Delta electricity

environment: protected

DELTA ELECTRICITY ENVIRONMENT REPORT 2001/02

Contents

About this report

Report objectives

This Environment Report aims to provide a perspective on Delta's recent environmental performance and to foreshadow future initiatives and challenges. It also assesses Delta Electricity's commitment and performance in environmental management and practices, illustrating a commitment to ongoing improvement.

The Environment Report 2001/02 adds to the previous environmental reports and reviews published since 1999. It complements the Annual Report, which covers Delta's business operations over the financial year.

Scope of the Report

The Report provides an overview of Delta's operations within the NSW Central Coast and Western regions and assesses Delta's performance against its stated environmental policies and standards. Performance against relevant regulatory standards and licence conditions is also included in the Report.

Information is provided on the primary impact areas of Delta's operations, namely:

- energy generation and development
- atmosphere
- water
- land and biodiversity
- resource use
- waste management.

For further information on Delta Electricity's operations and approach to environmental issues please contact:

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Stakeholders

Delta's stakeholders include industry regulators, government authorities, local councils, the community and Delta Electricity contractors and staff. All readers are encouraged to provide feedback on this report on the "Have your say" included on page 40.

a message from the chief executive

In 1999, Delta Electricity produced its first comprehensive Environment Report, which covered the period 1996/1999. The Report reflected an increasing expectation within society for businesses to be more transparent and have more accountability for their environmental performance. Two annual environmental reports have been published covering the periods 1999/00 and 2000/01.

In the past three years there have been significant changes to the environmental landscape. Policy revisions by government have seen the introduction of a national mandatory renewable energy target and, at a state level, a scheme to encourage energy retailers to reduce per capita greenhouse emissions. Also in New South Wales, a load-based licensing scheme has been introduced, while the Commonwealth Government has introduced the National Pollutant Inventory. Both of these initiatives encourage businesses to introduce measures that reduce emissions from their operations.

Delta is proud of its environmental achievements over this period. We were the first electricity generator to sign the Generator Efficiency Standard and the first NSW-based generator to meet the certification requirements of the International Organisation for Standardisation (ISO) for our Environmental Management System (EMS).

This latest achievement means that Delta has been officially recognised as having an EMS that meets the acknowledged world standard for environmental management systems, ISO 14001.

This certification reflects our long-term commitment to environmental improvement and provides us with external feedback and comparison on how we are performing. A part of the ISO requirements is that there will be a regular external review of our performance and it will need our best efforts to ensure we continue to meet world best practice standards. In three years, the certification will be reviewed through a complete reaudit of our four coal-fired power plants and renewable energy projects.

Certification is the result of dedicated work by our environmental people with support from our plant managers, team leaders and staff, building and improving on an established and effective EMS. I thank them all for their efforts in meeting the strict criteria of the ISO.

This Report will provide you with an overview of Delta's Environmental Performance and outline our plans for the future. We are very interested in your feedback and encourage you to complete the "Have your say" form at the back of the Report. This will help us continue to refine and develop the information we provide to you, our stakeholders.

Jim Henness

Jim Henness
CHIEF EXECUTIVE

performance summary:
major achievements and challenges

Major achievements

Delta's key environmental achievements were:

First NSW power generator to be certified for Environmental Management Systems (ISO 14001)

Delta Electricity is the first NSW-based electricity generator to achieve environmental management systems certification of its power stations. Delta's operations at Vales Point, Munmorah, Wallerawang and Mt Piper power stations have been certified to the International Organisation for Standardisation ISO 14001 standard.

The certification, which follows a year of external reviews, audits and building on an established and effective EMS, officially recognises Delta as having implemented an environmental management system (EMS) that meets the acknowledged worldwide standard known as ISO 14001. This is a major achievement and reflects an ongoing commitment to ensuring that operations are conducted in a responsible manner.

Further details are provided in Environmental governance.

Improved plant performance – Delta improved plant performance and used fewer resources to produce power

Delta was the first power generator to commit to the Federal Government's Generator Efficiency Standard (GES) for Power Generation. The Generator Efficiency Standard is voluntary, but by signing the agreement, Delta Electricity is now legally bound to reduce greenhouse gas emissions from its power generating plant through increased operational efficiency. An Action Plan has already commenced and plant performance improved in the past year.

Further details are provided in Energy production and Atmosphere.

Delta achieves full compliance with licence conditions

Delta is subject to a number of licence conditions required by regulators. In the past year, Delta has achieved full compliance with all licence conditions. Due to effective procedures and systems, plant performance and staff training and commitment there have been no significant environmental incidents at any power station sites.

Further details are provided in Licensing and compliance.

Challenges

Delta Electricity faced a number of environmental challenges while striving to achieve its mission and objectives.
Key challenges included:

- increasing the production of renewable energy
- waste management, in particular ash storage
- regulatory frameworks.

Renewable energy

With the Commonwealth Government's Renewable Energy Act in 2001 and Delta Electricity's commitment to reducing greenhouse gases, the pursuit of opportunities to develop renewable energy projects has been a major focus. However, there have been a number of issues that have resulted in slower progress than was planned.

Technical aspects of handling biomass co-firing materials, including its integration into plant infrastructure, have proved challenging at both Wallerawang and Vales Point. Other hurdles for the Delta Electricity team included administrative aspects of sourcing eligible biomass fuel, audit trails for the fuel and calculating Renewable Energy Certificates. Work is continuing in these areas.

Delta Electricity has taken a position that no native forest residues will be sourced or used for power generation. This decision has enabled Delta to focus on sourcing fuel in the form of non-recyclable construction and demolition timber from the Sydney area. Research and development of protocols for co-firing of this type of material has involved a significant input from staff and research institutes such as the University of Newcastle. The advantages of this material are the avoidance of landfill, generation of renewable energy from an otherwise wasted material and a reduction in greenhouse emissions.

Delta Electricity has mini-hydro generators in operation at Mt Piper and Chichester Dam. Construction of a third mini-hydro generator at the Dungog Water Treatment Plant is underway. It is anticipated that the in-line mini-hydro will be operational by the end of 2002. Delays were experienced in the development of this mini-hydro due to technicalities of incorporating it into an existing major water supply line that delivers water to Newcastle.

A number of other mini-hydro developments are planned throughout NSW. However, there have been some delays in commencing these projects due to changes in the water resource ownership. It is anticipated that four additional mini-hydro generators will be completed and operational within the next 18 months.

Further details are provided in Renewable energy.

Waste management

The capacity of Wallerawang Power Station to store wet ash has been reduced as a consequence of Sawyers Swamp Creek Ash Dam reaching near capacity. To overcome this and to maximise associated environmental opportunities, Wallerawang is currently being converted to a dry ash system similar to that at Mt Piper.

This transformation from the storage of wet ash to dry ash has also resulted in Delta Electricity identifying potential new uses for the dry ash material. This is part of a deliberate policy to maximise reuse of ash in the local building and construction industry. A percentage of ash from the Mt Piper and Vales Point facilities is sold for cement manufacture and other uses. Delta continues to pursue options for the reuse of all waste products.

Further details are provided in Resource use and waste management.

Regulatory frameworks

Delta is introducing alternative forms of energy production and management, through its new initiatives. In some cases, the regulatory environment in terms of planning controls, calculation of targets or monitoring mechanisms is still being developed. Delta has been a leader in working with regulators and approval authorities to address issues as they arise. Significant matters that have involved Delta staff include: the development of methodology for calculating the amount of renewable energy from co-fired biomass, EPA Licence conditions and protocols for co-firing and implementation methodology for the Generator Efficiency Standard.

Looking forward

Delta's corporate and regional Environmental Objectives and Targets for 2002/03 build on the commitments made this year. Some of the key targets include:

- substantially increasing renewable energy generation from current levels
- continuing the implementation of the Generator Efficiency Standard Action Plans
- meeting or exceeding the industry average for the ESAA Code of Practice Audit
- investigating and developing additional renewable energy options
- preparing and distributing an updated Environmental Awareness Training Package
- including environmental performance measures in corporate Balanced Scorecard
- making Mt Piper and Munmorah power stations PCB-free.

The 2002/03 Environment Report will focus on these commitments and the progress made during the year.

performance summary:
corporate environmental objectives and targets

Delta Electricity has striven to meet its corporate Environmental Policy and Commitments and has continued to develop and implement new strategies to meet these Commitments.

Each year, Delta develops specific environmental targets at a corporate and regional level. Delta's performance against Corporate Objectives and Targets for the period 2001/2002 is detailed in the table below. In addition, there are supporting regional objectives and targets that are not listed in this report.

Corporate objective	Target and achievement
Effectively integrate economic and environmental considerations in decision-making processes.	Include environmental considerations in 2002/03 Strategic Plan. **Target met; two of the six principal objectives in the strategic plan are environmentally related.**
Implement, monitor and maintain programs to ensure that emissions of greenhouse gases are minimised.	Commence Generator Efficiency Standard Action Plan. **Target met; actions have commenced at all sites.**
Support research and development of economically viable sustainable energy systems.	Support the CRC for Coal in Sustainable Development – Participate in all Board and Research Advisory Committee Meetings. **Target met with 250 hours of staff time as an in-kind contribution.** Produce 10.5 GWh of renewable energy. **Target not met due to delays in commissioning biomass co-firing and mini-hydros.**
Take into account natural, aboriginal, historical and industrial heritage issues in the design, siting, construction, operation, decommissioning and disposal of facilities.	Consider heritage issues in all Environmental Impact Statements (EIS) for major development projects by June 2002. **Target met by including heritage in the Broadwater EIS and Wallerawang dry ash disposal environmental assessment.**
Maintain a comprehensive environmental management program that targets compliance with all statutory environmental regulations and facilitates continual improvement of environmental performance.	Update EMS and commence ISO 14001 Certification by November 2001. **Target met following Environmental Audits.**
Where suitable substitute materials exist, eliminate the use of environmentally harmful material, including the phasing out of ozone depleting chemicals and polychlorinated biphenyls (PCBs), in accordance with state and national goals.	Revise Environmental Standard to set 10 ppm PCB transformer maximum level. **Target met with all material >10 ppm removed. Wallerawang first PCB-free site.**
Actively pursue opportunities to reduce, reuse and recycle waste materials and to convert wastes to useful by-products by supporting research, marketing and recycling activities.	Achieve EPA approval of protocol for co-firing. **Target met with a protocol prepared and submitted to the EPA following research and trials.** Finalise supply contracts. **Target not met; negotiations are continuing.** Prepare Strategic Plan for increasing fly ash usage. **Target not met; negotiations proceeding on a regional basis with potential users.**
Where suitable economically viable technology exists to reduce or eliminate emissions or discharges, these technologies will be implemented.	Assess selenium reduction technologies. **Target met; technologies considered not applicable at Wallerawang. Some positive indications were obtained at Vales Point but further review recommended.** Assess flue gas conditioning at Vales Point. **Trial successful; plant to be installed in 2002.**

Corporate objective	Target and achievement
Where emissions and discharges are unavoidable, these emissions will be monitored both at the source and in the external environment.	Ensure Licence emission monitoring is completed to compliance standard at all sites. **Target met; emission monitoring completed at all sites.**
Review environmental policy and standards every two years to ensure alignment with corporate imperatives, business effectiveness, clarity and policy compliance.	Revise Environmental Management Standard by June 2002. **Target met; standard revised for ISO 14001 Certification.**
Regularly review environmental performance at power station, regional, Executive and Board level.	Review environmental performance quarterly at regional, Executive and Board level. **All quarterly reviews completed on target.**
Incorporate power station and regional environmental objectives and targets into annual and five year business plans, and revise these objectives and targets on an annual basis.	Incorporate setting of business unit environmental targets into business planning guidelines. **Target met; to be implemented on an ongoing basis.**
In making significant strategic decisions on environmental matters that may have community impacts, open communication and extensive community consultation will take place.	Complete EIS for Broadwater co-generation plant. **Target met; completed January 2002.** Develop and implement social assessment guidelines for new projects. **Target met; guidelines in place for new projects.** Ensure each strategic decision is accompanied by a stakeholder assessment and engagement plan. **Target met; process developed and will be implemented as required.** Publish an Environment Report. **Target met; annual Environment Reports will be published.**
All public enquiries and concerns will be given prompt and courteous attention, including communication of any follow up activities.	Ensure all concerns are reported to Board level and actions taken are endorsed. **Target met and will be implemented on an ongoing basis.**
Delta Electricity will seek active participation in community consultative environmental forums, conduct appropriate environmental research and projects, and support community-based environmental activities.	Initiate a Waste Watchers program through "Keep Australia Beautiful" in the Central Western region. **Target met; program established and will commence in Greater Lithgow area July – September 2002.**
Where emissions and discharges are unavoidable, these emissions will be monitored both at the source and in the external environment.	Finalise NPI reporting methodology. **Target met; methodology finalised. Has been included in September 2002 report to NPI.**
Minimise greenhouse emissions.	Complete GES greenhouse reporting. **Target met; Strategic Plan submitted and approved.**
All staff provided with the necessary technical and personal development skills and resources to achieve Delta Electricity's environmental objectives.	Complete specified environmental training contract by September 2001. **Target met; training complete.**
Managers, team leaders and staff with specific environmental responsibilities have these outlined in position descriptions and included in performance assessments.	Include environmental responsibilities in corporate position descriptions or performance agreements by June 2002. **Target met; responsibilities included.**

environmental governance: overview

Principal functions and objectives

Delta Electricity's principal functions are to:

- establish, maintain and operate facilities for the generation of electricity and other forms of energy
- supply electricity and other forms of energy.

Guiding Delta in carrying out these functions are the following principal objectives:

- to be a successful business and to this end:
  - operate at least as efficiently as any other comparable businesses
  - maximise the net worth of the State's investment in Delta
  - exhibit a sense of social responsibility by having regard to the interests of the community in which it operates
- to protect the environment by conducting its operations in compliance with the principles of ecologically sustainable development contained in Section 6 (2) of the Protection of the Environment Administration Act 1991
- to exhibit a sense of responsibility towards regional development and decentralisation in the way in which it operates
- to operate efficient, safe and reliable facilities for the generation of electricity
- to be an efficient and responsible supplier of electricity
- to be a successful participant in the wholesale market for electricity.

Vision

Generating Performance Through Innovation

Mission

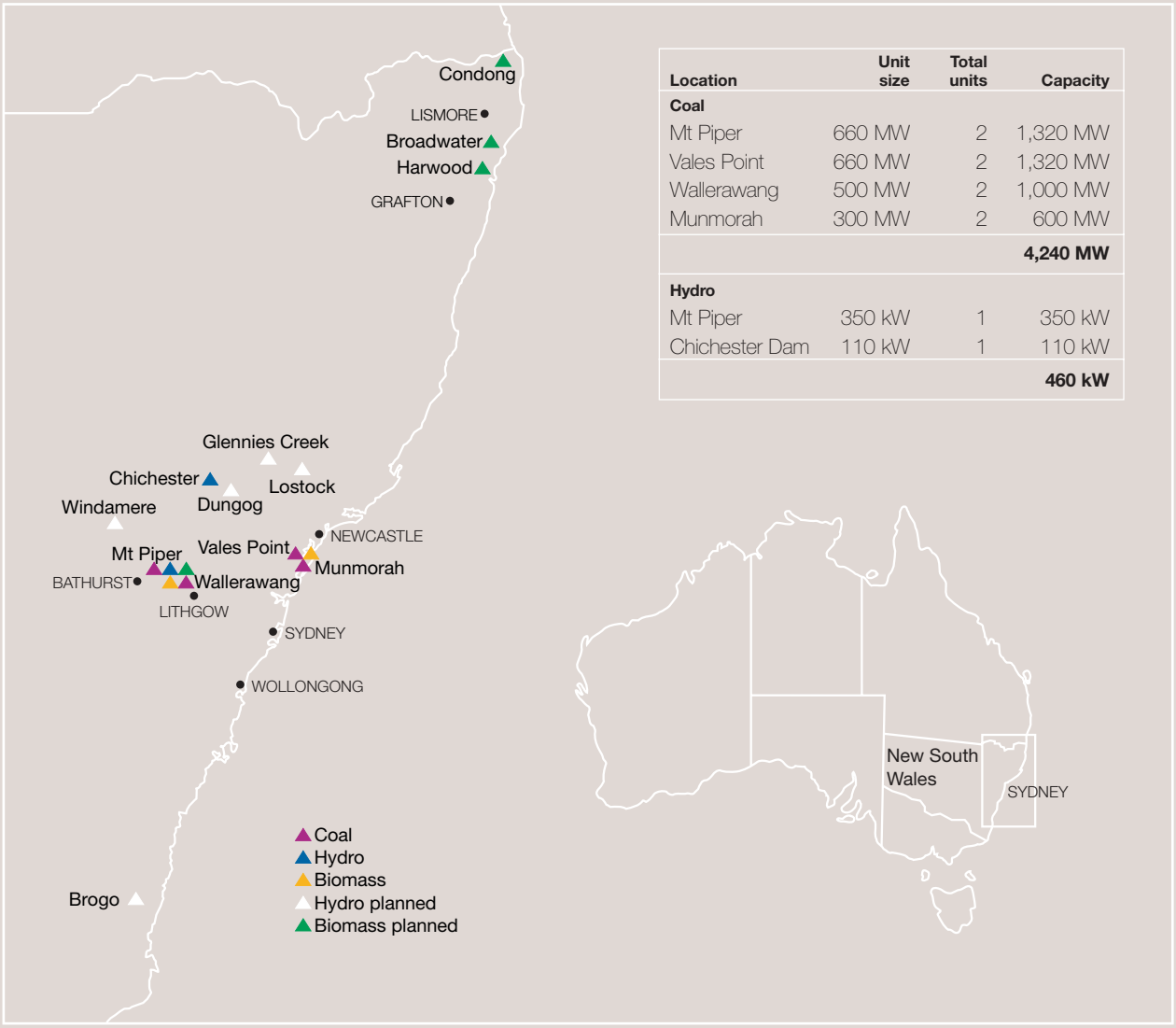
To be the supplier of first choice in the electricity market by ensuring that:

- **Customers** receive competitive prices, reliable supply and innovative customised services
- **Staff** work in a safe, challenging and creative workplace, receive fair return for their contribution, and have opportunities to develop
- **Community** members welcome us as a valued, environmentally responsible organisation
- **Stakeholders** are confident that we effectively manage the business and associated risks

Shared values

- **Productive relationships**
  Maintaining productive relationships with customers, colleagues and suppliers
- **Safety, health and welfare**
  Providing for the safety, health and welfare of our people, visitors and the community
- **Continuous improvement**
  Demonstrating continuous improvement in all aspects of our business
- **Learning and development**
  Supporting the learning and development of our people for business success
- **Environmental performance**
  Caring for the environment for future generations
- **Honesty, fairness and integrity**
  Ensuring honesty, fairness and integrity in all that we do

Map of operations



Location	Unit size	Total units	Capacity
Coal			
Mt Piper	660 MW	2	1,320 MW
Vales Point	660 MW	2	1,320 MW
Wallerawang	500 MW	2	1,000 MW
Munmorah	300 MW	2	600 MW
			4,240 MW
Hydro			
Mt Piper	350 kW	1	350 kW
Chichester Dam	110 kW	1	110 kW
			460 kW

Delta Electricity is an electricity generation corporation formed on 1 March 1996, as part of the New South Wales Government's restructure of the State's electricity industry. Delta Electricity produces electricity at several facilities using diverse energy sources such as coal, fuel, oil, water and biomass materials.

From its coal-fired power stations Delta produces approximately 13% of the electricity needed by consumers in South Australia, Queensland, New South Wales, Victoria and the ACT. Mt Piper and Wallerawang power stations are located 10 km apart near Lithgow with Vales Point and Munmorah power stations located 5 km apart on the Central Coast. The stations have a combined generating capacity of 4,240 megawatts, as shown in the Map of operations above.

Delta is also developing a number of renewable energy projects, including the proposed northern NSW sugar mill co-generation plants; hydro and wind power; and co-firing biomass. These are detailed in Energy production.

Delta's business practices focus on providing cost-effective, safe and reliable electricity to the market. Underpinning this is a strong commitment to sustainable development, community relationships, minimising environmental impacts and a continuing focus on improving staff knowledge of environmental issues through training in environmental management systems (EMS).

environmental governance: policy

Through the commitment and skills of our people, Delta Electricity will be a leader in caring for our environment to ensure its preservation for future generations.

Objectives

1 **To protect the environment and pursue environmental best practice by:**

- conducting operations in compliance with the principles of ecologically sustainable development
- reducing greenhouse gas emission intensity by improving the efficiency of existing operations and increasing the amount of renewable energy generated
- adopting relevant industry Codes of Practice and other environmental standards
- operating the business in a safe, efficient and environmentally responsible manner
- understanding the potential for environmental impacts and managing environmental risks such that pollution of the environment is avoided
- minimising the consumption of resources and the production of wastes
- minimising the impact of our operations on the environment and surrounding communities
- continually measuring, reviewing and improving our environmental performance

2 **To exhibit a sense of social responsibility by having regard to the interests of the communities in which we operate**

3 **To comply with all statutory environmental regulations**

4 **To promote environmental responsibility among our people**

5 **To obtain and maintain certification to ISO 14001 Environmental Management Systems**

environmental governance: commitments

In 1996, Delta Electricity established corporate environmental commitments. These provide the basis for setting corporate Objectives and Targets, against which Delta Electricity measures its environmental performance.

Delta's environmental commitments are:

1. **Conduct operations in compliance with the principles of ecologically sustainable development**
2. **Operate the business in a safe, efficient and environmentally responsible manner**
3. **Understand the potential for environmental impacts and avoid pollution**
4. **Minimise the consumption of resources and the production of wastes**
5. **Minimise the impacts of our operations on the environment and surrounding communities**
6. **Continually measure, review and improve our environmental performance**
7. **Exhibit a sense of social responsibility by having regard to the interests of the communities in which we operate**
8. **Comply with all statutory environmental regulations**
9. **Promote environmental responsibility among our people**

environmental governance:
environmental management system

In order to manage the environmental aspects of its business, Delta has an integrated and co-ordinated approach that includes:

- policies and objectives approved by the Board
- clearly identified roles and responsibilities
- procedures and systems in areas of operations.

This section outlines the personnel within Delta responsible for environmental management and the systems that have been developed to enable the implementation of the corporate policies.

The following diagram illustrates the broad structure of Delta's management team, in relation to environmental and related issues.

Board of Directors and Chief Executive

Board Environment Committee
Two Directors and Chief Executive

Executive Environment Committee
Chief Executive, General Managers and Environment Managers

Regional Environment Committees
General Managers, Production Managers and Team Leaders, Environment Managers and Environment Officers

Executive Environment Committee members

Jim Henness Chief Executive (Chairman Executive Environment Committee)

Rodney Ward General Manager Strategy and Development

Greg Everett General Manager Delta Production Central Coast

Gordon Deans Corporate Manager Environment (Secretary Executive Environment Committee)

Stephen Saladine General Manager Delta Production Western

Glenn Sharrock Production and Environment Manager Central Coast

Rohan Hall General Manager Delta Maintenance

Nino Di Falco Environment Manager Western

environmental governance: ISO 14001 and environmental management systems

An Environmental Management System is a systematic means of ensuring that environmental risks are identified and controlled, regulatory compliance is achieved and that the environmental "footprint" of an organisation is gradually reduced. An EMS involves tighter controls on potential environmental impacts and use of rigorous procedures to ensure staff understanding of requirements and responsibilities.

The ISO 14001 standard provides a "best practice" specification for implementation of an EMS and has been adopted by a wide range of leading multinational companies. In many cases, organisations elect to have their EMS audited against ISO 14001 by accredited certification bodies to provide third-party assurance that the EMS is workable, effective and meets the standard.

Through the implementation of the International Standard, Delta Electricity has ensured a consistent approach to environmental management throughout the organisation by:

- identifying significant environmental risks
- identifying and maintaining awareness of relevant environmental legislation
- assigning clear roles and responsibilities
- establishing procedures for internal and external communications
- establishing procedures for monitoring and measuring environmental performance
- setting and reviewing objectives and targets for improving environmental performance
- monitoring and measuring environmental compliance and community interaction
- setting and reviewing management system programs for achieving objectives and targets
- providing environmental training aligned to skill requirements
- reviewing EMS performance for continual improvement.

Delta achieved third party certification to ISO 14001 in June of 2002, becoming the first electricity generator to achieve this goal in New South Wales. Over the coming year, Delta Electricity will continue to develop and implement the EMS in order to maintain the high level of environmental risk management.

energy: renewable

RENEWABLE ENERGY

Delta Electricity's commitment to renewable energy is presently focused on hydro electricity and biomass utilisation. Delta operates two mini-hydro systems and plans for the installation of five more throughout NSW. Biomass is currently utilised at Wallerawang Power Station with planned expansion of co-firing at Vales Point and Mt Piper power stations. For further information on renewable projects refer to Review of operating performance, Renewable energy.

EMISSIONS

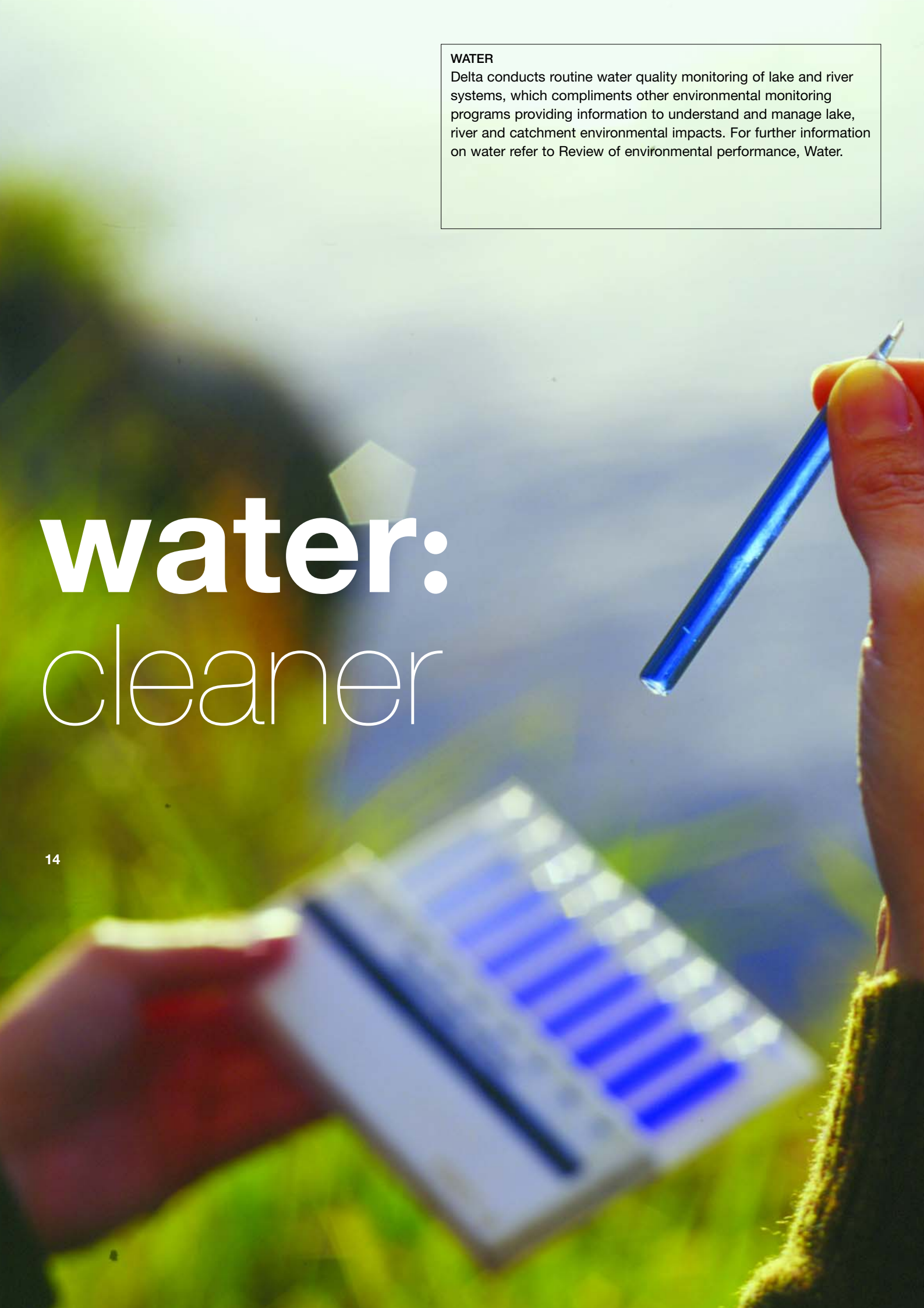
Delta recently installed a Sulfur Trioxide injection plant at Wallerawang to aid in the further reduction of stack emissions. Similar plant is currently being installed at Vales Point Power Station. For further information on emissions refer to Review of operational performance, Atmosphere.

air: fresher

WATER

Delta conducts routine water quality monitoring of lake and river systems, which compliments other environmental monitoring programs providing information to understand and manage lake, river and catchment environmental impacts. For further information on water refer to Review of environmental performance, Water.

water: cleaner



habitat: preserved

COPPERWING BUTTERFLY

Delta is working at identification of any habitat of the endangered Copperwing Butterfly on Delta land in the Western region. This is part of Delta Electricity's ongoing land environmental management using the principles of total catchment management aimed at improving and protecting native habitats found within the power station buffer zones. For further information on land and biodiversity refer to Review of environmental performance, Land and biodiversity.

GENERATOR EFFICIENCY STANDARDS

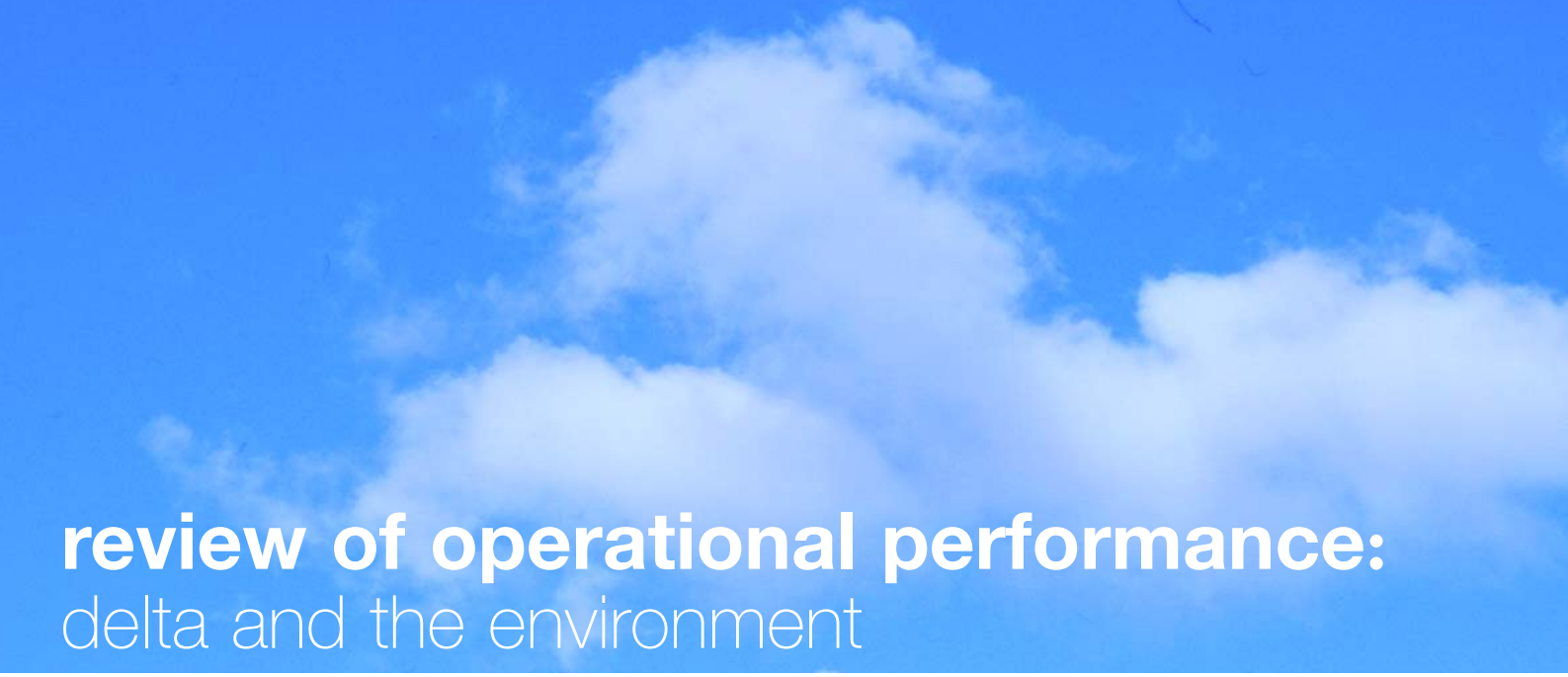
Delta Electricity as the first generator to sign onto the Generator Efficiency Standard has undertaken a range of projects aimed at improving power station efficiency. As a result, all Delta owned power stations operate at or near the top of the best practice efficiency band. Mt Piper Power Station is currently performing near world's best for plant of its type. For further information refer to Review of environmental performance, Atmosphere.

resources: conserved

community: involved

COLONGRA WETLAND

Colongra Wetland is located within the Munmorah Power Station buffer zone. The wetland provides habitat to a large number of birds, including the great egret and white-bellied sea eagle. Delta is working with local conservation groups to ensure the wetland is appropriately managed and is negotiating with the National Parks and Wildlife Service for transfer of ownership to ensure continued protection. For further information refer to Review of environmental performance, Land and biodiversity.



review of operational performance:
delta and the environment

Energy production

Delta's core business is the production of electricity. Its generators produce approximately 13% of the power needed for the national electricity market, servicing consumers across the entire East Coast and South Australia. Delta's total output for the 2001/02 financial year was 20,863 Gigawatt hours. This was a decrease of 323 GWh over last year, attributable to lower electricity demand due to the mild summer conditions in 2001/02.

Renewable energy

On 1 April 2001 the Commonwealth Government's Renewable Energy Act was implemented. This Act is designed to increase the amount of electricity generated from renewable sources by a total of 9,500 GWh by 2010.

The Act works by placing a legal responsibility on wholesale buyers of electricity to purchase a percentage from renewable sources. This percentage is governed by the amount of electricity they purchase from the National Electricity Market. For example if a company purchases 10% of the electricity available on the NEM in 2010, they would be required to purchase 950 GWh (10% of the 9,500 GWh target) of that electricity from renewable sources.

Further information on the Commonwealth Government's requirements for renewable energy can be accessed through the Office of the Renewable Energy Regulators website: http://www.orer.gov.au

There are presently no legal requirements for power generators to produce renewable electricity. Delta believes that a diversified portfolio of generation assets is the best approach to meeting increasing electricity demands. To achieve this, Delta Electricity is developing technologies that will provide cleaner, more efficient and more commercially viable power generation from sustainable resources.

Delta's commitment to renewable energy is presently focused on mini-hydros, wind generation and two different forms of biomass utilisation. Currently, mini-hydro schemes are operational at Mt Piper and Chichester Dam, with five more planned over the next 18 months.

Delta is currently in the early development stages of a significant wind generation project in the NSW Central Highlands. In addition, a number of other possible wind farm sites are being investigated.

Biomass co-firing trials at Wallerawang, Mt Piper and Vales Point have shown great promise. Delta's largest renewable energy projects, however, are the sugar mill co-generation plants located on the NSW North Coast. These three projects alone have the potential to provide about 7% of the Commonwealth Government's Mandatory Renewable Energy Target.

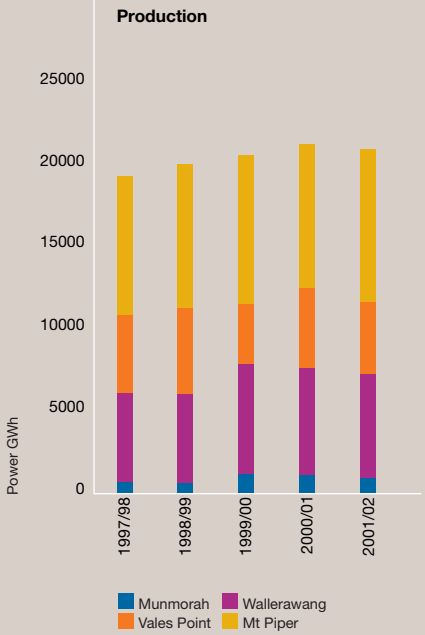
Energy efficiency

The efficient generation of energy is seen by Delta as one of the more important stepping stones towards sustainable development. Efficient generation of energy helps lower greenhouse gas emissions and decreases the demand for the construction of new power stations. Delta was the first power generator to commit to the Federal Government's Generator Efficiency Standard, and all power stations are now operating at or near the top of the best practice efficiency band.

These initiatives have led to an overall 1.6% increase in the electricity generation efficiency of Delta's power stations as well as a 1.3% reduction in greenhouse emissions. This is further discussed and illustrated in Atmosphere.

Delta's renewable energy projects

Power source	Location (NSW)	Operational	Target date	Capacity
Hydro	Mt Piper	✓	1998	350 kW
Hydro	Chichester Dam	✓	2001	110 kW
Biomass Co-firing	Wallerawang	✓	2001	N/A
Hydro	Dungog	×	2002	110 kW
Hydro	Windamere Dam	×	2003	630 kW
Hydro	Glennies Creek Dam	×	2003	630 kW
Hydro	Brogo Dam	×	2003	200 kW
Biomass Co-firing	Mt Piper	Trials completed	2003	N/A
Biomass Co-firing	Vales Point and possibly Munmorah	Trials completed	2003	N/A
Hydro	Lostock	×	2004	200 kW
Bagasse and cane trash	Condong	×	2005	30 MW
Bagasse and cane trash	Broadwater	×	2005	30 MW
Wind	Central Tablelands	×	2005	40 MW
Bagasse and cane trash	Harwood	×	2007	30 MW



Case study – biomass co-firing

Over the previous three years, Delta has been examining the opportunity to utilise sustainable biomass as part of the combustion process at existing coal-fired power stations. Newcastle University has been heavily involved in research into combustion characteristics, particle burnout and plant operational constraints. Successful small-scale trials were conducted during 2000/02 at Wallerawang and Vales Point power stations.

The Wallerawang trials used small quantities of biomass fuels, such as radiata pine sawdust sourced from sustainable plantation forestry, to supplement coal. A dedicated biomass fuel handling facility has been constructed at Wallerawang Power Station to deliver biomass fuel onto the existing coal conveyors as part of the station's normal operations.

Subsequent trials completed at Vales Point and Mt Piper used non-recyclable timber waste as a fuel. This is made up of construction and demolition woodwaste or chipped pallets that would normally go to landfill. The material is processed into fuel and combusted in highly efficient coal-fired boilers to produce renewable energy. This limits waste to landfill and subsequently the production of methane from the breakdown of waste within the landfill site. Methane is 21 times more potent as a greenhouse gas than carbon dioxide.

Delta's EPA operating licences for Mt Piper, Wallerawang, Vales Point and Munmorah power stations were recently amended in order to allow ongoing co-firing of eligible renewable biomass fuels. Prior to obtaining these amendments to the operating licence, Delta Electricity was required to satisfy the EPA's rigid requirements for having negligible environmental impacts. A comprehensive health risk assessment was completed. This study demonstrated that co-firing would cause no measurable increase in health risks for the community.

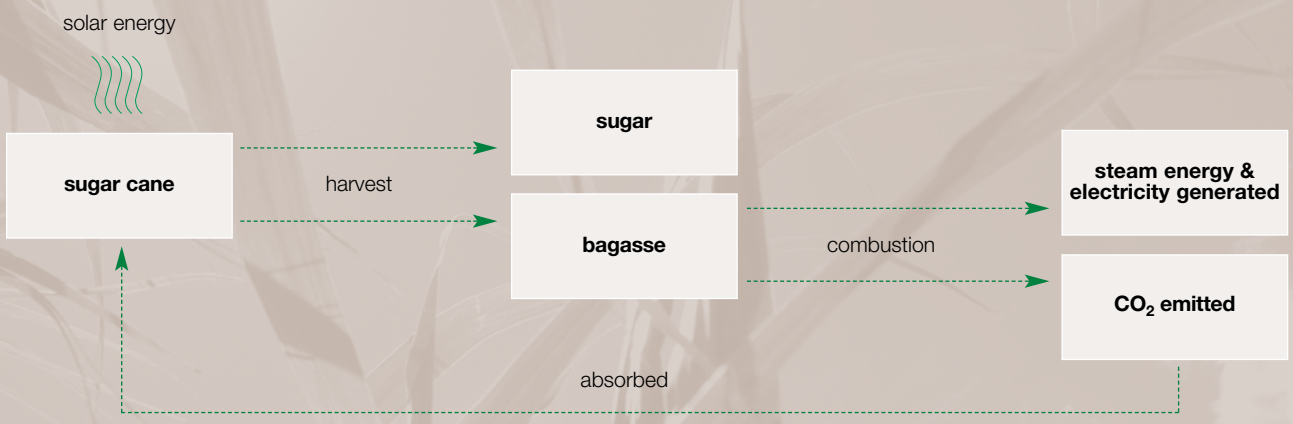
Case study – sugar mill co-generation plants

In conjunction with the NSW Sugar Milling Co-operative Delta is developing new co-generation plants at Condong and Broadwater sugar mills on the NSW North Coast. The plants will use biomass fuels including cane wastes from sugar milling and harvesting to produce up to 400 GWh of renewable electricity per year and supply steam and electricity to the sugar mills.

The co-generation process involves burning cane leaf and bagasse (the fibrous material that remains after sugar cane has been crushed and the sugar removed) in a highly efficient boiler to produce high-pressure steam. This steam will power both the 30 MW turbine generator and sugar mill operations. Cane leaf comprises almost half of the fuel stock and is currently burnt in the field during the harvesting process. Controlled combustion of this waste product in a new, efficient boiler fitted with highly effective emission control equipment will make a significant improvement to local air quality.

Approval to develop the Condong Plant was received from Tweed Shire Council in 2001. An Environmental Impact Statement (EIS) was recently submitted to Richmond Valley Council for the Broadwater Plant. Should this EIS be approved, it is hoped to have both plants commissioned by 2005.

Renewable energy from sugar cane



Atmosphere

Global climate change

Delta Electricity has long recognised the growing concern of communities and governments on the issues of global climate change and emissions of greenhouse gas from the combustion of fossil fuels. The greenhouse effect is the result of greenhouse gases such as carbon dioxide (CO_2) and methane (CH_4) trapping the sun's heat in the atmosphere. It is generally accepted that human activities increase the levels of greenhouse gases in the atmosphere and add to the process of climate change.

Production of electricity at Delta Electricity power stations involves the combustion of black coal. The primary greenhouse gas emitted from this process is carbon dioxide (CO_2), which constitutes more than 99% of total greenhouse gas emissions from Delta's operations. Other greenhouse gas emissions released through the generation of electricity include methane and nitrous oxide. Small amounts of methane and carbon dioxide are also released when black coal is mined. Emissions of all three gases are normally expressed in carbon dioxide equivalents (CO_2-e), i.e. the global warming potential of the gases when compared to carbon dioxide.

Delta Electricity's emissions of carbon dioxide from electricity production for the period 1999 to 2002 are shown in the graph below. In 2001/02 Delta's carbon dioxide emission rate decreased due to efficiency improvements at most sites from 914 to 902 tonnes/GWh generated. Over the past 12 months, Delta Electricity emitted a total of 18.83 million tonnes of CO_2-e from the four New South Wales power stations.

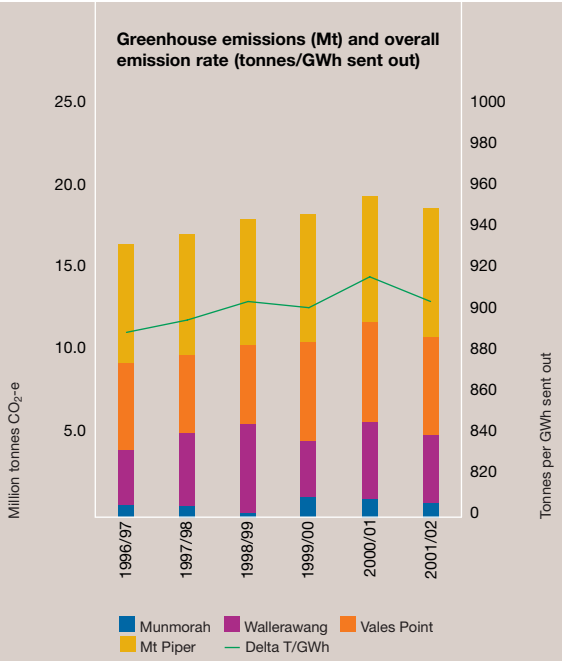
Greenhouse Challenge

The Greenhouse Challenge is a joint voluntary initiative between the Commonwealth Government and industry to abate greenhouse gas emissions. Delta Electricity joined the Greenhouse Challenge Program in 1997 and implemented an action plan to reduce greenhouse gas emissions from its power stations.

In future, most emission savings will come from implementing the Generator Efficiency Standard and renewable generation projects, but Delta will remain a member of the Greenhouse Challenge. Reporting of Greenhouse Challenge and Generator Efficiency Standard is to be integrated into a single report by the Australian Greenhouse Office.

As part of its overall commitment to improve greenhouse performance, Delta is implementing the following initiatives:

- improving the thermal efficiency of existing plant under the Generator Efficiency Standard
- co-firing of biomass with coal in existing plant
- developing mini-hydro generators throughout NSW
- working with the NSW Sugar Milling Co-operative to install new generating plant utilising bagasse and cane leaf as a renewable fuel
- trialling the use of waste mine methane
- wind energy.



Generator efficiency standard

In 1997, the Federal Government announced a package of measures to reduce greenhouse gas emissions. One of the major measures adopted was the Generator Efficiency Standard for Power Generation. Delta Electricity was the first power generator to sign a deed of agreement with the Commonwealth Government's Australian Greenhouse Office. Although joining the AGO Generator Efficiency Standard is voluntary, by signing the agreement Delta Electricity is now legally bound to reduce greenhouse gas emissions from its power generating plant by increasing efficiency. Increased generator efficiency will result in a reduction in the amount of greenhouse gases per unit of electricity produced.

In consultation with the Australian Greenhouse Office, Delta Electricity prepared a Strategic Plan for each of its power stations. Preparation of the plans involved the following steps:

- establishing performance for plants as built and using current fuel
- calculating non-recoverable degradation greenhouse efficiency intensity standards
- determining current performance
- assessing whether the performance is within best thermal efficiency and greenhouse intensity ranges
- developing options for greenhouse gas reduction
- evaluating those options.

Delta Electricity's Strategic Plan contained a list of emission reduction projects that Delta agreed to investigate. Following these investigations, a number of projects were found to be feasible and these were included in Delta Electricity's Action Plan. Action Plans for each station have been agreed with the AGO and will be completed by 2005. When completed, it is anticipated that the Action Plan will reduce emissions by more than 400,000 tonnes of carbon dioxide per year.

Annual reporting requirements include the type and tonnes of fuel used, average annual greenhouse intensity, capacity and output factors, MWh generated, MWh sent out, thermal efficiency, details of improvement options undertaken and greenhouse targets. From these reporting requirements, capacity, greenhouse intensity and greenhouse targets will be made publicly available.

Currently Delta Electricity power stations are all operating at or near the top of the best practice efficiency band, with Mt Piper performing at near world's best for plant of its type. The following graph illustrates Delta's current performance.

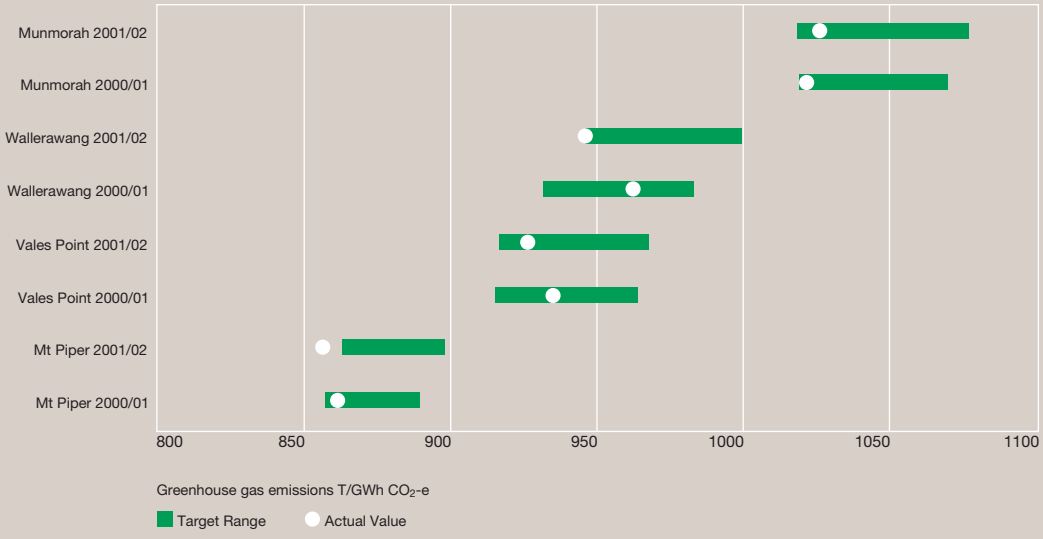
Air quality

As part of Delta's production from the combustion of black coal, flue gases are released through the tall chimney stacks high into the atmosphere. The flue gases contain nitrogen oxides (NOx) which is controlled by power station boiler design and operational control; sulfur oxides (SOx) which are a function of the concentration of sulfur in the coal; plus small amounts of particulate matter (dust).

The emission of particulate matter is controlled by highly efficient electrostatic precipitators or fabric filter baghouses. The design and height of the stacks ensure that the air quality in surrounding areas is well within the regulatory limits. In addition, dust can also be generated from coal stockpiles. However, operational procedures such as using water tankers with sprays on hot windy days ensure ambient air quality goals are achieved.

Generator efficiency standard targets

Note: The lower the range the greater the efficiency



Operating licence conditions require both source monitoring and community air monitoring at each of Delta's four power stations. Source monitoring is a measure of power station stack gas emissions at the point of discharge. Community air monitoring is a measure of the air quality at a determined distance away from the power stations.

Delta Electricity's air emission limits are determined by the NSW Environment Protection Authority and are set out in Environmental Protection Licences. Details of these licences can be accessed through the following web address:

http://www2.epa.nsw.gov.au/prpoeo/licenceN.asp

Nitrogen oxides

Nitrogen oxides (NOx) are produced during the combustion of coal at high temperatures and consist of approximately 80% to 95% nitrogen oxide (NO) with the remainder being nitrogen dioxide (NO_2). Boiler design, operational conditions and the nature of coal can affect the concentrations of NOx in flue gas. Formation of NOx during combustion can be reduced by use of burner optimisation techniques and low NOx burners. Mt Piper Power Station is fitted with low NOx burners. Boilers at the other three stations are tangentially fired, which results in low NOx without the need for low NOx burners.

Although all plant was constructed before 1997, Delta has set a target of reducing or maintaining average NOx emissions below the NSW regulation limit for plant built after 1997. All stations, except Mt Piper, achieved this target in 2001/02.

Maximum NOx emissions are approximately 50% higher than the average figures shown in the graph, depending on the unit load and type of boiler and are generally highest at high load. Consequently Mt Piper, which operates as a base load plant, has the highest average emission rate of Delta's power stations despite having low NOx burners and other combustion control technology. Mt Piper has established a NOx reduction team to investigate further emission reductions.

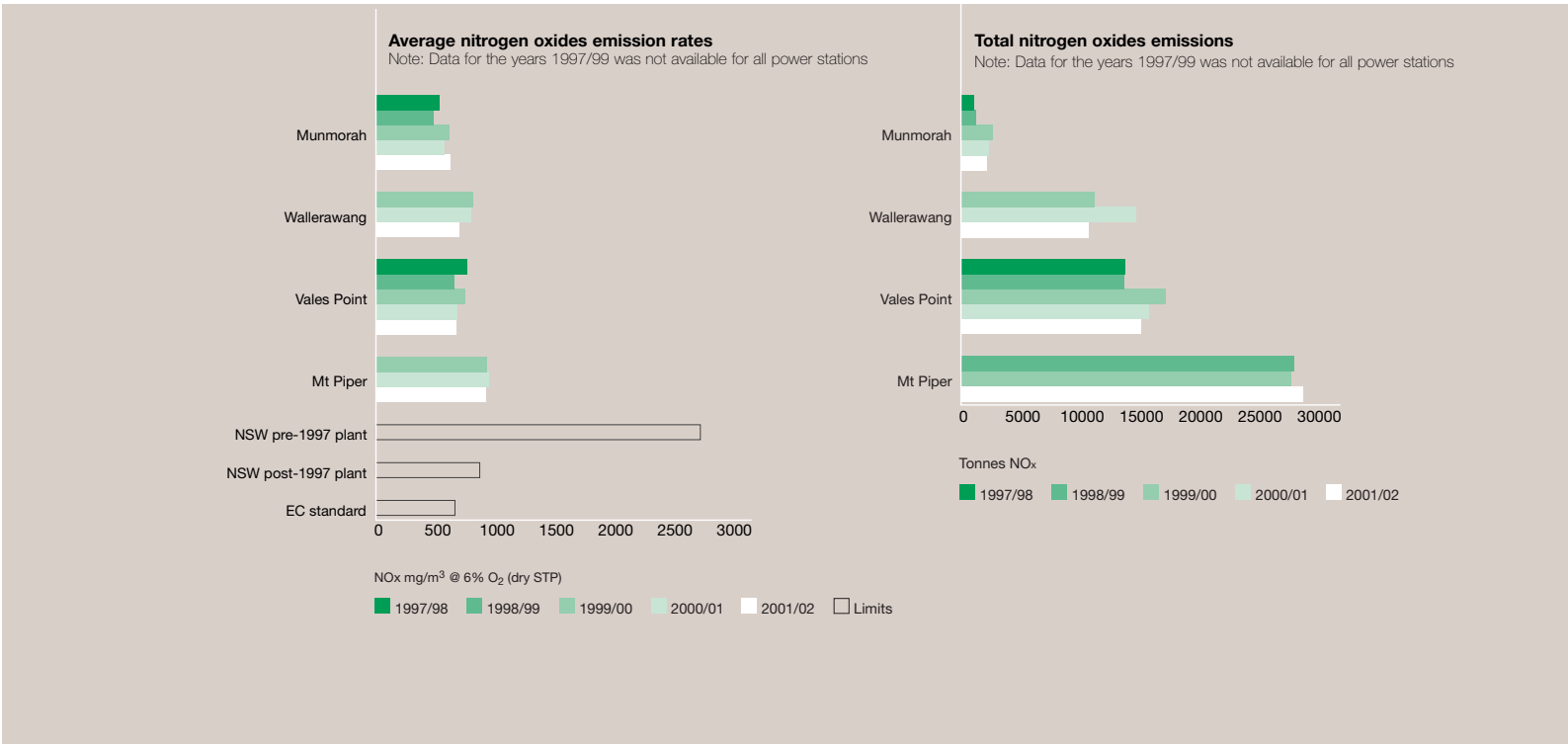
Total nitrogen oxide emissions are shown in the graph below.

The Protection of the Environment Operations Act prescribes NSW limits for NOx emissions depending on whether the plant was built before or after 1997. These limits are 2,500 mg/m3 for plant built before 1997 and 800 mg/m3 for plant built after 1997 (at 7% oxygen dry STP). They can be converted to the international standard (6% oxygen dry STP) level by multiplying by 1.07.

Sulfur oxides

Sulfur oxides (SOx) are produced by the combustion of coal, which contains low levels of sulfur. The major component of sulfur oxide emissions is sulfur dioxide (SO_2), with the remaining proportion being sulfur trioxide (SO_3).

In Australia, SOx emissions from coal-fired power stations are generally low due to the low sulfur content of Australian coals. This means that boilers do not require the installation of energy consuming SOx scrubbing plant.



The graph below shows the average sulfur oxides emission limits between 1997 and 2002 for Delta's power stations.

Average sulfur dioxide emissions from both Mt Piper and Wallerawang power stations are higher than those at Central Coast power stations due to the higher sulfur content in coal from the Western coalfields.

Total sulfur oxides emissions for all sites are shown in the graph below.

There are no NSW SOx emission limits. Emission levels achieved by Delta sites were all well below the World Bank guideline limit for new projects, but above the UNECE limit. This latter limit is used only in the highly industrialised countries of Western Europe.

Particulates

Particulate emissions are generated when mineral matter from the combustion of coal is converted to ash. Part of this ash is collected at the bottom of the furnace (bottom ash) whilst the remaining ash is suspended in flue gases (fly ash). Particulate emission levels in the flue gas depend on the type of cleaning equipment installed.

Munmorah and Mt Piper power stations are equipped with fabric filters that remove 99.95% of all particulates, resulting in dust emission levels well below all the NSW statutory limits and World Bank guidelines for new plant. Vales Point and Wallerawang power stations are fitted with more energy efficient fans and electrostatic precipitators which remove 99.5% of all particulates. As a result these power stations emit higher levels of dust but still well below the applicable NSW statutory limits.

Mt Piper experienced premature fabric filter failure in 2001 which increased emissions, however, the emissions remained below the limit.

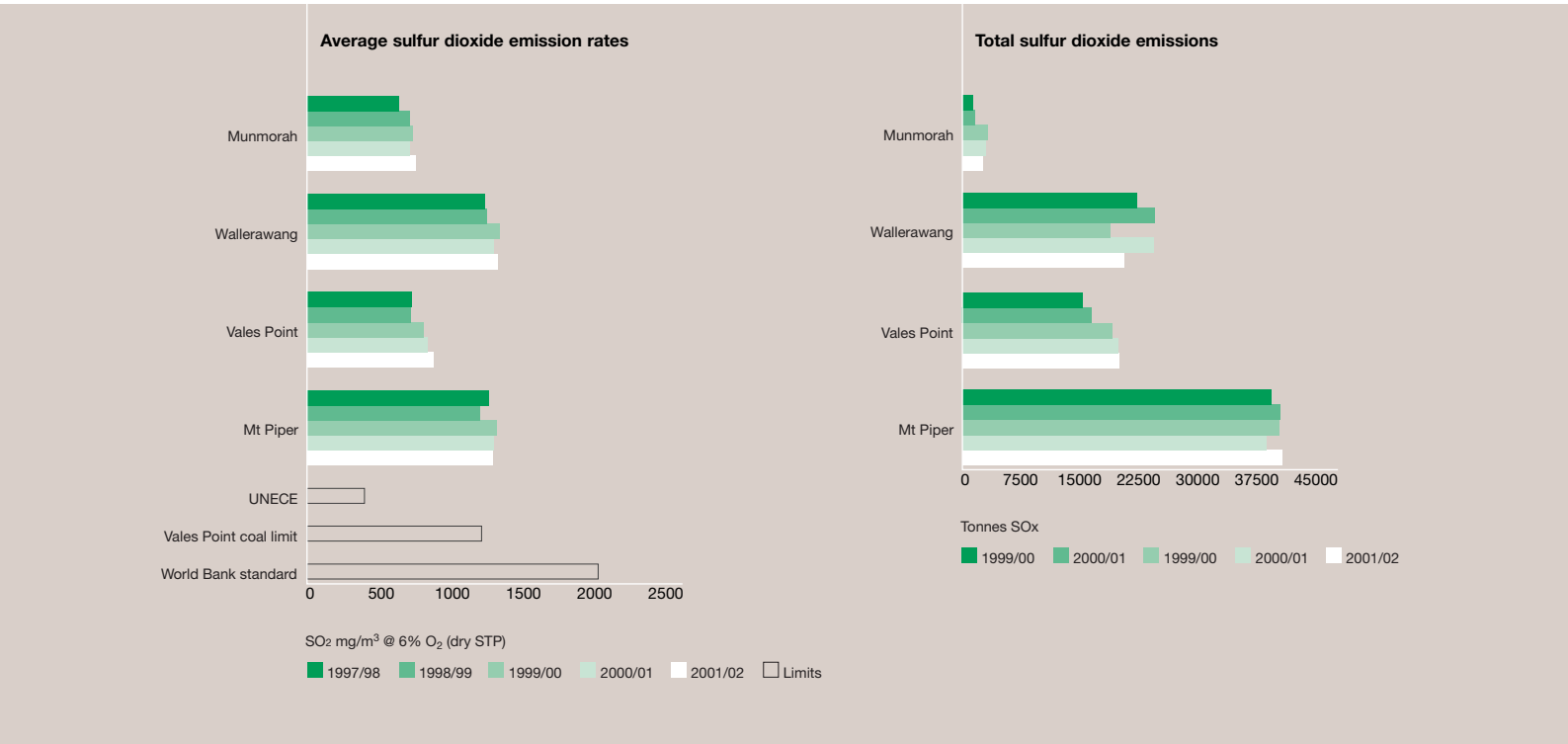
Delta has set a self-imposed target to further reduce dust emissions from the precipitator stations (i.e. to less than the NSW statutory levels for plant built after 1997). To achieve this target a number of investigations have been conducted at Wallerawang and Vales Point.

Flue gas conditioning has resulted in significant decreases in particulate emissions at Wallerawang. Following the successful implementation of sulfur trioxide flue gas conditioning, Wallerawang Unit 7, although approved before 1972, now has a particulate emission limit of 250 mg/m^3 bringing it into line with the EPA particulate emission limit applied to Wallerawang Unit 8.

To improve the efficiency of the Vales Point electrostatic precipitators, sulfur trioxide injections were trialled in 2001/02. Although proving less effective than at Wallerawang due to the different nature of the coal ash, improvement was noted and permanent equipment will be installed and commissioned by December 2002.

Total particulate emissions from all sites are shown in the graph on the following page, 25.

The NSW Clean Air (Plant and Equipment) Regulations prescribe various limits for particulate emissions depending on the year a plant first became scheduled premises. If pollution control approval was first granted before 1972 (Munmorah and Wallerawang Unit 7) the applicable limit is 400 mg/m3 at 12% CO2. The limit for plant approved between 1972 and 1997 (Wallerawang Unit 8, Vales Point and Mt Piper) is 250 mg/m3. Plant approved after 1997 is limited to 100 mg/m3. These can be converted to the international standard (6% oxygen dry STP) by multiplying by 1.27.



Ambient air quality

Delta Electricity operates two ambient air monitoring stations on the Central Coast at Wyee and Munmorah and two in the Western Region at Blackmans Flat and Wallerawang. These monitoring stations continuously monitor the ambient air quality of both regions, providing data to compare against appropriate National and State health standards. Results for nitrogen dioxide and sulfur dioxide as measured at ambient monitoring stations against the National Environment Protection Council standards are shown in the graphs on page 26. All readings were well below the applicable NEPM standard.

In June 1998, the National Environment Protection Council set standards for ambient air quality. The standards set the maximum one hour concentration of nitrogen dioxide at 12 parts per hundred million and for sulfur dioxide at 20 parts per hundred million. Power stations emit NOx mainly as nitric oxide (NO), for which there is no applicable NEPM standard.

Fugitive dust

Fugitive dust can be generated from coal stockpiles and ash dams under strong wind and dry conditions. Dust emission arising from coal stockpiles or coal-handling plant is controlled by watering with dust suppression sprays.

Potential dust emissions from ash dams are controlled by using fabric fences to maintain slurry wetting zones and by maintaining high water levels in ash dams to keep surface ash wet. Once sections of ash dams are filled, the surface is capped and revegetated thus preventing wind borne emissions.

Delta received two concerns relating to fugitive dust during the 2001/02 reporting period. Both were related to the dry ash handling facility at Mt Piper Power Station and occurred during periods of unusually high wind. As discussed in the section on Delta and the community, all concerns received are thoroughly investigated to ensure that any impacts are minimised and action is taken to avoid recurrence.

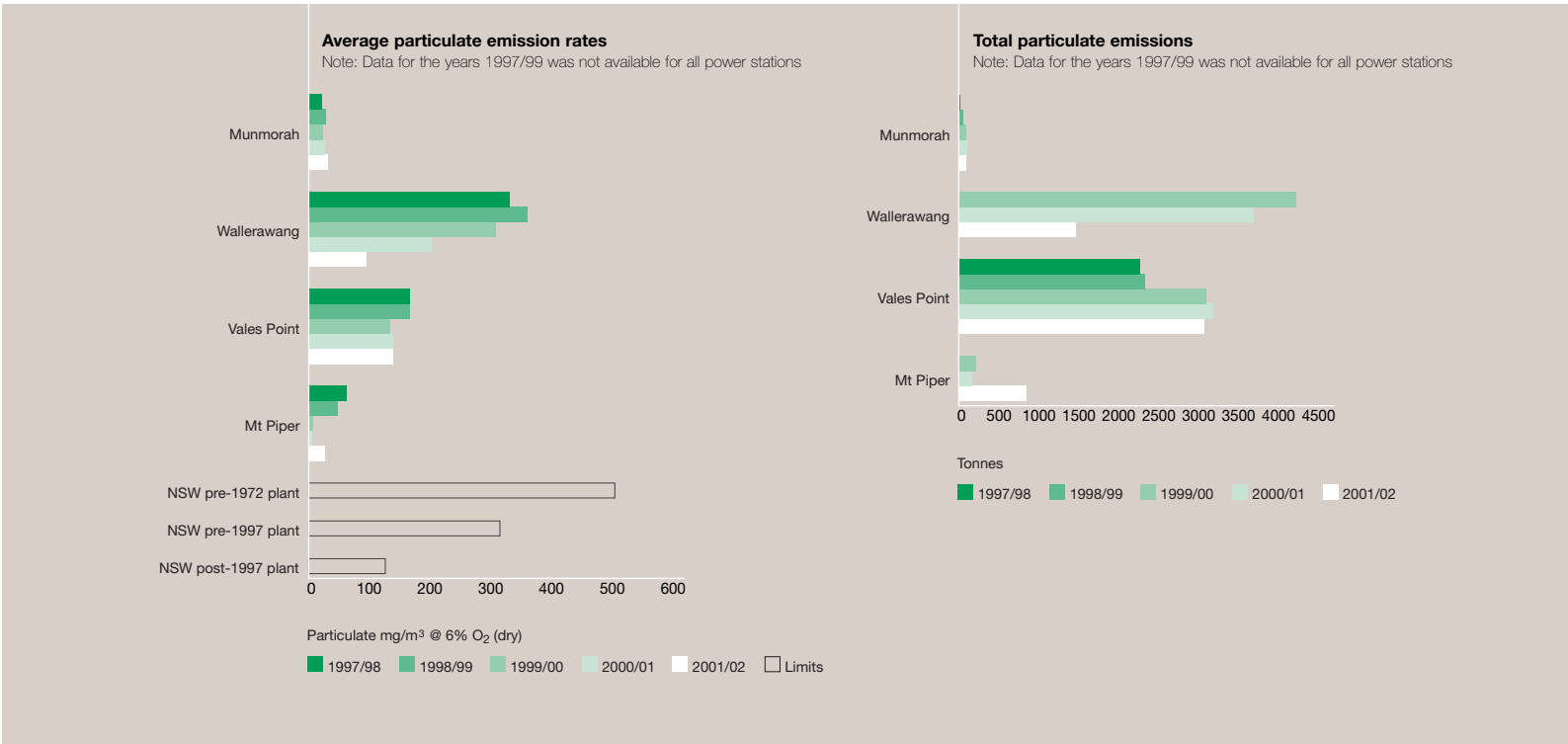
National Pollutant Inventory

The National Pollutant Inventory (NPI) is an Internet database designed to provide the community, industry and government with information on the types and quantity of certain substances being emitted to the air, land and water. The database may be viewed at the following website:

http://www.npi.gov.au

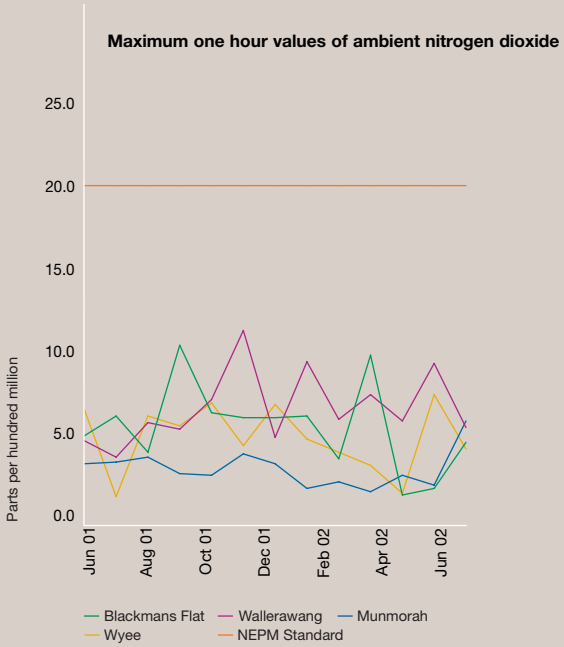
Delta has been estimating and reporting substances emitted to the air for the NPI since 1998. The table on page 26 lists the mass of the substances reported for calendar year 2001. Data for 1999 and 2000 was previously reported in Delta's Environmental Reviews for these years.

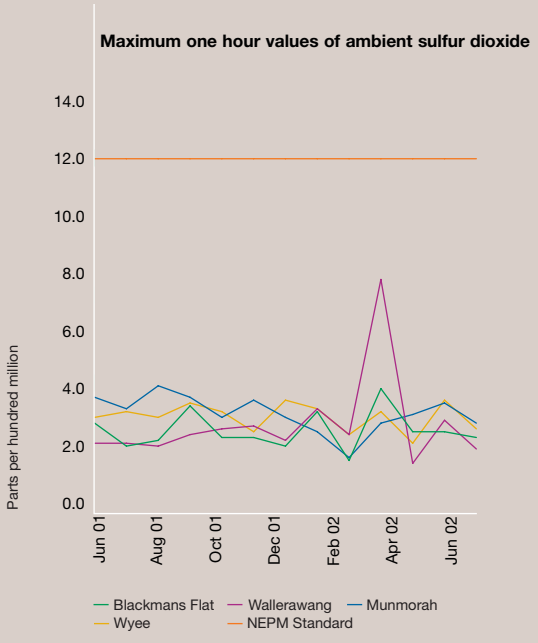
Emission quantities for the majority of substances are derived from default emission factors listed in the approved industry handbook. Because the default emission factors are generally related to the quantity of particulate matter emitted, stations with fabric filters report lower emissions than those with precipitators. The use of emission factors means that all data should be considered as indicative rather than absolute.



Emissions to air in 2001 (kg/year)

Substance	Mt Piper	Munmorah	Vales Point	Wallerawang
Ammonia	1,100		95,000	490
Arsenic & compounds	22	4.1	68	24
Beryllium & compounds	16	1.4	35	16
Boron & compounds	43,000		9,900	17,000
Cadmium & compounds	12	1.7	15	9.2
Carbon monoxide	960,000	150,000	630,000	440,000
Chromium (III) compounds	120	24	240	110
Chromium (VI) compounds	6.1	1.3	13	5.7
Copper & compounds	55	11	270	84
Cumene	10		7	5
Fluoride compounds	140,000	65,000	260,000	79,000
Hydrochloric acid	2,300,000	370,000	1,600,000	1,000,000
Lead & compounds	130	26	380	160
Mercury & compounds	42	3.6	61	12
Nickel & compounds	150	26	230	110
Nickel carbonyl	0	0	0	0
Nickel subsulphide	0	0	0	0
Nitrogen oxides	30,000,000	320,000	13,000,000	12,000,000
PM10	160,000	60,000	1,500,000	75,000
Polychlorinated dioxins & furans	0.00093	0.00016	0.0006	0.00044
Polycyclic Aromatic Hydrocarbons	38	6.2	25	17
Sulfur dioxide	41,000,000	400,000	17,000,000	23,000,000
Sulfuric acid	420,000	34,000	180,000	200,000
Total VOC	120,000	19,000	75,000	52,000





Water

Water is an essential resource in the ongoing operation of coal-fired power stations and, as such, a great deal of care and responsibility is taken in its use. Water is utilised:

- to produce high purity steam to drive the turbines
- as cooling water
- to supply domestic water
- to supply miscellaneous operations such as cleaning and dust suppression.

Water usage requirements for Delta's power stations depend largely on their location and also reflect the available volume necessary for efficient electricity production.

Wallerawang and Mt Piper power stations are located inland and rely on water pumped from Coxs River as the principal source of cooling water for the cooling process. Separate cooling water is continually circulated between the cooling towers and the turbine condenser. In the condenser, the steam that drives the turbines comes into contact with a series of tubes through which the cooling water is being circulated. The resulting warm water returning to the cooling towers produces the water vapour that can be seen above inland power station cooling towers.

Munmorah and Vales Point power stations are situated close to estuarine lakes and use saline lake water for the cooling process. There are therefore no cooling towers. Instead, lake water is pumped through the condensers to condense the steam after it has passed through the turbines. Although a similar volume of cooling water is ultimately evaporated for cooling at both inland and coastal power stations, the volume of evaporated salt water at coastal stations is not shown in the graph below.

Western region

The Coxs River System

Wallerawang and Mt Piper power stations both draw cooling water from the Coxs River and Fish River systems. Coxs River originates from north west of Lithgow, eventually discharging into Lake Burragorang (Warragamba Dam) and provides a significant amount of Sydney's water supply. The river has been dammed at two locations, Lake Wallace and Lake Lyell, to provide a supply of fresh water to the power stations.

Delta's water management licence

Delta's Western region power stations are now operating under a revised water licence for the extraction of water from the Coxs River system. The new licence, one of the first of its kind in NSW, was issued following several years of extensive research and consultation. The licence covers a number of important issues including the quality of the water in the river, the monitoring program in place and the amount of water released from Lake Lyell and Lake Wallace, to ensure that an appropriate flow regime is maintained in the Coxs River ecosystem.

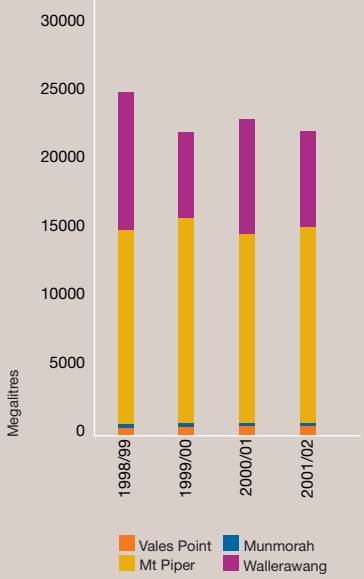
Water use

Each day, Mt Piper and Wallerawang power stations combined use more than 60 megalitres of water. The majority is evaporated from the cooling towers and a small amount is used in other plant operations such as wash down, ash handling and water purification processes.

In order to replenish the water lost through power plant operations, additional water must be extracted from nearby water bodies. In the year 2001/02 Mt Piper and Wallerawang power stations extracted a total of 22,144 ML from the Coxs and Fish River systems. This water use is a slight decrease from the previous year, due to lower production from Wallerawang.

Fresh water use

Note: Data for the years 1997/98 was not available



Discharges

Mt Piper Power Station has been designed to achieve zero discharge of process water. Waste water from site sources including cooling tower blowdown, plant washdown, water treatment plant effluent and sewage are recovered and recycled on site.

At Wallerawang, a proportion of the station's process water is discharged into Coxs River. Excess water from Sawyers Swamp Creek Ash Dam and water from cooling tower blowdown is discharged following pH correction in settling ponds. These discharges occur at licensed discharge points and are continuously monitored. The following tables show the levels of monitored substances in these discharges.

In order to maintain river water purity, the discharge system is linked directly to river flow. This ensures that during times of low flow, discharges from the power station are limited and, if necessary, suspended.

As part of Delta's environmental improvement program, a project is currently underway to convert Wallerawang wet ash storage system to a dry storage system similar to that at Mt Piper. When the dry ash storage system is operational, a large portion of the discharges to Coxs River will be eliminated.

Central Coast

Vales Point Power Station is located on the edge of Lake Macquarie and draws cooling water from Chain Valley Bay and discharges this water into Wyee Bay. Lake Macquarie is the largest estuarine lake in NSW with an area of over 170 km^2 and is a popular holiday and recreation area. The water quality within the lake is affected by runoff from the catchment, discharges from surrounding industries and the small percentage of water from the lake that is exchanged with the ocean during each tidal cycle.

Munmorah Power Station draws cooling water from Lake Munmorah and discharges to Lake Budgewoi. These lakes form part of the Tuggerah Lakes System, the third largest estuarine lake system in the State. Tuggerah Lakes occupy an area of approximately 70 km^2 and are important fish and prawn producing estuarine areas. Water quality within the area is affected by the surrounding urban catchment of Wyong Shire as well as industries and the limited tidal interchange.

Water usage

In the year 2001/02 Vales Point and Munmorah power stations used a total of 963 megalitres of fresh water from Wyong water supply. Although Central Coast power stations use far less fresh water than inland power stations, programs are being investigated to further reduce water consumption.

Discharges

Vales Point and Munmorah power stations were both built some 30 years ago. Since construction both power stations have undergone a number of modifications and improvements to water drainage and containment systems. Modifications include stormwater diversions, redirection of station drains, installing settling ponds, upgrading oil and grit trap facilities and improving environmental monitoring systems. These systems ensure that only clean, pollutant-free water is discharged to the lakes.

Wallerawang cooling tower discharges to Coxs River

Parameter	1999/00		2000/01		2001/02	
	Unit 7 Avg	Unit 8 Avg	Unit 7 Avg	Unit 8 Avg	Unit 7 Avg	Unit 8 Avg
Sulfate (mg/L)						
Limit: 1,200	400	452	536	670	537	804
Non-Filterable Residue (mg/L)						
Limit 30*	9.4	5.6	10.7	5.3	10.4	3.6

* This limit is applicable to the receiving waters.

Wallerawang Power Station discharges to Coxs River from caustic injection plant settling ponds

Trace element	1999/00 Avg	2000/01 Avg	2001/02 Avg
Fluoride (mg/L)	9.9	10.1	11.6
Manganese (mg/L)	1.08	1.34	1.35
Iron (mg/L)	0.02	0.02	0.015
Boron (mg/L)	5.27	5.68	6.67
Selenium (mg/L)	0.12	0.12	0.13

As part of their EPA Licence monitoring, both stations monitor the trace element concentration of water discharged from the ash dam to the lakes. Vales Point has two licensed discharge points to Lake Macquarie, whilst Munmorah Power Station has one licensed discharge point to Lake Budgewoi. The following table shows the monitored levels of these trace elements reported to the EPA over the past two years.

Land and biodiversity

Delta Electricity's operations cover approximately 6,000 hectares of land. Delta Western region manages approximately 3,500 hectares of land located within the City of Greater Lithgow local government area. Delta Central Coast manages approximately 2,500 hectares of land located within the Lake Macquarie and Wyong local government areas. Whilst a third of this land is used for Delta's power station activities, the remaining land either forms a buffer zone around each site to minimise impacts to surrounding landowners or is land surrounding fresh water reservoirs.

Delta manages its land using the principles of Total Catchment Management (TCM) incorporated into station Land Management Plans. TCM is defined in the Catchment Management Act 1989 as "the co-ordinated and sustainable use and management of land, water, vegetation and other natural resources on a water catchment basis, so as to balance resource utilisation and conservation". The objective of TCM is to ensure that natural resources are managed more sustainably by:

- co-ordinating policies, programs and activities that relate to catchment management
- encouraging community participation
- identifying and, where possible, fixing degradation of natural resources
- promoting the sustainable use of natural resources
- providing stable, productive soil, high quality water and protective healthy vegetation cover in all catchments.

In addition, natural, indigenous, non-indigenous and industrial heritage issues are taken into account in the design, siting, construction, operation, decommissioning and disposal of facilities.

Biodiversity

Flora and fauna assessment and management on Delta's land holdings ensure that rare and endangered species are identified and protected. Natural habitats within Delta managed land are varied depending on the geographic location and include open water, wetland and bushland. Several of these habitats include rare species listed under the Threatened Species Conservation Act 1995.

Listed flora species include Acacia bynoeana, Tetratheca juncea (Black-eyed Susan) and Cryptostylis hunteriana (Leafless Tongue-orchid). In addition, a substantial number of threatened fauna species have been identified on Delta's lands including Petaurus norfolcensis (Squirrel Glider), Calyptorhynchus lathami (Glossy Black Cockatoo), Crinia tinnula (Wallum Froglet), Miniopterus schreibersii (Common Bentwing Bat) and Myotis adversus (Large-footed Fishing Bat).

Delta Electricity Central Coast region – water emissions to licensed discharge point (mg/L)

Trace element	Munmorah ash dam discharge		Vales Point ash dam discharge	
	2000	2001	2000	2001
Zinc	<0.050	0.050	<0.050	<0.050
Copper	<0.005	0.005	0.009	0.003
Selenium	<0.001	0.001	0.031	0.030
Manganese	0.012	0.030	0.006	0.007
Cadmium	<0.005	0.005	<0.005	<0.005
Lead	<0.005	0.005	<0.005	<0.005

Management of land holdings using the principles of TCM to protect, conserve and improve biodiversity encompasses the following activities:

- biodiversity inventories and studies
- erosion and sediment control
- noxious plant control targeting bittou bush, blackberry, croften weed, lantana and pampas grass
- monitoring feral animal numbers and implementing control plans
- bushfire prevention planning
- habitat restoration and revegetation programs including establishing wildlife corridors
- prohibiting removal of bushrocks or logs from bushland areas
- access control for public and Delta staff, including closing and rehabilitating non-essential tracks.

In previous years Delta has undertaken extensive tree and vegetation planting and weed control programs in Western and Central Coast land holdings to improve wildlife habitat, visual amenity and to provide a sink for carbon dioxide emissions. With the exception of a 30 hectare pine plantation, all trees planted are native and characteristic of the surrounding native habitat. To date, some 150 hectares of land previously used for operational purposes has been revegetated.

Colongra wetland

Delta's land holdings include Colongra wetland, a fresh to brackish water wetland located on the buffer zone of Munmorah Power Station and an area of salt marsh located at the mouth of Colongra Creek. These wetlands are listed under the State Environment Planning Policy (SEPP14).

The Colongra wetland attracts a large number of birds including two of international conservation significance, the great egret and the white bellied sea eagle.

Negotiations are currently underway to transfer ownership and management to NSW National Parks and Wildlife Service.

Cultural heritage

Delta's land holdings contain a number of identified indigenous and non-indigenous heritage sites. Indigenous sites have been surveyed and the details entered into a database.

Non-indigenous historic sites include a rare convict stockade on the banks of Lake Lyell, the Old Wallerawang School House, the Cottage Hospital, a stone barn and the Wallerawang Units 1 & 2 chimney stacks. Our environmental management procedures ensure that none of these sites are impacted on during new works or by the operation of the stations.

Resource use and waste management

Delta Electricity is committed to efficient use of resources and minimising the production of waste. A waste management strategy has been implemented, which aims to reduce, reuse and recover waste materials.

In addition to energy and water the main resources used in power station operations include:

- coal
- fuel oil
- lubricating oil.

Other resources used include:

- approximately 1,600 tonnes of sulfuric acid, 1,400 tonnes of caustic soda and 50 tonnes of ferric chloride for water purification processes; and
- approximately 140 tonnes of chlorine and 35 tonnes of ammonia for corrosion and scaling control.

Coal

One of the most significant resources used in power station operations is black coal. Western region power stations use coal from the following sources:

- Angus Place (by private road haulage)
- Enhance Place open cut
- Ivanhoe
- Baal Bone
- Invincible open cut
- Cullen Valley open cut
- Springvale (by overland conveyor to Mt Piper).

Central Coast power stations use coal from the following locations:

- Wyee
- Munmorah
- Baal Bone (by rail)
- Moonee (now closed)
- Stratford open cut (by rail)
- Newstan
- Chain Valley
- Warkworth
- Bayswater open cut (by rail).

Hazardous materials

Where suitable alternative materials exist, Delta is working towards eliminating the use of environmentally harmful materials including phasing out ozone depleting chemicals and polychlorinated biphenyls (PCBs).

Although no transformers at Delta sites were ever filled with PCBs, a number of transformers were contaminated with small quantities of the material when oil filtering equipment from other sites was used at the station. Subsequently, Delta has been progressively removing this low level PCB contaminated oil and arranging for its destruction at licensed facilities interstate.

PCB contaminated oil has been removed from all transformers on Wallerawang site. All transformers have now been tested “PCB-free” (i.e. <2 ppm). The contaminated oil has been disposed of and destroyed at an approved facility. In September 1999, 110,000 litres were disposed of at an appropriate facility and a further 26,350 litres in June 2002. As a result, Wallerawang Power Station is Delta’s first PCB-free site.

Resource consumed 2001/02	Delta production Central Coast	Delta production Western
Coal (megatonnes)	3.1	5.6
Fuel oil (kilotonnes)	4.2	4.1
Lubricating oil (kilolitres)	44	105

Mt Piper has a small number of transformers with PCB concentrations between 2 and 10 ppm. This oil will be removed and disposed of at an approved facility in 2002/03 making Mt Piper the second PCB-free site.

Munmorah Power Station has no remaining PCB contaminated transformers, with the last PCB contaminated oil removed and destroyed in 1999/00. However, the station has a large number of small PCB filled capacitors that are progressively being removed. These will be destroyed at an appropriate facility after December 2002 when all the remaining capacitors have been removed.

Ash

Ash is a by-product generated when coal is burnt. Two types of ash are produced: fly ash which is collected from flue gas by electrostatic precipitators or fabric filters; and bottom ash which is heavier and coarser and is collected at the bottom of the boiler. Ash is generally composed of inert particles, however, it may also may also contain trace elements such as boron, fluoride and selenium.

Fly ash is used in cement manufacture with about 10% of Delta's ash used for this purpose. The market for cement manufacture is currently fully supplied and Delta is actively pursuing other opportunities to use the remaining ash.

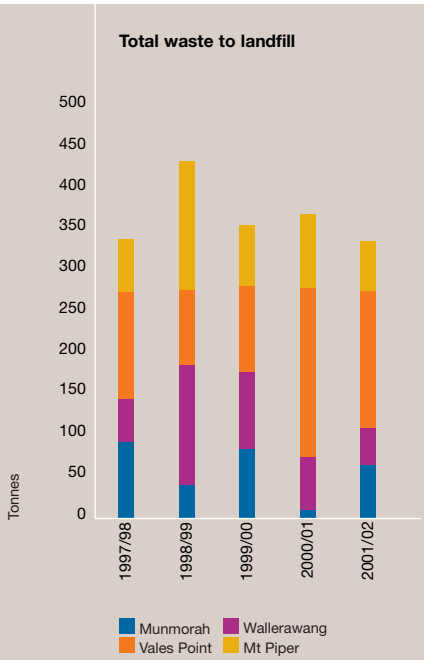
Vales Point and Munmorah power stations operate a wet ash storage system. Wet ash systems combine the ash with water to form slurry, which is pumped into ash dams. The ash settles in these dams, leaving free water to be collected and reused in the wet ash cycle. Any excess water from catchment inflows is returned to the cooling water canal system in accordance with the Environment Protection Licence requirements.

Mt Piper Power Station operates a dry ash storage system and Wallerawang is to be converted to a dry ash system in 2002. By converting the wet slurry transportation system to a dry transportation and ash storage system, Delta Electricity is minimising water usage and also encouraging ash reuse in local industry. The objective is to reuse as much ash as possible and thereby minimise the environmental issues associated with ash handling and management. A longer-term objective is to minimise the land required for ash storage and to reclaim and revegetate former ash dams.

Other waste streams

Other minor waste streams are as follows:

- lubricating oil – recycled
- paper and cardboard – recycled
- timber and vegetation wastes – converted to wood chip or compost
- general non-recyclable waste – sent to landfill.



review of operational performance: delta and the community

Delta Electricity's role as a corporate citizen

Delta Electricity is widely recognised in both the Central Coast and Western regions as a strong supporter of the local community. As an active community leader, Delta has a local sponsorship program to support the social, educational, cultural, sporting and business development of these communities.

In 2001, Delta Electricity supported a number of events and organisations in both Western and Central Coast regions. These include:

- "Celebrate Lithgow Festival"
- Lithgow "Tidy Towns"
- many arts and music groups and sporting organisations
- continuing support for Camp Breakaway, a Rotary Club initiative to support individuals with physical disabilities. Camp Breakaway is situated on Delta land on the shores of Lake Budgewoi and gives people with disabilities a place to camp away from their families or carers whilst providing the opportunity to meet new people
- sponsorship of the "Schools Environment Competition" in both Wyong Shire and Lake Macquarie
- sponsorship of the Lake Macquarie Environmental Research Grants and "Clean Up Australia Day"
- sponsorship of the Toukley Chamber of Commerce Annual Business Awards.

In addition to supporting these events and organisations, Delta also runs an annual scholarship program which this year provided university scholarships to seven local students to attend Charles Stuart and Newcastle Universities.

As Delta diversifies its generation portfolio, new projects and opportunities will be investigated. These will focus on positive social, environmental and economic outcomes that are sustainable. New renewable energy generation projects are often located in small communities where Delta may have no existing relationship with the community. Delta recently developed a set of social-impact assessment guidelines to be integrated into all new project assessments. The guidelines will identify and manage social impacts for each new project and identify areas where benefits to the community can be maximised.

Involvement in the community

Delta conducts its operations in regional areas surrounded by small communities. It has recognised for some time that its "licence to operate" in these regions is linked to the development of long-term sustainable relationships with these communities. Delta can only deliver its business objectives if its corporate values are shared by the communities in which it operates. To facilitate this, Delta must maintain the respect and trust of all stakeholders through recognising and responding to the needs of both the local and wider environment. Delta is increasingly involving stakeholders in discussions relating to its operations. This active participation has a number of key elements:

- working in partnership with all stakeholders
- seeking feedback through environmental forums
- looking for opportunities to make a difference within its communities
- listening, understanding and acting on stakeholder issues through management processes
- accounting for environmental performance in an open and transparent way.

On the Central Coast, a Community Access Regional Environment (CARE) forum has been in place for more than five years, providing feedback on current and proposed activities. This forum is community and environmentally-based and links with existing community networks, providing an outlet for community concerns.

To assist the community's understanding of Delta Electricity operations, newsletters are distributed around the regions and the local print, radio and television media are utilised to raise awareness of its activities.

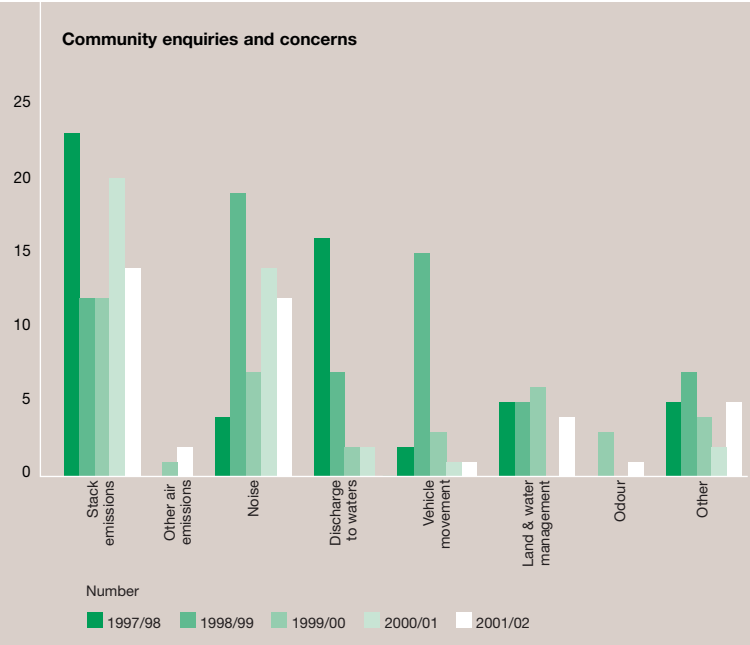
Enquiries and community concerns

Delta has established a comprehensive system of monitoring and addressing community concerns and enquiries. All community enquiries are recorded and reported on. In all cases, Delta's environmental officers personally contact the person to ensure that the issue or concern is addressed to their satisfaction.

The number of enquiries and concerns received by Delta over the preceding 12 months has remained consistent with those fielded in previous years. During the 2001/02 reporting period across both Central Coast and Western areas of operation, Delta received fewer than 40 enquiries and concerns.

In early 2002, a series of community and stakeholder surveys were undertaken in both the Central Coast and Western regions. These surveys were aimed at investigating how Delta was seen by the people in these regions. From the results of these surveys it was pleasing to note that the community has a positive view of Delta's role and high recognition and acceptance of its contribution. Both regions were aware of Delta's community support activities and its importance to the local economies. Issues such as jobs and infrastructure remain important within the regions as does the local environment, in particular air and water quality.

Delta is committed to communicating its environmental performance to stakeholders and listening to and understanding the feedback. This Environment Report provides an account of Delta Electricity's performance to stakeholders. Delta seeks your views on its performance and this report, through the "Have your say" form provided at the end of this Report.



Licensing and compliance

Compliance

Delta Electricity, like all businesses, must operate within the bounds set by government legislation and regulations. All of Delta's facilities are operated under a series of licences issued by various government authorities, including the NSW Environment Protection Authority and the Department of Land and Water Conservation. These licences cover a range of activities ranging from the temperature of the water entering Lake Macquarie to the number of air quality monitoring stations surrounding Mt Piper Power Station.

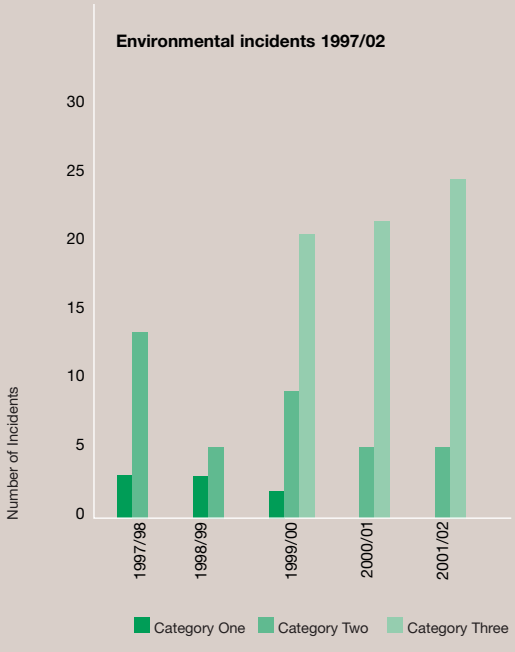
One of the key environmental objectives is to comply with all statutory requirements by ensuring that there are no non-compliance issues with regard to EPA licences. Delta is pleased to report that during the year 2001/02, zero non-compliance events were reported.

Environmental incidents

Whilst Delta is required by law to report significant environmental incidents to the appropriate licensing authority, it believes that its responsibility in safeguarding the environment does not end there. Delta views all environmental incidents very seriously and action is taken to ascertain the maximum amount of information from each incident to ensure that it is not repeated.

Procedures are in place to ensure that all environmental incidents are recorded, classified and reported regularly to senior management. Each environmental incident is classified into one of three categories:

Category	Incident
1	incidents are those that involve a breach of an EPA Licence condition or other statutory regulation.
2	incidents are near miss incidents that involve a possible or potential breach of a licence condition or other statutory regulation.
3	incidents are minor plant incidents that, although not serious in nature, are diligently monitored to assist in the management of potential problems and issues.



eco-efficiency profile

The concept of eco-efficiency was developed by the World Business Council for Sustainable Development (WBCSD) in 1992 and has now become widely recognised by the business community. This concept brings together economic and environmental progress in a way that focuses business on attaining more value with lower inputs of materials and energy, whilst reducing emissions.

In 2000, the WBCSD released a measurement framework that would allow any business to measure its progress toward economic and environmental sustainability. This can be found at the following website:

http://www.wbcsd.org/newscenter/reports/2000/MeasuringEE.pdf

This framework provides a set of "generally applicable" indicators that are relevant to virtually all businesses and relate to a global environmental concern or business value. The framework also provides "business specific" indicators that can be utilised by individual industry sectors.

Each of these indicators can then be presented in an eco-efficiency ratio represented by:

$$\frac{\text{Product or Service Value}}{\text{Environmental Influence}}$$

where "Product or Service Value" relates to such indicators as the quantity of goods produced or the company's profit and "environmental influence" relates to such indicators as the water consumed or the amount of greenhouse gases emitted.

In measuring an organisation's performance, an increasing eco-efficiency ratio reflects a positive performance improvement. The following information reports against the requirements outlined in the eco-efficiency framework.

Organisation profile

Company Name	Delta Electricity
Business Segment	Electric Utility
Report for	Fiscal Year 2002
System Boundaries	Entire Company
Number of Employees	754
Internet	www.de.com.au
Contact for Further Information	gordon.deans@de.com.au
Methodology	Data tracked on various internal tracking mechanisms. Summary data included in this report.

Value profile

Generally Applicable Indicators:	
Electricity Supplied	75 PJ
Sales Revenue	A$719m
Business Specific Indicators:	
Ordinary Profit (gross)	A$142m

Environmental profile

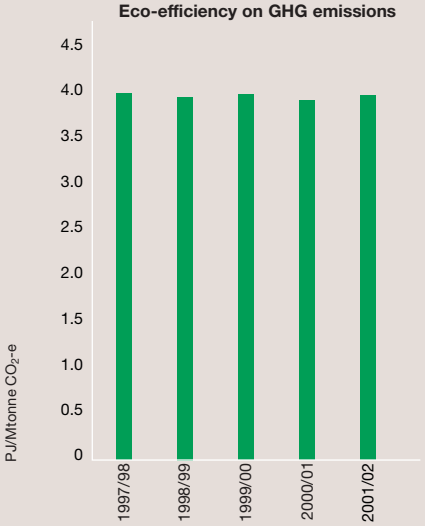
Generally Applicable Indicators:		**Business Specific Indicators:**	
Energy Consumed	137 PJ	Total GHG Emissions*	19.5 Mt CO_2-e
Water Consumed	22.6 Mil.m^3	SOx Emissions	82.3 kt
GHG Emissions	18.8 Mt CO_2-e	NOx Emissions	55.2 kt
ODS Emissions	0	Particulate Emissions	5.5 kt
		*Includes CO_2-e emissions from coal mining	

Eco-efficiency profile

Electricity Supplied per:	
GHG	4.0 PJ/M tonne CO_2-e
Water Use	3.32 PJ/mil. m^3
SOx	0.92 PJ/kt
NOx	1.35 PJ/kt
Particulates	13.6 PJ/kt

Eco-efficiency ratio for NOx improved slightly and particulate significantly in 2001/02. The eco-efficiency ratio for greenhouse gas, SOx and water use remained static. Planned improvements to plant and the advancement of the renewables program will see this ratio for greenhouse gas improve in the coming years.

Eco-efficiency on GHG emissions

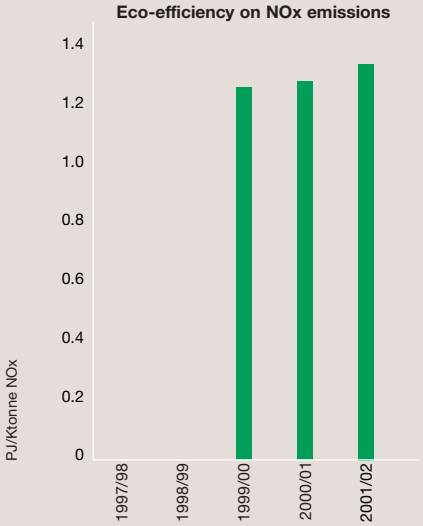


Eco-efficiency on water use

Eco-efficiency on particulate emissions

Eco-efficiency on SOx emissions

Eco-efficiency on NOx emissions



Verification Statement

Delta Electricity Auditor's Verification Statement

Scope of ERM's Assessment

Environmental Resources Management (ERM) was commissioned by Delta Electricity to independently verify the data and content of the 2001-2002 Environment Report ("the Report"). The scope of the verification was to:

- Verify that the data collected for the Report was materially correct, based on randomly selected data;
- Review the comprehensiveness, robustness, consistency, calculation methods and base assumptions of the data;
- Review industry and best practice standards used as benchmarks in the Report;
- Review company documentation that supports statements, targets and policy positions outlined in the Report; and
- Review the implementation of recommendations made in the 1996-1999 Verification Reports and provide further recommendations if required.

General Findings

Data from graphs, tables and within the text of the Report were reviewed and relevant management staff were interviewed. A detailed evaluation Report was produced by ERM outlining data errors, errors of fact, omissions and areas for improvement. It should be noted that all errors of fact and a number of omissions were corrected prior to finalising the Report.

Based on our findings, the statements made in the Report present a fair view of Delta Electricity's environmental management and performance on the issues reported over the past three years.

Recommendations

Some of the recommendations made in the 1996-1999 Audit Verification Statement have not been implemented and remain high priorities.

1 A recommendation to establish data collection procedures for future environmental reporting has not been implemented. ERM recommend data collection procedures be prepared. Standard procedures will assist with consistency of reported data in future environment reports.

2 A recommendation to develop standard environmental reporting reports/spreadsheets has not been prepared. ERM recommend that a standard environmental reporting system be implemented for accuracy of data collection and ease and consistency of compilation across all power stations.

3 A recommendation that the conversion factors used and the methodology for all calculations and derived values be documented so that future environment reports use the same basis for comparison has not been completed. ERM recommend documentation of conversion factors and calculation methodologies.

Danny Ptak
SENIOR ENVIRONMENTAL AUDITOR
ERM, SYDNEY
OCTOBER, 2002

David Snashall
PROJECT DIRECTOR
ERM, SYDNEY
OCTOBER, 2002

have your say

I found this report to be:

☑ (tick one)	Comments
☐ Transparent and open	
☐ Vague and ambiguous	

Sections that interested me the most:

☑ (tick one or more)	Comments
☐ Policies and Commitments	
☐ Performance Overview	
☐ Environmental Management	
☐ Energy	
☐ Atmosphere	
☐ Water	
☐ Land and Biodiversity	
☐ Resource Use and Waste	
☐ Delta and the Community	
☐ Licensing and Compliance	
☐ Eco-efficiency Profile	

I found the contents of the report to have:

☑ (tick one or more)	Comments
☐ The right amount of information	
☐ Not enough information	
☐ Too much information	
☐ Missed some vital information	

How could this report be improved?

What improvements would you like to see Delta making in their environmental performance?

What improvements would you like to see Delta making in their stakeholder consultation?

If you would like to be included on our mailing list for future environment reports, please supply contact details:

Name:

Address:

Delta electricity

STAMP TO GO HERE

Mr Gordon Deans
Corporate Manager Environment
Delta Electricity
C/– PO MANNERING PARK NSW 2259

Please mail to the above address **or**
Email gordon.deans@de.com.au **or**
Fax (02) 4390 1733

glossary

CARE	Community Access Regional Environment forum
CH_4	Methane: a greenhouse gas contributing to climate change
CO_2	Carbon dioxide: a greenhouse gas contributing to climate change
CO_2-e	Carbon dioxide equivalents
EC	European Community
EPA	Environment Protection Authority
GRI	Global Reporting Initiative
GWh	Gigawatt hour; 109 watt hours – unit of power
kL	Kilolitre; 1,000 litres
kt	Kilotonne; 1,000 tonnes
kWh	Kilowatt hour; 1,000 watt hours – unit of power
mg/L	Milligrams per litre
ML	Megalitre (million litres)
Mt	Megatonne (million tonnes)
MWh	Megawatt hour: Million watt hours – unit of power
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NOx	Nitrogen oxides, primarily nitric oxide (NO) and nitrogen dioxide (NO_2)
NPI	National Pollutant Inventory
ODS	Ozone depleting substances
PCB	Polychlorinated biphenyls
PJ	Peta Joule; 10^{15} Joules
ppb	Parts per billion
ppm	Parts per million
SOx	Sulfur oxides, primarily sulfur dioxide (SO_2) and sulfur trioxide (SO_3)
TCM	Total Catchment Management: the co-ordinated and sustainable use and management of land, water vegetation and other natural resources on a water catchment.

Further Information

Contact names, phone numbers and addresses for Delta power station environment managers.

Central Coast:

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Production and Environment Manager
Delta Electricity

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www.de.com.au

Western region:

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Environment Manager
Delta Electricity

Mt Piper Power Station
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NSW 2847

Telephone: (02) 6354 8350
Email: nino.di.falco@de.com.au

Delta
electricity