Chapter 4
Australia

4.1 INTRODUCTION

The past two years have witnessed both exceptional growth and great uncertainty for the Australian wind industry. Since 2001, the industry has demonstrated rapid expansion by more than doubling the nation's installed wind capacity, bringing the cumulative total to 198 MW at the end of 2003.

The industry has also consolidated and developed in other important ways. During 2003, Vestas Australia opened its first wind turbine assembly plant in the state of Tasmania. And at the end of 2003, the first Australian wind-tower component export contract was signed by the engineering firm, Keppel Prince.

However, the industry was also greatly affected by uncertainty created by the federal government's drive for a new approach to a national energy strategy. The year 2003 began in the wake of a federal government report, the *Parer Report*, which recommended abolition of the most significant policy driver behind renewable energy sector growth, the Mandatory Renewable Energy Target (MRET).

Many in the industry expressed concern when the Review Committee's report, released in January 2004, recommended that the current target for 2010 remain unchanged. Although it has fostered considerable renewable investment thus far, the 9,500 GWh fixed target is an insufficient stimulus to establish a robust wind-manufacturing base in Australia.

The Australian industry is now focused on the outcome of a legislated review of the MRET measure. The review has been completed, but the government's response is still awaited, expected some time in early 2004. The government's final decision on the future of MRET will undoubtedly have a significant impact on the wind industry in Australia.

4.2 NATIONAL POLICY

Strategy

The development and growth of the renewable energy industry in Australia is primarily supported by the strategic initiatives from the federal government's 1998 National Greenhouse Strategy (NGS). The Australian government has invested nearly 1 billion Australian Dollars (AUD) to fund a wide range of greenhouse abatement measures across the economy, especially within the energy, transport, and agricultural sectors. Renewable energy industry development is supported through a range of NGS measures.

Mandatory Renewable Energy Target (MRET)

A cornerstone of federal government support for the Australian renewable energy industry is the MRET initiative. This initiative proceeded from the Prime Minister's 1997 *Safeguarding the Future* package of measures, which is a core component of the NGS. Current MRET legislation mandates the sourcing of 9,500 GWh of extra renewable electricity per year by 2010, through 2020.

The program requires electricity wholesalers and retailers to source an annually increasing percentage of their supply from registered renewable generators or pay a shortfall pen-

Figure 4.1 Tower construction at Challicum Hills wind farm
Image courtesy Keppel Prince

alty of 40.00 AUD/MWh. The MRET was a "world first" in creating a national renewable energy market that is backed by legislation, using an innovative market-based system of tradable certificates.

In 2002, the *Parer Report* to the Council of Australian Governments (COAG) on national energy reform recommended the abolition of the target, a suggestion that caused great uncertainty in the industry. Subsequently, the legislation underpinning the MRET underwent a scheduled review process, beginning in March 2003.

There have been widespread calls for significant changes to the legislation, such as an increased target and an extension to the time period over which the target is mandated. After consulting with stakeholders, the MRET review panel tabled their report in the Australian Parliament during January 2004. The government's response to the report is also expected early in 2004 either before, or as part of, a national energy policy statement.

Renewable Energy Action Agenda (REAA)

The REAA is another NGS initiative. It was developed in 2000 and established a partnership between government and industry to support and advance the domestic renewable energy industry. The agenda reflects a multi-pronged approach that includes an analysis of current industry performance, identification of impediments to growth, and development of priorities for action. It strives to foster a competitive energy market with clear signals to investors, and it aims to achieve annual renewable energy industry sales of 4 billion AUD by 2010. The agenda is on track – 2002 to 2003 sales were estimated at 1.8 billion AUD.

A Renewable Energy Technology Roadmap followed the REAA. The roadmap provides analyses of strategic technology development crucial to establishing and maintaining a long-term competitive advantage. It outlines a long-term R&D plan that defines the industry's collective future and establishes clear pathways forward.

Other Programs

The NGS also provides direct support to the renewable energy industry through programs that include the following:

1. The 264 million AUD Renewable Remote Power Generation Program
2. The Renewable Energy Equity Fund, which provides venture capital to high-growth and emerging companies commercializing directly to or enabling renewable energy technology services
3. The Renewable Energy Commercialisation Program (RECP)
4. The Renewable Energy Showcase, which provides seed funding and/or promotion of leading edge technologies that are approaching commercialization.

In addition to the above, the National Green Power Accreditation Program (Green Power), which was initiated by the Victoria state government, encourages expansion of green power electricity generation by allowing customers to request, for a small premium on their electricity bill, that participating power retailers provide them with electricity from renewable resources.

State-Based Greenhouse Gas Abatement Schemes

In addition to Australian federal government strategies, some Australian states have also established their own greenhouse gas abate-

Figure 4.2 Mist below Challicum Hills wind farm during construction
Image courtesy Keppel Prince

ment programs. For example, New South Wales (NSW) established the Renewables Investment Program, which provides grants, loans, and equity for companies demonstrating new renewable energy technologies or new applications on existing technologies.

The NSW Greenhouse Benchmarks Scheme provides retail electricity suppliers with a compulsory greenhouse gas reduction target proportional to their market share of emissions, as well as support for low-emission power-generation projects. This program's impact on the renewable energy industry is unknown, but is unlikely to be high.

Queensland established the Queensland Sustainable Energy Innovation Fund, which provides matching funds for the demonstration of renewable energy technologies. The Queensland 13 Percent Gas Scheme requires electricity retailers and other liable parties to source at least 13% of their electricity sold in Queensland from gas-fired generation, beginning 1 January 2005.

Victoria has a variety of programs that support the renewable energy industry, including a 22.95-million-AUD fund for the development of new technology and the introduction of small-scale renewable energy projects.

Progress Towards National Targets

The MRET measure has performed strongly since coming into force in April 2001. It has generated a high level of renewable energy project planning and development activity, especially in the wind sector. Compliance with the scheme rose from just more than 92% in 2001 to more than 99% in 2002. These compliance results indicate the MRET is working, that electricity retailers are buying renewable energy, and that there are ample renewable energy supplies available for purchase.

According to the Australian Bureau of Agriculture and Resource Economics (ABARE), the average annual growth in wind-generated electricity is expected to exceed 25% until 2020. This was certainly the case in 2003, during which time it grew by 88%. Specifically, total installed capacity grew from 105 MW at the end of 2002 to 198 MW at the end of 2003. Victoria is home to almost half this total, with 91.65 MW of wind now installed in the state.

By the end of 2003, proposed Australian wind farms – with a capacity of 1,629 MW – had received planning approval. The 2003 industry goal of the Australian Wind Energy Association (AusWEA) is for 5,000 MW of installed wind capacity in Australia by 2010.

Figure 4.3 and Figure 4.4 indicate the percentage of Renewable Energy Certificates registered against the different sources of renewable energy as of December 2002. Although the percentage increase for wind from 2001 to 2002 appears as only 2%, this actually represents a significant increase from 100,191 MWh to 207,145 MWh.

4.3 COMMERCIAL IMPLEMENTATION

Installed Capacity

The total installed capacity of commercial wind turbines (10 kW or greater) reached more than 198 MW at the end of 2003, an increase of 88% over the 2002 value (Figure 4.5). More than 164 MW of this total is grid-connected, while the remainder is located in remote wind-diesel power systems (Figure 4.6).

New installed capacity for 2002 was 31.56 MW, with 31.50 MW of that total grid-connected and the remaining 60 kW in remote wind-diesel power systems. The projects were Toora (21 MW), Woolnorth Stage 1 (10.5 MW), and Exmouth Advanced (0.06 MW).

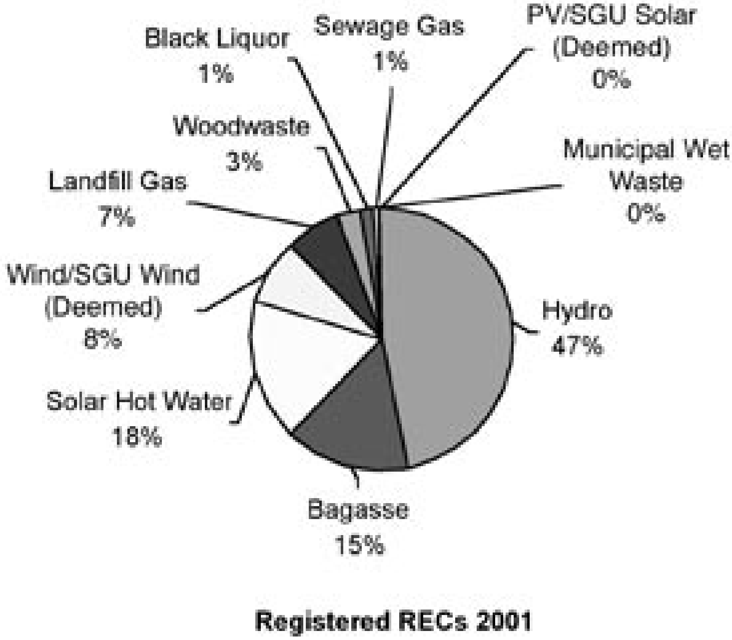

Figure 4.3 Renewable Energy Certificates registered against specific generation modes in 2001

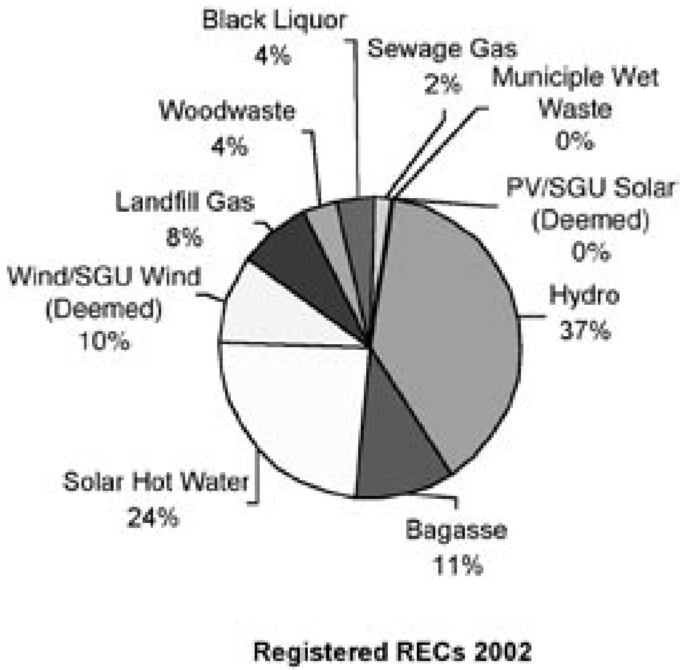

Figure 4.4 Renewable Energy Certificates registered against specific generation modes in 2002

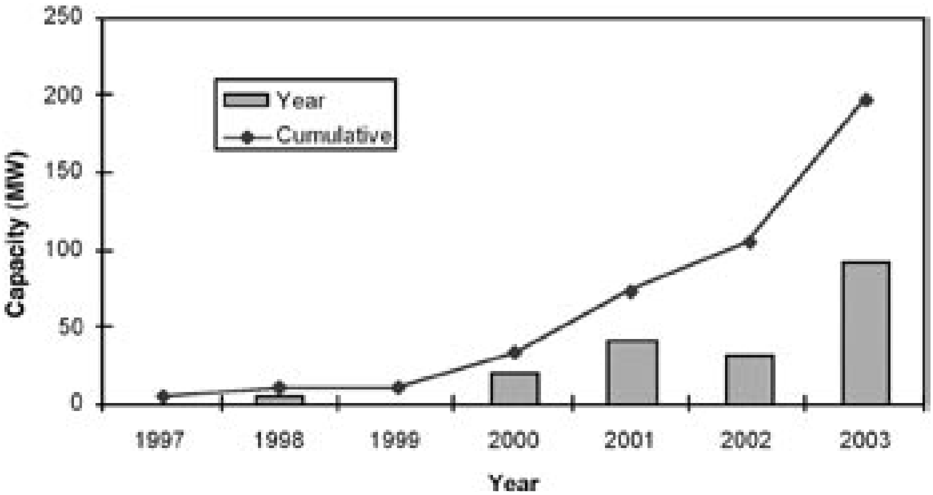

Figure 4.5 Total installed wind capacity in Australia at the end of 2003 (MW)

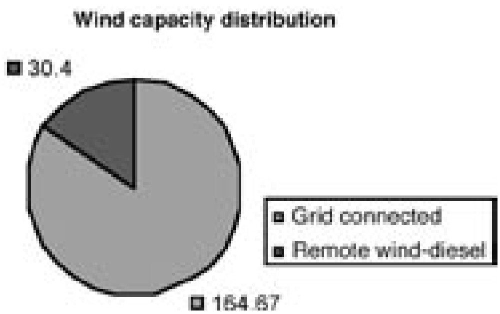

Figure 4.6 Grid versus remote supply of wind capacity

New wind installations soared in 2003 to 92.90 MW across five wind farm sites. These are the Mawson Base in Antarctica (0.6 MW), Starfish Hill (34.5 MW), Challicum Hills (52.5 MW), Huxley Hill Extension (1.7 MW), and Nine Mile Beach (3.6 MW). Of this new 2003 capacity, 87 MW is grid-connected, and 5.9 MW is located in remote wind-diesel power systems.

Three of the earliest Australian wind installations, totaling 430 kW, have been decommissioned. These are: Breamlea wind turbine located near Queenscliff, Victoria (a single, 60-kW Westwind turbine installed in 1987); Coconut Island, Queensland (a single, 10-kW Bergey-Westwind turbine installed in 1992); and Salmon Beach wind farm near Esperance, West Australia (six, 60-kW Westwind turbines installed in 1988). Six larger turbines at Nine Mile Beach near Esperance have replaced the Salmon Beach wind farm, and the Breamlea wind turbine is undergoing an upgrade.

The outlook for further installations of large, grid-connected wind is positive. At the end of 2003, more than 1,629 MW worth of projects had received planning approval, and more than 555 MW of capacity were already under tender or construction. The projects are spread over the four states of South Australia, Tasmania, Victoria, and West Australia, which all have large tracts of cleared farmland in coastal areas. In addition, four remote wind-diesel projects, totaling 3.28 MW have received planning approval and will be built in 2004.

An additional 3,180 MW of public domain projects have been identified, but have not yet gained planning approval. Some of these projects may not proceed once they have been tested against local planning approval criteria, availability of grid transmission infrastructure, and financing. There are, in addition, a large number of identified potential projects not yet in the public domain. AusWEA is aware of approximately 2,000 MW within this category.

Rates and Trends in Deployment

Over the past four years, Australia's wind capacity has undergone an average growth rate of 120%. This rapid growth rate is expected to continue until about 2007, as requirements for electricity retailers to source more renewable energy ramp up towards the current legislated MRET of 9,500 GWh of renewable energy by 2010. In the absence of a higher MRET, it is highly likely that the rate of investment in wind energy projects will quickly drop off after 2007.

The timeframe and incremental increase required under the MRET has caused the amount of electricity produced per annum from wind energy to grow rapidly since the target commenced in 2001 (Figure 4.7).

A green power program, mentioned earlier, also encourages renewable energy development. Increasingly popular, this program now has 75,000 customers and more than 3,000 businesses enrolled. During 2001 to 2002, green power programs purchased more than 405 GWh of renewable energy, of which 18% came from wind energy.

Wind energy projects in Australia so far have all been land-based. Australia is sparsely populated, and several states have extensive private coastal farmlands that possess good wind regimes. Over the past three years, the trend has been toward larger wind projects. With 32 turbines and a total capacity of 52.5 MW, the Challicum Hills wind farm near Ararat in the state of Victoria is the largest in Australia to date, and it is also the largest wind farm in the southern hemisphere. Several projects of more than 100 MW have already received planning approval and will be built in stages.

Additional projects are still being identified, particularly in inland regions of Victoria, NSW, and the Australian Capital Territory (ACT). In January 2004, the Victoria state government released a detailed state wind map that indicated viable inland areas. Following widespread bushfires in NSW and ACT, which destroyed large tracts of plantation forests, the state forests of NSW called for "expressions of interest" for wind developments in those regions.

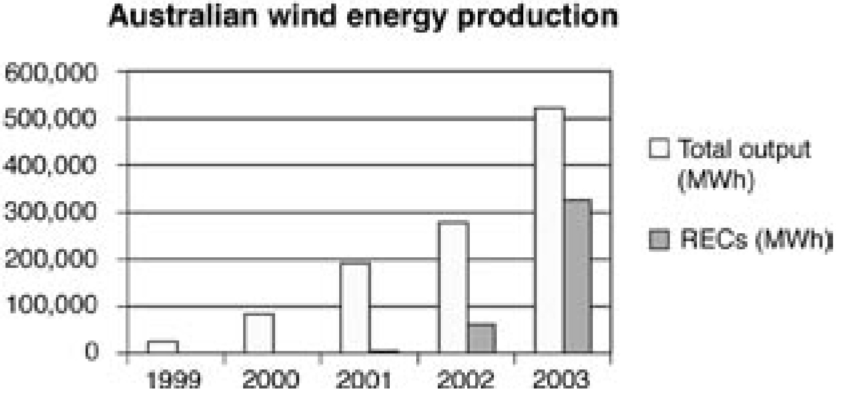

Figure 4.7 Estimated cumulative wind energy output and number of registered renewable energy certificates.
(Note: one REC = one MW; from www.orer.gov.au)

In addition, there is a trend towards installing larger turbines for grid-connected projects. The largest turbines installed in 2003 used 1.75-MW Vestas equipment. Some up-coming wind developments are expected to use 2-MW turbines. Smaller wind turbines, including Westwind and Enercon machines, are being utilized for small remote wind-diesel projects.

A focus of the wind industry has been to encourage local manufacture of wind turbines and towers, with a trend toward construction contracts based on commitments to local industry development. Grid-connected projects have so far been able to award approximately 50% of construction contracts to local Australian companies. The industry goal is to increase this to 90% local content in projects by 2010.

Contribution to National Energy Demand

The most recent statistics for electricity generation in Australia are from 2001 to 2002. As of June 2002, total Australian generation capacity of 42,942 MW produced 205,407 GWh of electricity (excluding independent power producers).

Corresponding to this period, the installed capacity of wind for 2002 was 105 MW, or 0.24% of national electricity capacity (Figure 4.8). In 2002, Australian wind generators produced approximately 277 GWh of electricity, of which 207 GWh was provided to various state transmission systems and 63 GWh to remote power systems.

In 2003, the installed capacity of 198 MW was estimated to have produced more than 520 GWh of electricity with more than 442 GWh provided to state transmission systems and 78 GWh to remote power systems. Caution should be applied in the use of these estimates because actual production figures are not reported in Australia.

4.4 MARKET DEVELOPMENT AND STIMULATION

Main Support Initiatives and Market Stimulation Incentives

The most influential market stimulant in Australia for wind power continues to be the MRET, which requires an additional 9,500 GWh of new electricity to be generated per year from renewable and specified waste sources by 2010. Though the MRET was

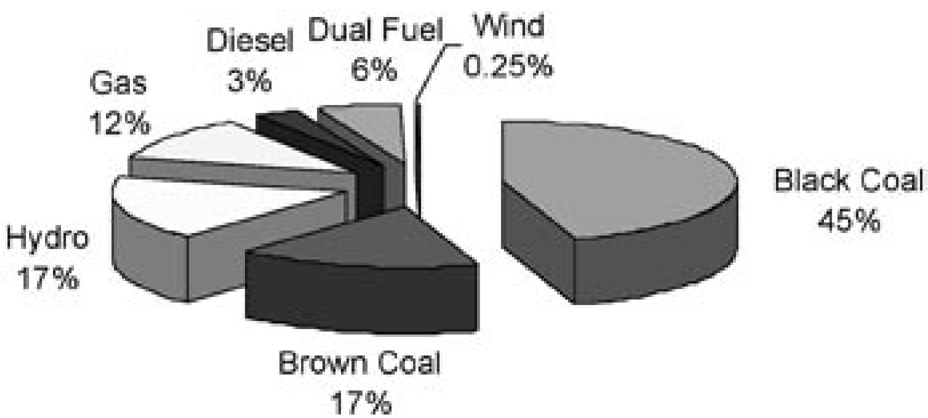

Figure 4.8 Contribution of wind to national electricity capacity in 2002

originally set at 2% new renewable energy by 2010, the target was subsequently converted to the stated fixed quantity. Due to rising total energy demand, this fixed target will amount to less than a 1% increase by 2010. As stated earlier, the MRET legislation is currently under review; the results of this review will undoubtedly be significant for the future growth of the Australian wind power industry.

Another federal government strategy is the REAA, described previously. This government/industry partnership is on-track toward achieving annual renewable sales of 4 billion AUD by 2010, with 2002 to 2003 sales estimated at 1.8 billion AUD. The Renewable Energy Technology Roadmap, which followed the REAA, provides strategic long-term direction to the industry.

Other federal government support for renewable energy includes the following:

1. The Renewable Remote Power Generation Program (RRPGP), which is funded to 264 million AUD, available over four years commencing in 2000
2. The 54-million-AUD RECP, launched in 1999 and continuing for five years
3. The 26.5-million-AUD Renewable Energy Equity Fund
4. An R&D Tax Concession administered by the federal Department of Industry, Science, and Resources and the Australian Taxation Office, which fosters renewable energy innovation with a 1.25-AUD deduction for every dollar spent on eligible R&D activities

In addition, the Australian Greenhouse Office is providing up to 6 million AUD over four years to foster the industry and guide standards development. It granted an 88,000.00 AUD award to AusWEA to develop *Best Practice Guidelines for the Implementation of Wind Energy Projects* in Australia in 2001. These guidelines are intended to be a live document to ensure that they represent the best in development practice in the light of ongoing knowledge and experience. An additional grant to AusWEA, of 170,000.00 AUD, followed in 2003 for the Wind Industry Development Project. This project aims to develop bird protocols and dataset standards, and develop and disseminate fact sheets on key wind farm issues as an adjunct to the *Best Practice Guidelines*.

The Australian Greenhouse Office, established in 1998, remains the principle federal government agency on greenhouse matters. A separate entity, AusIndustry, is the main federal government agency for delivering information, programs, and services that support industry research and innovation.

A notable 2003 development was the termination of federal government funding for the Australian Cooperative Research Centre for Renewable Energy (ACRE).

In some cases, wind energy projects are also supported at a state level. In Western Australia, the Sustainable Energy Development Office, created in 2001, continues to deliver state-sustainable energy policy in that region. In 2003, the Sustainable Energy Development Agency (SEDA) of NSW was moved to the state's Department of Energy. And the Sustainable Energy Authority of Victoria (SEAV) works to accelerate progress toward a sustainable energy future for the state, by facilitating investment in demonstration of innovative renewable energy technologies.

The NSW and Victorian agencies have each produced a state-based wind atlas, SEDA in 2002 and SEAV in 2004. During 2002 and 2003, SEDA's WindBusiness unit produced data to assist the NSW industry to choose favorable sites and harness the maximum available energy at any site. In Victoria, the

Figure 4.9 Turbines at the Woolnorth wind farm in Tasmania
Photo courtesy Hydro Tasmania

8.45-million-AUD Renewable Energy Support Fund, administered by SEAV, aims to support new and innovative applications of medium-scale, renewable energy technologies and can provide up to 20% of the capital cost of eligible projects.

4.5 DEPLOYMENT AND CONSTRAINTS

Wind Turbines Deployed

Although new Australian wind capacity deployment dropped off slightly during 2002 from 2001 levels, installation redoubled in 2003, during which time the highest-ever quantity of new capacity was connected to the grid.

In 2002, Tasmania was home to the largest share of new installed capacity (10.5 MW). During 2003, Victoria (52.5 MW) and South Australia (34.5 MW) underwent a surge in new capacity as some large wind farms were completed (Figure 4.10). South Australia, Western Australia, Victoria, and Tasmania all show great promise for future development, with major wind farm projects already approved by planning agencies in these states.

The majority of turbines deployed in 2002 and 2003 had a capacity greater than 1 MW. However, they ranged in size from 20 kW to 1.75 MW. In 2002, eighteen 1.75-MW turbines were installed, and six 20-kW turbines. In 2003, fifty-eight turbines with a capacity great than 1.5 MW were installed, along with two 850-kW machines, six 600-kW machines, and two 300-kW turbines.

Operational Experience

Australian wind farm contribution to electricity supply continues to rise. In 2002, wind farms produced approximately 277 GWh of electricity; in 2003, they produced 520 GWh.

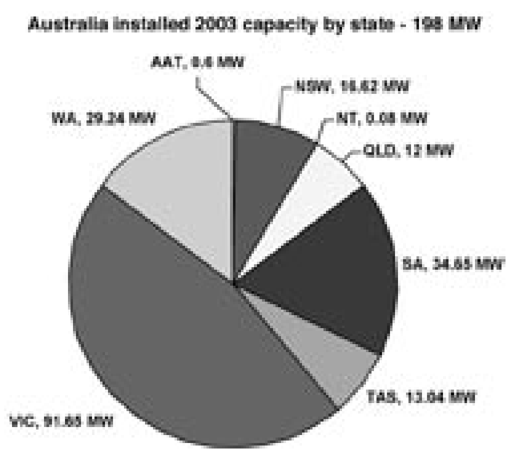

Figure 4.10 Australian installed capacity to the end of 2003

Main Constraints on Market Development

The market development constraints are mainly: (1) the market price for electricity from renewable sources, (2) access to the grid for export of power, and (3) planning approval.

Renewable energy development in Australia faces a serious competitive challenge in the form of some of the lowest electricity prices in the world, largely due to the generation sector's reliance on cheap, abundant coal for approximately 84% of electricity. The market price for electricity from wind farms is set by a number of sources, including market spot price, value of renewable energy certificates, green power component, and emission reduction rights.

Issues associated with the connection of wind farms to Australia's transmission and distribution grids, now and in the future, are of high importance to the wind energy industry. These issues have the potential to make or break the development of new wind farms, depending on the location of the project within the transmission and distribution systems.

To address these issues, AusWEA has established a Wind Grid Working Group. Consultation with stakeholders will be followed by the development of potential solutions, actions, and strategies, scheduled for completion by mid-2004. Recommendations based on these analyses will then be made available to the regulatory bodies capable of approving and implementing them.

In 2003, high-growth plans proposed by developers continued to face rising community concerns over the deployment of wind farms, particularly in coastal areas of the state of Victoria.

In response to calls from community leaders, SEAV has released wind farm planning guidelines. And in early 2004, AusWEA and the country's foremost landscape conservation body, the Australian Council of National Trusts, launched a joint project to address landscape concerns. The project aims to develop mutually agreed methodologies for assessing landscape values to assist siting wind farms. Stage 1 of the project is being funded by the federal government through the Department of Environment and Heritage, and the Australian Greenhouse Office.

Weighing the perceived loss of visual amenity against considerable economic and environmental benefits, both to local communities and the whole nation, is crucial. Other issues include the potential impact of wind farms on rare and endangered species such as migratory, orange-bellied parrots (protected by federal legislation); neighbors potentially affected by noise; changes in land values; and interference with television reception. The lack of a national, coordinated approach to planning the location of future wind farms is also of concern.

AusWEA's comprehensive *Best Practice Guidelines for the Implementation of Wind Energy Projects in Australia* aids in appropriate installation of wind farms. The guidelines were prepared by consulting with diverse stakeholder groups including developers, local councils, consultants, environmental groups, state agencies, network operators, and retailers. Although not mandatory, AusWEA is encouraging all of its members to follow these guidelines.

Standards Australia has also established a Wind Turbine Noise Committee to address the lack of an Australian standard in this area. Their Australian Standard for the Prediction, Measurement and Assessment of Noise from Wind Turbines will provide a detailed methodology and examples (but no recommendations) for criteria or limits because these are the responsibility of the relevant regulatory authorities. The Draft Standard is scheduled for public release and comment in early 2004.

4.6 ECONOMICS

Trends in Investment

Growth of capital expenditure on wind farms has been rapid over the last two years and is forecast to continue at an extraordinary rate in the short-to-medium term. Current growth rate predictions estimate a total expenditure of 5 billion AUD by 2007 forward. However, the accuracy of this forecast depends heavily on the outcome of the MRET review currently being undertaken by the federal government.

Trends in Unit Costs of Generation and Buy-Back Prices

The potential for ongoing improvements in technology is highlighted by major wind turbine manufacturer NEG Micon's commitment to achieving 5% to 10% cost reductions (on a Australian dollar per megawatt-hour basis) between successive generations of machines, typically released every two years. With Australia's world-class wind sites, the industry should be able to track the lower of published price curves. However, wind energy price will depend not only on sites and technology, but also on the commercial environment and economies of scale.

4.7 INDUSTRY

Manufacturing

Australia has a small but viable manufacturing industry for wind turbines in the battery charger sizes, and the manufacture of 5-kW to 20-kW turbines for export is another growing Australian industry. Demand for large wind-turbine generator components has also spawned a vibrant domestic industry for steel tower manufacturing. In 2003, a further milestone was achieved when a Vestas nacelle assembly plant opened in Tasmania, signifying continued industry diversification. In Queensland, Notus Energy – in partnership with German turbine manufacturer, RePower – is also hopeful of developing an Australian turbine manufacturing facility in the near future.

Current Australian content of new wind farms is estimated at about 50% of total capital cost, with the balance largely coming from

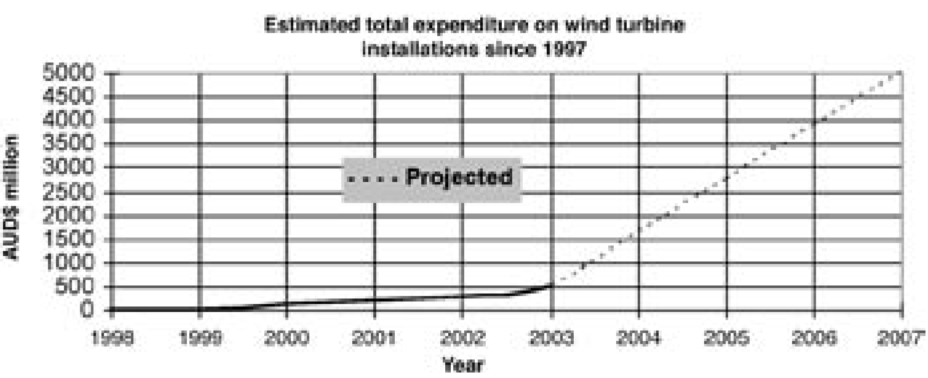

Figure 4.11 Estimated total expenditure on wind turbine installations since 1997

Danish and German manufacturers. With increased scale, it may be possible in the near future to source up to 90% of turbine manufacturing within Australia. This would comprise blade, nacelle, and tower manufacturing.

Industry Development and Structure

A range of different types of companies is active in the Australian wind industry. Wind farm developers and owners include private equity investors, public companies, and government-owned generators and utilities both from within Australia and offshore. In addition, a wide range of companies (both public and private) provides the industry with materials, specialist expertise, labor, and ancillary services including finance.

Domestic manufacturing has progressed in a number of important ways in recent years. Manufacture of steel towers continues to grow as an industry, with excellent capability at many centers around Australia. Tower manufacturing generally proceeds on a project-by-project basis, with suppliers usually located in the same region as the developing wind farm in order to maximize regional and local economic benefits. This manufacturing industry took an important step forward at the end of 2003, with Australia's first wind turbine tower component export contract. It will see the Portland, Victoria-based engineering firm, Keppel Prince, supply embeds to Meridian Energy's Te Apiti wind farm in New Zealand.

In 2003, another industry breakthrough was the opening of the first Vestas nacelle assembly plant, in Wynyard, Tasmania. The 15-million-AUD plant is expected to supply nacelles for 75 to 100 wind turbines per year. It brings 73 new jobs at the factory, plus an additional eight support jobs in Wynyard, a considerable economic stimulus for this regional center of 4,900 inhabitants.

Manufacturing in Australia of turbine blades has been the subject of feasibility studies by some of the world's largest manufacturers since the MRET was announced. The key impediment has been guaranteeing demand for sufficient numbers of machines in order to justify the start-up costs for such facilities. The states of Victoria and Tasmania are the most likely locations for proposed blade plants.

International manufacturers are attracted to Australia as a location because it is well situated to export throughout the Asia-Pacific region. It also possesses political stability; well-developed infrastructure; and an array of other positive social, economic, and financial factors.

The manufacture and installation of small wind generators (up to 200 kW) is a growing market in Australia. Responding to this opportunity, in 2003, AusWEA established a Small Wind Working Group to focus on developing standards for small wind generators and promoting Australian manufactured equipment.

4.8 GOVERNMENT-SPONSORED R,D&D

New R,D&D Developments

New government R&D sponsorship came through the funding programs of the Australian Greenhouse Office, state government sustainable energy organizations, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), and universities.

Australian Greenhouse Office (AGO) Initiatives

The key AGO programs of benefit to wind energy projects are the RECP, the Renewable Energy Industry Development Program (REID), and the RRPGP.

There have been six rounds of the RECP to date. Two types of wind energy projects were funded under the last round of the commercialization component and the industry development component of RECP: (1) the Commercialisation Project and (2) Industry Development Projects.

For the Commercialisation Project, Powercorp Pty Ltd. received a 1-million-AUD grant for the commercialization of its Intelligent Power Systems (IPS) Wind/Diesel/Energy Storage technology to enable successful marketing and installation of this innovation in Australia and overseas.

There were three Industry Development Projects, which were awarded financing as follows:

1. An award in the amount of 238,400.00 AUD was made to Wind Corporation Australia Ltd. to produce Comprehensive Guidelines for the Development of Embedded Wind Farms Connected in Rural Australia.
2. An award in the amount of 38,600.00 AUD was awarded to the Wind Energy Research Institute of CSIRO Land and Water to produce a *Planners Guide for Wind Resource Assessment in Australia*.
3. AusWEA was provided with 88,000.00 AUD to develop *Best Practice Guidelines for Grid Connected Wind Projects*.

REID supports the growth of the Australian renewable energy industry, mainly through grants to Australian companies that demonstrate that their projects would assist the wider development of the Australian renewable energy industry.

The single wind project funded under the most recent REID round in March 2003 provided AusWEA with 170,000.00 AUD. The funding was given in order to develop assessment protocols and dataset standards with regard to wind turbine impacts on birds, and to develop and disseminate a range of educational material on Australian wind farms.

RRPGP provides financial support to increase the use of renewable energy generation in remote parts of Australia that presently rely on diesel for electricity generation. The objective of the RRPGP is to increase the uptake of renewable energy technologies in remote areas of Australia, which will assist in doing the following:

1. Providing an effective electricity supply to remote users
2. Developing the Australian renewable energy industry
3. Meeting the energy infrastructure needs of indigenous communities
4. Reaching long-term greenhouse gas reduction goals

More than 200 million AUD is expected to be available over the life of the RRPGP. The RRPGP provides support for up to 50% of the capital costs of renewable generation equipment.

Other Initiatives

In 2003, the government also funded five other initiatives, explained in more detail in the following paragraphs. They were: (1) the SEAV Wind Atlas, (2) CSIRO, (3) ACRE, (4) RESLab, and (5) the University of Newcastle Wind Energy Group.

In 2003, SEAV funded the development of a Victorian Wind Atlas and Map, which was released in January 2004. This product seeks to increase the quality of publicly available information about the state's wind resources. Average annual wind speeds were modeled using the WindScape wind resource mapping tool developed by the Wind Energy Research Unit of CSIRO Land and Water. WindScape uses atmospheric data and regional topography to model wind resource. The wind speeds have been

Figure 4.12 Woolnorth wind farm in Tasmania

modeled at 65 m above ground level to a resolution of three kilometers.

CSIRO is Australia's premier scientific organization and it makes its major contribution to wind energy research through its Wind Energy Research Unit (WERU). The WERU has primarily focused on developing capabilities for regional wind assessment tools and modeling wind flow over complex topography. A business unit resulting from this work, Windlab Systems Pty Ltd., was established and spun out from CSIRO during 2003.

ACRE was opened in 1996 under the Australian Government's Cooperative Research Centres Program. The various cooperative research centers facilitate technology development and commercialization through university, government, and industry collaboration. ACRE, based at Murdoch University in Western Australia, sought to facilitate creation of an internationally competitive renewable energy industry. However, the federal government terminated funding for ACRE, and the center closed its doors in December 2003. There is currently no similar research center in Australia.

RESLab is a testing laboratory for renewable energy components and systems. Formerly a project of ACRE, at which time it was known as ACRELab, the lab was shifted to a new center within Murdoch University, called the Australian Sustainable Energy Centre (ASEC) near the end of ACRE's term. Continuing under the name RESLab, the laboratory provides testing, design, certification, and training services for the renewable energy industry. It also conducts standards development, product development, research, and commercial consultancies.

The University of Newcastle Wind Energy Group's research focuses on small wind turbines. As a consequence of past research, three turbines have been designed for remote-area power systems: (1) a 600-W machine being marketed by Australian Wind Power, (2) a 5-kW turbine being manufactured in China, and (3) a 20-kW prototype. The current research program focuses on aerodynamics and structural dynamics.

Offshore Siting

Does not apply.

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