfill Gas	3.3
Energy Developments Ltd	Mugga Lane II	ACT	Landfill Gas	1.3
Solar Systems	Hermannsburg	NT	Photovoltaic	0.2
Solar Systems	Lajamanu	NT	Photovoltaic	0.3
Solar Systems	Yuendumu	NT	Photovoltaic	0.2
Hobart City Council	Macquarie Point	TAS	Sewage Gas	0.1
Energetech	Port Kembla	NSW	Wave	0.5
AGL	Wattle Point	SA	Wind	90.8
Global Wind Partners	Lake Bonney – Stage I	SA	Wind	80.5
International Power	Canunda Wind Farm	SA	Wind	46.0
Western Power Corp	Bremer Bay	WA	Wind	0.7
Wind Power	Wonthaggi	VIC	Wind	12.0
DOTARS	Cocos Islands	Territories	Wind	0.1
	22 Projects			Total 356.2

Looking at Tables 2, 3 and 4, wind energy projects have been the most numerous in terms of projects committed, approved and installed. In terms of megawatts (MW) installed, hydropower has the most historically, with wind leading the installed capacity for 'new' renewables capacity. This trend has continued in renewable projects committed and/or under construction at 31 December 2005, but with landfill gas projects exceeding hydro in both terms of MW installed and number of projects.

2.1.2 COGENERATION AND WASTE-TO-ENERGY PROJECTS

A breakdown of renewable cogeneration projects by fuel type is shown in Table 5. The majority of the 154 cogeneration projects operating in Australia at 31 December 2005 were powered by renewable fuel, representing 509.7 MW of installed capacity. Some 80% of this supports the sugar industry in the form of bagasse cogeneration. This proportion is expected to further increase in the future with three new projects currently under construction.

2.1.3 WIND ENERGY

In 2006 there were around 1,000 MW of wind farms operating or under construction, and over 7,000 MW of wind farms under development and evaluation across Australia (refer to Table 6). This is many times the level required to meet current renewable energy targets.

The Wind Energy Forecasting Capability initiative is an AUD 14 million Government program to support the development and installation of wind energy forecasting software and systems to address the challenges of integrating greater amounts of wind power into electricity networks.

Under the program:

- Studies and research projects are under way to support development and ongoing improvement of a wind energy forecasting system for Australian conditions;

TABLE 4:
RENEWABLE POWER PROJECTS COMMITTED AND/OR UNDER CONSTRUCTION (BUT NOT INSTALLED) AT 31 DECEMBER 2005

Fuel Type	Installed Capacity (MW)	Number of Projects
Bagasse Cogeneration	85.5	3
Energy Crops	1.1	2
Geothermal	3.0	1
Hydro	9.1	3
Landfill Gas	33.8	8
Photovoltaic	0.1	1
Sewage Gas	10.8	2
Solar Thermal	0.5	1
Wind	413.5	10
Wood Waste	13.5	1
Total	570.9	32

TABLE 5:
RENEWABLE COGENERATION PROJECTS

Fuel Type	Installed Capacity (MW)	Number of Projects
Bagasse Cogeneration	406.3	28
Black Liquor	76.5	3
Crop Waste	1.5	1
Food And Agricultural Wet Waste	0.2	1
Landfill Gas	6.3	3
Municipal Solid Waste Combustion	1.4	1
Sewage Gas	14.1	8
Wood Waste	3.5	1
Renewable Total	509.7	46

TABLE 6: STATUS OF WIND ENERGY IN AUSTRALIA TO DATE⁹

Generation capacity:	471 MW
Energy generated per year:	1.4 million MWh
Average number of households supplied with wind energy:	270,000
Proportion of the Mandatory Renewable Energy Target:	15.2%
Total capital investment	\$850 million
Operations and management	\$12.5 million
Average total landholder lease payments per year	\$1.5 million
Direct Australian manufacturing jobs	335
Direct Australian construction jobs	374
Direct Australian operations jobs	120
Other direct Australian jobs	75

Refer: http://www.auswea.com.au/auswea/downloads/Tradewinds_report.pdf

- Consultation with the wind energy industry, technical experts and electricity market participants has indicated broad support for the initiative and functional requirements for the system are being developed with input from these stakeholders.

9. Refer: http://www.auswea.com.au/auswea/downloads/Tradewinds_report.pdf

2.1.4 GEOTHERMAL RESOURCES

In Australia, the main types of geothermal energy are to be found in hot dry rocks (HDR) and hydrothermal reservoirs (hot groundwater that has been heated by hot rocks). Currently, these are being used for heating applications and tested for electricity generation in various Australian States. Harnessing HDR energy typically involves drilling into and fracturing hot basement rocks, so that water can be circulated via deep injector wells into the heat source. This heated fluid is recovered from deep production wells and circulated to the surface to a heat exchanger and used to generate electricity. The fluid is then recirculated.

In Australia, the potential to produce electricity is being tested in the Cooper Basin area in South Australia and the Hunter Valley Region in New South Wales. This is being undertaken by Geodynamics. The Company's business plan is based on three stages, (i) development of an underground heat exchanger; (ii) development of a demonstration HDR geothermal power plant (10-15 MWe) and (iii) a commercial scale HDR geothermal power plant capable of generating hundreds of megawatts.

Hot groundwater has been used on a small scale in South Australia, Queensland and Victoria. For example, at Portland, naturally hot groundwater from the Portland area was used from 1985 until recently to heat municipal buildings, the town swimming pool and a motel. A number of other Australian companies are now also exploring other geothermal possibilities.

2.1.5 OCEAN ENERGY

There is significant potential for ocean energy technologies in Australia, though the projects underway to date are few. Many ocean energy devices remain at the research and development stage and have thus to enter the market. A number of demonstration projects have been installed world-wide, and companies are planning their first commercial schemes.

During July 2006, the Energetech wave energy plant at Port Kembla was deployed in the open ocean and operated successfully. The Energetech turbine performance was found to be operating at around 80% efficiency, while the overall device performed at an industry leading efficiency level (independently verified). In general, the device performed better than

previous wave tank, wind tunnel, and computer simulation tests had predicted. The structure will soon be permanently deployed, with connection to the grid via an 11 kV cable. It is expected to generate a maximum of 500 kW of power, as well as to operate in desalination mode to produce fresh water.

An AUD 40 million commercial wave power plant is planned for Portland in southern Victoria. In a world first, Energetech is investigating using technology to desalinate water from some of the proposed 10 to 15 wave energy units to be installed in waters off Portland. Each wave energy unit could produce enough electricity for 1,500 to 2,000 households or desalinate enough drinking water for 3,000 to 4,000 households. If desalination was included in the development, the project would produce both electricity and drinking water. The plant is likely to be based on the prototype built in Port Kembla. The wave energy units would be using standard reverse osmosis desalination technology and have the potential to produce three million litres of drinking water each day.

2.2 Smaller-scale bioenergy opportunities

Australia, with its extensive agricultural sector and long growing seasons has one of the best bioenergy resource bases in the world and is highly capable in the area of bioenergy. For example, Australian companies have highly regarded engineering expertise in integrating differing technologies and building systems, and over 50 years experience with the design and installation of electricity generating plants using agricultural wastes.

In Australia, there are a diverse range of biomass products, which are suitable for being used as fuel for generating heat and electricity. These

are either waste streams from existing agro-industries (e.g. mills, canneries, piggeries etc), or grown-to-order energy crops. Bioenergy production can thus help create added value to industry, plant and rural and regional economies. Bioenergy encompasses a broad range of potential feedstocks, some of which are detailed below.

- **Waste streams from agro-industries:** dairies, piggeries, chicken sheds, fruit processing, grain milling, etc. In Queensland and NSW, sugar cane waste (bagasse) is a significant renewable fuel source for heat and power generation. This is considered in Section 2.1, above.

- **Energy crops:** crops grown, under contract, for energy production, such as willow coppice or grasses. Wood chips can be used, but this is not a sustainable biomass product unless sourced from new growth, managed plantations.
- **The biodegradable fraction** from municipal and industrial wastes (also see Section 2.1).
- **Wood processing waste** – wood and paper processing, in producing a number of primary products such as construction materials, paper and packaging typically involves a substantial amount of left-over material¹⁰ that can be usefully employed to

generate electricity. Already wood wastes and paper processing wastes produce electricity equivalent to the usage of almost 100,000 households in Australia. Forest plantations, in producing timber products, leave residues

from thinning which are left on the forest floor to decay, residues from harvest of sawlogs are windrowed and burned in the forest, and mill residues are often burned as waste.

The net result is that Australian yields per hectare are about twice those of northern Europe, a region that makes far more extensive use of their bioenergy resource for energy production.

2.3 Solar energy – Photovoltaics and Solar Water Heaters

In Australia the solar energy market is divided into photovoltaic (PV) units that generate electricity, and solar water heaters (SWH) that offset electricity use (or gas) by using the energy of the sun to heat water. PV figures include high concentration solar PV applications. SWH figures do not include high temperature concentrating technologies, such as detailed below.

In terms of thermal concentrator systems, in 2003, Macquarie Generation commissioned Solar Heat and Power to build Phase 1 of a 40 MW Compact Linear Fresnel (CLFR) concentrator adjacent to its 200 MW coal-fired power station in NSW. This concentrator outputs wet steam which is fed into a heat exchanger. The concentrator is expected to generate 49,000 MWh of renewable energy annually. The Liddell project is the first full-scale trial of CLFR technology and is progressing well.

The Centre for Sustainable Energy Systems at the Australian National University (ANU), together with Rheem Australia, is constructing a large concentrating solar system that provides both electricity and hot water to a new student residence to be built on the ANU campus at Bruce Hall. This project will provide a pathway for commercialisation of the Combined Heat and Power Solar (CHAPS) collectors. Australian Government funding, through the Australian Greenhouse Office, supports this project.

It is estimated that the CHAPS collectors will contribute between a third and two thirds of the annual hot water consumption for the new building. The hot water is used to power a hydronic heating system and supply the domestic hot water needs of the individual bathrooms and kitchenettes.

It is also estimated that the PV array will contribute around 60% of the annual electricity consumption by residents in the new Bruce Hall building. The solar cells convert around 15% of the sunlight into electricity, which is delivered to the building and the electricity grid through a 40 kW grid-connected inverter.

The ANU has also developed a “big dish” concentrator system. The “SG3” 400 m² Big Dish prototype, with its associated steam system components, is the world’s largest paraboloidal dish solar concentrator. It is currently operated with a monotube boiler receiver which produces superheated steam at up to 500°C, at pressures up to 4.5 MPa. This dish is a prototype of a design that is ultimately intended for use in large scale solar thermal power generation systems, where large arrays of dishes are joined to feed energy to a central power generation plant. At the end of 2004, the ANU reached agreement with the local company Wizard Power to licence the technology for commercial deployment.

In addition, the ANU also is undertaking research on a prototype ammonia thermochemical energy storage technology. This has a 20 m² small dish experimental unit, that is currently the work-horse for the existing ammonia thermochemical energy storage system; a test array of solar air heaters with attached phase change energy storage bank; and a parabolic trough thermal concentrator test bed.

The National Solar Energy Centre (NSEC) is located in Newcastle, New South Wales on the same site as the CSIRO Energy Centre. The NSEC is the only multi-collector facility of its type in Australia and home to the largest high concentration solar array in the Southern Hemisphere. At peak operation it generates enough energy to power more than 100 homes. The NSEC consists of three main elements:

- A high concentration tower solar array that uses 200 mirrors to generate more than 500 kW of power. It will be capable of achieving peak temperatures of over 1,000°C;
- A low concentration linear solar array that produces a hot fluid at temperatures around 250°C; and
- A control room facility that will house the Centre’s communications and control systems and serve as an elevated viewing platform.

10. For softwoods (e.g. radiata pine), 40% of the logged tree is transformed into the primary product, i.e. lumber. Forty percent is transformed into chips with the remaining 20% of softwood trees turned to sawdust and shavings during milling operations. The recovery rate for hardwoods (e.g. eucalyptus) is slightly lower, with output typically being 30% and chips accounting for 50% of the original tree.

The NSEC is used to research and demonstrate advances in innovative solar technologies in collaboration with other national and international research institutes. The solar concentrators will initially be used to develop two technologies.

The low concentration array will be used to provide thermal energy that drives a small, high-speed turbine designed for use in remote power applications and distributed generation markets. This will produce electricity and heating, cooling/chilling and desalination. Thermal storage will be used to overcome the issues of transient sunlight.

The high concentration array will be used to provide the temperatures needed to produce a solar gas that contains over 25% more energy than the natural gas feeding into the process. This solar gas can then be processed to solar hydrogen. Solar gas and solar hydrogen provide all the benefits of solar energy but with the convenience of gas. It enables solar energy to be stored and transported. The technology serves as a transitional route toward higher levels of solar penetration into the energy mix.

2.3.1 PHOTOVOLTAICS

Installations of solar electric photovoltaics (PV) in Australia grew at 15% during 2005, totalling 8.3 MW installed by the end of 2005. The largest Australian PV market segment, accounting for 3.4 MW in 2005, was for off-grid systems for industrial, agricultural and telecommunication applications. Off-grid residential systems comprise the next largest market at 2.9 MW, followed by grid-connected (electricity grid and diesel grid) residential systems with 1.4 MW installed. Australia has many small diesel grid systems in remote towns. About half a MW of PV was connected in centralised systems to the main power stations, in addition to distributed systems connected via individual homes which receive power from diesel grids.

Historically, the main applications for PV in Australia have been for off-grid industrial and agricultural applications. These include power systems for telecommunications, signalling, cathodic protection, water pumping and lighting. Significant markets also exist for off-grid residential and commercial power supplies, and increasingly for fuel saving and peak load reduction on community diesel grid systems. Some of this market is supported by government grants aimed at reducing diesel fuel use. PV installations connected to central grids continue to increase steadily, with the majority of installations taking advantage of government grant programs which currently contribute

20-25% of up-front capital costs. The main applications here are rooftop systems for private residences, schools and community buildings.

Table 7 lists the major Australian manufacturers of PV modules and components and the locations of their facilities. Australia produced 35.5 MW of crystalline silicon cells in 2005 using imported wafers. Most of these were for the export market. 6.7 MW of modules were made locally, of which nearly 50% were exported. Imported modules made up an increasing share of local sales. 0.4 MW of concentrating PV systems were also manufactured and installed in 2005.

TABLE 7: MAJOR AUSTRALIAN MANUFACTURERS OF PV CELLS/MODULES AND SYSTEM COMPONENTS

Company	Manufacturing facilities
Cell and Module Manufacturers	
BP Solar	Homebush, NSW (poly and mono crystalline)
Dyesol	Queanbeyan, NSW (turnkey manufacturing solutions, technology services and materials for the production of Dye Solar Cells)
Origin Energy	Regency Park, SA (Sliver [®] cell pilot plant under construction)
Component and System Manufacturers	
M&H Power Systems	Melbourne, VIC
BP Solar	Homebush Bay, NSW
PV Solar Tiles	Sydney, NSW
Selectronics	Mooroolbark, VIC
Power Solutions Australia	Mooroolbark, VIC
Mono Pumps	Melbourne, VIC
Origin Energy	Adelaide, SA
Latronics	Moffat Beach, QLD
Solco	Welshpool, WA
Plasmatronics	Melbourne, VIC
Swiss-Electric Solar	Glynde, SA
Solar Energy Australia	Mt Kuring-Gai, NSW
Rainbow Power Company	Nimbin, NSW
Battery Manufacturers	
Century Yuasa Batteries	Carole Park, QLD
Redflow Energy	Seventeen Mile Rocks, QLD
Battery Energy Power	Sydney, NSW
Exide	Sydney, NSW
Concentrator PV system Manufacturers	
Solar Systems	Melbourne, VIC

MANUFACTURING FACILITIES

BP Solar is the major PV module and cell manufacturer in Australia, carrying out cell fabrication from imported wafers through to module fabrication, as well as total system production. BP Solar cell manufacturing capacity grew from 26 MW in 2003 to 40 MW at the end of 2004, which expanded production capacity to 50 MW by the end of 2005. 35 MW of PV product was produced in 2004, 77% of which was exported.

CSG Solar (formerly Pacific Solar) undertakes R&D on Crystalline Silicon on Glass (CSG), a thin film PV technology based on initial research at the UNSW. CSG cell and module manufacture is scheduled for 2006, but will be based in Germany.

Solar Systems is developing and commercialising its PV tracking concentrator dishes for off-grid community power supplies and end of grid applications. The CS500 concentrator system has 112 curved reflecting mirrors mounted on a steel frame, which tracks the sun throughout the day. The combination of mirror profile, mounting framework and solar receiver are carefully designed to deliver concentrated sunlight energy to each PV module. The tracking mechanism allows electricity to be produced whenever the sun is more than 5 degrees above the horizon. The heart of the system is an array of close-packed PV cells that are located in the solar receiver, suspended above the focus of the mirrors. The cells are mounted in a way that allows efficient dissipation of thermal energy as well as extraction of electricity. Since PV performance falls by around 4% for every 10°C rise in cell temperature and the sunlight is concentrated 500 times, effective cooling is critical to achieve efficient performance. The module also incorporates electrical connections to deliver high voltage direct current output as well as current and temperature sensors for real-time monitoring.

The direct current (DC) electricity from the receivers is passed through an electronic inverter that produces grid-quality alternating current (AC) electricity. Transformers step up the voltage to the requirement of the local network at the point of connection. The control system keeps each dish pointing to the sun, monitors performance and adjusts the current and voltage to maximise electricity output.

An innovation in the market is SLIVER[®] technology, developed by ANU's Centre for Sustainable Energy Systems and funded and owned by Origin Energy. SLIVER[®] technology has the potential to revolutionise the global PV power industry through its drastic reduction in the amount of silicon needed for a PV module – where silicon represents the bottleneck limiting the growth of the PV industry. A PV panel using SLIVER[®] cells will soon require just two silicon wafers to convert sunlight to 140 watts of power. By comparison, a conventional PV module needs about 60 silicon wafers to achieve this performance. SLIVER[®] cells are made from tried and proven crystalline silicon using micro-machining techniques from the semiconductor industry to create thinner cells, which are then assembled into PV modules. Origin Energy's AUD 20 million pilot manufacturing plant in Adelaide, South Australia, is now making pre-production panels which are undergoing extensive reliability testing.

In addition to PV cell and module related manufacturing, there are associated PV system components – such as inverters, solar grade glass, batteries, regulators, and control equipment – which are also manufactured in Australia. Balance of System (BOS) component manufacture and supply is a critical part of the PV system value chain.

There are a number of Australian manufacturers of inverters, battery charge controllers and inverter/chargers, particularly catering

for the off-grid system market, including Selectronics, Plasmatronics, Latronics and Solar Energy Australia. A number of these manufacturers also supply inverters suitable for grid interconnection. Inverter prices range from AUD 1-2 per W. Exide is manufacturing complete solar batteries with its Energystore products. Battery Energy is Australia's leading Gel battery manufacturer with a fully integrated Gel battery manufacturing facility in Sydney. Battery Energy manufactures a complete range of Gel batteries using its proprietary SuperGel long life plate technology developed in collaboration with the CSIRO. Battery Energy's unique technology provides for a more robust and longer battery life than traditional technologies, especially in extreme climatic conditions that makes it ideally suited to mission critical and safety applications in PV stand-alone systems, telecommunications, transport, power generation, military and other applications.

As the PV component market becomes more global, expertise is increasingly being built up at the systems design level. There are several hundred companies around Australia which distribute and install solar systems. A number of these have now become significantly large businesses, providing products and systems for a range of applications in Australia and worldwide.

ACCREDITED INSTALLERS AND DESIGNERS

In the 1990s, the PV Design and Installation Accreditation scheme was established in Australia to increase the competency of installers and designers of solar energy systems in compliance with Australian Standards. By giving customers an increased confidence in design and installation work, the scheme helps to increase the uptake of PV systems. Australia's Accreditation scheme leads the world. As at 30 March 2006, there were 223 accredited designers and installers in Australia¹¹.

11. For more information refer: www.bcse.org.au, then go to Installing Renewables/Accreditation.

TESTING SERVICES

The Research Institute for Sustainable Energy (RISE) is an Australian university-based research centre possessing the expertise and flexibility to offer a full range of testing, research & development, education and training, policy analysis, demonstration, monitoring and resource assessment services in the field of sustainable energy in the community. ResLab has an emphasis on renewable energy systems and components¹².

2.3.2 SOLAR WATER HEATERS

Solar Water Heater (SWH) sales have doubled since 2000/01; in 2004/05, SWH sales in Australia were estimated to be 42,700 units. The current installed share of SWHs in the Australian hot water market is 5%, with annual sales of AUD 135 million, including AUD 31 million of exports. Sales over the last six years are shown in Table 8.

Based on recent Australian Bureau of Statistics data (derived by home occupiers self-reporting) nearly 350,000 homes had a SWH system installed amounting to some 5% of homes.

The long term growth rate of water heater sales in Australia is forecast to be 2% per annum. However, not all water heater types are expected to grow at the same rate, with a predicted increase of gas heater market share over time and electric water heater sales have been noticeably declining. Given that water heaters account for about 30% of energy use in the residential sector and that electric water heaters account for about 80% of greenhouse gas emissions associated with water heaters, the increasing use of solar water heaters (as well as gas systems) is a positive outcome.

TABLE 8:
TOTAL AUSTRALIAN MANUFACTURED SWH UNIT SALES

Solar Water Heaters Production in Australia	Domestic market	Exports	Total
99/00	19,000	17,000	36,000
00/01	19,000	19,000	38,000
01/02	26,000	17,000	43,000
02/03	36,000	17,000	53,000
03/04	36,000	22,000	58,000
04/05	42,700	18,300	61,000

SWHs make up 9% of total water heater units manufactured in Australia (including exports), slightly higher than the SWH market share of the

domestic market (including imports) estimated to be around 6% in 2004/05.

TABLE 9:
AUSTRALIAN MANUFACTURED WATER HEATER UNIT PRODUCTION

Water heater type	Domestic Water Heater Production in 2004/05	% share of total production
Electric – instantaneous	4,000	1%
Electric – storage	390,000	55%
Gas – instantaneous	122,000	17%
Gas – storage	133,000	19%
Solar	61,000	9%
Total	710,000	

Source: Australian Bureau of Statistics

SWH systems are awarded Renewable Energy Certificates (RECs) under the Australian Government's Mandatory Renewable Energy Target (MRET) Scheme. These are assigned to small generation units by estimating generation over a 10 year period and 'deeming' RECs to the expected energy savings. Refer Annex A for more information.

MANUFACTURING AND EMPLOYMENT

Australia has nine major manufacturers of SWH systems, which are shown in Table 10.

TABLE 10:
MAJOR MANUFACTURERS OF SWHS IN AUSTRALIA

Company	Manufacturing facilities
Aquamax	Moorabbin, VIC
Rinnai / Beasley	Devon Park, SA
Dux Hot Water	Moss Vale, NSW
Rheem (Edwards)	Welshpool, WA
Quantum	Newcastle, NSW
Rheem	Rydalmere, NSW
Rheem (Solahart)	Welshpool, WA
Solco	Welshpool, WA

12. Refer www.rise.org.au

In addition to the above companies manufacturing systems in Australia, there are a number of importers of solar collectors, tanks and/or systems. All imported products must conform to relevant Australian Standards.

Current employment in the SWH industry is around 1,200 people, increasing by some 200 since 2003. A breakdown of employees by Australian SWH sector is shown in Table 11.

TABLE 11:
SWH EMPLOYMENT IN AUSTRALIA IN 2004

Sector	Employees
Distribution and sales	480
Manufacturing	360
Administration, installation and research	360
Total	1,200



Part 2

Australian Renewable Energy Businesses

Aerogenesis Australia Pty Ltd	16
Allco Wind Energy Asia/Pacific	16
Australia-China Business Council	17
Austrian Energy & Environment (Australia) Pty Ltd	18
Babcock and Brown	19
Baker & McKenzie	20
Barefoot Power Pty Ltd	21
Centre for Appropriate Technology (CAT) Incorporated, Bushlight project	22
Choice Electric Co. (Aust) Pty Ltd	23
Clarke Energy (Aust) Pty Ltd	24
CSIRO Energy Technology	25
Dyesol Limited	25
Econnect Australia Pty Ltd	26
Entech – Renewable Energy Technologies Pty Ltd.	26
Envirogen Pty Ltd	27
Garrad Hassan Pacific Pty Ltd	28
Geodynamics Limited	29
Global Sustainable Energy Solutions Pty Ltd	30
Greenbank Capital Pty Ltd	31
Green Rock Energy Limited	31
HTC Pureenergy Corp.	32
Hyder Consulting	33
Hydro Tasmania	33
Landfill Management Services Pty Ltd	34
Latronic Sunpower Pty Ltd	35
Liquitech (Qld) Pty Ltd	35
Mallesons Stephen Jaques	36
NUE Pty Ltd (trading as Nu Energy)	37
Petratherm Limited	37
Phillips Fox	38
Powercorp Pty Ltd	38
Pulse Energy Pty Ltd.	39
PV Solar Energy Pty Ltd	40
Research Institute for Sustainable Energy, Murdoch University	41
Roaring 40s	42
Selectronic Australia Pty Ltd	42
Snowy Mountains Engineering Corporation Limited (SMEC)	43
Solahart Industries Pty Ltd	44
Solar Inverters Pty Ltd	45
Solar Sales Pty Ltd	45
Solco Ltd	46
School of Photovoltaic and Renewable Energy Engineering, University of New South Wales	46
Stratcon Australia Pty Ltd	47
Windlab Systems Pty Ltd	48
Wind Prospect Pty Ltd	49
Wizard Power Pty Limited	50
ZBB China Pty Ltd	51

Aerogenesis Australia Pty Ltd

Small wind turbine manufacturers and design of blades and other components for small wind turbines.

SIZE: <25 people

DESCRIPTION Aerogenesis Australia (AA) is a small company active in the area of small wind turbine research, development, and commercialisation. It was formed two years ago by David Wood who has a Ph.D. in aerodynamics from Imperial College, London, and Harry Snaith who has a Masters' degree in composite technology from the University of Manchester. Wood was the Australian representative on the international team that produced the latest revision of the international safety standard for small turbines, which has just been published by the International

Electrotechnical Commission. In addition to the principals' expertise, AA, has consultants in the areas of finite element analysis, computer aided design and manufacture, and control systems.

AA's current major activity is the redesign of a 5 kW wind turbine with an original blade design developed by AA. The main philosophy is to produce a turbine that uses as many off-the-shelf components as possible with the eventual aim of having it mass-produced in China. These turbines will be significantly cheaper than any current competitor. The technology is very scaleable, so AA intends to move on to a 1.5 kW turbine before turning attention to larger machines, eventually up to 100 – 150 kW.

AA is currently negotiating a joint venture project in China and has strong links to research and development projects in Hong Kong aimed at developing remote and renewable power systems.

CONTACT

Name and position: David Wood, Technical Manager & Director
Telephone: +61 2 49 589958
E-mail address: David.Wood@aerogenesis.com.au
Office address: 109 Marmong Street Marmong Point, NSW 2284
Web: <http://www.aerogenesis.com.au/>

Allco Wind Energy Asia/Pacific

Wind Energy Project Co-Development and Joint Venture Partnerships. Investment in operating projects, operating/control systems and software

SIZE: >50 people

DESCRIPTION Allco Wind Energy Asia/Pacific is a division of Allco Wind Energy Management, a wholly owned subsidiary of the Allco Finance Group Limited, an international Finance and Investment Corporation in Australia.

Allco Finance Group (Allco) was formed in Sydney in 1979, and is an established and successful structured finance corporation. Allco has completed in excess of \$60 billion in finance transactions in its 27 year history. It has always specialised in arranging equity and leveraged leases for large items of plant and equipment but in recent years it has diversified its activities into structured property finance, specialized vendor finance facilities and cross border finance. Main investment areas are Aircraft, Property, Shipping, Rail and Energy assets.

In its Australian business, Allco is focused on four key areas, being equity investment, funds management, asset finance and capital markets finance. Allco is an Australian-based company with an international business including offices in major financial centres around the world including London, New York, San Francisco, Frankfurt, Hong Kong and Singapore.

Allco Finance Group, in collaboration with Australian wind development company Energreen Wind, has established a global wind farm infrastructure development group to develop, finance, own and operate wind generation assets. Currently, Allco has investments and development partnerships for an international portfolio of projects in excess of 2,500 MW in Australia, New Zealand, North America, Europe and China.

Allco Wind Energy participates in the full development cycle with expertise and skills to advance projects from 'the cradle-to-the grave' including site identification, turbine selection, wind project development, equity and finance, wind farm construction and

the long term ownership, operations and maintenance.

In China, Allco is working through direct contact with project developers and power generating corporations in mainland China and Hong Kong. Current activities are primarily in Inner Mongolia for project specific co-development and joint venture partnerships in wind generation with tender bidding and local projects.

CONTACT:

Name and position: Steen Stavnsbo – Global Head/CEO, Allco Wind Energy,
Telephone: +61 2 89167713 or +61 414 94 1340
Email: steen.stavnsbo@allco.com.au
Name and position: Alan Keller – Managing Director Energreen Wind,
Telephone: +61 2 49225000 or +61 419 141 968
Email: alan.keller@energreen.com.au
Address: P.O. Box 574 East Maitland NSW 2323
Web: <http://www.allco.com.au>

Australia-China Business Council

DESCRIPTION The Australia-China Business Council is the premier business organisation in Australia for the promotion of commercial relationships with China. Established in 1973, the Council is a non-profit national organisation with five strong autonomous branches in New South Wales, Victoria, Queensland, Western Australia and South Australia. The Council presents a number of high profile functions during the year. They host CEO briefings with distinguished visitors from China, including the October 2003 visit of President Hu Jintao, and the September 1999 visit of former President Jiang Zemin. These visits were complemented by their exclusive access to visiting National People's Congress Chairman, Wu Bangguo, in 2005.

The Council also arranges an annual visit to Canberra with briefings by top officials from the Australian Parliament, Department of Foreign Affairs and Trade and the Chinese Embassy, allowing access to the latest information and networking opportunities with members from around Australia.

The objectives of the ACBC are:

- To provide information programs and opportunities for the Australian business community to network on China business activities with their peers;
 - To host events with senior contacts within the Australian and Chinese Governments;
 - To represent members' views to Australian and Chinese policy makers, and act as a conduit between these governments and the Australian business community;
 - To support the promotion of Australia's commercial interests in China;
- To develop and maintain a high level of support for the Council's activities from the respective governments and collaborate in relevant government-initiated programs;
 - To encourage social and cultural exchanges between Australia and China.

CONTACT

Name and position: Kate Barnett,
National Director
Telephone: +61 2 9252 4277
Email: katebarnett@acbc.com.au
Address: Level 8,
17 Bridge Street
Sydney 2000 NSW
Web: <http://www.acbc.com.au>



Austrian Energy & Environment (Australia) Pty Ltd

Original Equipment Manufacturer (OEM) power plant equipment and engineering services to customers in the steam generation, power and process industries.

SIZE: >50 people

DESCRIPTION AE&E (AU) offer a full range of industrial boilers, industrial and utility heat recovery steam generators (HRSGs) and turnkey steam and gas turbine industrial power plants. AE&E(AU) also offers fluidised bed combustion systems (CFB & BFB) and flue gas desulphurisation systems. Their range of boilers can be fired by a range of renewable fuels such as agricultural waste, sewage sludge, residues from bio-fuel production, pulp and paper and many more.

AE&E has a fully-integrated engineering capability to support services projects, with an experienced team of designers supported by a range of software solutions. All engineering services have the backing of AE&E 's project management, procurement, and site construction and commissioning capabilities and their ISO 9001/ AS3901 quality systems.

AE&E (AU) is based in Sydney, and employs over 250 people. They provide Original Equipment Manufacturer (OEM) power plant equipment and engineered solutions to industries and power generators throughout Australasia and South-East Asia.

CAPABILITIES INCLUDE:

- Experienced supplier of first-class technologies and innovation strategies
- Commitment to customer needs and efficient solutions
- Global network close to customers
- Customer-oriented corporate culture
- International know-how and plant operating experience

PRODUCT CAPABILITIES INCLUDE:

- Field erected boilers firing coal, biomass, oil or gas
- Industrial sized HRSGs
- Refurbishment and performance upgrades of existing boilers
- Total combined cycle or Cogeneration power plants

SERVICE & MAINTENANCE

CAPABILITIES INCLUDE:

- Site Works – installation / commissioning
- Operation & maintenance
- Overhauls, refurbishment work & retrofits
- Plant optimisation / modernisation
- Plant performance testing and spares
- Technical support and consulting

ENGINEERING SERVICE CAPABILITIES

AE&E have a fully integrated engineering capability to support services projects, with an experienced team of designers supported by a range of software solutions providing expertise in:

- Steam Generators and Plant Design
- Combustion, Heat Transfer and Process Calculations
- Environmental Emissions Systems
- Mechanical and Civil/ Structural Design
- Piping System Design and Analysis
- Electrical, Instrumentation, and Control Systems

OTHER BALANCE OF PLANT CAPABILITY

With their experience in supplying turnkey power plant projects, AE&E have developed expertise in the integration of a wide range of "Balance of Plant" equipment into the power house environment, such as

- Solid, Liquid and Gaseous Fuel Storage and Handling
- Water Treatment, De-aeration and Chemical Dosing
- Pipework including stress analysis
- Civil and Structural works
- Burner Management Systems
- Instrumentation and Controls

ENVIRONMENTALLY FRIENDLY SOLUTIONS

AE&E (AU) offer environmentally friendly solutions for an extensive range of customers around the world. Our solutions provide electricity and heat from renewable fuels such as:

- Wood and wood waste – wood, chippings, bark, sawmill shavings
- Agricultural Waste – liquid manure, chicken manure, bagasse, rice husks, olive residues, sugar cane husk
- Food industry residues – grain husks, food waste containing animal protein
- Bio-fuel production residues – linseed cake, distilled dry grain solubles
- Industrial and municipal wastewater sludge – paper sludge, de-inking sludge
- Pulp & paper industry residues – fibre and particleboard waste, card waste

CONTACT

Name and position: Kevin Foong
 Telephone: +61 2 8870 6228
 Email: Kevin.foong@
 austrianenergy.com.au
 Office address: 16 Giffnock Avenue
 North Ryde NSW 2113
 Web: <http://www.aee.co.at>

Babcock and Brown

Owner and manager of renewable energy plants, plus significant investment and advisory capabilities

SIZE: >800 employees

DESCRIPTION Babcock & Brown is a major developer, owner and manager of wind farms, biodiesel plants, ethanol plants, biomass power plants and oil recycling plants. It is also a leading developer, financier, owner and manager of a large (3,000 MW +) thermal power generation portfolio in Australia and Europe. Babcock & Brown has a highly regarded infrastructure and project finance business operating across a diversified range of sectors, including renewable energy, power, transportation, Public Private Partnerships ("PPP") and energy distribution and transmission. The renewable energy sector, in particular the wind sector, is an important focus for Babcock & Brown, with the organisation's Infrastructure & Project Finance group active as an advisor, developer and investor in renewable energy in Australia, the United States and Europe.

It currently manages:

- Babcock & Brown Wind Partners: a AUD 0.9 billion market capitalisation enterprise which own and operates one of the largest wind power generation assets portfolio in the world;
- Babcock & Brown Environmental Investment Limited: a AUD 0.3 billion market capitalisation enterprise which build, own and operates a number of biodiesel, ethanol and oil recycling plants;
- Babcock & Brown Enersis: a Euro1.2 billion enterprise which owns 700 MW+ of operating wind, hydro and biomass power generation assets in Portugal, Spain and France; and
- Babcock & Brown also partners with many independent developers and develops renewable energy businesses/projects around the world.

In China, Babcock & Brown has been working with the following wind power developers, wind turbine manufacturers and consultants:

- China Long Yuan Electric Power Group Corp (state-owned enterprise wind power project developer)
- AlltronicTech Investment Corp, China (local wind power developer)
- Farsighted Group (local wind power project concessionaire)
- Beijing Wende Xingye Wind Energy Technic Co. Ltd (local wind power project developer)
- Guangdong Zhulong Emergency Technical Co., Ltd (local wind power project developer)
- Baicheng Chengyuan Electric Power Engineering Co., Ltd (local power bureau employees fund wind power project developer)
- Zhong Ren Wind Power Co., Ltd (local wind power project developer)
- Heilongjiang Huafu Electric Power Investment Co., Ltd (Heilongjiang power bureau employees' fund wind power project developer)
- Dalian Beiguo Wind Power Co. Ltd (local wind power project developer)
- Andong S.E.D. (Dandong) Ltd (local wind power project developer)
- Hong Kong Flyway International Group. Ltd (local off-shore wind power project developer)
- People's Government of Tuobei District, Baicheng City, Jilin Province (local municipality in-charge of wind power project development)
- Azure International Technology & Development (Beijing) Ltd (wind power project development consultant)
- Liankai Wind Power Development Co., Ltd (local wind power project developer)
- Tang Energy Group Ltd (wind power project developer and wind blade manufacturer)

- Guohua Energy Corporation Ltd (state-owned enterprise wind power project developer)
- Garrad Hassan and Partners Ltd Beijing Representative Office (wind energy consultant)
- Nantong CASC Wanyuab Acciona Wind Turbine Manufacture Co., Ltd (1.5MW wind turbine unit manufacturer utilising technology transfer from Fuhrlander)
- Dongfang Electric Wind Turbine Manufacture Co., Ltd (1.5MW wind turbine unit manufacturer utilising technology transfer from Repower)
- Dalian Heavy Industry Co., Ltd (1.5MW wind turbine unit manufacturer utilising technology transfer from Fuhrlander)
- Sichuan StarCorp Electric Power Co., Ltd (small-scale hydro electric power project developer)

CONTACT

Name and position: Raymond Fung, Business Development Manager
 Telephone: +61 2 9229 1800
 Email: Raymond.fung@babcockbrown.com
 Address: Level 39, Chifley Tower 2 Chifley Square Sydney NSW 2000
 Web: <http://www.babcockbrown.com>

Baker & McKenzie

Legal services

SIZE: >50 in Australia

DESCRIPTION Baker & McKenzie has the world's largest and most experienced team of climate change lawyers working in developed, developing and least developed country jurisdictions. The firm has provided legal advice on nearly all of the major international carbon transactions and carbon projects, and given assistance to many countries in the development of climate law.

Specific expertise includes:

- advising on the development of green field renewable energy projects and assisting project participants, including drafting Power Purchase Agreements and arranging project financing;
- assisting with the design of and participation in new environmental markets and trading regimes;
- advising on and structuring of early climate change projects, including CDM and JI projects;
- advising ethical investment and technology funds;
- advising and assisting corporations in the development of greenhouse and climate change policies, carbon trading strategies and market analysis;
- working on the carbon aspects of M&A transactions and new investments;
- advising on early carbon trades, including the development of bilateral and multilateral trading platforms, support to early exchanges, and identifying possibilities for securing carbon rights; and
- advising on international, regional and domestic climate law and policy.

Baker & McKenzie has significant experience in advising clients on renewable energy, climate change and CDM projects in China.

RECENT HIGHLIGHTS INCLUDE:

- Representing the World Bank in raising investment in its Umbrella Carbon Fund and the ultimate negotiation by that fund of a USD 930 million contract for the purchase of CERs from two industrial gas CDM projects in Jiangsu Province in China.
- Representing Roaring Forties (a joint venture between China Light and Power and Hydro Tasmania) on the development of CDM wind projects in several areas in China.
- Advising major carbon funds, including the World Bank's carbon funds, Climate Change Capital Carbon Fund (C4F), Rabobank International's CDM Facility and the European Carbon Fund, on the purchase of CERs under the CDM from a number of Chinese renewable and industrial projects.
- Advising Grontmij BV (a top European engineering firm) on the off take of CERs from a landfill project in China and the China rules surrounding CDM project development.
- Providing expert advice to the National Development Reform Commission on China's climate change strategy.
- Advising Climate Change Capital on the establishment of a China branch office to manage its Chinese project portfolio.
- Conducting CCLaw Assist capacity building workshop in Beijing on climate change laws and project development.
- Advising major multinational clients on the development of China's Renewable Energy Law and surrounding regulations.
- Advising Han Wind (DGM) on locating wind farm sites and developing wind projects in China, including on project finance issues.

Baker and Mackenzie has offices in Beijing, Hong Kong and Shanghai and regularly participates in conferences and trade fairs in the region.

CONTACT

Name and position: Martijn Wilder, Partner and Head, Global Clean Energy and Climate Change Practice
 Telephone: +61 2 9225 0276
 Email: martijn.wilder@bakernet.com
 Fax: +61 2 9225 1595
 Address: PO Box R126, Royal Exchange – Sydney NSW 1223
 Web: <http://www.bakernet.com>

Barefoot Power Pty Ltd

Project Developer. Barefoot Power provides consultancy services, undertakes research, and initiates and manages village electrification projects.

SIZE: <25 people

DESCRIPTION Barefoot Power was formed to deliver essential services to developing countries, with a focus to a committed presence in these countries. Three major areas are covered:

- Consulting services for larger companies in developing countries;
- Investing in the delivery of essential services to rural villages; and
- Developing small renewable energy power stations.

The Barefoot team has a wide range of enabling skills for developing renewable energy projects. These include:

Renewable energy power generation and distribution

- renewable energy project development, including investment
- distribution system design for rural electrification
- micro-hydro design and installation
- solar photovoltaic design and installation
- large scale wind farm development
- wind/solar/diesel hybrid power projects
- biomass gasification and improved cookstoves
- biofuels, including straight vegetable oils and biodiesels
- project management from concept to commissioning

Generation and demand side resource assessment

- GIS and its use in energy planning – wind, solar, hydro and biomass resource mapping, future grid expansion planning
- energy efficiency and demand side management
- distributed utility assessments using Monte Carlo simulation
- sustainable energy options studies for provincial governments

Capacity building and project impact assessments

- community liaison and management training
- engineering software development and training
- technical and management training of rural communities
- socio-economic impact studies of rural electrification
- environmental impact assessment
- policy design and regulatory assessments
- strategic energy planning for businesses & government

An essential characteristic of delivering such services to remote and rural areas of developing countries is captured by the name of the company. In countries such as China, the terms “barefoot doctor” or “barefoot engineer” are often recognized as describing well-trained people that venture by foot to remote areas to install water supply systems or offer higher level medical services. Our staff are highly mobile, highly interested in experiencing real life in different countries, and use the maximum benefits of modern technology to deliver high quality services where required with a minimum of overheads.

Barefoot Power believes that without committed presence on the ground, and transfer of our skills to local people, our aims of reducing poverty and improving opportunities in rural areas of developing countries will not be achieved.

CONTACT

Name and position: Stewart Craine, Director

Telephone: +61 424 793 485

Email: stewartc@barefootpower.com

Office address: 79 Morrissett Street Bathurst NSW 2795

Web: <http://www.barefootpower.com>

Centre for Appropriate Technology (CAT) Incorporated, Bushlight project

CAT provides engineering and consultancy services, and has expertise in the design, manufacture and installation of high quality renewable energy systems

SIZE: 25 to 50 people

BUSHLIGHT: LIGHT AND LIFE IN THE BUSH Bushlight is an Australian government-funded organisation, formed in July 2002 to address critical shortcomings in the reliability and performance of renewable energy services in small remote Indigenous communities in Australia.

Bushlight designs and manages the installation of renewable energy systems which operate reliably across the range of climatic and environmental conditions from coastal to desert locations and which communities can operate safely and with confidence. It has installed nearly 100 renewable, highly reliable energy systems in more than 80 remote communities across Australia. Integral to the reliability of energy services has been the engagement of community residents in choosing, operating and managing their energy services. This has been achieved through the development and implementation of a Community Energy Planning process modelled on the internationally recognised Sustainable Livelihoods community development framework.

With input and support from the renewable energy industry in Australia, Bushlight has created a new Australian and international benchmark for the design, installation, maintenance and performance of small and medium-scale renewable energy systems. In addition, access to reliable renewable energy services is providing increased livelihood opportunities for nearly 2,000 indigenous Australians living in remote communities. Bushlight offers:

- Building community capacity to choose and manage renewable energy services, including development of pictorial-based training materials;
- Design and specification of high quality and reliability renewable energy systems to appropriate Australian and international standards;
- Standards and specification development for renewable energy system design, installation, commissioning and maintenance; and
- Project management of renewable energy system installation and maintenance.

CONTACT

Name and position: Grant Behrendorff, Group Manager, Bushlight, Centre for Appropriate Technology

Address: PO Box 8044
(32 Priest Street)

Alice Springs NT 0871

Telephone: +61 8 8951 4330

Email: grant.behrendorff@bushlight.org.au

Web: <http://www.bushlight.org.au>

Choice Electric Co. (Aust) Pty Ltd

Wholesale and distribution of PV equipment to the solar power market

SIZE: <25 people

Established in 1983, Choice Electric Co is an innovative Queensland company pursuing excellence in solar technology and applying it in ways that benefit people's lives. Choice staff and contractors have been designing and constructing solar power systems for over 20 years. Choice Electric Co. is one of Australia's largest independent solar electric systems houses.

Choice is using PV technology to make modern lifestyles possible in the most remote locations around Australia, and across many of the Pacific islands and Asia.

PV POWER SYSTEM EXPERTISE AND PRODUCTS INCLUDE:

- Grid connect systems – GridPower™
- Remote Area Power Systems (RAPS).
- Communications
- Recreation vehicle, motor home & marine applications
- Solar area and path way lighting.

Choice is Australia's leading distributor for Sharp Solar. Both Sharp and Choice Electric are committed to raising the industry standard for quality and reliability of solar power systems. They are the Australian importer, distributor and service centre for SHURflo solar pumps, and for UniRac Solar Mount universal PV mounting frames. Choice pioneered the marketing, testing and certification for Fronius grid inverters in Australia. Their position as distribution agents is used to ensure that products are delivered to the market with the appropriate knowledge and after sales support. Choice Electric has achieved the number 1 position in Australia for sales for S.E.A. power inverters and Century Yuasa batteries over the last 3 years.

Choice Electric conducts product research and development in many areas, and was recently awarded a Queensland Government innovation grant to develop a solar street light using High Intensity Discharge lighting.

MANAGEMENT AND STAFF:

Choice sees this as their major strength: the directors are hands on, and decisions are made on site with strong participation and involvement by staff members. They also receive technical support and training from their suppliers, and they employ the latest computer aided design software. Customer service is important to Choice, they believe their customers deserve to talk to staff that have technical skills in selecting the right products, system design, troubleshooting and fault diagnosis. Training, staff morale and Workplace Health and Safety are of paramount importance.

Strong domestic market and exported throughout the Pacific region: Choice Electric employs 11 full-time staff, 3 casuals, and has strong alliances with electrical contractors and accredited installers. Choice Electric has an extensive distribution network throughout Australia and the Pacific region.

CONTACT

Name and position: Brian Nowakowski

Telephone: +61 7 3868 1999

Email: brian@choicelchoiceelectric.com.au

Address: 150 Gerler Road

Hendra QLD 4011

Web:

<http://www.choicelchoiceelectric.com.au/>



Clarke Energy (Aust) Pty Ltd

Clarke Energy is a hardware manufacturer, exclusive distributor for GE Jenbacher Gas Engines – Power Generation, project developer, and provides engineering and project delivery services. Clarke Energy also has after-market support, operation, maintenance and service capability.

SIZE: >50 people

DESCRIPTION Clarke Energy is a leading global energy systems company offering a wide range of sustainable and renewable energy generation solutions. As a 'Gas to Energy Solutions' provider of gas engine generation and gas management solutions for natural and non-natural gases, Clarke Energy has an unrivalled quality of product and service performance in this industry. In 1995, Clarke Energy was appointed as the exclusive UK distributor for GE Energy Jenbacher engines - the world's leading manufacturer of gas engines and cogeneration units. Today, Clarke Energy is now the exclusive distributor for GE Energy Jenbacher gas engines in the UK, Australia, New Zealand, France, India, Ireland and Nigeria. Within the countries where Clarke Energy distributes GE Energy Jenbacher products as well as providing operation and maintenance support, it has over 1.5GWe of installed capacity; of this approximately half is in non-natural gas renewable energy applications. In total Clarke Energy is responsible for approximately 900MWe. Clarke Energy, world-wide, is the largest distributor of GE Energy Jenbacher gas reciprocating engines. GE Jenbacher is the only company in the energy industry concentrating exclusively on gas engine technology. The engines are manufactured at GE's

factory in Jenbach/Tyrol, Austria and designed to run on gas (not diesel engine conversions): either natural gas, landfill gas, biogas, non-natural gas or special gases. Over five decades of experience in the gas engine business has resulted in 1,000's of GE Energy Jenbacher engines being installed globally. These high-tech engines cover a range from 330kWe to 3MWe, and are designed as stationary continuous operation units.

The Clarke Energy's Engineering, Project Management Sales, Operations and Service teams are able to meet the needs of the customer through their extensive technical knowledge and experience of the GE Jenbacher engines and gas treatment technology.

The high class leading efficiency (42%+) of GE Jenbacher engines with lean burn technology (Leanox™) have allowed Clarke Energy to lead the way in green Gas-to-Energy Solutions.

With the GE Jenbacher product range, Clarke Energy has developed to encompass many varied gas generation and cogeneration applications – ranging from landfill gas containerised modular installations for waste-to-energy schemes, to 'turnkey' 30 MW power station projects for major Australian coal-gas companies. This has also led to the setting up of a dedicated product support facility with

remote monitoring facility, spares stock holding, and full engine rebuild and refurbishment capabilities.

CONTACT

Name and position: Greg Columbus, Managing Director

Telephone: +61 8 8290 2100

Email: gregc@clarke-energy.com

Office address: P.O. Box 136

Hindmarsh SA 5007

Web: http://www.clarke-energy.co.uk/clarke_offices/clarke_australia.htm

CSIRO Energy Technology

CSIRO Energy Technology is a leading research organisation covering a range of solar energy technologies.

SIZE: >50 people

DESCRIPTION Expertise and services available from CSIRO Energy Technology include:

- Research, testing, development and demonstration of renewable technologies, particularly medium to high temperature solar thermal.
- Providing access to CSIRO's National Solar Energy Centre

which comprises a 150 kWth trough array (coupled to Rankine cycle, storage and chiller); 550 kW solar tower (for high temperature work) and also a 112 m² solar dish. These fully-instrumented solar fields are available to test new technologies and energy conversion concepts.

- High level modelling skills including thermodynamic cycles, computational fluid dynamics (CFD), thermochemical processes and complete system performance.
- Optical skills in beam splitting and ray tracing.
- Photocatalysis and organic photovoltaic devices.

CONTACT

Name and position: Mr Wesley Stein
 Telephone: +61 2 49846498
 Email: wes.stein@csiro.au
 Office address: 10 Murray Dwyer Cct, Mayfield West (P.O. Box 330)
 Newcastle NSW 2300
 Web: <http://www.csiro.au>

Dyesol Limited

Dyesol is a leading supplier of 3rd generation Dye Solar Cell (DSC) Technology.

SIZE: <25 people

DESCRIPTION Dyesol has associations with leading scientific and academic institutions in China and participates in regional trade fairs. It has an informative website with e-commerce facilities, and a free newsletter subscription. Dyesol uses AusTrade to represent it at international fairs.

Dyesol manufactures a range of products and related services aimed at assisting DSC researchers and technologists, including supply of materials, components, equipments, training, testing and validation services.

Dyesol offers a range of consulting services relating to the Industrialization and commercialisation of DSC technology, including research and development, new product applications and prototyping.

CONTACT

Name: Ken McKeen – International Business Development
 Telephone: + 61 2 6299 1592
 Email: dyesol@dyesol.com
 Address: P.O. Box 6212 Queanbeyan NSW 2620
 Web: <http://www.dyesol.com>

Econnect Australia Pty Ltd

Consultancy services

SIZE: <25 people

DESCRIPTION Econnect is an international electrical engineering consultancy which is focussed on innovative solutions for the grid-integration of renewable and distributed generation. In addition to front end design, they are also pioneering intelligent solutions for electrical load and active network management in order to achieve better utilisation of weak or constrained electrical networks. They have been active in the market for more than 10 years, and have gained operational experience in more than 20 countries around the world. They have offices in the UK, Ireland, Australia and New Zealand.

In the coming years China has significant need for very substantial investment in electricity generation, transmission and distribution assets in order to meet brisk growth in demand for electricity as a result of the rapid industrialisation of the Chinese economy. China has also announced very demanding targets for increasing the penetration of renewable energy throughout the country. Against this background of rapidly increasing renewable energy supply, growing demand and constrained transmission and distribution networks, Econnect is exceptionally well placed to assist Chinese companies in:

- Maximising the penetration of renewable energy
- Optimising the usage of constrained electricity networks.

CONTACT

Name and position: James Glennie, Managing Director
 Telephone: +61 3 9650 1124
 Mobile: +61 406 627 127
 Email: james.glennie@econnect.com
 Office address: Suite 201, Level 2
 55 Swanston Street
 Melbourne VIC 3000
 Web: <http://www.econnect.net.au>

Entech – Renewable Energy Technologies Pty Ltd.

Environmental services

SIZE: 25 – 50 people

DESCRIPTION ENTECH Renewable Energy Systems produce clean energy from biomass or waste, thereby replacing millions of tonnes of fossil fuel as an energy source. These sources are environmentally superior to fossil fuel combustion, mass-burn incineration or conventional waste to energy, fuel sources. ENTECH Renewable Energy Systems = fossil fuel reduction + greenhouse gas reduction + clean energy + superior waste resource utilization.

ENTECH Renewable Energy Systems has more than 50 applications worldwide, with technology which is proven to replace millions of tonnes of fossil fuel as an energy source by utilizing a wide variety of biomass and wastes as fuel. The latest US-EPA studies show that ENTECH Renewable Energy Systems produce less HAP's (hazardous air pollutants), including dioxins than combustion of any fossil fuel.

Instead of burning waste the ENTECH Renewable Energy System heats it to its ignition temperature in an oxygen-depleted environment. The thermal degradation process used is a combination of semi-pyrolysis and gasification, whereby the solid form is converted into a gaseous form that is referred to as "syngas", which is a volatile and energy rich gas having similar properties to methane gas. Just like other combustible gases, the syngas can be fired into boilers, gas engines, fuel cells or other energy generators to produce clean energy in the form of electricity, steam or domestic heating.

ENTECH Renewable Energy Systems are suitable for municipal solid waste, refuse derived fuel and any waste or biomass of an organic or synthetic nature, including that produced by:

- Municipalities.
- Waste disposal contractors
- Manufacturers & factories
- Medical facilities
- Quarantine facilities
- Petrochemical industry

- Plantation
- Forestry industry
- Food industry
- Pharmaceutical industry,

CONTACT

Name and position: Neil Martin
 Telephone: +61 8 9456 5688
 Email: neil.martin@entech.net.au
 Email: info@entech.net.au
 Telephone: +61 8 9456 5688
 Facsimile: +61 8 9456 5699
 Address: PO Box 1088,
 Canning Vale WA 6970
 Web: <http://www.entech.net.au>

Envirogen Pty Ltd

Power generation stations utilising waste and renewable resources (55 MW).

DESCRIPTION Envirogen Pty Limited and its associated companies – Hydro Power Pty Limited and Envirowind Pty Limited – are a privately-owned group which develop and operate small environmentally-friendly power stations throughout Australia.

The power stations utilise waste and renewable resources, thus contributing to meeting increased energy demand with environmentally-responsible alternatives to fossil fuel-fired power stations. The Envirogen power stations generate electricity using waste mine

gas, water and wind. Envirogen has four power stations which are currently in service, located at Wyangala Dam, Tahmoor Colliery and Teralba Colliery (all in New South Wales), and the newly-commissioned Oaky Creek power station in Queensland. A fifth waste coal mine gas power station, at Glennies Creek Colliery in New South Wales, is due to commence construction in 2006.

The Envirogen Group has developed a significant management capability and expertise to cover all development phases from inception through to commissioning and operational management. Envirogen is committed to working in partnership with site

owners, government bodies and energy retailers. It has developed a sound understanding of the intricacies of these relationships and the issues that face co-operative project planning.

CONTACT

Name and position: Jeff Rice, Chief Executive Officer
Email: Jeff.rice@envirogen.net.au
Office address: Envirogen Pty Limited
106 Crescent Road
Newport NSW 2106
Web: <http://www.envirogen.net.au>



Garrad Hassan Pacific Pty Ltd

Consultancy services

SIZE: >50 people

DESCRIPTION Garrad Hassan (GH) is an independent engineering consulting firm specialising in wind energy. They supply independent expert advice on all technical, commercial, environmental and strategic aspects of wind energy. They work globally, with experience in 40 countries and offices in Australia, New Zealand, Japan and China.

Garrad Hassan and Partners Limited was established in 1984 in the UK, in answer to a growing need for independent expert advice on wind energy. GH now employs over 150 full time staff working in the wind energy industry around the world, and is recognised as a leading independent authority. Their client list includes all the major wind turbine manufacturers, developers, banks and lenders. GH maintains its independence by taking no equity stake in any development or technology, working purely on a consultancy basis.

GH's expertise covers every aspect of wind energy: acted as Bank's or Owner's Engineer for 5,000 MW of operating wind farms around the world; and carried out energy assessment totalling over 20,000MW. GH provides due diligence work, contract review and supervision for banks and lenders. Energy resource assessment, wind farm design and development services, on- and offshore are major parts of their portfolio. GH has significant experience and expertise in providing independent assessments for investors.

Leading products for the design of wind turbines and wind farms: *GH Bladed*, launched in 1996, is the industry standard software package for turbine design and analysis. *GH T-MON* is an integrated hardware and software system for measurement of structural loads and performance of wind turbines. In 1998, it launched *GH WindFarmer*, the advanced software tool for the design and analysis of wind farms, which is used throughout the world. *GH SCADA* is the leading independent wind farm management, information and reporting tool. *GH Forecaster* was launched in 2003 to provide short-term forecasts of the wind energy production of wind farms.

Wind Farm Energy: GH has developed a sound methodology for accurately assessing wind and climate and a reliable prediction of expected energy production from any wind farm. GH has assessed over 20,000MW of wind power globally.

Wind Turbine Design, Testing & Certification: GH offers a full range of wind turbine design, testing and certification services.

Strategic and Policy Studies: GH's expert advice is based on in-depth knowledge of markets, trading and planning issues fully reflecting local circumstances.

Offshore Wind Farm Development and Construction Monitoring

Services: full support to offshore wind farm developers and lenders. The offshore team delivers a specialised development and analysis service; and offers a construction monitoring service to project owners, providing technical support, project management functions, marine warranty surveys, health, safety and environmental support, plus full marine and technical support through construction operations.

Wind Farm Electrical Engineering: extensive experience of windfarm electrical systems, including new wind farms, extensions, re-powering and industrial on-site generation. Projects on- and offshore range in size from single turbines up to several hundred megawatts.

CONTACT

Name and position: Graham White, Managing Director
Telephone: +61 3 9370 2500
Email: white@garradhassan.com.au
Address: P.O. Box 1005
Moonee Ponds VIC 3039
Web: <http://www.garradhassan.com>

Geodynamics Limited

Research and development in renewable geothermal energy generation from hot rocks

SIZE: 10 people

DESCRIPTION Geodynamics Limited was registered as a public company in November 2000, formed solely to focus on developing renewable geothermal energy generation from hot fractured rocks (HFR). Its overall objective is to become the leading renewable energy company in Australia. In 2001 and 2002, Geodynamics secured two geothermal exploration licences in the Hunter Valley in New South Wales and two in the Cooper Basin in South Australia. A site in one of its South Australian licences was selected for development of Australia's first HFR underground heat exchanger late in 2002.

Geodynamics has established close links with HFR experts in France, Germany, Japan, UK and the USA. Through these links, it has gained access to the results of millions of dollars of R & D generated internationally.

A three-stage approach has been adopted to develop Geodynamics based on its Cooper Basin site, where it believes there is enough resource to provide all of Australia's current electricity requirements for 70 years. To date, the Company has focused on field activities to prove Stage 1.

Stage 1: Underground Heat Exchanger Development. It involves drilling the first deep well and the development of a subterranean, engineered, heat exchanger in hot granites. This is followed by the drilling of a production well and proving the output of the underground heat exchanger through circulation.

Stage 2: Demonstration Plant Development – the construction of a geothermal power plant (2-3 MWe). This stage requires approximately 18 months to 2 years to complete.

Stage 3: involves the scaling-up to a commercial plant in the order of hundreds of megawatts. The initial commercial development is for a 40 MWe power plant deriving from 3 injection wells and 4 production wells at a cost of AUD 226 million. The total electricity costs are estimated to be between 7 and 8 AU cents/kWh, whilst operating costs are estimated at less than 1 AU cent/kWh. For later larger-scale developments, electricity costs are expected to fall to 5 AUD cents/kWh.

In its Stage 1 program, Geodynamics has drilled injection and production wells 500 m apart to depths of 4,300 m where rock temperature has been proven at 250°C. Connection through a fracture system has been proven, and this system has been enhanced by what is termed "hydraulic stimulation". The stimulation involves high pressure water injection into the natural fracture network. The pathways of water flow are traced using a microseismic monitoring system that detects slight movements of the rock during flow (acoustic emissions). At the same time these slight movements lead to increased fracture permeability and more efficient flow within the fracture network. Geodynamics claims to have built the world's largest artificially-enhanced underground heat exchanger. It has also flowed water and steam from its production well at temperatures over 200°C.

CONTACT

Name and position: Lisa Huet, Executive Assistant
 Telephone: +61 7 3721 7500
 Email: lhuet@geodynamics.com.au
 Office address: Suite 6, Level 1
 19 Lang Parade, Milton QLD 4064
 Web:
<http://www.geodynamics.com.au>

Global Sustainable Energy Solutions Pty Ltd

Consultancy services, technician training, and capacity-building in training

SIZE <25 people

DESCRIPTION Global Sustainable Energy Solutions (G.S.E.S) is a consultancy business that started as a consortium of renewable energy system designers and installers. G.S.E.S started in Australia in 1998 with four directors: Geoff Stapleton, Susan Neill, Kim Atkinson and Stephen Garrett. Each of the four directors has over 18 years experience operating their own sustainable energy companies within Australia. In 2006, GSES appointed a local representative in Beijing.

Initially the aim of the business was to partner RE businesses in developing countries and be involved in projects within those countries. Though this is still one of the company's objectives, it is currently only a minor part. A need identified very early in its history, was for technical training. If the projects that were planned or being undertaken in these countries were to be successful they needed well trained technicians to design, install and maintain the systems – which was not usually the case especially when G.S.E.S. commenced operations.

G.S.E.S specialises in capacity building in technical training and the development of technical standards and certification programs for technicians. G.S.E.S has the regional licence for the Institute for Sustainable Power (ISP) – a non-profit organisation that specialises in the accreditation of RE training programs.

Projects undertaken by G.S.E.S include:

- Development of RE training Strategy for China – partner CREIA – funded by DEH (Australia) through Climate Change Partnership Program (June 2005-December 2006)
- APEC Renewable Energy Standards Projects – Phase 1 and 2. Project managed by G.S.E.S on behalf of ISP; partner CREIA. Funded by APEC (2002-2006)
- Development of Regional Competency Standards for Training in Renewable Energy – ASEAN region. Project funded by Australian ASEAN Development Cooperation Program (August 2003- July 2006)
- Development of Solar Training School in Ghana. Funded by DEG, Germany. (April 2005-July 2007)
- Development of BIPV training course and certification of technicians program in Malaysia. Funded by UNDP. (April 2006-July 2007)
- Solar Technician Training Development in Sri Lanka. Funded by World Bank (2001-2002)
- Preparation of the Teachers' Solar Lighting SHLK Product Catalogue – Papua New Guinea. Funded by World Bank (2005)
- Developed project documentation for Pacific renewable Energy Training Initiative (PRETI). Funded by UN-ESCAP (2005)

CONTACT

Name and position: Geoff Stapleton or Stephen Garrett

Telephone: +61 2 4457 3057 or +61 2 6495 6922

Email: gses@bigpond.com or sgarrett@aapt.net.au

Fax: +61 2 4457 3666

Address: P.O. Box 57
Ulladulla NSW 2539

Web: <http://www.gses.com.au>

Greenbank Capital Pty Ltd

Greenbank's major focus is on facilitating projects for its shareholders.

SIZE: <25 people

DESCRIPTION Greenbank Capital – *China Services*: market analysis, corporate structures and funding support and carbon financing.

CONTACT

Name: Mark Fogarty
 Telephone: + 61 414 827129 or +61 2 9221 2191
 Email: mfogarty@greenbankcapital.com.au
 Office address: Level 7
 No 1 Bligh Street
 Sydney NSW 2000
 Web:
<http://www.greenbankcapital.com.au>

BEIJING

c/- The Tree, 43 Bei Sanlitun Nan
 Chaoyang District
 Beijing, PRC
 Telephone: +86 13439840801

Green Rock Energy Limited

Green Rock Energy Limited is focusing on the evaluation, development and management of geothermal energy projects with an emphasis on hot dry rock (HDR), using commercially and technically focused drilling and fracture stimulation management teams.

SIZE: the Company has a market capitalization of approximately AUD 5.0 million.

DESCRIPTION Green Rock Energy's principal project is the evaluation and development of a 400 MWe+ geothermal power plant on its geothermal exploration licence areas in central South Australia to supply the current and proposed electricity needs of BHP Billiton's copper operation at Olympic Dam and the surrounding area. The Company is reviewing other geothermal projects, within Australia and internationally with the objective of acquiring a portfolio of commercial geothermal projects.

With the increasing world cost of fossil fuels, and significant technological HDR improvements, particularly associated with drilling and rock fracturing, the concern over carbon emissions and the desire by governments for an ever increasing percentage of renewable energy, base-load electricity generated from geothermal energy has become cost competitive. Green Rock Energy proposes to capitalise on the increasing cost competitiveness of

geothermal energy with a focus on HDR opportunities. The Company is pursuing projects where success will provide exceptional returns.

The company's Olympic Dam Geothermal Energy Project is located within 10 km of BHP Billiton's Olympic Dam copper and uranium mine, and only 5 kms from a 275 kV and a 132 kV power transmission line connected to the Eastern Australian power grid. The geothermal licence area has the potential to support a power plant with a capacity up to 1,000 MWe. This would make the project a world-scale geothermal power producer. Any power produced in excess of BHP Billiton's and the surrounding areas requirements could potentially be supplied to the Eastern Australia electricity grid. Preliminary analysis, following the drilling of a 1.9 km deep exploratory diamond hole, indicates that a 400 MWe geothermal power plant at Olympic Dam has the potential to have in excess of a 40 year commercial life and costs towards the bottom end of the electricity production cost curve. The next and final stages in the pre-development evaluation of the Olympic Dam Geothermal Energy Project are the drilling of two deep production wells, the establishment of the underground permeable reservoir connecting the wells and testing of the water circulation through the reservoir. This is planned to commence early in 2007.

Applications for geothermal exploration licences have been lodged over other prospective geothermal energy areas in South Australia.

In addition to the Australian geothermal projects, Green Rock Energy is evaluating the acquisition of a selective portfolio of geothermal energy projects in Europe, New Zealand, and the USA.

Green Rock Energy has been admitted as a member of the Geothermal Implementing Agreement (GIA), established under the auspices of the International Energy Agency. The GIA provides broad international cooperation between member countries in geothermal R&D and seeks to overcome barriers to the development of geothermal energy utilization.

CONTACT

Name and position: Adrian Larking, Managing Director
 Alan Knights, Executive Director
 Telephone: +61 8 9482 0482
 Email: alarking@greenrock.com.au, aknights@greenrock.com.au
 Office address: Unit 6,
 38 – 40 Colin Street
 West Perth WA 6005
 Web: <http://www.greenrock.com.au>

HTC Pureenergy Corp.

Consultancy services on the management of CO₂. Technology developers of Dry Reforming Ethanol into Hydrogen for onsite distribution of Hydrogen

SIZE: 25 to 50

COMPANY DESCRIPTION: HTC provides technology to generate hydrogen from gas, including biofuel feedstocks, using a novel dry reforming process. In contrast with conventional hydrogen steam reforming technologies, where steam is reacted with the feedstock to generate hydrogen, HTC's process uses carbon dioxide to carry out the first step in the process. As with steam reforming, this produces a gas stream consisting of hydrogen and carbon monoxide (often referred to as synthesis gas), which can be further refined using a water-gas-shift reactor. The process is more scaleable than existing reforming technologies and provides more compact and efficient reformers. Additionally HTC's reformer configuration also includes technology that can capture any excess CO₂ not recycled in the reaction.

Dry reforming is a well documented concept, having been explored by a number of research teams worldwide however HTC is the first organisation to demonstrate a commercially viable dry reforming technology which is unique, novel and patented by HTC.

HTC's advancement in the development of a CO₂ reforming catalyst that is resistant to deactivation has been the most significant issue in advancing the commercialisation of dry reforming technology. HTC has developed systems that operate at reduced levels of heat requirement in the dry reforming phase and increased the operating temperature of the water-gas shift phase, thereby balancing the thermal requirements of the two processes and leading to greater energy efficiency versus conventional hydrogen reforming systems. Importantly this heat balancing process allows for the proprietary catalysts of HTC to be manufactured from relatively low-cost, non-noble metal formulations compared to the platinum group metals used in most other catalysts of this type.

In parallel with catalyst development, HTC has also developed proprietary modeling and simulation technology which assists in catalyst and reactor design. Whilst the initial focus was on the dry reforming of natural gas, development of reforming technology for other fuels such as ethanol, gasoline and methanol has also been completed which require their own unique catalyst and process design.

The HTC dry reformation technology is highly scalable from appliance size as might be located in a private home – to industrial plants. This means the process can be deployed at a wide range of sites in which hydrogen is produced local to the point of consumption. This overcomes one of the main barriers to the widespread adoption of hydrogen as a consumer end use fuel i.e. the difficulty in storage/transportation due to metal embrittlement and leakage.

HTC's method for dry reformation of natural gas into hydrogen extracts more usable energy content from natural gas (at least 1.4 times) than combusting it in even the most efficient steam boiler or gas turbine. It extracts much more energy content in the form of hydrogen than what the natural gas itself contains. Out of the 4 atoms in natural gas (CH₄) the overall dry reforming process actually extracts 8 atoms during the process, the extra 4 atoms being obtained from water by reactions 1 and 2. Similar arguments are applicable to crude ethanol reforming.

HTC has recently set up an office in Beijing. They promote via the website, trade mission and trade fairs.

CONTACT

Name and position: John Hanson,
Managing Director Asia Pacific
Telephone: +61 2 8249 4545
Email: jhanson@htcenergy.com
Office address: 3 Spring St,
Sydney, NSW 2000
Web: <http://www.htcenergy.com>



Hyder Consulting

Hyder Consulting is a diversified international engineering and environmental consultancy, and is a leading provider of management advisory, engineering and environmental consultancy services for projects worldwide.

DESCRIPTION Hyder has offices in Europe, the Middle East, China and Australia and New Zealand. Hyder is proud to have worked on some of the world's landmark infrastructure projects, and has had a presence in Hong Kong and China for many years.

Hyder is actively involved in Greenhouse Gas Emissions Trading – as consultants, project developers, and in investment raising. Technology due-diligence, project structuring, and transaction advisory are all key strengths. Project types of interest include wind, waste-to-energy, complex industrial gas abatement, waste water treatment, fuel-switch and coal mine methane.

Hyder has a number of capabilities to bring to renewable energy and energy efficiency projects and planning. Hyder has a proven track record in strategic planning, assessment and design for renewable energy projects.

For further information about Hyder, please refer to our website. Through the 'project search' area of the site a number of our projects in Hong Kong and China can be viewed.

CONTACT

Name and position: Andrew Jones, Climate Policy and Projects
Office address: Hyder Consulting Level 5, 141 Walker St North Sydney NSW 2060

Telephone:

Direct: +61 2 8907 9283

Switch: +61 2 8907 9000

Mobile: +61 423 356 650

Email: Andrew.Jones@

hyderconsulting.com

Web: <http://www.hyderconsulting.com>

Hydro Tasmania

Renewable energy consulting services (wind and hydropower); Remote Area Power Supplies; and Emerging and Enabling Technologies

COMPANY SIZE: < 700

COMPANY DESCRIPTION Hydro Tasmania is Australia's leading renewable energy business, contributing 60% of Australia's electricity produced from renewable energy sources. Their vision is to be Tasmania's world-renowned renewable energy business. They have three major business interests:

Energy – generates renewable energy as a vital component of the Tasmanian economy and trade electricity and energy products in the Australian National Electricity Market.

Business Development – pursues business growth opportunities and partnerships in emerging renewable energy technologies, markets and investments.

Consulting – national and international consulting firm. Drawing on around 100 years of expertise, Hydro Tasmania Consulting (HTC)

provides expert engineering and environmental services in the areas of renewable energy, power engineering and environmental and catchment management. HTC's ability spans the planning, design, construction, operation and maintenance aspects of a wide variety of major energy and water projects

HTC's experience in China includes:

- Supervision and Review of Evaluation Study for Rehabilitation and Upgrading Potential of Small Hydroelectric Power Plants in the Hubei Province (World Bank)
- Guanzhong Irrigation Improvement Project – Xi'an City (World Bank)
- Zhejiang Water Conservation Bureau (Asian Development Bank)
- Zhejiang Shanxi Project Phase 1 (Zhejiang Shanxi Economic Development Corporation (ZSEDC))
- Hainan Wind Farm – Long term energy estimate (Roaring 40s)
- Zhangbei Wind Farm – Long term energy estimate (Roaring 40s)
- Datang-Jilin Wind Farm – Technical due diligence (Roaring 40s)

HTC Office Locations include: Australia – Tasmania, Victoria, South Australia; International – PNG and India.

CONTACT

Name and position: Pat Lennon, General Manager

Telephone: +61 3 6230 5340

Email: Pat.Lennon@hydro.com.au

Web: <http://www.hydro.com.au>

Name and position: Simon Gamble, Regional Manager

Telephone: +61 3 6230 5340

Mobile: +61 438 520 163

Office address: 4 Elizabeth Street Hobart TAS 7000

Email: Simon.gamble@hydro.com.au

Web:

<http://www.hydrotasmaniiconsulting.com>

Landfill Management Services Pty Ltd

Renewable Energy Generator

SIZE: 25 – 50 people

DESCRIPTION Landfill Management services (LMS) is a specialist landfill gas and power generation company. In 1982 the company principals pioneered the collection and conversion of landfill gas to energy in Australia. Having invested extensive resources in the on-going development of intellectual property for landfill gas management and power generation, LMS technologies are now utilised throughout the world.

LMS is managed by a uniquely qualified team with outstanding experience in landfill gas, bio gas, coal seam methane, power generation, energy trading, emission trading, power purchase agreements, and the commercialisation of new technologies. The management team has extensive project development experience encompassing significant landfill gas and energy infrastructure projects throughout Australia, Malaysia, China, Korea, North America, United Kingdom and Europe.

The company's market position is further enhanced by the financial backing of the Sims Group, one of the world's largest recyclers. Financial strength and stability, combined with industry experience, provides LMS with the resource base to, build, own and operate power generation facilities, to the ultimate satisfaction of clients and stakeholders. The renewable energy market is a progressive environment, driven by ongoing technological innovation and changing legislative framework. Through years of hands-on experience, LMS has developed proprietary technology and intellectual competencies that are vital for success in this vibrant industry. LMS provide a suite of proven, reliable technologies and capabilities aimed at delivering tailored solutions to clients and communities in an ever-changing environment.

LMS's approach to developing successful projects has emerged through the extensive skills of Australia's most experienced personnel. The company culture and corporate structure provide a platform to best utilise this expertise through its *Gas – Energy – Power* operating groups.

The Gas Group manages all landfill gas-related activities for the company, and is the cornerstone of LMS's competitive position in the industry. Having been involved in over two decades of landfill gas projects, the Gas Group has an international reputation for delivering effective, innovative solutions in the extraction and combustion of landfill gas. The expertise of the group focuses on the development of high quality gas systems that achieve significantly higher extraction and utilisation efficiencies than industry competitors. This is achieved through the integration of leading edge technology developed and tested in-house. Extensive gas field installations and field trials throughout the world have resulted in proven processes.

The specialist nature of the group's landfill gas services is characterised by system installations and the development of the LMS Clean Burn Enclosed Flare. This combustion technology has independently verified capabilities for certified emission reductions and carbon credit trading.

Correct design and installation are paramount to providing long-term solutions for landfill gas management. On going research and development of gas control and utilisation applications enables LMS to provide clients with the most up to date, proven technology. The Gas Group delivers quality gas installation and recovery systems, proven by maximum gas flow rates and the continued successful regulatory compliance of projects. A proactive approach ensures that gas resources are effectively controlled and managed for optimum utilisation options.

CONTACT

Name and position: Brett Maple
Telephone: +61 416 221 933
Email: brett.maple@lms.com.au
Office address: 1 Union Street
Stepney SA 5069
Web: <http://www.lms.com.au>

Latronic Sunpower Pty Ltd

Manufacturer of Sinewave inverters

SIZE: <25 people

DESCRIPTION Established in 1985, Latronics has 20 years experience in the design of high quality inverters, with all products manufactured in Australia from our Caloundra Factory. Benchmark quality standards have now ensured Latronics are recognised as one of the most reliable Inverters available.

As a specialist inverter manufacturer we have supplied products to over 60 countries, for a wide range of applications such as Telecom installations, power utilities, locomotives, test equipment, remote area solar power and emergency back

up systems. Their main export models are the "LS Series Sinewave Inverters", with a wide range of choices available and standard features which include:

- Pure Sinewave output
- Heavy duty DC battery leads
- High Surge rating for large inrush current and motor starting
- High efficiency toroidal transformer
- Short circuit proof
- Full electronic protection
- DC circuit breakers
- LED status indicators
- Frequency 50/60Hz selectable
- AC/DC isolation

Latronics also offers a wide range of options to suit almost any application, including :

- Automatic AC transfer switch
- Non-standard DC input voltages
- Andersen Connectors
- Psophonometric noise filter for sensitive telecom applications
- 19" Rack mount version
- Voltage free alarm contacts

CONTACT

Name and position: Brad Cowin
Telephone: +61 7 5491 6988
Email: bradc@latronics.com
Address: P.O. Box 73
Moffat Beach Qld 4551
Web: <http://www.latronics.com.au>

Liquitech (Qld) Pty Ltd

Project Developer; Engineering, Environmental and Consultancy services; Standards and Conformance

SIZE: <25 people

DESCRIPTION Founded in 1998, Liquitech (Qld) Pty Ltd was established to satisfy a need for an independent pumping, filtration and power equipment supplier to service the Industrial and Municipal markets throughout Queensland and Asia-Pacific regions. Company Director Kerry Baumann has been involved in the industrial pump market throughout Australia since 1981. The five years prior to establishing Liquitech he occupied the position of State Manager – Queensland for KSB Ajax Pumps Pty Ltd.

Liquitech (Qld) has been involved with the sugar industry in Queensland, supplying Boerger pumps and filtration systems. In addition, the company has been involved in the supply of Boerger pumps to a new sugar production plant in Guyana, South America, where, apart from products, Liquitech will also be involved with the commissioning and training of onsite personnel.

PRODUCTS & SERVICES INCLUDE:

- Boerger pumps
- Water treatment and sanitation
- Amiad filtration systems
- Renewable energy systems
- Renewable energy solutions
- Process industries
- Mineral processing
- Environmental engineering

Liquitech also offers the following services in the Environmental, Mining and Industrial Process field:

- Operator advisory service
- Process optimization advice
- Preventive maintenance proposals
- Contract operators
- Contract management
- Supply and installation of plant and equipment

Liquitech offers these services at very competitive rates for both long and short term contracts.

It boasts in excess of 50 years combined experience in the pump, wastewater, filtration and renewable energy industries and has the technical expertise and resources to select the right plant or package for the job. Proudly supported by several of the world's leading pump, filtration,

aeration equipment, valving, power transmission, solar and UPS equipment manufacturers in their respective markets, namely: Grundfos, Boerger, Robuschi, SEW Eurodrive, Amiad, Dorot, AVK Aqua Gas, BP Solar and Siemens.

Liquitech can provide commercially attractive and hydraulically competitive quotes on any pump, filtration, aeration, screening, power generation or transmission application. They have the ability to provide complete packages, from initial selection to installation, commissioning and maintenance.

Liquitech's mission is to provide quality equipment through services that are tailored to meet their clients' requirements no matter how unique..

CONTACT

Name and position: Graeme Hunter, Sales Engineer
Telephone: +61 7 4728 6783
Email: saleliq@bigpond.net.au
Office address: 12 Leyland Street
Garbutt QLD 4814

Mallesons Stephen Jaques

Legal services

SIZE >1,000 people

DESCRIPTION Mallesons Stephen Jaques is a leading international commercial law firm that focuses on advising major corporations and financial institutions in Asia and Australia. They are committed to providing outstanding client service and excelling in the practice of law. They have offices in Beijing, Hong Kong, London and all the major business centres of Australia.

Their China practice group has more than 40 dedicated team members, almost all of whom are fluent in Mandarin. Some team members have over 20 years of legal experience in China, providing practical advice to multinational corporations.

Mallesons are fully equipped to service the requirements of their projects, energy and resources clients in China. Their expertise extends across all major industry sectors including energy (power stations, gas pipelines and transmission and distribution assets), renewable energy (wind farms, hydro, geothermal, landfill gas, coal mine methane capture and biomass), and infrastructure and resources (coal, oil and gas, iron ore, alumina, base metals, precious metals and chemicals). Advice covers a range of areas, including:

- joint ventures
- mergers and acquisitions
- electricity industry restructuring
- environmental regulatory compliance
- exploration, production, processing, distribution and transmission
- marketing of petroleum (oil, gas and related products), ores and minerals and downstream products

- long-term power purchase agreements and hedging agreements
- financing and commercial contracting
- project development and financing
- trust establishment

Clients include producers, sponsors, financiers, purchasers, suppliers, distributors, governments and regulatory authorities.

CLIMATE CHANGE AND RENEWABLE ENERGY

Mallesons undertakes work for foreign governments, major multi-nationals and financiers with interests in international renewable energy projects and operations. They have advised clients on all legal and commercial aspects of climate change and renewable energy, including:

- construction and EPC contracts
- emissions trading and CDM projects
- environmental impact assessment
- equity contributions
- financing
- grid access
- insurance
- sell-down/transfer of shares
- off-take arrangements (power purchase agreements and emission reduction purchase agreements)
- pricing
- risk assessment and management
- sustainable development policy and strategies

ENVIRONMENT

Mallesons are regularly involved in assisting clients on the full range of environmental law issues in construction and projects, corporate transactions, finance and investment as well as the assessment of environmental law risk of business activities in all industries. They are also actively involved in cutting-edge legal advisory work in the areas of corporate social responsibility, corporate responsible investment and sustainable development. These are increasingly important to businesses around the region which aspire to international best practice, (such as sustainability "triple bottom line" reporting in accordance with the Global Reporting Initiative), in respect of the environmental, social and economic impacts of their business operations.

CONTACT

Name and position: Christopher Tung, Partner

Telephone: +852 3443 1082

Email: christopher.tung@mallesons.com

Office address: 37th Floor
Two International Finance Centre
8 Finance Street
Central Hong Kong

Web: <http://www.mallesons.com>

NUE Pty Ltd (trading as Nu Energy)

Engineering services; and Renewable energy system construction

SIZE: <25 people

DESCRIPTION Nu Energy is an alternative energy company, servicing domestic and industrial power needs with renewable energy systems throughout Australia. Established in Tasmania in 1986, Nu Energy has designed and installed hundreds of solar energy systems and has established a reputation for excellence in renewable energy products and services. Nu Energy operates in all sectors of the renewable energy market, providing product, design, supply, installation and maintenance services. They have BCSE-Accredited installers, which allows for their clients to be eligible for government Solar Rebate Schemes.

Nu Energy is an industry leader in all aspects of renewable energy in Australia. This includes:

- Wind turbines – up to 50 kW
- Mini hydro – up to 1 MW
- Solar PV – up to 1 MW
- VRB storage batteries – up to 200 kW
- Carbon block storage – up to 500 kW
- Inverters – up to 60 kW 3-phase

Nu Energy has an annual turnover of \$7.8m with annual growth over the next 2 years of 35%. Nu Energy is currently involved with the supply of Solar PV Grid Connect “kit” systems for 1,000 homes in Nigeria and 4,500 homes in Pakistan.

CONTACT

Name and position: Garry Yost
 Telephone: +61 3 6272 4366
 Email: garry.yost@power-plus.com.au
 Office address: 25 Derwent Park Road, Derwent Park TAS 7009
 Web: <http://www.power-plus.com.au>

Petratherm Limited

Geothermal Energy Project Explorer & Developer

SIZE: <25 people

DESCRIPTION Petratherm Limited is a publicly listed company on the Australian Stock Exchange that has a mission to: “Explore for, and develop, emission free, commercially sustainable geothermal energy projects”.

Petratherm has a unique exploration model that prospects for heat and seek to find shallow hot rocks close to market.

Petratherm's current focus is on geothermal projects known as Enhanced Geothermal System (or Hot Dry Rocks) that target heat from non-volcanic sources. Specifically, heat sources from deeply buried (4 to 5kms) radiogenic granites with suitable thicknesses (2 km) of high insulating sedimentary cover.

Petratherm using its unique exploration model to identify high

prospect (quality) geothermal projects having due regard for key economic parameters, including;

- Temperature differential
- Drilling depth
- Flow rates/circulation
- Connection to market
- Generation plant cost/efficiency

Petratherm seeks to optimize the above key parameters (or cost drivers) to achieve the lowest long run average cost of electricity delivered to market while minimising project risks.

Following the confirmation of suitable initial parameters i.e. 200°C temperature differential at around 3.5 km depth Petratherm then seeks to develop its Heat Exchanger within the Insulator – HEWI model.

The HEWI model aims to reduce cost and risk by creating the underground heat exchanger within the naturally permeable and porous insulating rock above the granite heat source.

Petratherm has secured 3 projects in South Australia where there exists a

world class heat flow anomaly that exhibits elevated temperatures of the Earth's crust that are 20 to 4 times normal heat flows.

Two of these projects, Paralana and Callabonna, have demonstrated – after recent drilling, very high temperature gradients of 81°C/km and 68°C/km respectively.

Petratherm's Exploration Model was used to identify those projects and the model is being applied elsewhere in SA and Australia and it is now being proposed to apply the model overseas.

CONTACT

Name and position: Terry Kallis – Managing Director
 Telephone: +61 8 8304 8200
 Email: tkallis@petratherm.com.au
 Office address: 105 Tusmore Avenue Tusmore SA 5065
 Web: <http://www.petratherm.com.au>

Phillips Fox

Legal services

SIZE: >50 people

DESCRIPTION Phillips Fox provides cross-border legal services for outbound Australian investment. Providing cross-border legal advice is a specialist task, in which they have considerable experience. Phillips Fox provides integrated seamless advice combining local law legal advice in the People's Republic of China and Hong Kong and domestic legal considerations. An example of this is ASX listed companies which invest

overseas – they co-ordinate local law advices with domestic corporate and mergers and acquisitions advice.

Phillips Fox has recently announced its exclusive alliance with DLA Piper. DLA Piper is a global legal services organisation that builds long-term relationships with its clients in order to provide high-quality legal advice, wherever they do business. Details of this alliance and the full breadth and depth of Phillips Fox's expertise are available from the firm's website.

CONTACT

Name and position: Eugene Fung, Partner

Telephone: +61 7 3246 4048

Email: eugene.fung@phillipsfox.com

Office address: Level 29, Waterfront Place, 1 Eagle Street Brisbane QLD 4000

Web: <http://www.phillipsfox.com.au>

Powercorp Pty Ltd

Hardware manufacturer of grid stabilising technology for use in renewables projects and control equipment.

SIZE: 25 – 50 people

DESCRIPTION Powercorp was formed in 1988 in Darwin, Australia, to automate the wide variety of diesel generator power stations in Northern Australia for the Power and Water Authority. This program encompassed some 60 communities and work has extended throughout Australia and internationally.

With the success of the automation program came the need to integrate renewable energy for fuel saving. This work and the demand side management capability of the control system led to advanced wind diesel systems in WA for Western Power Corporation. With the winning of a Showcase Grant from the Federal Government Powercorp pioneered high penetration wind diesel systems during the late 1990s.

The chief problem facing wind-diesel systems, and indeed any renewable energy fuel saving technology when connected to isolated grids, is the instability caused on the grid by power surging. Such surges, and frequent loss of power, can be caused by wind gusts and lulls or cloud cover in the case of solar systems. It is not possible for conventional generators to cope with these power instability issues, and blackouts usually result. Even when the wind flow is low the fluctuations in wind speed can cause unacceptable generator response called "hunting" which uses more fuel and can cause engine damage.

The grid stability issue is seen in many small grids and at the end of long distribution lines. In the mining sector large electrical equipment such as winders and crushers can cause power fluctuations much the same as seen from renewable plant.

PowerStore the company's flywheel inverter system can absorb and deliver power very fast to dampen all instability to maintain the grid specifications to utility standards. Powercorp developed expertise in inverter technology with specialization in high speed bi-directional control to solve the grid instability problem. With these solutions now a commercial reality Powercorp stands as the most advanced high penetration renewable energy company in the world. This work is expanding to encompass mine sites and industrial complexes. The company is largely research engineering based with a strong manufacturing capability. It stands ready to serve any customer with grid instability problems.

CONTACT

Name and position: Alan Langworthy, Managing Director

Telephone: +61 8 8947 0933

+61 411 154 100

Email: alanl@pcorp.com.au

Office address: Export Drive

Darwin Business Park

Berrimah NT 0828

Web: <http://www.pcorp.com.au>

Pulse Energy Pty Ltd

Project developer, power station owner and technology provider with major areas of focus on:

Biomass, Waste / slag coal, and Municipal Solid Waste (MSW).

SIZE: <25 people

DESCRIPTION Pulse Energy is an Australian renewable energy company, operating internationally with a particular focus on biomass.

Pulse Energy is well under way with a number of projects, which consist of building, owning and operating biomass fired, electricity generating plants and their associated fuel handling facilities. In particular Pulse has a 110 MW power project under development in the Peoples' Republic of China and they are looking to expand this significantly in the next two years.

In addition to this project in the PRC, Pulse Energy has secured suitable amounts of feedstock to fuel an additional 300 MW of power plants.

The patented technology Pulse Energy uses has been proven as a robust and efficient system and Pulse Energy has signed a number of agreements to market and develop these power plants on an international scale. The technological advantages including being able to cope with rapid changes in fuel quality, requiring very low maintenance, its robust nature, low auxiliary power usage and flexible fuel characteristics made it perfect for the biomass industry. Pulse Energy has a number of other current initiatives which include working in Cuba, Mexico, Fiji and the Caribbean.

Pulse Energy is currently looking for other opportunities in the PRC, utilising lower grade fuels and renewable feed stock, these fuels include corn, rice husks, wood chips, waste / slag coal and MSW. Pulse Energy's aim is to assist China in reaching their goal for renewable energy of 15%. Pulse Energy is well underway with creating a pipeline of projects throughout the PRC and is actively seeking potential partners in government and private enterprise with access to renewable feedstock.

A secondary focus of Pulse Energy is supply existing industry with power generation plants that can be placed adjacent existing industry to utilize waste and generate power for the sale to the grid or internal consumption. The power plants range from 5 MW upwards and will burn a wide variety of fuels and fuel qualities.

Pulse Energy has worked closely with local partners to develop projects in the region. Its success in the area of biomass has lead to various media articles which have continued to promote Pulse Energy in the China. Pulse has also built up an extensive network of contacts which are constantly providing new projects

CONTACT

Name and position: Mr Damien Weis – Director Business Development
Telephone: +61 7 3217 6722
Email: damien@pulseenergy.net.au
Contact address: Pulse Energy Pty Ltd, Level 1, 17 Mayneview Street Milton QLD 4064
Web: <http://www.pulseenergy.net.au>

PV Solar Energy Pty Ltd

Hardware manufacturer of PV Solar Tile framing system for integrated PV systems.

SIZE: <25 people

DESCRIPTION PV Solar Energy is an independent company, based in Sydney. Over the past seven years PV Solar Energy has gone from strength to strength, driving as well as servicing the Solar Energy market. The vision of PV Solar Energy is to have a future of sustainable energy supply accessible to all of society.

The main focus of PV Solar Energy is the PV Solar Tile[®], building material of the future today! The 100% Australian designed and manufactured PV Solar Tile[®] offers true innovation on the best, proven and genuine PV integration method where the PV serves as a functional part of the building fabric. PV Solar Tiles[®] can

use any PV laminates to suit the customer's needs. Improvements in design flexibility have made the new PV Solar Tile[®] the building material for a sustainable future of energy supply, ready now for the architectural design and building industries.

Solar PV energy is widely accepted as a most plausible in-situ energy source for the future of the built environment, as well as a viable approach to ecologically sustainable development for electricity supply. Creative use in building design includes energy efficient and solar passive design possibilities such as awnings, overhangs and covered walkways. PV Skylight type laminates can be incorporated in the PV Solar Tile[®] frame system for natural day lighting and as a trafficable roof. The possibility to extract useful low-grade heat from the back surface of the PV Solar Tiles[®] for winter heating is

available. Heat extraction for uses such as water pre-heating is an energy saving project under continuing development."

CONTACT

Name and position: Peter Erling,
Managing Director

Telephone: +61 414 895 370

Email: info@pvsolar.com.au

Office address: 765 Princes Highway
Tempe NSW 2044

Web: <http://www.pvsolar.com.au>



Research Institute for Sustainable Energy, Murdoch University

Consultancy services; Standards and Conformance; Research; Testing Services

SIZE: <25 people

DESCRIPTION RISE is an Australian university-based research centre possessing the expertise and flexibility to offer a full range of testing, research & development, education and training, policy analysis, demonstration, monitoring and resource assessment services in the field of sustainable energy.

ResLab is its NATA-Accredited Test Centre providing services to the renewable energy industry. The laboratory specialises in testing inverters, stand-alone power supply (SPS) systems and balance of system (BOS) components, solar home systems (SHS) and battery charge controllers for solar PV systems. The laboratory can also consider specific industry requests to provide other testing services based on industry demand and the capability of ResLab to meet the necessary test requirements.

ResLab provides consultancy services as well as professional development programs for renewable energy (RE) technologies. In pursuit of improving the reliability of RE systems, ResLab has an ongoing involvement in standards development for solar photovoltaic systems and wind turbines. ResLab can provide a range of services to assist build capacity for Chinese companies involved in either of these project areas. These include

Standards Training and Development:

ResLab can provide training and assistance to aid Chinese authorities and RE program implementation managers. Standards training and development as applied to SPS (especially solar PV and solar thermal systems) can include assistance with implementing international standards and adapting for local conditions. Training can also include how to develop testing laboratories and technical specifications for RE systems as well as how to apply specific test methodologies.

Monitoring and Resource

Assessment: ResLab can conduct remote weather data monitoring and resource assessment for RE systems. This will aid collecting real weather data (particularly remote locations for SPS and other RE systems) to assess the potential and site suitability for future system installations. Monitoring and resource assessment is useful as a tool in planning of future RE programs.

Product Design and Development:

ResLab can assist with product development of inverters and BOS components by developing and providing custom testing methodologies.

Introduction to Renewable Energy Systems and Applications:

ResLab can develop and conduct training programs to provide a broad understanding of RE systems and SPS applications. Programs could be tailored to include site visits and presentations from expert scientists, engineers and industry people and showcase technologies in the area of RE and energy efficiency. Training can be conducted in major Australia cities (where appropriate) and participants might include representatives from Chinese government funding agencies, community service organisations and associated organisations involved in any RE project proposal.

Training for Administrative and

Technical Personnel: ResLab can conduct specialised technical training for project participants involved in the implementation of an RE system or plant. The technical training program can be split into providing a broad over view of SPS system design, testing, operation and maintenance of stand alone as well as grid connected solar PV systems and components, solar water heating systems and wind turbines. Equally a more detailed technical understanding of the aforementioned aimed at installers, electricians and other technical personnel involved in setting up an RE system or plant.

RESLAB CONTACTS

Name and position: Dr Om Prakash Dubey, Manager, Industry and Market Development

Telephone: +61 8 9332 0818

Email: pdubey@rise.murdoch.edu.au

Address: Murdoch University
South Street, Murdoch WA 6150

Telephone: + 61 8 9360 7355

Email: pdubey@rise.murdoch.edu.au

Fax: + 61 8 9360 6624

Web: <http://www.reslab.com.au>

Roaring 40s

Project Developer

SIZE: 25 – 50 people

DESCRIPTION Roaring 40s is a joint venture between internationally renowned energy companies Hydro Tasmania and CLP Power Asia.

Roaring 40s is one of the leading renewable development businesses in Asia and Oceania, with a large portfolio of existing wind farm projects in Australia, New Zealand and China. In addition to these projects, Roaring 40s is also currently investigating new project opportunities in Korea and India.

Roaring 40s has the commercial, technical and management skills and experience to optimise whole of project life solutions. Roaring 40s has sound experience, with over 700 MW of wind energy projects completed or under construction in three continents.

The Roaring 40s approach to strategic joint venture partnerships has provided sound experience and access to knowledge of foreign markets and cultures. Roaring 40s involvement with high-level policy development and implementation has led to experience in government and other stakeholder management.

Roaring 40s has a high-level profile in national and international industry and policy associations.

Roaring 40s has an experienced, capable team in development of wind and hydro projects, project financing, and asset management. Roaring 40s has highly respected shareholder companies that allow access to resources.

CONTACT

Name and position: Josh Bradshaw, Public Relations and Communications Manager

Telephone: +61 3 6213 4331

Email: josh.bradshaw@roaring40s.com.au

Address: GPO Box 1484
Hobart TAS 7001

Web: <http://www.roaring40s.com.au>

Selectronic Australia Pty Ltd

Inverter design and manufacturer

SIZE: 25 to 50 people

DESCRIPTION Selectronic (incorporating Power Solutions Australia) has been designing and manufacturing DC-AC inverters in Australia since 1980. We have designed the latest PWM technology to create our low distortion True Sine Wave inverters. Their technology ensures an extremely reliable product with features not offered by competitors. The standard product ranges from 200 watt continuous to 3,600 watt continuous, with features such as dual input voltage, digital voltmeters, Amp hour counters and a remote display.

Selectronics also offers products ideally suited to remote village electrification, which include daily energy disconnect and an inbuilt solar controller.

Their range of generator-interactive inverter chargers range from 3 kW to 12 kW single phase, including 120 volt DC inputs. The interactive design allows inverter output power to be added to generator power for increased capacity. A range of 3 phase units are also offered from 20 kW to 60 kW.

Customised applications can also be considered for projects and volume applications. Selectronics is seeking sales partners/distributors for our products as well as the opportunity to consider joint manufacturing.

CONTACT

Name and position: Lindsay Hart, Marketing Manager

Telephone: +61 3 9727 6600

Email: lhart@selectronic.com.au

Office address: Suite 5, 20 Fletcher Road, Mooroolbark VIC 3138

Web: <http://www.selectronic.com.au>

Snowy Mountains Engineering Corporation Limited (SMEC)

Project Developer, plus Engineering and Consultancy services

SIZE: >1,400 people

DESCRIPTION The Snowy Mountains Hydroelectric Authority was established in the 1950s to develop the then largest integrated infrastructure project in the world, with 3,500 MW capacity. Following its completion in 1970, the design and construction skills were separated into a new corporation, SMEC, established as the government agency responsible for implementing all of Australia's international aid work. From there, *SMEC* has developed into a staff-owned multi-disciplinary consultancy, with capabilities in engineering and social infrastructure feasibility, design and construction supervision. It is consistently ranking in the top 100 engineering consultancies in the world, having completed projects in 82 countries. It has 16 regional offices outside Australia, in Africa, Middle East, Central, Southern, SE and North Asia, and the Pacific.

In 1982 SMEC entered the energy market in China. The first project was on the Lubuge Hydro-electric Power Project in Yunnan Province – the first World Bank-funded power project in China. In 1994 SMEC established an office in Hong Kong to service the growing work load in China. In 2002, SMEC established SMEC China, a Beijing-registered Chinese JV company. In 2004, a representative office was established in Kunming to service transport-related projects in Yunnan Province. In April 2006, SMEC opened a project office in Chongqing to service the World Bank-funded Chongqing Small Cities Infrastructure Improvement Project.

Since 1982, SMEC has completed over 50 projects in 15 provinces, 2 Autonomous Regions and 2 Municipalities. They have also been involved in the development of over 2,500 km of transport infrastructure.

SMEC will continue its investment in six market segments within the Chinese market, as it sees China as a strategic business growth centre.

These are:

- Water and environment
- Highways and transport including rail
- Power particularly hydro, geothermal and biomass
- Social Development (Health, education and law)
- Local government services
- Civil Infrastructure including buildings

CONTACT

Name and position: Peter Hall, Regional Manager, North Asia
 Telephone: +861088018468 (office)
 +8613910396350 (mobile)
 Email: peter.hall@smec.com.au
 Web: <http://www.smec.com.au>
 Office address: SMEC Beijing Office
 Room 1027, Building B,
 Huatong Plaza
 19 Chegongzhuang West Road
 Beijing 100044, PRC

Solahart Industries Pty Ltd

Hardware manufacturer and exporter of solar water heaters and heat pumps.

SIZE: >50 people

DESCRIPTION Mastering solar energy in its many forms and supplying it to a world desperate for alternative energy sources is the drive behind Solahart. With over half a century of experience in design, manufacture and marketing of solar water heating systems, Solahart has the knowledge and technical edge over other manufacturers and brands. This has secured their position as a world-leader in solar water heaters, represented in over 80 countries.

It has been their absolute commitment to R&D that has been critical to success. They have constantly pushed the boundaries, looking for more effective ways of extracting the sun's energy and transforming it to provide *Hot Water Free From The Sun*.

Solahart were the first to introduce major product innovations such as: ceramic-lined tanks for longer life; closed circuit collectors for frost prone areas; and Multi Flow[®], Black Chrome absorber technology for incredible efficiency.

Solahart has 'state of the art' manufacturing processes and wide-ranging skills within their production team – activities include sheet metal fabrication, welding, shot blasting, enamelling, plating testing and packaging. Their primary manufacturing plant is based on a 3 hectare site in Perth, WA, and accommodates their world-wide manufacturing, R&D, testing and International Sales and Marketing facilities. The Australian Sales & Marketing Head Office is based in Sydney.

Solahart is committed to quality assurance and have been accredited to the international quality standards including ISO9001, Japanese JIS, and the German TUV standards. Their products have also been assessed to meet stringent product certification protocols including the Dutch TNO, and New Zealand BRANZ. Solahart is the first product to carry the European Solar Keymark label.

Solahart has appointed experts and authorised dealers in many countries. They provide support and training in technical and marketing expertise for their global network. Vigorous overseas marketing activities have bought Solahart official Australian Government recognition with Export Dedication and Enterprise Awards.

To be a recognised leader in the field of solar water heating is a major achievement and they are determined to retain their reputation as the major innovator in the field. They intend to constantly refine and improve our products and to maintain their commitment to excellence and innovation. To support this Solahart continues to invest heavily in research and development, in the capability of its people and in the sophisticated production equipment and processes utilised.

CONTACT

Name and position: Denis Avery,
International Export Manager
Telephone: +61 413481412
Email: denis.avery@solahart.com.au
Address: PO Box 95
Welshpool WA 6986
Web: <http://www.solahart.com>



Solar Inverters Pty Ltd

Engineering services; sales and service of multi-mode renewable power systems

SIZE: <25 people

DESCRIPTION Solar Inverters is a specialist Renewable Energy services company, actively involved in Power Electronics and Wind Turbines. Established in 1995, their state-of-the-art repair and testing facilities are suitable for factory authorized warranty repair and customer support services to power inverters and power inverter/chargers. They also offer complete renewable power system design services, specialising in wind and PV systems up to 300 kW.

Their qualified personnel can provide design engineering services, tender specification preparation and consultation. Solar Inverters is able to supply:

- Professional quality power inverters and inverter/chargers from 200 W to 250 kW
- Grid connected small wind turbines and power electronics turnkey solutions (6 kW and 25 kW)
- 350 W (750 & 1500W in 2007) professional marine grade wind turbines
- Containerized UPS including inverter/charger (250 kW) and batteries up to 1MWh
- Inverters for wind and solar applications both grid connect and stand alone 2 kW to 500 kW
- MPPT battery charge controllers up to 5 kW
- Training services and ongoing product support for all their equipment.

CONTACT

Name and position: Peter Bulanyi, Manager
 Telephone: +61 2 6655 3930
 Email: peter@solarinverters.com.au
 Office address: 30 Osprey Drive Urunga NSW 2455
 Web: <http://www.solarinverters.com.au>

Solar Sales Pty Ltd

Project Developer; Consultancy services

SIZE: <25 people

DESCRIPTION Solar Sales aims to build on its strong existing business base and grow a diversified business operating within the overall focus of sustainable energy and development. Traditionally the company has predominantly operated in renewable energy, selling a range of solar PV products and systems. Exports have grown significantly over the last 6 years and now represent a significant percentage of total sales.

The company's vision is to be *the leading supplier of renewable energy products and systems, and professional engineering/after sales service providers relating to renewable energy applications in Australia, Asian and Pacific regions.*

The main product line to date has been PV panels, along with charge regulators, batteries, inverters, village power and lighting systems, wind turbines, solar water pumps, power systems for communities and ancillary equipment.

Over the next year, the company aims to substantially grow its existing product and system clientele, and to selectively enter new markets which are compatible within an overall sustainability focus. This growth strategy will involve a new focus on complete alternative energy solutions and packaged systems – thus reducing

its focus on the local renewable energy market, and increasing its export focus. Solar Sales will also provide professional engineering and maintenance services and supplying packaged energy systems for remote standalone applications. Diversification into wind based power generation and supporting power electronics is also planned.

CONTACT

Name and position: Bob Blakiston, General Manager
 Telephone: +61 8 9258 8244
 Email: bob.blakiston@solarsales.com.au
 Address: P.O. Box 190 Welshpool WA 6986
 Web: <http://www.solarsales.com.au>

Solco Ltd

Sell and licence the Solco Manufacturing System, a turnkey manufacturing facility to make solar water heaters. Solco also offers Australia's widest range of solar pumps.

SIZE: >50 people

DESCRIPTION Solco Limited, manufacturer of the world's most cost-effective solar hot water system, is seeking companies or individuals to establish manufacturing plants globally on a nationally or regionally exclusive basis. With 13 factories already established around the world, the system is a proven success. Measured growth of the domestic solar hot water market is currently 25% per annum. With increasing governmental support, especially since the Kyoto Protocol and subsequent greenhouse gas targets, in many countries this growth will continue to accelerate. The companies or individuals we are seeking are likely to have established links in the plumbing

or building distribution industry and/or to have links to large domestic builders. Expected investment is in the region of USD1,000,000.

WHY SOLCO?

Solco Industries was formed in 1984 when a group of investors and inventors joined forces to develop the world's first polymer-based solar hot water system. Working with a leading Australian University, Solco spent four years and more than \$20 million USD developing the product and manufacturing process.

The Solartech Genius eliminates many of the problems of traditional steel-based systems, such as rust, boiling, freezing and high maintenance. Because it is manufactured as a one-piece polyethylene unit, the Solartech Genius carries a lifetime guarantee against rust and has no joints to leak. Polyethylene will also expand and contract, so it is equally at home in tropical temperatures or frost and ice-

prone areas. Because polyethylene is an inert material, it is unaffected by saline, mineralised or acidic water and will work equally well in almost any conditions.

SOLAR PUMPING

Solco also offers Australia's widest range of solar pumps. The Solco water pumps offer flowrates from under 1,000 to 160,000 litres per day and pump heads up to 230 metres. The full range provides durable and reliable pumping solutions in above ground and submersible, bore and transfer models which comprise easy installation and low maintenance.

CONTACT

Name and position: Michael Starling, General Manager
Telephone: +61 8 9334 8100
Email: mstarling@solco.com.au
Address: P.O. Box 37
Welshpool DC WA 6986
Web: <http://www.solco.com.au>

School of Photovoltaic and Renewable Energy Engineering, University of New South Wales

Research; Education & training

SIZE: >50 people

DESCRIPTION The University of New South Wales School of Photovoltaic and Renewable Energy Engineering offers:

- Undergraduate degree education in (1) Photovoltaics & Solar Energy Engineering and (2) Renewable Energy Engineering; Postgraduate coursework degree education in Photovoltaics & Solar Energy Engineering;
 - Final-year UG project students to work on interesting and exciting projects, especially in photovoltaics engineering and remote area applications;

– Senior UG students, each needing to undertake 60 days Industrial Training during their course before gaining the degree.

- Postgraduate research training (Masters or PhD) in photovoltaics and other renewable energy technology, applications and policy;
- Short courses (in Chinese language if required) in various topics, including applied PV and PV manufacturing technology;
- An online course in applied photovoltaics;
- Training in photovoltaics manufacturing technology; and
- Consulting in photovoltaics manufacturing technology and photovoltaics science and engineering.

CONTACT

Name and position: Richard Corkish, Head of School
Telephone: +61 2 93854068
Email: r.corkish@unsw.edu.au
Contact: Mark Silver, Business Manager
Address: University of New South Wales, Sydney NSW 2052
Telephone: +61 2 93856150
Email: m.silver@unsw.edu.au
Fax: +61 2 93855412
Web: <http://www.pv.unsw.edu.au>

Stratcon Australia Pty Ltd

Project Developer, Consultancy services, Environmental services and Research.

SIZE: <25

DESCRIPTION Stratcon Australia Pty Ltd is part of the Stratcon Group of Companies.

In Australia, the Group has undertaken works for Melbourne Water, the University of Melbourne, The Australian National University and Gippsland Water. Regionally, clients include Asia Netcom/Asia Global Crossing, WorldCom MCI, Global Switch and Multiplex.

The group has a strong focus on waste to energy, environmental infrastructure and construction services. One of our companies designs, builds, owns and operates anaerobic digestion plants throughout Asia. Current

developments include a 3 MW project in Vietnam, 9 MW project in Indonesia and a 5 MW plant in India. Projects in other locations including Australia are in development.

The group also carries out research and development implementation of environmental related technologies.

The group has staff in Australia, United States of America, Singapore, Laos, Vietnam and Indonesia. The group is looking to develop long term relationships in the China Market.

Stratcon Australia Pty Ltd is working with Ingersoll Rand Inc on development projects in Shanghai to convert food waste to biogas. The Stratcon Group is a shareholder in waste to Energy Pte Ltd (W2E) – a regionally based anaerobic digestion plant developer. Ingersoll Rand and W2E are partnering in China.

CONTACT

Name and position: Steve Peters, Director and Ronnie Atlas, Project Director

Telephone:

Office: +61 3 9821 5874

Steve Peters mobile:

+61 403 258 028,

Singapore +65 9062 7396

Ronnie Atlas +61 418 666600

Email: steve.peters@stratcon.net

ronnie.atlas@stratcon.net

Office address: Stratcon Australia
5th floor, 409 St Kilda Road
Melbourne VIC 3004

Web: <http://www.stratcon.net>

<http://www.w2eglobal.com>



Windlab Systems Pty Ltd

Consultancy services

SIZE: <25 people

DESCRIPTION In the science of wind energy resource assessment, Windlab Systems is an international leader specialising in the development and application of site location and wind-assessment technologies.

Locating premium wind energy sites can be difficult. Windlab's mapping technology and scientific Once identified, Windlab's Virtual Wind Farm report helps understand the risks of a site early. This assists in making judgments about potential energy yield, ease of construction, turbulence, noise limitations and visual impact.

Mistakes in turbine placement leads to reduced yield and increased maintenance costs. Such mistakes are often due to using models outside the range of steepness and surface terrain for which they were designed. Our RaptorNL and RaptorC models are designed to extend the usable range and allow you to make better, more cost effective decisions in difficult terrain.

WindScape™ is their atmospheric modelling system designed to predict wind conditions at any point on the globe. The key input is historical climate data gathered by the World Meteorological Organisation. Two 'nested' numerical models are then used to convert this data into wind statistics for wind energy prospecting, resulting in a complete model of wind conditions within an area of interest. Parameters such as mean wind speed, probability distributions, and directional information can then be extracted for any point.

As well as running their own models, Windlab uses standard tools where appropriate. They have substantial expertise in WindFarmer and WASP.

RaptorNL is state-of-the-art for modelling wind resource. Standard wind resource assessment is currently undertaken with wind flow models that were developed in the mid- to late-1970s. These models typically solve some simplified form of the fluid flow equations, and suffer from low accuracy when used in steep terrain. Many real-world situations are well outside of the steepness/roughness/complexity range where these models can be expected to give accurate results.

Windlab's steep terrain flow model RaptorNL and canopy flow model RaptorC overcome these limitations and allow accurate wind resource assessment in steep and forested terrain where it is well known that industry standard models fall well short of providing accurate results. The outcome is reduced wind resource risk in these areas and the ability to undertake development in areas where the high levels of risk using industry standard tools would be prohibitive.

Windlab's strong foundation in the atmospheric sciences and collaborative links with world-class research institutes like RISØ in Denmark and the National Center for Atmospheric Research in the USA allow them to solve problems that are beyond the reach of standard engineering or consulting practices.

CONTACT

Name and position: Mark Sinclair, Chief Executive Officer

Telephone: +61 2 6229 1744

+61 407 303 654

Email: mark.sinclair@

windlabsystems.com

Office address: 401 Clunies Ross Street, Canberra ACT 2601

Web: <http://www.windlabsystems.com>

Wind Prospect Pty Ltd

Wind Prospect develops, constructs and operates wind farms. Their new JV, called *IW Power Co. Ltd*, will offer development, investment, construction (through EPC and project management) and operations of wind farms in China.

SIZE: <25 people

DESCRIPTION Australia's Wind Prospect Pty Ltd has opened its second Asian subsidiary by joining forces with China's Insigma Group and RidgeWind to further their activities in the Chinese wind energy market. The consortium combines three unique aspects: vast international wind power experience; significant financing capabilities; and an established and innovative Chinese power market construction and engineering team.

The joint venture company is IW Power Co. Ltd, which is focussed on the development, financing, construction and operation of wind farms. In addition, IW Power is offering technical and commercial services to developers, project investors and financial institutions.

Wind Prospect undertakes all aspects of wind energy from development to decommissioning. Along with its parent company, the Wind Prospect Group, it has been involved in nearly 2,000 MW of approved wind farms, including onshore and offshore projects, in terms of development, construction, operations and commercial services. In terms of capacity installed, Wind Prospect is the most successful developer in the southern hemisphere, and has 670 MW approved in Australia.

The company's civil, electrical and mechanical engineers have overseen the commissioning of over 20 wind farms and have been involved in operating 15 wind farms. The Wind Prospect Group has offices in China, Hong Kong, Australia, UK, Ireland and New Zealand.

Insigma's China experiences gained from being commissioned as EPC contractors of power plants, flu-gas desulphurisation units (FDG) and recently subways all around China, will offer power market expertise, engineering and project management capabilities.

RidgeWind's capabilities stem from over 400 MW of wind farm development, and the financial strength of its US and Chinese affiliates. RidgeWind's principals have over 100 years of combined international energy market expertise to compliment the financing capability necessary to enter the wind energy market in China.

CONTACT

Name and position: James Pennay, Managing Director, IW Power Co. Ltd

Telephone: +86 10 8447 6459

Email: james.pennay@

iwpower.com.cn

Fax: +86 10 8447 6429

Mobile: +86 139 1020 1137

Office address: 7L, Oriental Kenzo Building, No.48 Dongzhimenwai, Dongcheng District, Beijing, PRC 100027

Web: <http://www.iwpower.com.cn>,

<http://www.windprospect.com.au>,

<http://www.zdwxjd.com> and

<http://www.ridgewind.com>

Wizard Power Pty Limited

Project Developer; Engineering services; Consultancy services; Research; and Technology sub-licensing to international partners.

SIZE: <25 people

DESCRIPTION Wizard Power's mission is to deliver renewable energy to the nation through open integrated solar solutions, solutions capable of incorporating industrial, agricultural and domestic systems. These integrated solar solutions involve the development of infrastructures that combine solar energy collection systems with systems for electricity generation, desalination, waste water treatment, chemical extraction, town heating, aquaculture and thermochemical energy conversion for the production of hydrogen and enhanced hydrocarbon fuels.

As part of its solutions portfolio Wizard Power has licensed the Australian National University's (ANU) Big Dish™ solar concentrator – advanced mirror panels that are used for reflecting solar radiation and ammonia-based thermochemical energy storage system which enables high capacity storage of solar energy. It is the world's largest paraboloidal dish concentrator. The dish incorporates a mono-tube boiler at its focus that produces superheated steam at 4.5Mpa and 500°C. It is based on a space-frame design with a network of tubular steel members joined to spherical nodes. The dish rotates on a reinforced concrete track. Fifty-four triangular mirror elements are attached to the dish frame. Elevation-azimuth tracking of the dish is accomplished using hydraulic rams. This system enables the delivery of multi-megawatt electrical and thermal power for continuous base-load or on-demand peak power applications.

Wizard Power's longer-term strategic goal is for Big Dish™ systems to power thermochemical gasification processes for the production of hydrogen and enhanced hydrocarbon fuels for transport and stationary power applications. Large paraboloidal dish solar thermal concentrator power systems are configured to use either direct steam generation or thermochemical dissociation/synthesis of ammonia to transport energy to central plants for electrical and thermal power production.

The concept for solar thermal power generation using direct steam generation is that multiple dishes would be joined by steam lines to a central plant housing an industry standard steam turbine for electricity production. Steam based systems are ready for commercialisation and would suit multi-megawatt remote electricity mini grids up to large-scale main grid connection, or for powering thermochemical energy conversion.

Wizard Power, in collaboration with other specialist organisations, has the capabilities to deliver innovative and industrial strength solar power solutions to the Australian and international markets. Services excellence, market experience and the Big Dish™ solar thermal concentrator and thermo-chemical solar energy storage technologies will be at the heart of our competitive power offering for energy intensive applications.

Wizard Power has recently developed a market assessment and business plan for China to be implemented over the next 2 years. Wizard Power has in place a business representative / facilitator in China.

CONTACT

Name and position: Artur Zawadski, Manager – Business Development & Project Delivery

Telephone: +61 2 62 750 750

Email: artur.zawadski@wizardpower.com.au

[wizardpower.com.au](http://www.wizardpower.com.au)

Facsimile: +61 2 62 750 777

Mobile: +61 408 635 360

Address: GPO Box 2700

Canberra ACT 2601

Web: <http://www.wizardpower.com.au>

Name and position: Dr Keith Lovegrove, Deputy Director ANU Centre for Sustainable Energy Systems

Telephone: +61 2 61 255 433

Email: keith.lovegrove@anu.edu.au

Facsimile: +61 2 61 250 506

Address: Faculty of Engineering and Information Technology

Canberra ACT 0200

Web: <http://solar.anu.edu.au>

ZBB China Pty Ltd

Energy storage systems

SIZE: 10

COMPANY DESCRIPTION ZBB China Pty Ltd is a joint venture between ZBB Energy Corporation and China Century Group Limited. ZBB China holds the exclusive distribution rights for the ZBB advanced battery energy systems in China, Macao and Hong Kong.

ZBB Energy Corporation is a world leader in the development of zinc/bromine stationery battery systems for power utilities and renewable energy application. ZBB Energy Corporation has its manufacturing facilities located in Milwaukee, Wisconsin in the United States. It conducts research and development activities in its laboratories located in Perth, Western Australia.

ZBB is committed to offering cost-effective, scalable, energy storage solutions to electric utilities, T&D (transmission & distribution) utilities, renewable generators, Independent System Operators (ISOs) and end users. ZBB holds twenty patents and patent applications and its modular battery system can be used to stabilize voltage, manage peak loads, improve power quality, defer upgrade investments and support renewables.

ZBB China has made visits to some Chinese industrial users in Zhejiang and Fujian provinces and attended the Fifth International Battery Exhibition in June 2005 in Beijing. Discussions with some of China's power plants, regional transmission and distribution companies and industrial users are underway. ZBB is going to visit the

Chinese interested parties in early August and has planned to deliver a demonstration unit to China after signing of an agreement.

CONTACT

Name and position: William Wang, Director

Name and position: Robert Parry, Director

Telephone: +61 2 9290 2400

Email: wwang@chinacentury.com.au, rparry@zbbenergy.com

Office address: Level 5, 47 York Street Sydney NSW 2000

Web: <http://www.zbbenergy.com>



Glossary and Definitions

ABARE	Australian Bureau of Agriculture and Resource Economics	KWth	Kilowatt therm
AC	Alternating Current	LETA	Low Emission Technology Abatement Initiative
ACT	Australian Capital Territory	MRET	Mandatory Renewable Energy Target
AGO	Australian Greenhouse Office	MW	Megawatt
ANU	Australian National University	MWe	Megawatt electric
ANZSES	Australian and New Zealand Solar Energy Society	MWh	Megawatt hour
APEC	Asia Pacific Economic Cooperation	NEM	National Electricity Market
APP	Asia Pacific Partnership for Clean Development and Climate	NGACs	Greenhouse Abatement Certificates
AUD	Australian dollar. At the time of printing, the exchange rate used was 1 AUD = 6 CNY = 0.75 USD	NSEC	National Solar Energy Centre – joint program between CSIRO Energy Technology and the Energy Transformed Flagship
BCSE	Australian Business Council for Sustainable Energy	NSW	State of New South Wales
BoS	Balance of System [components]	NT	Northern Territory
CHAPS	Combined Heat and Power Solar	OECD	Organisation for Economic Co-operation and Development
CLFR	Compact Linear Fresnel	PV	Photovoltaic [solar electricity]
CREIA	Chinese Renewable Energy Industries Association	PVPRP	Photovoltaics Rebate Program
CSG	Crystalline Silicon on Glass	QLD	Australian State of Queensland
CSIRO	Commonwealth Scientific and Industrial Research Organisation	REAA	Renewable Energy Action Agenda
DC	Direct current	REC	Renewable Energy Certificate
DEH	Department of the Environment and Heritage	REDI	Renewable Energy Development Initiative
AEST	Advanced Electricity Storage Technologies	REEEP	Renewable Energy and Energy Efficiency Partnership
EPA	Environment Protection Authority (there is one in Victoria and another)	RRPGP	Remote Renewable Power Generation Program
FDG	Fluid desulphurisation [units]	SA	State of South Australia
GECs	Gas Electricity Certificates	SETC	Chinese State Economic and Trade Commission
GEF	Global Environment Facility	SPS	Stand-Alone Power Systems
GGAS	NSW Greenhouse Gas Abatement Scheme	SWH	Solar Water Heater
Government	The Australian Government	TAS	State of Tasmania
GWh	Gigawatt hour	UNDP	United Nations Development Program
HDR	Hot Dry Rocks	UNSW	University of New South Wales
kW	kilowatt	VIC	State of Victoria
		WA	State of Western Australia
		Wp	Watt peak

Definitions

COGENERATION:

all projects where heat is recovered and used productively. It incorporates all fuels, including bagasse, digester gas, coal, oil and waste gas. While coal and oil are not typically seen as sustainable fuel types, a significantly improved greenhouse outcome is achieved where the waste heat is productively used and hence its inclusion.

WASTE-TO-ENERGY:

all projects where waste fuel streams are used to produce electricity, including landfill gas, municipal waste, waste gases, coal waste methane but excluding coal tailings.

PV SYSTEM:

Set of interconnected elements such as PV modules, with inverters (converting the DC of the modules into AC), storage batteries and all installation and control components with a PV power capacity of 40 watts or more.

Background information on Australia and its system of Government

Australia is a country in the Southern Hemisphere comprising the world's smallest continent and a number of islands in the Southern, Indian and Pacific Oceans. Australia's formal name is the Commonwealth of Australia. The form of government used in Australia is a Constitutional Monarchy – 'Constitutional' because the powers and procedures of the Commonwealth Government are defined by a written constitution, and 'Monarchy' because Australia's Head of State is Queen Elizabeth II.

Federation

The Commonwealth of Australia was formed in 1901 when six independent British colonies agreed to join together and become states of a new nation. The rules of government for this new nation were enshrined in the Australian Constitution, which defined how the Commonwealth Government was to operate and what issues it could pass laws on.

The birth of our nation is often referred to as 'federation'. This is because the Constitution created a 'federal' system of government. Under a federal system, powers are divided between a central government and the individual states. In Australia, power was divided between the Commonwealth Government and the six state governments.

Commonwealth Government

The Commonwealth Government, also known as the Australian Government or the Federal Government, passes laws which affect the whole country. Section 51 of the Constitution defines a number of issues that the Commonwealth Government can make laws on.

There are three 'arms' of the Commonwealth Government:

- the legislature (or parliament) is responsible for debating and voting on new laws to be introduced under the power of section 51.
- the executive is responsible for enacting and upholding the laws established by the legislature. Certain members of the legislature (called ministers) are also members of the executive, with special responsibilities for certain areas of the law.
- the judiciary is the legal arm of the Commonwealth Government. It is independent of the other two arms, and is responsible for enforcing the laws and deciding whether the other two arms are acting within their powers.

State and Territory Government

Although the six states joined together to form the Commonwealth of Australia and the Commonwealth Government, they still each retain the power to make their own laws over matters not controlled by the Commonwealth under Section 51 of the Constitution. State governments also have their own constitutions, as well as a structure of legislature, executive and judiciary.

Territories are areas within Australia's borders that are not claimed by one of the six states. Territories can be administered by the Commonwealth Government, or they can be granted a right of self-government. Self-government allows a territory to establish its own government in a similar manner to a state. The Constitution of Australia allows territories to become states with the approval of the Commonwealth legislature.

Local Government

Local governments are established by state and territory governments to take responsibility for a number of community services. Local governments have a legislature and an executive but no judiciary. Their powers are defined by the state or territory government which established them. Local governments are also known as local councils.

National Capital and Population of Australia

Canberra, located in the Australian Capital Territory, is Australia's national capital. The Parliament of Australia is located in Canberra, as is most of the Australian Government public service.

The current national population of around 20.6 million is concentrated mainly in the large coastal cities of Sydney, Melbourne, Brisbane, Perth, and Adelaide.

For further information refer: <http://www.australia.gov.au/about-australia>

Annex A: Australian Government programs and policies

Overview

There are a number of Australian government programs which support the renewable energy industry. In addition, some of the State governments have renewable energy targets and / or greenhouse gas reduction programs which support the deployment of renewable and sustainable energy solutions.

The Commonwealth and State governments also provide annual funding for research, development and technology commercialisation programs.

The Mandatory Renewable Energy Target (MRET)

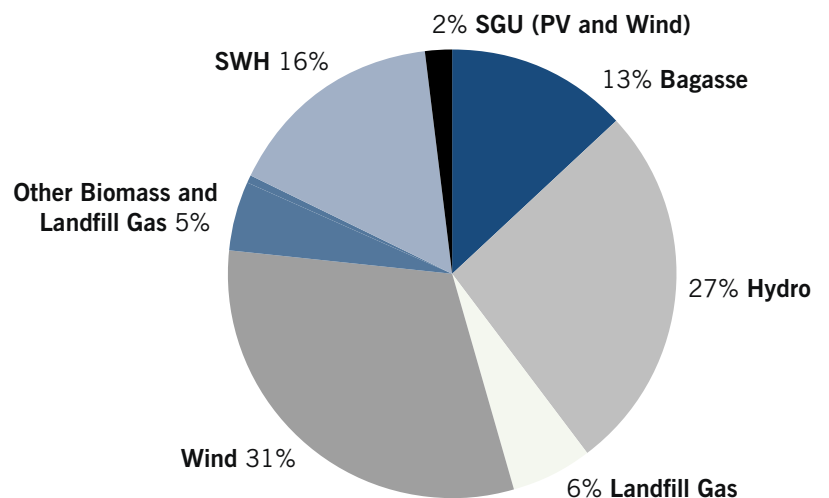
The key Australian government support measure for the renewable energy industry is the Mandatory Renewable Energy Target (MRET) which is aimed at increasing the production of renewable energy in Australia. The MRET commenced on 1 April 2001 and requires the generation of 9,500 gigawatt hours of extra renewable electricity per year by 2010. Under the target, all electricity retailers and wholesale buyers have a legal liability to contribute towards the generation of additional renewable energy. They are called 'liable parties', and meet their legal obligation by acquiring renewable energy certificates. Renewable energy certificates can be created when:

- Electric water heaters are replaced by solar water heaters
- Renewable energy is produced by small generation units or power stations

To be eligible for renewable energy certificates, solar water heaters and renewable energy generators must comply with certain conditions. Renewable energy certificates can be sold to agents or liable parties. The price of certificates varies because sellers and purchasers directly negotiate price and payment arrangements. Renewable energy certificates are not a government rebate or refund.¹³

Figure 1 identifies the source of RECs by fuel type on a cumulative basis over the life of the scheme showing that wind and hydro are the largest suppliers.

FIGURE 1 CUMULATIVE RECS TO 2020 BY ELIGIBLE SOURCE



13. Office of the Renewable Energy Regulator: www.orer.gov.au; REC Registry

Photovoltaics Rebate Program (PVRP)

This program began in January 2000 to encourage the development and use of building-mounted PV, in particular in the grid-connected market. Other key objectives are to:

- Reduce greenhouse emissions;
- Assist in the development of the Australian PV industry; and
- Increase public awareness of renewable energy.

This is funded and administered by the Australian Greenhouse Office, Department of the Environment and Heritage (DEH), with administration by the State governments. The PVRP was recently extended for a further two years through the 2005 budget process, with annual funding of AUD 5.7 million being provided for cash rebates to householders, housing estate developers and owners of

community use buildings who install grid-connected or stand-alone photovoltaic systems.

1,042 systems were installed in 2005, amounting to 1.553 MWp. 65% of customers, accounting for 73% of installed capacity, were on grid-connected buildings and around AUD 4.2 million was allocated in rebates. Since the start of the program in 2000, more than 6,700 systems, using 8.2 MWp of PV, have been installed and rebates of over AUD 35 million have been provided.

The program commenced in 2000 and is currently funded until 2007. Householders are eligible for a rebate of AUD 4/W capped at AUD 4,000 per residential system. Community

buildings attract an AUD 4/Wp rebate but have had a higher cap of AUD 8,000. This cap was reduced to AUD 4,000 from 2006. As part of the Program, the Australian Government has also made available rebates to projects by residential housing developers and display home builders. A rebate of AUD 3.50/Wp, reducing to AUD 3/Wp by end 2007, is available to developers in AUD 50,000 portions.

Renewable Remote Power Generation Program (RRPGP)

This is an Australian Government program established to meet the specific needs of electricity users not connected to the main grid through renewable remote power generation including solar, wind and bioenergy. In August 2006, the Australian Prime Minister announced an AUD 123.5 extension and expansion to the RRPGP program to cover all states and territories, commencing on 1 July 2007.

In general, the target groups for this program are indigenous and other small communities, commercial operations, including pastoral properties, tourist facilities and mining operations, water pumping and isolated households that operate within diesel mini-grids, use direct diesel generation or are at the end of long grid lines.

2.08 MW of PV was installed under RRPGP in 2005, bringing the total installed capacity to 5.35 MW under this program, of which 0.81 MW is installed in large utility run diesel grid systems outside of the main grid. The latter includes 0.43 MW of solar concentrating dishes commissioned in the NT, with an additional 0.29 MW to be commissioned in early 2006. Although it is not PV specific, over 95% of small systems installed under the RRPGP include some PV. The overall program has funds of around AUD 205 million allocated to it, of which around AUD 142 million had been allocated by mid 2006. Of this, AUD 15 million has been allocated to industry support activities, including test facilities, standards development, training, feasibility studies and demonstration projects.

Of the industry support funds, a specific allocation of AUD 8 million has been made for the *Bushlight* project to assist with the development of industry capability and local understanding of renewable energy systems in small indigenous

communities and to install household and community systems.

The Bushlight Project started in 2001, and has overseen the installation of 93 renewable energy systems in 77 communities, valued at more than AUD15 million, throughout northern and central Australia. These systems range in size from small household systems to larger community-based systems, and provide sustainable energy services to some of Australia's most remote indigenous communities. Community energy planning processes have now been facilitated in 84 communities.

Renewable Energy Development Initiative (REDI)

This was launched in October 2005, and will provide AUD 100 million over seven years in the form of competitive grants of between AUD 50,000 and AUD 5 million to Australian industry to support early-stage commercialisation; research and development; technology diffusion and proof-of-concept activities in renewable energy technology. Projects are required to demonstrate strong commercial and emissions-reduction potential. Origin Energy received AUD 5 million in the first grant round to assist with commercialisation of its Sliver[®] Cell PV technology.

In July 2006, the Australian Government awarded funding to another six renewable energy projects. To date, this program has so far delivered grants in excess of AUD 33 million to 16 Australian renewable energy companies, with six new projects recently awarded funding:

- Australia Renewable Fuels, South Australia, for micro-algal feedstock biodiesel production;
- CSR Sugar Pty Ltd, Queensland, to develop its Ethanol Energy Production using its *SugarBooster* technology;

- Geothermal Resources Limited, South Australia, for its project involving the heat-generating capacity of buried hot radiogenic granite;
- New Energy Partners Pty Ltd, NSW, for its parabolic solar collector for medium temperature application;
- Powercorp Pty Ltd, Northern Territory, to develop an electricity grid stabilising system for large wind farm interconnection; and
- SQC Pty Ltd, Queensland, for production of hydrocarbons from algae.

Low Emissions Technology and Abatement (LETA) initiative

This is an AUD 26.9 million measure to reduce greenhouse gas emissions over the longer term by supporting the identification and implementation of cost effective abatement opportunities and the uptake of small-scale low emission technologies in business,

industry and local communities. Support for renewables is provided via an industry development sub-program and is available to State and Territory Government agencies and renewable energy industry associations.

Advanced Electricity Storage Technologies

The AUD 20.4 million program aims to identify and promote strategically important advanced storage technologies in order to increase the ability of renewable energy-based electricity generation to contribute to Australia's electricity supply system. Advanced storage technologies for

electricity applications include, but are not limited to, batteries, electro-mechanical, chemical and thermal storage technologies in either on-grid or off-grid situations.

Solar Cities trial

Solar Cities is an AUD 75.3 million initiative announced by the Government in June 2004. Solar Cities will be implemented by the Department of the Environment and Heritage through trials in Adelaide and at least three other electricity grid-connected urban areas around Australia. Solar Cities is an innovative program which is designed to

demonstrate how solar power, smart meters, energy efficiency and new approaches to electricity pricing can combine to provide a sustainable energy future in urban locations throughout Australia. It is a partnership approach that involves all levels of Government, the private sector and the local community. Eleven consortia from across Australia

have been short-listed at the Solar Cities expression of interest phase. Proponents from Adelaide, Perth, Kalgoorlie, Alice Springs, Townsville, Newcastle, Sydney, Melbourne and Bendigo have been invited to submit a detailed business case and compete to host a Solar City. Final selection of the Solar Cities will be made in 2006.

Wind Forecasting Capability initiative

The Government has provided AUD 14 million over five years to support the development of a wind forecasting capability for Australian conditions.

This funding will be used to develop and install systems to provide wind energy forecasts to facilitate greater penetration of wind in energy markets.

The Renewable Energy Action Agenda

In 2000, the renewable energy industry and the Australian Government developed the *Renewable Energy Action Agenda* (REAA). The REAA outlined a strategic vision and plan of action for the growing renewable energy industry, aiming to achieve annual sales of \$4 billion by the year 2010.

Major achievements in the implementation of the REAA have included:

- the formation of a peak industry body – the Australian Business Council for Sustainable Energy;
- completion of a Renewable Energy Technology Roadmap and an Australian Photovoltaic Industry Roadmap;
- a successful trade mission organised by the Australian Renewable Energy Export Network to Brazil, Chile and Mexico in April 2002;
- the development, implementation and accreditation of renewable energy training programs; and
- the organisation of successful solar house days over the last four years by the Australian and New Zealand Solar Energy Society (ANZSES) to increase community awareness and commitment to renewable energy.

Further information on the REAA is available at www.industry.gov.au/reaa.

International Measures

THE AUSTRALIA-CHINA CLIMATE CHANGE PARTNERSHIP

Established in 2003 the Australia-China Climate Change Partnership provides for cooperation between Australia and China on climate change with the aim of enhancing understanding of climate change, facilitating greenhouse gas reductions and building capacity to respond to climate change. A wide range of cooperative activities are being pursued under the partnership including practically focused projects of mutual benefit to both countries. Renewable energy has been identified as a high priority for collaborative activity. Two renewable energy projects are currently being implemented under the Partnership. These include the *Renewable Energy Industry Guide to Doing Business in China* and the *Renewable Energy Training System for China*.

In addition the Partnership is providing opportunities to promote or enhance business prospects for Australia and Chinese companies. In October 2006 the Australian Minister for the Environment and Heritage is scheduled to lead a Renewable Energy and Energy Efficiency Business Mission to China to showcase Australian expertise and capabilities and identify/secure business opportunities in China and facilitate further cooperative activities.

OTHER INTERNATIONAL FORA

The Australian Government is participating in a number of other international fora to promote renewable energy. These include:

- The Asia Pacific Partnership for Clean Development and Climate (APP), which has established a Renewable Energy and Distributed Generation Task Force, chaired by the Republic of Korea and co-chaired by Australia. The role of the Task Force is to develop

detailed action plans outlining both immediate and medium-term specific actions. The Australian Government has announced a commitment of AUD 100 million over five years to the APP, with 25% allocated specifically for renewable technology projects. <http://www.asiapacificpartnership.org/default.htm>

- The Renewable Energy and Energy Efficiency Partnership (REEEP) which fosters international collaboration to accelerate the growth of markets in the use of renewable energy and energy efficiency technologies. Further information is available at www.reeep.org;
- The International Energy Agency Implementing Agreements, which provides the basis for interested parties to collaboratively undertake energy technology research, development and deployment activities. Further information is available at www.iea.org/Textbase/techno;

continued over page

- The Asia-Pacific Economic Cooperation Energy Working Group projects, which seek to maximise the energy sector's contribution to the region's economic and social well-being, while mitigating the environmental effects of energy supply and use. Further information is available at www.apec.org; and
- Australia has bilateral climate change partnerships with the European Union, Japan, New Zealand, South Africa and the USA. This expands the capacity for climate change action by providing market opportunities for greenhouse technologies, products and expertise from Australia, and broadens the participation in climate change action by encouraging direct involvement by industry, business, scientists and communities. Further information is available at www.greenhouse.gov.au/international/partnerships.



Annex B: Australian State and Territory Government Initiatives

State and Territory governments have also implemented a number of energy and greenhouse abatement schemes which support the development of the renewable energy industry in Australia. Most States have initiated a "Solar Schools" program; and supported the market through

development of information centres and displays on renewable energy. The major schemes which are having a positive effect on increasing the Australian market for renewable energy are listed below. However, this list is by no means exhaustive.

NSW Greenhouse Gas Abatement Scheme (GGAS)

Since January 2003, the NSW Greenhouse Gas Abatement Scheme operates as a form of emissions trading, however instead of trading emission permits, which would otherwise be required to be surrendered by emitters, trade occurs in emissions abatement or reduction. Electricity suppliers are required to reduce the emission intensity of the

power they supply to customers and can do this through the surrender of NSW Greenhouse Abatement Certificates (NGACs).

NGACs typically can be earned through a range of activities including renewable generation – avoided fugitive emissions from landfill gas and sewage gas projects are also eligible abatement sources.

More information:
<http://www.greenhousegas.nsw.gov.au/>

Victorian Renewables Scheme

The Victorian Government has implemented legislation to deliver a 10% market share for renewables in that State by 2010. The Victorian Renewable Energy Target (VRET) – a state-based mandatory renewable energy target and supporting scheme will require electricity retailers to purchase a minimum of 10% renewable energy by 2016, up from the current level of around 4%. Refer: www.dse.vic.gov.au/dse/index.htm



