



POWER AND WATER CORPORATION
ENVIRONMENT REPORT 2005

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Managing Director's Foreword

The Power and Water Corporation's environmental performance is now part of an integrated management approach. The Corporation is implementing an Integrated Management System, which will apply across all business activities, and across all the geographically diverse areas of our operations. This will ensure a consistent corporate approach to quality, environmental management and occupational health and safety.

I am pleased to report we made significant progress towards achieving our goal of having all components of the management system certified. However, our target date for certification by December 2005 has been pushed back to a more realistic June 2006 to ensure comprehensive and consistent application across the Corporation.

Power and Water continued its Environmental Excellence Awards for the third year, and in this report we shine the spotlight on Territorians who share our concern for the environment.

We have also put our money where our mouth is when it comes to energy and water efficiency. Our multi-million upgrade of the Ben Hammond Complex in Darwin used a green building strategy, saving an estimated 20% in annual energy costs alone.



Kim Wood

Managing Director



Introduction

The Power and Water Corporation entered its third year as a commercially focused entity on 1 July 2004. It is one of the largest businesses in the Northern Territory and makes a significant contribution to the Territory's economic well being.

The Board of Directors has continued to support the corporate values and environmental commitments spelt out in successive public environment reports since 1999.

Power and Water firmly believes in providing timely information to the community on our environmental performance. We have changed from providing biennial environment reports to reporting annually. This report is our second annual report and provides information on corporate governance, performance in relation to our Environment Strategy, and compliance with our statutory obligations.

Our Environment

The Territory covers about one-sixth of the area of Australia, with a population of 210 664 according to the 2001 Census. It is sparsely settled, and has not had the long history of industrial development common to the other states.

This means we are operating in largely undisturbed landscapes and with relatively intact ecosystems. The Territory has clean air, clean water and clean land, uncontaminated by industrial development. We are rich in natural resources and biodiversity values.

Power and Water's environmental objectives therefore focus on:

- Protecting existing biophysical values
- Maximising the wise use and conservation of resources, particularly those that are non-renewable.

“THE POWER AND WATER CORPORATION IS ONE OF THE LARGEST BUSINESSES IN THE NORTHERN TERRITORY AND MAKES A SIGNIFICANT CONTRIBUTION TO THE TERRITORY'S ECONOMIC WELL BEING.”

Assurance

The Board of Directors has ultimate responsibility for ensuring Power and Water achieves its environmental objectives.

The following measures provide the board with assurance that those objectives are being pursued:

- Meeting statutory obligations
- Communicating our Integrated Management Policy
- Implementing our Integrated Management System
- Actively managing environmental risks
- Sponsoring activities with positive environmental outcomes
- Facilitating interactions between the Board and senior managers through representation on the Environment Committee
- Reporting regularly on progress.

Complying with our statutory obligations is a priority for Power and Water. How we achieved this is detailed on page 15.

Policy



In December 2004 Power and Water brought three separate corporate policies for quality, environment and occupational health and safety together in its Integrated Management Policy. The policy complies with the requirements of the international standard for environmental management systems, ISO 14001.

Integrated Management System

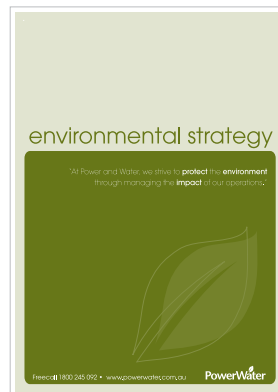
Power and Water is working towards achieving certification of the Integrated Management System, including the environmental management elements relevant to ISO 14001, by June 2006.

A principal component of ISO 14001 is a focus on environmental risk management. Power and Water uses the Australian Standard AS/NZS 4360:2004: Risk Management as a guide.

Strategic environmental risks are incorporated in a corporation-wide risk register that is reviewed annually. There are two identified strategic risks with the potential for extreme impacts on Power and Water, and these relate to the distribution of electricity and the treatment of wastewater. Strategic risk management plans have been formulated and implemented to manage such risks.

Environment Strategy

The Environment Strategy contains outcomes and objectives to manage operational environmental risks as well as meet broader environmental objectives. The Environment Strategy is available from the Power and Water website at www.powerwater.com.au.



Operational environmental risks are managed at business unit level, and Power and Water is currently conducting risk assessments across a number of business units and facilities to identify specific risks.

The aim is to identify the highest risks across all facilities to target investments that will reduce the Corporation's risk profile.

Investment objectives and targets can then be outlined in action plans developed as part of the Corporation's business planning.

Currently, Power and Water's business units use the strategy framework to formulate environmentally relevant actions for inclusion in their business plans. This approach will change in future years to one based on a specific risk profile, as outlined above.

The following section details our environmental performance against the strategy.

Performance

Where available, Key Performance Indicators are denoted as KPI # and are summarised in Appendix 1.

Clean Air

Power and Water will manage its emissions to ensure there are minimal impacts on ambient air quality from pollutants and greenhouse gases.

Generator Efficiency

Power and Water made a commitment to the Australian Government's Generator Efficiency Program to minimise emissions of greenhouse gases from electricity generation.

The program is an Australian Government voluntary initiative aimed at encouraging a move towards best practice in the efficiency of electricity generation using fossil fuels to reduce greenhouse gas emissions.

The Australian Greenhouse Office (AGO) accepted draft strategic plans for Channel Island and Ron Goodin Power Stations in June 2003. The Corporation has drafted action plans to implement the strategic plans for the two power stations, and will submit them to the AGO early in 2005-2006.

We also reviewed our total emissions of greenhouse gases and the results will be reported to the Australian Greenhouse Office to meet the requirements of the Greenhouse Challenge program.

Our use of natural gas in major centres for electricity generation already makes us one of the lowest greenhouse gas intensive generators using fossil fuels in Australia [KPI 1].

New base load gas powered generators have been commissioned at Ron Goodin Power Station (Alice Springs) and Tennant Creek Power Station, reducing the reliance on diesel sets. This will improve our greenhouse efficiencies in coming years.

The diesel powered Newcastle Waters Power Station was decommissioned during the year and the township connected to the gas powered Elliott Power Station.

Information on renewable energy is on page 12.

Emissions of Key Pollutants

Air emissions from major power stations are estimated from fuel volumes and types, and reported annually through the National Pollutant Inventory. Channel Island Power Station runs almost exclusively on natural gas, and the NO_x emissions reflect this. The other stations use a mix of gas and diesel depending on the operational profile [KPI 2].

As reported above, the commissioning of new gas powered generators at Tennant Creek and Ron Goodin power stations will reduce emissions associated with diesel fuel.

KPI 3 shows the emissions of sulfur dioxide (SO₂) per GWh sent out. The use of diesel reciprocating engines at Tennant Creek is associated with the high sulfur dioxide emissions. Sulfur levels in automotive diesel have been mandated to reduce from a maximum permissible 500mg/kg to 50mg/kg on January 2006. This, together with the increased use of gas, will reduce SO₂ emissions in coming years.

KPI 4 shows particle emissions (PM₁₀) from the major power stations. Tennant Creek is the highest emitter, reflecting the high level of diesel use. The future increased use of gas will see lower PM₁₀ emissions.

KPI 5 shows emissions of carbon monoxide (CO) per GWh sent out at major Northern Territory power stations. The difference between Tennant Creek and Ron Goodin Power Stations that use more diesel than the gas fuelled power stations (Channel Island and Katherine) is evident.



RON GOODIN POWER STATION

“POWER AND WATER MADE A COMMITMENT TO THE AUSTRALIAN GOVERNMENT’S GENERATOR EFFICIENCY PROGRAM TO MINIMISE EMISSIONS OF GREENHOUSE GASES FROM ELECTRICITY GENERATION.”

Clean Water

Power and Water's operations have the potential to significantly impact on the beneficial uses of ground and surface waters. We operate a number of treated water discharge points licensed under the *Water Act*, and meeting the requirements of these licences is a high priority. Monitoring and reporting on discharge water quality is an ongoing operational task.

Power and Water also focuses on minimising impacts that might arise when there are unintentional discharges to waters.

Minimising Impacts on Darwin Harbour

Power and Water provides water and sewerage services to a population of about 90 000 people in Darwin and Palmerston, the two major urban centres on Darwin Harbour. Treated effluent from these centres is discharged into the harbour, and Power and Water is seeking ways to minimise the impacts of those discharges on the harbour.

The values of Darwin Harbour as a community resource for conservation and recreation are detailed in the Darwin Harbour Regional Plan of Management. The plan contains a suite of actions for the sustainable use of the harbour and is available at <http://www.nreta.nt.gov.au/whatwedo/dhac/>.

Power and Water contributed to the development of the plan and is now implementing one of the principal actions. A Chair of Civil Engineering at Charles Darwin University has been sponsored by Power and Water for three years. The Chair was filled in April 2005, and will provide project leadership to develop a hydrodynamic and water quality model of Darwin Harbour. The model will be used for a range of purposes, including the establishment of future discharge criteria for treated wastewater discharge licences under the *Water Act*.

The initial modelling run is due for completion by June 2006.

Alice Springs Waste Stabilisation Ponds and Ilparpa Swamp

In Alice Springs, urban growth has resulted in significant discharges of treated water into Ilparpa Swamp.

The current discharge licence for the ponds requires all dry season overflows to the swamp to end by December 2005. Power and Water is developing a treated water reuse scheme in conjunction with the Department of Primary Industry, Fisheries and Mines to divert water from the swamp.

The initial target is to use 600ML per year to prove up the reuse scheme, with the potential for reuse of up to 1800ML in future years.

Gaining environmental and health approvals and licences for the reuse scheme has proved time-consuming, and Power and Water will consider applying for an extension of the current discharge licence to allow time to build and commission essential infrastructure.

For more information on the reuse scheme, see page 12. More information on the rehabilitation of Ilparpa Swamp is at page 8.

Managing Trade Waste

The implementation of a Trade Waste Management System (TWMS) across the Northern Territory by Power and Water started in January 2002. Since then, about 800 businesses Territory-wide have been identified that discharge trade waste to sewer.

More than 700 completed Trade Waste Applications have now been lodged with Power and Water. Of these, 550 are compliant dischargers and have been issued with a Trade Waste Discharge Permit. The permit is valid for three years and specifies the maintenance frequency of pre-treatment equipment.

About 150 businesses do not comply with the requirements of the TWMS and will be issued with an Interim Discharge Permit. The permit will specify pre-treatment equipment requirements and an agreed timeframe for compliance.

Before the TWMS was implemented there were about 200 pre-treatment devices installed in the Darwin region, including Palmerston. Most of these were restaurant and fast food shop grease traps, and few were maintained regularly.

Today there are over 350 devices installed and nearly all are locked into a controlled maintenance schedule. This has had a substantial impact. Most sewer lines that were regularly cleaned on a six-weekly cycle to prevent blockage and overflow are now cleaned on a 13-week cycle. Future inspections are likely to identify that many of these maintenance timeframes will be able to be further extended.

Power and Water is investigating other strategies to encourage more small businesses in the food and hospitality industry to implement waste minimisation strategies.

Clean Land

Power and Water manages a considerable number of facilities across the Northern Territory. We need to actively manage risks so that our operations do not contaminate land and threaten human health or the environment, or compromise current or future land uses. We will ensure we take site contamination into account in the management and disposal of Power and Water facilities.

We have a focus on minimising the risk of on-site and off-site contamination through appropriate storage, treatment and handling of fuels, chemicals and wastes, including treated wastewater.

Large Transformers Across the Northern Territory

Last year Power and Water initiated a review of the 27 zone substations we manage across the Northern Territory. Zone substations contain large transformers holding many thousands of litres of oil, and the review aimed to ensure we comply with the Australian Standards and Northern Territory environmental legislation.

All substations have now been reviewed and no significant shortcomings have been identified. A number of bunds require upgrading, and during the year extensions and upgrades were completed at Hudson Creek, Casuarina and City Zone substations.

A three-year program has been developed to implement the remainder of the outcomes from the review. Design work will be undertaken in 2005-2006 with completion due in 2008.

A number of large transformers are stored at the Ben Hammond Complex in Darwin. These are required to maintain full oil levels to prevent deterioration. A future upgrade of the site includes implementing the *energy supply association of australia (esaa)* guideline for the containment of transformer oil.

Storage of Fuels

During the year we took measures to reduce the risks posed by fuel storage and handling at several facilities. Our aim is to progressively upgrade all fuel storages to meet the new *Australian Standard AS 1940-2004: The storage and handling of flammable and combustible liquids*.

Design work was completed for upgrading existing bunds at Channel Island Power Station (two 6ML diesel tanks) and Berrimah Power Station (1ML aviation kerosene tank).

New fuel storage facilities were built at two remote community power stations, Docker River and Daly River, with bunding installed to meet the standard.

Power and Water is also investing \$80 000 to progressively fit dry break couplings to fuel delivery hoses at all remote power stations across the Territory. This will stop the chronic small spills that can lead to significant diesel contamination of soil

over time. To date, 40% of remote power stations have been fitted with the new couplings.

Berrimah Power Station was the site of an attempted fuel theft during Cyclone Ingrid in March 2005, and this incident is reported in the Compliance section. The incident was not related to bunding failures.

Decommissioned Power Stations

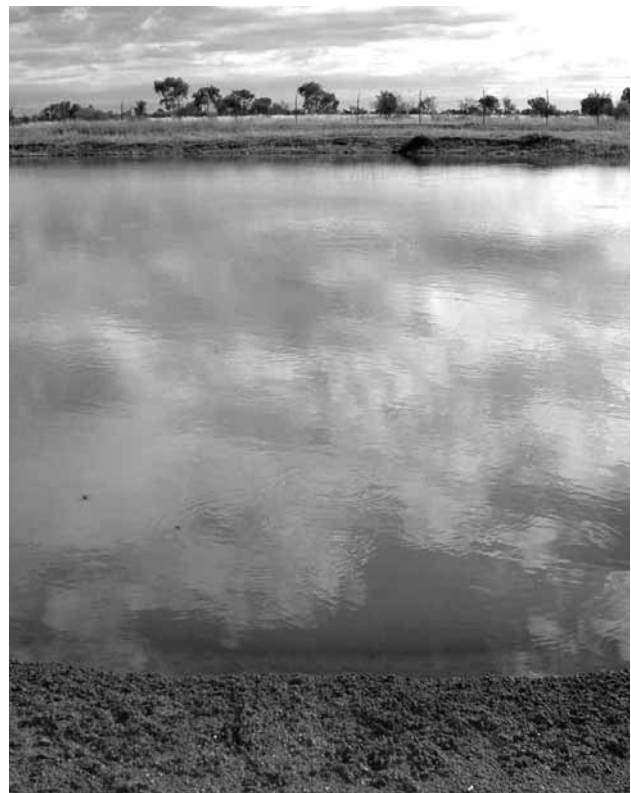
The decommissioned Katherine Power Station is being retained for Power and Water purposes. The site was cleaned up and contamination remediated during the year to ensure it was suitable for future use.

Decommissioning of the Newcastle Waters and old Daly River power stations will require these sites to be remediated before disposal. Site assessments will be undertaken in 2005-2006. All of Newcastle Waters township is a declared heritage site under Northern Territory legislation, and permission will be required from the Heritage Minister for any work at the power station.

Improving Wastewater Treatment at Remote Communities

Remote Operations invested almost \$900 000 at two remote communities during the year. An additional sewerage pond was constructed at Ali Curung to ensure adequate retention time and cater for an expanding population in the community.

At Hermannsburg the pond system was improved by refurbishing and improving the spray irrigation system to safely dispose of treated water.



SEWER PONDS AT ALI CURUNG

Conserving Biodiversity

Power and Water's activities have the scope to impact on the values of the Territory's terrestrial and marine biogeographic regions. In particular, we have a responsibility to ensure that the biodiversity values of areas under our direct management are protected and enhanced where possible.

Ilparpa Swamp

Rehabilitation of Ilparpa Swamp has been identified through community consultation as an important component of the Alice Springs Urban Water Management Strategy. The former claypan has valuable remnant vegetation that is now under threat from weeds and fires.

Continuous overflows from the Alice Springs Waste Stabilisation Ponds have encouraged the growth of couch grass and bulrushes that fuel hot fires in the swamp.

Since 2002, Power and Water has been funding action plans developed by the Ilparpa Swamp Rehabilitation Committee, a community based group formed as a result of the implementation of the Alice Springs Urban Water Management Strategy. The total funding commitment was for \$220 000 over three years.

The future of the Ilparpa Swamp Rehabilitation Committee is due for review in 2005-2006, in conjunction with commissioning the water reuse scheme and ceasing overflows.

Darwin River Dam Catchment Management

The Darwin River Dam and Manton Dam catchments cover 28 578ha, and contain the NT's largest body of permanent freshwater: Darwin River Dam at about 4355ha. Our catchment management aims to protect long-term water quality and yield from the dam, while conserving biodiversity values.

Building on the work reported in last year's Environment Report, a Geographic Information System (GIS) project was initiated under the Cooperative Research Centre for Water Quality and Treatment's Summer Scholarship scheme and in conjunction with Charles Darwin University.

The GIS project will improve the management of weeds, feral animals and bushfires to meet strategic management objectives. The Weeds Management Branch of the Department of Natural Resources, Environment and the Arts is helping to map specific weed infestations.

Gamba Grass is a particular weed of concern because of its flammability, and it is intended to remove and permanently exclude it from the catchment.

Hunters entering the catchment illegally are an ongoing problem for fire management. Our target is to limit the annual

area burnt during the dry season to 40% or less, but satellite imagery showed about 85% was burnt in the 2004 dry season. An increased focus on access control and fuel reduction burning in the early dry season is needed to prevent a reoccurrence of such fires.

An emerging threat to the dam's water quality was the discovery of a highly invasive aquatic weed species downstream of the dam. The weed, *Cabomba caroliniana*, was identified in several locations in Darwin River late in the 2004 dry season.

Control measures were immediately put in place under the direction of a government taskforce. A quarantine area was declared over the infested area, and herbicide treatments applied to kill specific patches.

A survey in the 2005 dry season indicated that eradication was not complete and further measures will be required.

If *Cabomba* invades Darwin River Dam, the current high quality water will be severely affected. It has been estimated that a water treatment plant costing several million dollars would be needed to improve water quality to potable standards.



DARWIN RIVER DAM

Conserving Resources

Power and Water uses a mix of fossil fuels and renewable energy to generate electricity for customers across the Territory. Natural gas is the principal fuel type for the major urban centres, but diesel is the mainstay of the smaller communities without access to gas.

Solar and wind power are small but growing renewable energy sources, especially in remote communities where it is economically feasible to partially substitute for diesel.

Darwin's water supply is jointly sourced from Darwin River Dam and the Howard East Borefield and blended to improve quality for human consumption. Katherine is similarly supplied by a blend of surface and groundwater. Elsewhere there is almost total reliance on groundwater, and in Alice Springs the demand for potable supply is impacting on the Roe Creek Borefield.

The reuse of treated wastewater and biosolids generated by sewage treatment presents an opportunity to conserve resources discharged to the environment or otherwise not used. In Alice Springs, there are opportunities to reuse water for non-potable uses and reduce the demand on high quality sources.

Our Green Buildings - the Ben Hammond Complex

The 7.5ha Ben Hammond Complex is Power and Water's main site in Darwin, and is used for offices, workshops, storage and vehicle garaging. The site's history dates back to 1895 when it was used as a railway depot, workshop and steam locomotive shed for the North Australian Railway.

The site was upgraded substantially over the years until the railway closed in 1976. Power and Water's predecessors then occupied the site, with purchase from the Commonwealth Government finalised in 1982.

The main feature of the site is a very large building, formerly a locomotive shed, containing two storeys of office space and several workshop areas.

The external cladding on most buildings has deteriorated over the years, and a decision was made to completely refurbish the whole complex. The initial stage consisted of removing unwanted buildings from the site, recladding the exterior of the main workshop and an adjoining canteen, and rebuilding the internal offices.

The design brief for the refurbishment included a green building strategy to increase energy and water efficiency and create an eco-friendly work place.

The design specification included numerous energy and water saving devices, with the NT Government Energy Management Program guidelines for reductions in energy usage set as a minimum requirement.

The eco-friendly workplace was achieved by using green building products in as many applications as possible. The choice of building products was assisted by the use of the nationally accredited website at <http://www.ecospecifier.org>

The choice of each product was balanced by ensuring that there would be an acceptable pay back period, or the initial cost would be outweighed by the ongoing benefits.

The Ben Hammond refurbishment is the largest commercial project to date in the Northern Territory to incorporate a complete green building strategy. Our consultants have estimated energy savings of the order of 20% from the refurbishment. The project will be rated under the Australian Building Greenhouse Rating Scheme and we are aiming for a 3,5 star rating from the scheme. This will be a first for the Northern Territory if successful.



STAGE ONE OF THE BEN HAMMOND COMPLEX REFURBISHMENT

The Green Buildings: How We Did It

Energy Efficiency - Lighting

- There is a significant amount of external glazing in the offices, allowing natural light to enter the office areas and reducing the need for artificial lighting.
- All fluorescent lights have tri-phosphor tubes, electronic ballasts and high efficiency diffusers, providing better energy efficiency than standard fluorescent fittings.
- The lighting has an internal and a perimeter zone. The perimeter zone lights have dimmable electronic ballasts controlled via daylight sensors to enable automatic dimming in response to the amount of natural light entering the buildings.
- All lighting is controlled by a programmable lighting control system that switches lights on and off at pre-determined times. Movement sensors throughout the office areas allow lights to switch on and off in relation to occupancy.
- All downlights are 12V halogen using 35W high efficiency globes and electronic transformers, in lieu of standard 12V 50W fittings.
- Skylight panels constitute about 10% of the total roof area over the workshop floor, significantly reducing the need for artificial lighting.
- Workshop lights are fitted with dimmers, controlled via daylight sensors.

Energy Efficiency - Ventilation and Air-Conditioning

- Air-conditioning heat loads have been significantly reduced through the use of building materials with good insulation properties, double glazing and tinting of all external windows, and insulation of roof spaces and all steel clad external walls. All external windows have external shading devices and internal blinds, and exhaust fans are installed over all of the facilities stations (printers, photocopiers and fax machines).
- Outside air intake has been regulated to comply with the minimum requirements of AS1668.2-1991 by the use of high-efficiency filters, outside air dampers controlled via CO² sensors on all AC units exceeding 25kW, and appropriately sized fresh air fans on all other units.
- Air-conditioner running time has been reduced through installing optimum start controllers and adjustable after hours switches on all large AC units. Conference rooms are cooled with dedicated split systems, rather than from the main air-conditioning plants, and all rooms and offices used after hours have supplementary split systems with movement sensors.
- Offices in the perimeter zone have thermo-fuser supply air outlets, which will operate in conjunction with variable frequency drives on the supply air fans. This will allow the amount of supply air quantity in these areas to automatically adjust in response to the amount of heat entering the building through the external walls and windows.

Energy Efficiency - General Power

Power consumption other than for lighting and air-conditioning has been reduced through:

- Using solar hot water systems.
- Installing high-efficiency water boilers in the kitchens fed from the solar hot water system as a form of pre-heating.
- On/off control of all hot water boilers, printers and photocopiers through the lighting control system, with adjustable after hours switches.
- Power factor correction fitted for the whole of the complex.

Water Efficiency

Water consumption has been reduced by using wherever possible:

- Dual flush toilet cisterns.
- Flow-restricting tap washers.
- AAA rated shower heads .

An Eco-Friendly Workplace

The creation of a green or eco-friendly workplace is based on using products that do not have a negative impact within the workplace or the environment as a whole. This means using products and materials that do not emit volatile organic compounds or require the use of chemical cleaners, and those that can be readily recycled or reused at end of their life cycle.

The design specification for the refurbishment included the following products that meet one or more of the above criteria:

- Paint and varnishes.
- Laminates.
- Glues/adhesives.
- Carpets.
- Resilient floor coverings (vinyl and rubber).
- Pin boards.
- Partitions.
- Fixed joinery.
- Office furniture.



Renewable Energy

Power and Water is always looking for cost-effective and sustainable ways to conduct its business. The high price of diesel fuel has driven the search for renewable energy sources in the remote outback where power generation costs are high.

Following the successful commissioning of the photovoltaic arrays at Bulman and Kings Canyon (reported in previous years), we are looking to expand the contribution of solar power in remote communities.

An agreement has been negotiated to purchase energy from an independent power producer at Hermannsburg, Lajamanu and Yuendumu. The independent producer will generate electricity from 24kW solar collector dishes and integrate the output with our standard diesel systems.

Practical completion has been achieved at Hermannsburg and pre-commissioning tests are underway. The project will also use Power and Water's sewerage treatment ponds at Hermannsburg to dissipate the large amounts of heat that build up in the array. The high-efficiency cells are cooled with circulating water that will then be passed through a heat exchanger installed in the ponds.

Yuendumu and Lajamanu are ahead of schedule and are expected to be commissioned before December 2005. The three systems will save around 420 000L of diesel and reduce greenhouse gas emissions by 1550 tonnes every year.

Negotiations are also underway with an independent power producer generating electricity from the landfill gas fired power station at Shoal Bay Waste Disposal site in Darwin. The power station is due for completion in 2005-2006.

In conjunction with the Australian Greenhouse Office, Power and Water initiated a pilot project to harvest the invasive woody weed *Mimosa pigra* and convert it into electricity through a gasifier unit. Work is continuing on the technical and financial feasibility of this project.

A contract for the supply of 60 000L of biodiesel has been let for a trial at the Daly Waters Power Station. The Office of the Renewable Energy Regulator will determine the number of Renewable Energy Certificates (RECs) arising from the trial.

The RECs will help us to meet our liabilities under the *Renewable Energy (Electricity) Act*. Power and Water has exceeded its milestone targets under the act in the first three years, mainly by purchasing RECs for solar hot water systems [KPI 6].

Alice Springs Water Reuse Scheme

Implementation of the Alice Springs Urban Water Management Strategy continues to focus on demand management strategies for the Roe Creek Borefield, sustainable use of the Town Basin Aquifer, promotion of effluent reuse, and demand management strategies for reducing water use and sewage flows. Limited reuse is already occurring at Blatherskite Park for landscape irrigation.

A key action under the strategy is the reuse of treated water from the Alice Springs Waste Stabilisation Ponds for a horticulture project at the Arid Zone Research Institute (AZRI), some 8 kilometres south of Alice Springs. The project involves treating effluent water by air flotation, microfiltration and disinfection, conveying the water to AZRI by pipeline, and infiltrating through ponds to underground storage for later use. The infiltration process is termed Soil Aquifer Treatment (SAT), and further raises water quality.

A Public Environment Report was prepared and made available for public review and comment on 15 April 2005, in accordance with the *Environmental Assessment Act*. Details are available at http://www.powerwater.com.au/powerwater/aboutus/water_reuse.htm.

The Office of Environment and Heritage completed an assessment of the report, and the Minister for Environment and Heritage subsequently advised on 24 June 2005 that the project could proceed subject to compliance with a number of recommendations. The assessment report is available in full at <http://www.nreta.nt.gov.au/whatwedo/environment/assessment/register/alicesprings/index.html>.

In essence, Power and Water and the Department of Primary Industry, Fisheries and Mines are required to:

- Obtain a number of licences and approvals from the Department of Health and Community Services and the Controller of Water Resources
- Meet a number of monitoring requirements
- Undertake a targeted flora and fauna survey across the site
- Submit four environmental management plans for the construction and operation of the SAT ponds and the horticulture project.

Work will proceed in 2005-2006 to implement the recommendations.

Electricity Supply and Distribution

Power and Water recognises the need to maximise the efficient use of non-renewable fuels. Our major power stations use natural gas from central Australia, supplemented by diesel when operational circumstances require it.

For example, Channel Island Power Station uses gas turbines and a mix of technologies such as cogeneration, combined cycle, and ice-cooled air intake to achieve efficient operation. It is very low in carbon intensity compared to typical brown coal power stations, but uses significant quantities of water [KPI 1 and KPI 7].

The transmission and distribution of electricity always incurs losses, and losses of the Darwin-Katherine, Tennant Creek and Alice Springs grids is at KPI 8.

Economies of scale are being investigated for linking some of our remote communities by 22kV powerlines and decommissioning the smaller power stations. To date, economic analysis is underway or complete to link Pirlangimpi and Milikapiti (Melville Island), Ngukurr and Rittarangu (Roper River), and to link Jilkmingan (near Mataranka) into the Darwin/Katherine Grid.

Efficiencies in Water Supply and Wastewater Systems

Hydraulic pumping efficiency studies undertaken in 2003-2004 at Darwin, Katherine, Tennant Creek and Alice Springs are being used to optimise management and maintenance of assets, and this will result in lower energy use per megalitre of water pumped. A new pump station has been designed for Tennant Creek, and tenders will be called for construction early in 2005-2006.

Information on water losses, treated water reuse and greenhouse gas emissions is at KPI 9.

Remote Community Resource Conservation Program

Remote Operations has developed a resource conservation program based on five basic elements:

- Meet with communities to foster collaborative approaches
- Base education (involving school students)
- Traditional links
- Maintenance
- Incentive.

The program aims to have a positive impact on economic, social and environmental aspects of remote community life. It has the potential to reduce immediate water and electricity production costs, prevent premature upgrade of infrastructure, reduce consumption of fossil fuels, reduce greenhouse gas

emissions and unnecessary draw down of water aquifers. The greatest immediate impact is by maintaining community assets such as plumbing in houses and buildings.

The program is delivered in schools in conjunction with resident teachers, and involves students undertaking measurements and auditing water meters in their own community and reporting leaks inside houses to the council for later repair. Improvements in water consumption are measured again and the data is used in a series of statistical and graphical classroom exercises. This program is extremely popular with students and teachers.

Engaging the Community

As a multi-utility, Power and Water plays an integral role in the life of communities across the Northern Territory. The quality of life of our customers depends on the goods and services we produce, and our activities can also impact on community amenity. We also manage sites of significance to the community on Corporation land.

We are committed to contributing to our community and creating greater awareness of environmental issues in the Northern Territory.

Environment Awards

Power and Water continued its program of environment awards in 2005 to encourage industry and the community to work together to help protect the environment.

The winners of Power and Water's third annual Awards for Environmental Excellence were announced at a ceremony at Parliament House on 9 June 2005.

Each winner received a Melaleuca Award plaque and a complimentary energy audit from Power and Water.



FROM LEFT TO RIGHT, RHONDA HERRICK - ALICE SPRINGS HIGH SCHOOL, YVONNE DRISCOLL - BRADSHAW PRIMARY SCHOOL, ROBYN GREY-GARDNER - CENTRE FOR APPROPRIATE TECHNOLOGY INC, QUENTIN DENNIS & LETCHIMI BALASUBRAMANIAM - CASUARINA SQUARE, DANIEL DEL NIDO & DAVE BENNETT - BENNETT DESIGN PTY LTD AND SHARON & ROB COX - OVERLANDER HOMES AND JOHN DAVIDSON & BRETT FITZGERALD - J & B TYRE RECYCLING PTY LTD



THE GREEN GUIDE HAS TIPS ON SAVING POWER AND WATER WHILE HELPING THE ENVIRONMENT

The winners of each category are:

Community and Local Government: *Bradshaw Primary School – Focus on Water Issues*

The children in years five and six at Bradshaw Primary School are becoming more aware of water issues in Central Australia after completing an extensive program on water.

Commercial/Industry Category: *Casuarina Square – Trade Waste Management*

Casuarina Square installed 18 grease traps throughout the centre to minimise waste and protect the environment, and spends \$17 000 every year to have the traps emptied and the waste products recycled.

Domestic Category: *Bennett Design Pty Ltd and Overlander Homes – Darwin Green House*

The northern winner of the Northern Territory Government's competition to design and build a green house was designed by Bennett Design and built by Overlander Homes. The design has real implications for improving climatically responsive and sustainable housing in Darwin.

Rural/Remote Category: *Centre for Appropriate Technology - Mutitjulu Rainwater Tank Trial*

The Centre for Appropriate Technology has been working with the Central Australian community of Mutitjulu on the Mutitjulu Rainwater Tank and Point of Use Treatment System Trial. The Centre planned and designed a robust system to provide safe drinking water for remote conditions.

Small Business Category: *J & B Tyre Recycling – Recycling and Reducing Tyre Waste*

J & B Tyre Recycling helps to reduce the number and volume of tyres going to landfill in the Northern Territory. The business collects 75 tonnes of waste tyres in Darwin a month, recycling about 22% into building products.

Environmental Grants: *Alice Springs High School - Hot Logs Project*

Alice Springs High School was awarded a grant to further develop its Hot Logs Project. Students at Alice Springs High School have been recycling shredded paper and sawdust to make Hot Logs, which can be used in wood heaters, furnaces and fires.

Providing Public Information

We are committed to reporting on our environmental performance each year, with highlights contained in our annual report and details provided in this environment report.

We also publish an annual Water Quality Report that reviews water quality in our five major and 13 minor centres. Further information about environmental management and water quality is available from our website at www.powerwater.com.au.

Power and Water is a signatory to the *electricity supply association of australia (essa)* Code of Environmental Practice. This requires us to audit the performance of our electricity business units against the code every two years, and we have undertaken to publish the audit results in our environment report. The 2004 audit results are presented in **Section 4 Compliance**.

We are obliged to report annually on our emissions through the National Pollutant Inventory annual emissions report. The NPI report was provided to the regulator, the NT Office of Environment and Heritage, in September 2004.

NPI data is available through the Australian Government Department of Environment and Heritage website at www.npi.gov.au, and relevant information has been used to develop the key performance indicators reported in **Section 3 Performance**.

Undergrounding Power Lines

Undergrounding of power lines in the Top End ensures reliability of supply given the high risk of thunderstorms and cyclones to overhead systems.

It also minimises the need for vegetation management, and reduces the visual impact of poles and wires across our landscapes.

The suburbs of Nightcliff and Rapid Creek are being progressively converted to underground supply. These suburbs have a high incidence of outages due to extensive street front vegetation growth. The change from overhead to underground power will significantly reduce the need for tree trimming, allowing the older established trees to add to the visual amenity of the streets.

Currently we have 2278km of our 6996km distribution network underground, up from 2233km in 2003-2004. This will increase in 2005-2006 as we progress the Darwin undergrounding project.

Compliance

Legislation

A list of relevant environmental legislation is at **Appendix 2**.

Key drivers for Power and Water's environmental performance and compliance in priority order are:

Water Act - licences for water extraction for potable supplies, and discharge licences for treated wastewater.

Waste Management and Pollution Control Act - regulatory requirements to manage waste and avoid pollution. The Act describes a number of environmental offences, and requires that pollution incidents be reported to the Office of Environment and Heritage within 24 hours. This includes any incident such as the emission, discharge, deposition or escape of contaminants that causes or threatens to cause environmental harm.

We also participate as a responding agency in the Northern Territory Government's Pollution Response Line. This is a Territory-wide Freecall number (1800 064 567). Calls from the public are routed to a 24-hour response room manned by Police, Fire and Emergency Response staff. We respond when a call relates to Power and Water facilities or operations.

Environmental Assessment Act - requires assessment of major new projects undertaken by Power and Water. One formal assessment was required during the period, for the Alice Springs Water Reuse Scheme. The Office of Environment and Heritage made recommendations on several other projects.

Planning Act - approvals required for certain land uses in areas regulated by the Development Consent Authority. No approvals were sought during the year.

Environment Protection and Biodiversity Conservation Act - this Act is administered by the Australian Government, and covers project developments that may impact on areas of national significance. No referrals were made to the Australian Government during the year.

National Environment Protection Council (NT) Act - this Act allows National Environment Protection Measures made by the National Environment Protection Council to be applied in the Northern Territory.

One National Environment Protection Measure (NEPM) directly relevant to Power and Water is the National Pollutant Inventory NEPM.

Power and Water is required to report emissions of prescribed substances to land, air and water every year. The information is collated and checked by the Department of Natural Resources, Environment and the Arts (DNRETA) and passed on to the Australian Government for inclusion on a national database.

The database is accessible either through DNRETA's website at <http://www.nreta.nt.gov.au/whatwedo/waste/inventory.html> or the Australian Government site at www.npi.gov.au.

Data from the reports have been used in **Section 3** of this report where appropriate as key performance indicators.

Licences

The Department of Natural Resources, Environment and the Arts is the administering agency for the *Water Act*.

Power and Water is required to hold water extraction licences under the *Water Act* to produce potable supplies. In 2004-2005 we extracted 67% of the allowable volume, up from 64% in 2003-2004 and 58% in 2002-2003.

We also hold water discharge licences under the *Water Act* for facilities that discharge treated wastewater. There are no concentration or mass loading conditions in the licences, but there is an obligation to monitor and report effluent parameters to the regulator. The information can contribute to a greater understanding of the transport and fate of substances in Darwin Harbour and other systems through hydrodynamic modelling.

“POWER AND WATER IS REQUIRED TO REPORT EMISSIONS OF PRESCRIBED SUBSTANCES TO LAND, AIR AND WATER EVERY YEAR.”

Code of Environmental Practice

Power and Water is a signatory to the *energy supply association of australia (esaa)* Code of Environmental Practice. Our performance against the code is audited biennially by an independent accredited auditor and reported to *esaa*.

Our latest audit was in November 2004. The results demonstrate that Power and Water continues to perform well in complying with the Code of Practice.

The most marked change since the 2002 audit is an improvement in the Social Responsibility Policy area. This reflects Power and Water's commitment to community support through sponsorships, and through the Environmental Excellence Awards program.

Policy area	2002 PWC audit score	2004 PWC audit score	2004 industry average score
Sustainable development	4.1	4.0	3.9
Social responsibility	3.5	4.08	3.8
Environmental management	3.27	3.27	3.7
Resource management	3.75	4.0	3.6
Average	3.65	3.84	3.8

Note: Each policy area receives a score between Zero (no activities to address a Code action) and Five (evidence of leadership or industry best practice) across a number of Code actions.

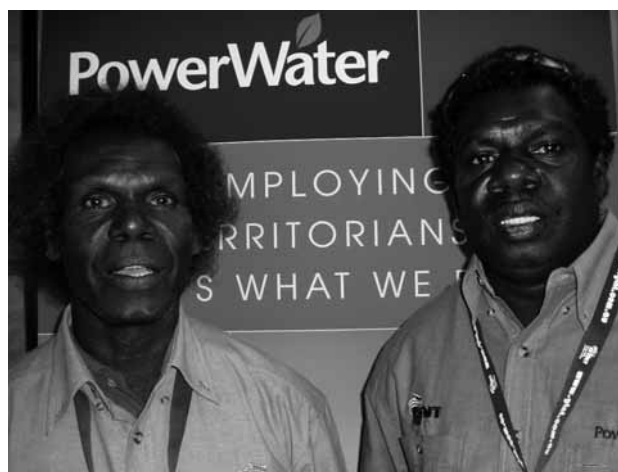
Environmental Incidents

Response to Incidents

The generation of electricity with diesel fuel and the treatment of wastewater are two areas where we have an increased risk of environmental incidents.

To reduce the risk of fuel spills, we have a program of upgrading fuel storage bunding to prevent releases to the environment. Selected Power and Water personnel have received training in dealing with land-based fuel spills.

Remote Operations have a training program in place for Essential Services Officers, or ESOs. ESOs are those people who are on the ground in remote communities with responsibility for the day-to-day operation of power,



ESSENTIAL SERVICE OFFICERS GRADUATE IN AUGUST AT A CEREMONY AT PARLIAMENT HOUSE DARWIN

water and sewerage services. ESO courses cater for up to 35 participants at a time, and were held in Darwin in March 2004 and in Alice Springs in May 2005. A course is planned for Alice Springs in September 2005.

Fuel spill clean-up kits are available at each remote power station and for rapid deployment from strategic placements as required. We are also fitting dry break couplings to our fuel storage tanks to reduce minor spillages that occur when we take delivery of fuel.

Sewer maintenance and appropriate design of new sewerage systems prevent sewage overflows. There are occasional dry season blockages and wet season overflows associated with stormwater. We have a comprehensive response protocol for sewage overflows, with a primary focus on clean-up and disinfection due to the potential health impacts of raw sewage.

The Department of Natural Resources, Environment and the Arts is notified of all spills or overflows in accordance with Section 14 of the *Waste Management and Pollution Control Act*, and the Department of Health and Community Services is consulted regarding sewage overflow management and clean-up.

Power and Water is committed to meeting the requirements of both agencies in responding to spills and overflows.

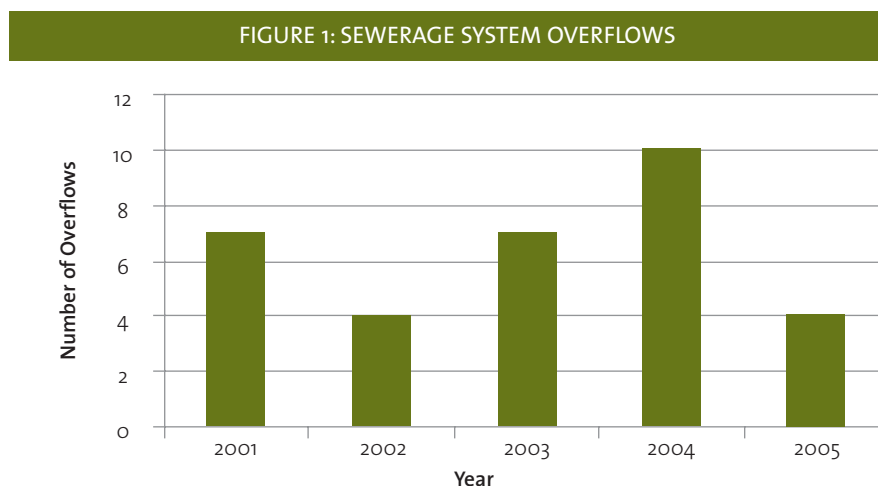
Incident Report Database

Power and Water maintains a database of all environmental incidents that occur as a result of the Corporation's activities. These incidents are reported by staff and external sources.

It enables recurrent problem areas to be identified and corrective measures to be implemented.

Sewerage System Overflows

Figure 1 shows the number of reported sewer overflows in the NT over the past five years. Most occurred in our major sewerage systems in the Top End because of stormwater inflow and infiltration during monsoon rain. The yearly changes largely reflect wet season rainfall intensity.



In 2004-2005 four overflows associated with abnormal operating conditions were reported to DNRETA. There were no instances recorded of impacts on human health or the environment as a result of overflows.

Fuel Spills

Figure 2 shows the number of reported fuel and oil spills over the past five years. Most spills occur during fuel delivery to remote community power stations, or as a result of damage associated with theft.

There were 10 fuel or oil spills reported during the year, with six of these being less than 150 litres.

At Milingimbi Power Station in Arnhem Land, an attempted theft is the likely cause of a spill of 18 900 litres of diesel. Interference with a fuel pump switch caused a tank to overflow. Contaminated soil arising from the spill has been remediated.

At Elcho Island Power Station, off the north coast of Arnhem Land, operator error led to a spill of 20 000 litres of diesel into a bunded area. The diesel was recovered and used in the power station.

At Berrimah Power Station, an attempted theft resulted in the loss of 47 000 litres of kerosene. Most of this was lost to ground on a neighbouring property, and investigations found that the kerosene was floating on top of groundwater 8 to 10 metres down. Remediation is ongoing, and an estimated 18 000 litres of kerosene has been recovered to date.

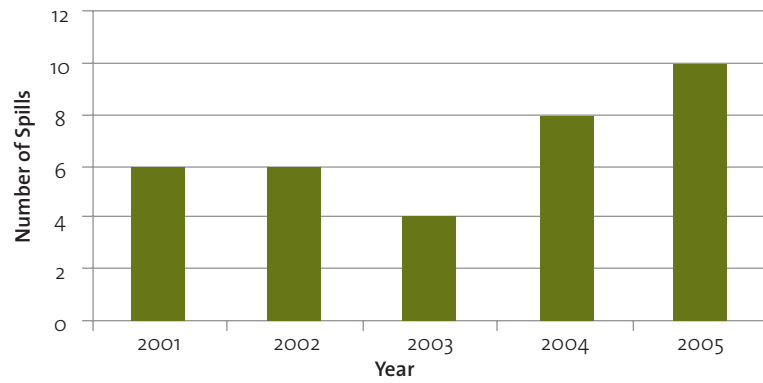
Switch failure caused a spill of 60 000 litres of diesel at Tennant Creek Power Station. Of this, 28 000 litres was recovered from bunds and reused and the remainder soaked into soil in a drain adjacent to the power station. All contaminated material was excavated from the drain, and remediation is in progress.

There is no evidence of environmental harm from any of the spills.

Chemical Leaks

There was one incident reported during the year. Up to 2000 litres of 14% ferric chloride solution leaked through a pipe joint to the grounds of the Ludmilla Wastewater Treatment Plant. Ferric chloride was being trialled to settle solids out of wastewater. The spillage was dispersed with freshwater. No environmental harm resulted.

FIGURE 2: FUEL AND OIL SPILLS



Prosecutions

The Northern Territory's principal environment protection legislation is the *Waste Management and Pollution Control Act*.

Under that Act, Power and Water is subject to a number of enforcement actions such as Authorised Officer Directions, Pollution Abatement Notices and prosecutions.

During the reporting period, no enforcement actions under the Act were taken against Power and Water, and there are no pending actions.

No prosecutions or actions were taken, or are pending, against Power and Water under other environmental legislation.



LUDMILLA LANDCARE GROUP REVEGETATION PROJECT SPONSORED BY POWER AND WATER

Glossary

CBD: Central Business District.

CO: carbon monoxide.

CO₂-e: carbon dioxide-equivalent. Used to indicate the greenhouse gas warming potential of a substance relative to atmospheric carbon dioxide. For example, 1kg of sulfur hexafluoride gas has the same greenhouse effect as 23 900kg of CO₂.

Controlled action: an action that is regulated by the Australian Government's Environment Protection and Biodiversity Conservation Act.

GWh: Giga Watt hours. A measure of the quantity of electricity generated over a time period.

National Environment Protection Council: a council of Environment Ministers from each State and Territory, and the Australian Government.

National Environment Protection Measure: statutory instruments to implement agreed national objectives for protecting or managing particular aspects of the environment. They may relate to ambient air quality; ambient marine, estuarine and fresh water quality; noise; general guidelines for the assessment of site contamination; environmental impacts associated with hazardous wastes; the reuse and recycling of used materials; and motor vehicle noise and emissions.

Near threatened: a classification of the status of rare plants or animals that, while not under threat of extinction, is under pressure from environmental changes.

NO_x: oxides of nitrogen, usually nitrogen dioxide produced by fossil fuel combustion for power generation.

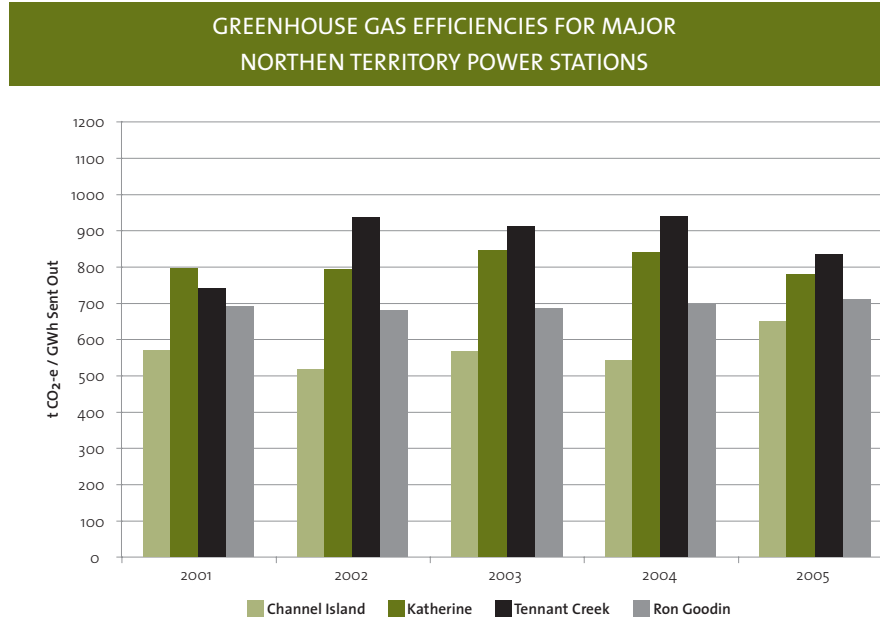
PM₁₀: particles with an aerodynamic diameter of 10 micrometres or less, and which can penetrate deep into the lungs and cause adverse health effects.

Vulnerable: a classification of the status of rare plants or animals that are vulnerable to extinction.

Appendix 1

Key Performance Indicators

KPI 1 – Greenhouse Gas Efficiencies



Overall, in 2004-2005 our major power stations in Darwin, Katherine, Tennant Creek and Alice Springs emitted an estimated 843 445 tonnes of CO₂-e, or 665.96 tonnes of CO₂-e/GWh sent out.

The current industry averages for thermal power generation are:

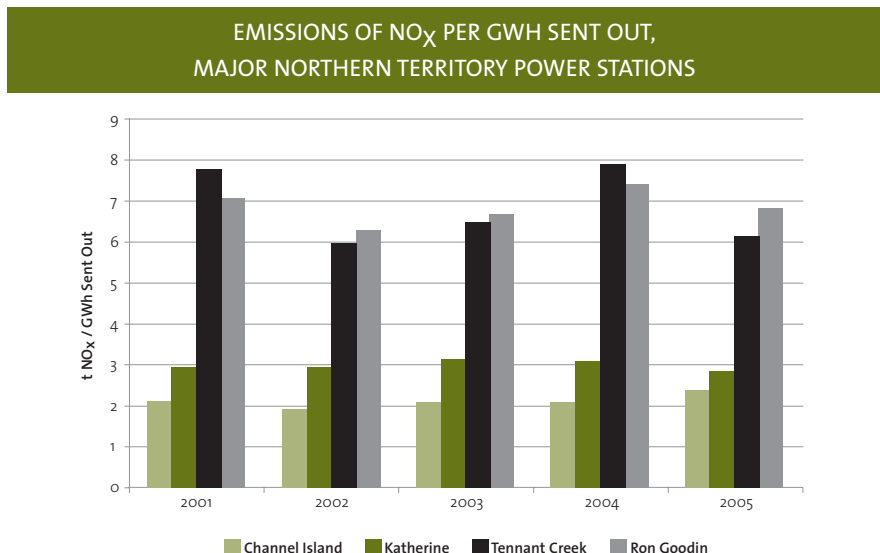
Overall - 903 tonnes of CO₂-e/GWh sent out

Black coal - 944 tonnes

Brown coal - 1341 tonnes

Gas - 551 tonnes.

KPI 2 – Oxides of Nitrogen Emissions



In 2004-2005 our major power stations emitted an estimated 39 070.02 tonnes of NO_x, or 2.49 tonnes of NO_x/GWh sent out.

The current industry averages for thermal power generation are:

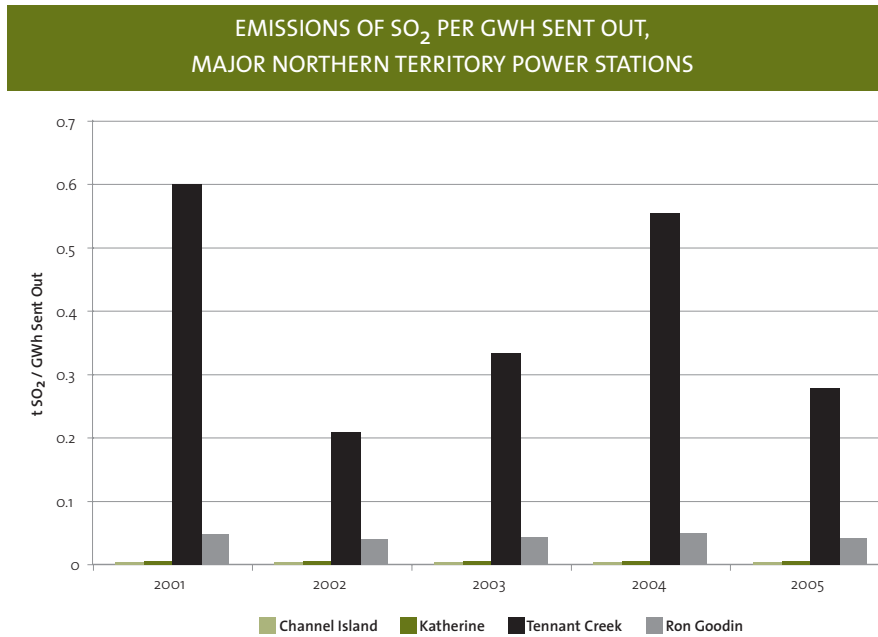
Overall - 3.21 tonnes NO_x/GWh sent out

Black coal - 2.89 tonnes

Brown coal - 2.78 tonnes

Gas - 1.40 tonnes.

KPI 3 – Sulfur Dioxide Emissions



In 2004-2005 our major power stations emitted an estimated 19.12 tonnes of SO₂, or 0.015t/GWh sent out.

The current industry averages for thermal power generation are:

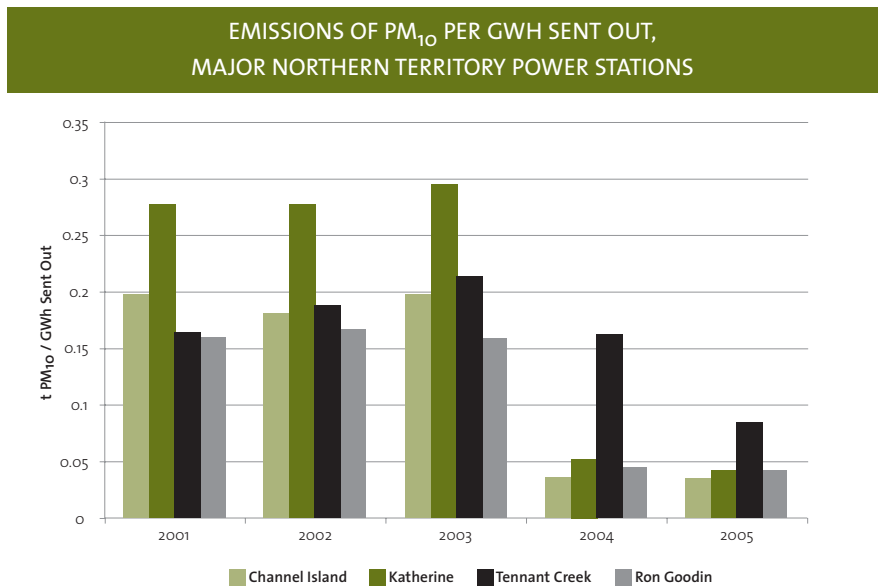
Overall - 2.24 tonnes SO_x/GWh sent out

Black coal - 3.91 tonnes

Brown coal - 2.43 tonnes

Gas - 0.034 tonnes.

KPI 4 – Particle Emissions



In 2004-2005 our major power stations emitted an estimated 47.11 tonnes of PM₁₀, or 0.04t/GWh sent out.

The current industry averages for thermal power generation are:

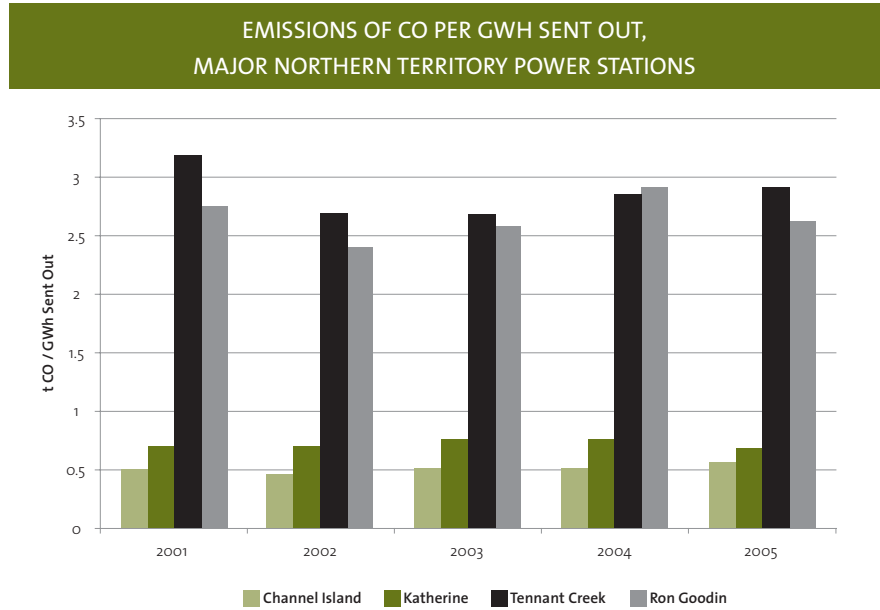
Overall - 0.43 tonnes PM₁₀/GWh sent out

Black coal - 0.69 tonnes

Brown coal - 0.22 tonnes

Gas - 0.08 tonnes.

KPI 5 – Carbon Monoxide Emissions



In 2004-2005 our major power stations emitted an estimated 1158.79 tonnes of CO, or 0.91 tonnes of CO/GWh sent out. No industry averages are available for CO.

KPI 6 – Renewable Energy

In calendar year 2004, Power and Water's target for Renewable Energy Certificates (RECs) was 15 800.

During the year we created 24 244 RECs, leaving 8 444 to be carried over to calendar year 2005.

RECs were created through the solar hot water rebate program, where customers who install solar hot water services can sell RECs to Power and Water, and by a number of photovoltaic arrays at remote power stations such as Bulman and King's Canyon.

KPI 7 – Water Usage in Power Generation

Channel Island Power Station used 788.16ML of potable water in 2004-2005 as cooling tower makeup on the steam turbine condensing system. This is equivalent to 0.77ML/GWh sent out from Channel Island.

This compares with industry averages for thermal power generation of:

Overall - 1.25ML per GWh sent out	Black coal - 0.92ML
Brown coal - 2.19ML	Gas - 0.65ML

KPI 8 – Power Line Losses

The Darwin-Katherine, Tennant Creek and Alice Springs transmission and distribution grids lost 159.44GWh in 2004-2005. This is equivalent to 0.0214GWh per circuit kilometre, or 10.16% overall.

The current industry average for transmission lines is 1.55GWh/circuit kilometre and 3.73%, and for distribution lines 0.078GWh/km and 5.44%.

KPI 9 – Efficient Water Use

In 2004-2005 we lost 6617ML, or about 11% of the total potable water supplied.

Greenhouse gas emissions from our water and waste water activities in 2004-2005 totalled 20,403 tonnes. This is equivalent to 0.29 tonnes of CO₂-e/ML of potable water supplied, and 0.20 tonnes of CO₂-e/ML of waste water pumped.

In 2004-2005 we reused 2120ML of treated wastewater, or 13.6% of the available volume.

Appendix 2

Environmental Legislation

Northern Territory legislation relevant to Power and Water's environmental management:

Aboriginal Land Act
Agricultural and Veterinary Chemicals (Northern Territory) Act
Bushfires Act
Crown Lands Act
Control of Roads Act
Dangerous Goods Act
Energy Pipelines Act
Environmental Assessment Act
Environmental Offences and Penalties Act
Fisheries Act
Heritage Conservation Act
Litter Act
National Environment Protection Council (Northern Territory) Act
Northern Territory Aboriginal Sacred Sites Act
Ozone Protection Act
Parks and Wildlife Commission Act
Planning Act
Power and Water Authority Act
Marine Pollution Act
Public Health Act
Soil Conservation and Land Utilisation Act
Summary Offences Act
Territory Parks and Wildlife Conservation Act
Waste Management and Pollution Control Act
Water Act
Water Supply and Sewerage Services Act
Weeds Management Act
Work Health Act

Power and Water is obliged to comply with the following Australian Government legislation:

Aboriginal Land Rights (Northern Territory) Act
Environment Protection and Biodiversity Conservation Act
Industrial Chemicals (Notification and Assessment) Act
Natural Resources Management (Financial Assistance) Act
Renewable Energy (Electricity) Act

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