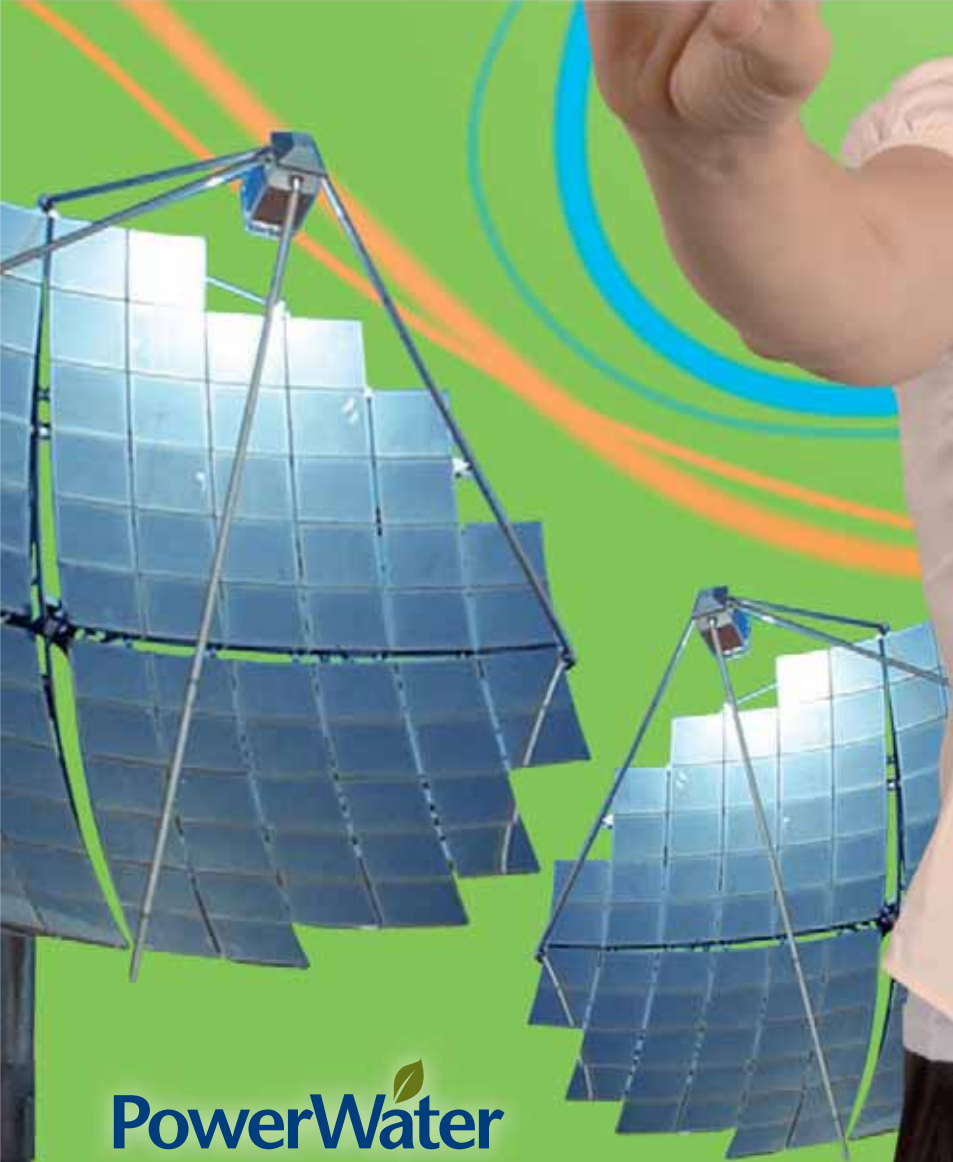
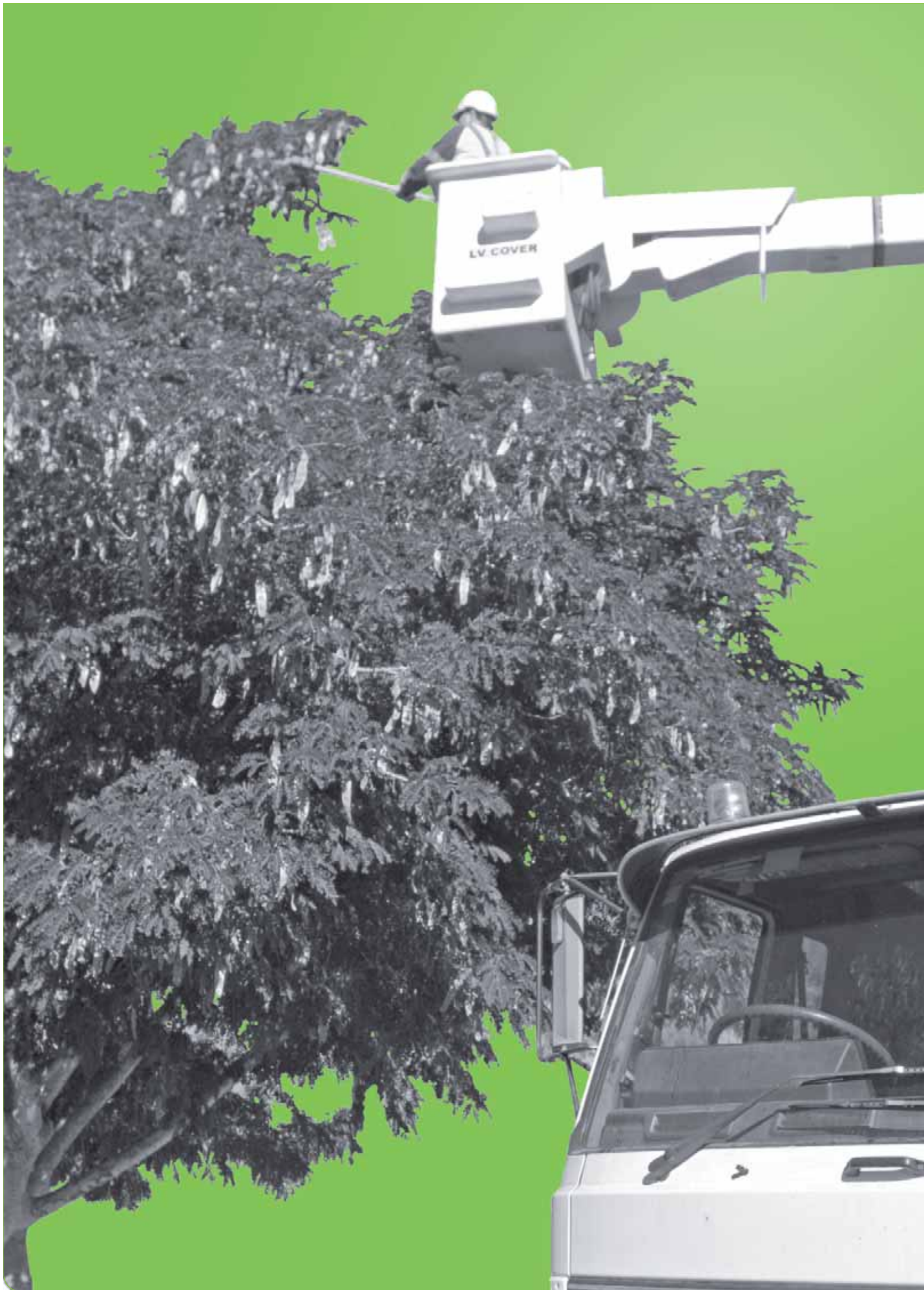


Environment Report 2007







COVER IMAGE
KATHRYN GREEN

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From the Managing Director

Power and Water Corporation remains committed to meeting and, where possible, exceeding our customers' expectations for environmental performance. Our performance is supported by our Integrated Management System, which encompasses environment, quality and occupational health and safety.

As foreshadowed in our 2006 Environment Report, we have now been certified to the Australian Standards for Environment (ISO 14001), Quality (ISO 9001) and Occupational Health and Safety (AS/NZ 4801). The three elements make up our Integrated Management System.

I must pay tribute to the continuing commitment of all our staff to improving our performance. The improvements

are reflected in the surveillance audit reports by our external auditor, SAI-Global. The six-monthly audits have now sampled each of our business units and all of our regions and they have found no instances of non-conformance to the standards.

We continue to highlight the achievements of Territorians who share our concern for the environment. The fifth annual Power and Water Melaleuca Awards for Environmental Excellence, held in June 2007, demonstrate the value Territorians place on the environment and the many ways people are contributing to our shared objective of caring for the environment.



A handwritten signature in white ink that reads "Andrew Macrides".

Andrew Macrides
MANAGING DIRECTOR

1. Introduction

The Power and Water Corporation is one of the largest businesses in the Northern Territory, with assets of more than \$1.2 billion. It employs about 750 Territorians to service over 70,000 customers. The Corporation entered its fifth year as a commercially focused entity on 1 July 2006.

We have set out our corporate values and environmental commitments in successive public environment reports since 1999.

This report provides information on corporate governance, performance in relation to our environmental objectives, and compliance with our statutory obligations.

Our Environment – the Territory Context

The Corporation is committed to achieving community recognition as a clean and green provider of sustainable power, water and sewerage services. We also recognise that, no matter where we are in the Northern Territory, we are in our own backyard and have a responsibility to keep it clean.

We want to keep our air clean and clear. We want to ensure that our waterways and aquifers remain unpolluted, and that we do not contaminate our lands.

We want to enhance the biodiversity values of land and water that we manage, and to protect those ecosystems or plants and animals that may be vulnerable or endangered.

Lastly, we want to ensure that we maximise the efficient use of fossil fuels while seeking renewable and sustainable long-term alternatives.

Detailed information on Power and Water's operational environment is available on our website at www.powerwater.com.au.

It highlights the areas of environmental risk we are focused on managing at each facility through our Integrated Management System (IMS).



Integrated Management System

Power and Water has integrated its management systems to meet international and Australian standards for quality, environment and occupational health and safety. We have now achieved formal certification from SAI-Global for our Environment (ISO 14001), Occupational Health and Safety (AS/NZ 4801), and Quality (ISO 9001) components of our IMS.

Since certification, two six-monthly surveillance audits by SAI-Global have now sampled each of our business units and all of our regions, and no non-conformances to the standards have been identified.

Sound corporate governance and the commitment of the Board and senior management are pivotal to the success of the IMS. We will:

- maintain a register of legal and statutory obligations;
- communicate our Integrated Management Policy;
- implement our Integrated Management System;
- actively manage environmental risks;
- sponsor activities with positive environmental outcomes;
- facilitate interactions between the Board and senior managers through representation on the Environment Committee, a Board subcommittee dedicated to environmental matters; and
- report regularly to the Board on progress.

Our Environmental Objectives

As part of continuously improving our environmental management we have refocused our environmental objectives and targets to more clearly measure our performance.

We have adopted three main strategic objectives as the starting point for our environmental performance:

- 100 per cent compliance with our legal and statutory obligations;
- zero environmental incidents causing environmental harm and operating within licence conditions; and
- zero extreme environmental risks at any Power and Water facility.

We use a number of tools to ensure that we comply with our legal and statutory obligations. Some of these are:

- **Legal Register**
We maintain a legal register that sets out in detail the regulatory requirements that apply to our business activities;
- **Australian Standards**
We have a large number of liquid fuel and chemical storages, and we review them annually to ensure we comply with Australian Standards such as AS1940 - 2004: storage and handling of flammable and combustible liquid; and

We aim to achieve zero incidents through identifying potential risks to the environment before commencing a job.

- **Codes of Practice**

We are a signatory to the Energy Supply Association of Australia (ESAA) Code of Environmental Practice. This means we must audit our compliance every two years. We are able to self-audit because we have a certified Environmental Management System in place. We conducted an internal audit in October 2006 and provided the results to ESAA.

We are also a member of the Greenhouse Challenge Plus program and a participant in the Generator Efficiency Program. The Australian Government Department of the Environment and Water Resources runs both programs, and we provide annual progress reports.

We aim to achieve zero incidents through identifying potential risks to the environment before commencing a job, promoting awareness of potential impacts on the environment, and by establishing a program of reporting environmental hazards.

All environmental incidents that cause or have the potential to cause environmental harm are reported to the NT Environment Protection Agency within 24 hours.

Our achievements in complying with our statutory obligations and responding to environmental incidents are detailed in the **Compliance** section.

Environmental Risk Management

Risk management is the key to ensuring we meet our objectives, given that Power and Water operates over 250 substantive facilities in more than a dozen major and

minor centres and 80 remote communities to service our customers across the breadth of the Northern Territory.

We use the Australian Standard AS/NZS 4360:2004: Risk Management as a guide for environmental risk assessment and management.

Strategic environmental risks are incorporated in a Corporation-wide risk register. Senior management and Board members review the register annually. We have formulated and implemented strategic risk management plans for two environmental risks with the potential for extreme impacts:

- distribution of electricity; and
- treatment of wastewater.

We are continuing to develop operational environmental risk registers for our high priority facilities. We have developed process maps for each facility to document all environmentally relevant activities, evaluate associated environmental impacts and generate facility-specific risk registers. The risk registers contain inherent and residual risks as well as actual and potential controls.

The risk registers are used to create annual environment action plans to manage the risks.

We have already established registers for our most significant facilities such as the wastewater treatment plants in Darwin and Alice Springs (eg Ludmilla Wastewater Treatment Plant) and major power stations (eg Channel Island power station).

This has now been extended to cover water and wastewater systems and power stations in Katherine and Tennant Creek.

2. Performance and Initiatives

Power and Water has a range of initiatives that work together to reduce the overall risk of our operations, as well as specific risk treatments for priority facilities. The Key Performance Indicators (KPIs) are summarised in Appendix 1.

Power Generation

Greenhouse Challenge Plus and Generator Efficiency Program

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 a voluntary initiative to encourage more efficient use of fossil fuels in electricity generation.

The Australian Greenhouse Office (AGO) has approved an action plan for Channel Island and Ron Goodin power stations, and specific operational efficiency targets for emissions have been set for both power stations.

	Target	2005 Achievement	2006 Achievement
Channel Island	< 672kg of CO ₂ per MWh at 60% of full load	570kg of CO ₂ per MWh at 60% of full load	596k of CO ₂ per MWh at 82% of full load
Ron Goodin	< 1051kg of CO ₂ per MWh at 50% of full load	692kg of CO ₂ per MWh at 50% of full load	661kg of CO ₂ per MWh at 88% of full load

Table 1: Operational efficiency targets and achievements, Channel Island and Ron Goodin power stations

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

Base load gas-powered generators recently installed at Ron Goodin power station (Alice Springs) and Tennant Creek power station have further improved greenhouse efficiencies.

Channel Island power station uses gas turbines and a mix of technologies, such as combined cycle steam generation and ice-cooled air intake, to achieve efficient operation.

A new gas-fired power station at Weddell near Palmerston is being constructed to meet growth in demand on the Darwin – Katherine interconnected network. The new units are expected to be about 34 per cent efficient compared with 27 per cent efficiency of the Channel Island open cycle gas turbines, and use of the new units will increase the overall efficiency of electricity generation.

Planning to relocate two gas turbines from Ron Goodin Power Station is well advanced. A new site will be developed at Brewer Estate, about 12 km south of Alice Springs. The relocation is in response to community concerns about noise from the gas turbines.

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 NOX emissions reflect this. The other stations use a mix of gas and diesel [KPI 2].

The increased use of gas at Tennant Creek and Alice Springs has led to a marked reduction in annual emissions from those power stations in recent years.

KPI 3 shows the emissions of sulfur dioxide (SO₂) per GWh sent out. The increased use of gas continues to reduce SO₂ emissions at Tennant Creek.

KPI 4 shows particle emissions (PM₁₀) from the major power stations. The increased use of gas is reflected in the continuing downward trend in recent years, particularly at Tennant Creek.

KPI 5 shows emissions of carbon monoxide (CO) per GWh sent out at major NT power stations. There is a continued downward trend at Tennant Creek and Ron Goodin.

KPI 6 shows the water consumption at Channel Island power station. In 2005-06 water was sometimes passed through the cooling tower recirculated water system once only. Changes to water management have significantly improved consumption in 2006-07.

Risk Reduction Initiatives

Fuel storage bunds have been significantly upgraded at Channel Island, Berrimah and Tennant Creek power stations to minimise the risk of pollution incidents.

Planning has started to reconfigure diesel storage and install ducted pipework at Yulara Power Station to reduce the risk of in-ground leaks.

Caustic and acid storage facilities at Channel Island power station have been separated and banded, and ducted pipework has been installed so chemicals for cooling water treatment can be distributed securely.

The fuel and chemical storage bunding program to reduce the risks of spills at remote communities is continuing. Storages at Elcho Island power station and barge landing were upgraded to meet the requirements of AS1940-2004: storage and handling of flammable and combustible liquids.

A new flood-proof power station is being constructed at Pigeon Hole community on the Victoria River. This will avoid the risk of spills affecting the river and provide certainty of supply during the wet season.

The trial of engine sump oil re-burning equipment in remote power stations has been suspended, pending the clarification of the Australian Government's automotive fuel standards legislation and its relevance to stationary engines.

So far this program has avoided the need to transport more than 100,000L of waste oil back to major centres for disposal each year.

Planning is well advanced to link the community of Jilkminggan near Mataranka into the Darwin – Katherine grid. This will allow the diesel fired power station to be decommissioned.

Renewable Energy

Power and Water uses a range of measures to meet the Territory's proportion of the Australian Government Mandated Renewable Energy Target (MRET). The measures include the purchase of Renewable Energy Certificates (RECs) from customers who install solar hot water systems in their homes.

Our target for RECs in 2006 was 27,960. The renewable energy certificate target is a calendar year target (ie as at 31 December 2006) rather than a financial year target. The Corporation was able to exceed the 2006 target with a total of 35,568 RECs either purchased or created by our investment in solar panels [KPI 7].

We will most likely be unable to meet our future MRET obligations from existing sources and will need to develop additional sources of RECs. The Corporation has developed a Renewable Energy Roadmap that identifies goals, options and risks. A recommended action plan has been developed for achieving the renewable energy objectives in the most

effective and cost-efficient way. The recommendations have been developed through extensive research and industry consultation.

Some future sources of RECs include:

- Solar concentrator dishes at additional remote communities installed by an independent power producer. Power and Water purchases the electricity and integrates the solar power outputs with the existing diesel systems.
- Electricity generated by a private provider from methane gas at the Shoal Bay Landfill in Darwin. Power and Water purchases the electricity.
- Biodiesel in remote community power stations. A trial of biodiesel at Daly Waters Power Station is complete. Power and Water uses more than 30 million litres of automotive diesel each year, and there are potential RECs available by substituting biodiesel for automotive diesel.
- Electricity generated by a private provider from methane gas at the Shoal Bay Landfill in Darwin. Power and Water purchases the electricity.
- A possible wind project at Tennant Creek with smaller wind projects across the Barkly Tableland.

Water and Wastewater

Darwin River Dam

The Darwin River Dam and Manton Dam catchments cover an area of 28,578ha. Darwin River Dam is the Northern Territory's largest body of permanent fresh water at about 4,355ha, and is the main surface water supply for the greater Darwin area.

Power and Water manages the catchment with the main aim of protecting the quality and yield of drinking water. By addressing the key environmental issues that affect ecosystem health, we can maintain and enhance the high biodiversity and conservation values of the catchment. The catchment is home to a number of near-threatened and vulnerable species.

Studies have indicated that raising the main dam embankment and spillway by 1.3m would increase capacity by about 25 per cent. The project would also increase the area under water when the dam is full, which has implications for flora and fauna. The inundation zone would increase by 1,100ha from 4,000ha to 5,100ha. The effects would be transient and would depend on the pattern of late wet season rainfall.

Two major studies are being undertaken on the effects of inundation. Early results from the first study, on the biodiversity effects, indicate that threatened and endangered animals will not be affected and that animals will most likely move laterally from the area. Two jungle patches are likely to expand over a decade as the increased inundation takes effect.

The other major study is on the heritage and archaeological values of the catchment. In addition to a long history of Indigenous use, the catchment was traversed by the old North Australian Railway and the Overland Telegraph Line. Although disturbed by scavenging, there may be sufficient heritage material to warrant an interpretive centre at the dam's day visitor area.

Two pest plant species pose a risk to the dam. One, *Cabomba caroliniana*, is downstream of the dam in Darwin River. The efforts of a joint Northern Territory Government taskforce have considerably reduced the risk of spread of Cabomba to the dam.

The second weed is Olive Hymenachne, a Weed of National Significance. It has been found in one of the creeks that feed into Darwin River Dam. Hymenachne is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spreading and economic and environmental impacts. The Weeds Division of the Department of Natural Resources, Environment and the Arts (NRETA) has provided assistance. Spraying appears to have contained the initial infestation, but further control measures are likely to be required.

In late January 2007 a temporary boom fence was installed across the creek to reduce the movement of plant parts and seeds downstream to other parts of the dam. Flooding associated with Cyclone Monica in March 2007 damaged the boom, so a program of spraying the weed with approved herbicide was introduced. This will mean staff or contractors do not need to enter water, which crocodiles are known to inhabit. Controlling and removing this weed will be a major undertaking at considerable cost.

Recycled Water Project, Alice Springs

Power and Water has committed \$10.4 million to an innovative water recycling project, the Water Reuse in the Alice Scheme. The project will support the establishment of a significant horticultural development next to the Arid Zone Research Institute (AZRI), 8 km 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 the water through ponds to underground storage so it can be retrieved and used later. The infiltration process, called Soil Aquifer Treatment (SAT), further improves water quality.

We are working with the Northern Territory Environment Protection Agency program and NRETA to progress a number of environmental risk control measures. These will be implemented through design, planning, licences and environmental management plans.

The treatment plant is currently nearing completion and will become operational during the summer of 2007-08.

More information about this project is at http://www.powerwater.com.au/powerwater/aboutus/water_reuse.htm

Wastewater Treatment

Power and Water provides water and sewerage services to more than 93,000 people in Darwin and Palmerston, the two major urban centres on Darwin Harbour. Treated wastewater is discharged into Darwin Harbour from facilities at Larrakeyah, Leanyer, Ludmilla, Berrimah and Palmerston.

We are working with Charles Darwin University (CDU) to use hydrodynamic modelling to map the transport and fate of nutrients from the discharges.

Two major projects are in the planning stages to reduce the potential impacts on Darwin Harbour:

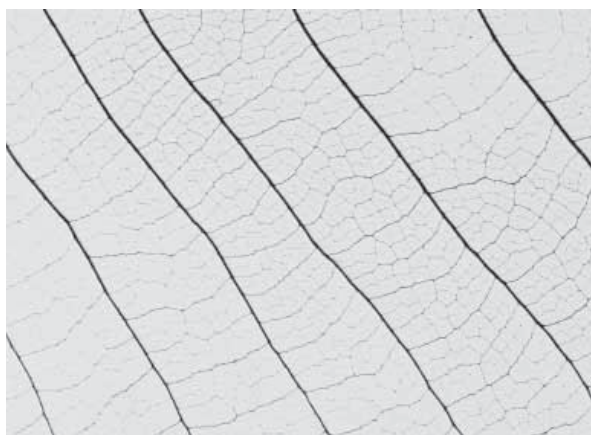
- closure of the Larrakeyah Macerator and Outfall; and
- extension of the Ludmilla Treatment Plant's East Point outfall to a deepwater location.

NRETA is currently developing a water quality protection plan for Darwin Harbour. The work includes a detailed review of water quality objectives for Darwin Harbour and is likely to have a significant impact on Power and Water's future treated wastewater discharge water quality targets.

Power and Water is undertaking some infrastructure development in the short term, but a longer term strategy needs to be developed in conjunction with the community to support ongoing improvements to wastewater treatment and disposal. We will undertake a thorough review of our Darwin region sewerage system operations over the next two years to align with relevant economic, environmental and social objectives.

To support this review, Power and Water is working collaboratively with NRETA and experts in the fields of engineering and science to undertake a number of studies related to the Darwin Harbour environment, and the impact of discharge of treated wastewater by Power and Water.

Information on compliance with our Waste Discharge Licences is contained in Section 3, **Compliance**.



Managing Trade Waste

Power and Water started to implement a Trade Waste Management System (TWMS) across the Northern Territory in January 2002. Since then, more than 700 businesses have been identified that discharge trade waste to the sewer.

The Trade Waste group is focusing on working with non-compliant businesses, which are mostly located in smaller centres outside Darwin.

Customers connected to high maintenance areas of the sewerage system have been targeted to ensure they have working pre-treatment equipment and that it is maintained regularly. This has reduced the number of line blockages and sewer maintenance schedules have been extended from six weeks to 13 weeks or more.

A trade waste pre-treatment pond has been constructed at the Palmerston Waste Stabilisation Ponds to reduce the risk of noxious trade waste affecting the treatment process in the main pond system. The performance of the pre-treatment pond will be monitored. Further development may be required.

Efficiencies in Water Supply and Wastewater Systems

Power and Water uses hydraulic pumping efficiency studies to optimise management and maintenance of assets; reducing energy use.

Losses of potable water are tracked down using sophisticated leak detection technology in mobile units and losses for 2006-07 were 4,744ML compared to 6,617ML in 2005-06.

Information on water losses, treated water re-use and greenhouse emissions is at **KPI 8**.



Power Networks

Large Transformers across the Northern Territory

In 2004 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. The review was done to ensure we comply with the Australian Standards and Northern Territory environmental legislation for the safe containment of oil.

We developed a three-year plan due to be completed in 2008. Design work is largely completed for all sites requiring upgrades. Construction is in progress for two zone substations at Cox Peninsula (Darwin Harbour), with sites at Weddell (near Palmerston), Humpty Doo and McMinns (intersection of Stuart and Arnhem highways) to follow in 2007-08.

A number of transformers containing large volumes of oil (10,000L to 20,000L) are stored at the Ben Hammond Complex in Darwin. A future redevelopment of the complex includes implementing the Energy Supply Association of Australia (ESAA) guideline for the containment of transformer oil.

Electricity Supply and Distribution

The transmission and distribution of electricity always incurs losses and losses of the Darwin – Katherine, Tennant Creek and Alice Springs grids are at **KPI 9**.

A new powerline and zone substation is nearing completion near Batchelor to service the Compass Resources mining project. The work involves constructing a 132kV link to the zone substation, underground 22kV lines through Batchelor township and aerial conductors to the mine site.

Power and Water is investigating ways to link some of our remote communities by 22kV powerlines and decommissioning the smaller power stations. Planning is underway to link Jilkminggan (near Mataranka) to the Darwin – Katherine Grid and completion is expected by October 2007. This will allow the diesel power station to be decommissioned.

Undergrounding of Powerlines

Undergrounding powerlines in the Top End ensures reliability of supply, given the high risk of thunderstorms and cyclones to overhead systems. It also minimises the need to manage vegetation, 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.

Power and Water uses a range of measures to meet the Territory's proportion of the Australian Government Mandated Renewable Energy Target (MRET).

In 2006-07 we completed undergrounding power to the second half of Nightcliff (369 properties) and in 2007-08, we will complete the electrical works for the first half of Rapid Creek (341 properties).

Currently we have 2,370 km of our 8,108 km transmission and distribution networks underground, or 29 per cent. This is the same percentage as 2005-06 despite the Nightcliff undergrounding project and is due to the extension of high voltage overhead lines to service rural areas. The undergrounding of such lines is only economically feasible in urban areas.

The growth in underground lines will increase in 2007-08 as we progress the Darwin undergrounding project and as new suburban estates are developed in the Palmerston area [KPI 10].

Environmental Excellence Awards

The annual awards, known as the Melaleuca Awards, acknowledge and encourage achievement in environmental excellence, as well as promoting environmental messages. As part of the awards each year, well-known Territorians ranging from politicians to media personalities participate in a Celebrity Lighten Up Challenge.

Winners of the fifth annual Melaleuca Awards were announced in June this year at a function in Parliament House.



SOME OF THE 2007 MELALEUCA AWARD WINNERS

Category	Winner
Community	Katherine Town Council – Water saving devices at Katherine Sportsground and Aquatic Centre
Commercial/Industry	Casuarina Square – reducing cardboard waste Highly commended: Imparja TV program Yamba's Playtime
Small Business	Eco Options – providing environmentally friendly household and building products
Schools	Pularumpi School – saving water through a new irrigation system
Environmental Grants	COOLmob – conducting home sustainability audits Desert Knowledge Australia COOLmob – developing an eco-footprint calculator suitable for Alice Springs Millner Primary School –installing a water conservation system Our Lady of the Sacred Heart College, Year 7 –planting trees at Hamilton Downs Station on the Year 7 school camp
Chairman's Award	Katherine High School, Intensive Learning Unit –students with special needs have created a garden to showcase their abilities.

3. Compliance

Legislation

Power and Water maintains a legal register of all environmental legislation that relates to its activities. A list of the most relevant legislation is at Appendix 2.

The main pieces of legislation 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 prescribes a number of environmental offences, and requires that pollution incidents be reported to the Environment Protection Agency 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 referral of major new projects by Power and Water to the Environment Protection Agency for assessment. No formal assessments were required in 2006-07.
- **Planning Act** – approvals are required for certain land uses in areas regulated by the Development Consent Authority. Approvals were gained for the major upgrade of the Ben Hammond Complex, and for the Alice Springs Recycled Water Project SAT ponds (see Water and Wastewater section).
- **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 in 2006-07.

- **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 (NRETA) and passed on to the Australian Government for inclusion on a national database.

The 2006-07 National Pollutant Inventory report is due to be delivered to the Australian Government Department of Environment and Heritage and the NT Environment Protection Agency before 30 September 2007. The report places information about Power and Water's emissions of certain substances to land, air and water in the public domain via an Australian Government website.

The database is accessible at <http://www.nreta.nt.gov.au/whatwedo/waste/inventory.html> and www.npi.gov.au.

Licences

The Department of Natural Resources, Environment and the Arts administers the *Water Act*.

Power and Water is required to hold water extraction licences under the *Water Act* to produce potable supplies. In 2006-07 we extracted 66 per cent of the allowable volume, up from 64 per cent in 2005-06 and down from 67 per cent in 2004-05.

Power and Water treats sewage throughout the Northern Territory using mostly pond treatment technology that consists of a series of open ponds that use complex, diverse and interrelated natural processes. Other treatment processes include chemically assisted sedimentation, dissolved air flotation, microfiltration and activated sludge.



The *Water Act* prohibits the pollution of water but allows for authorised waste discharge. The authorisation takes the form of a waste discharge licence that regulates the quantity and quality of wastewater discharged to receiving waters in the Northern Territory for which environmental values (beneficial uses) have been formally declared. The licence also provides consideration for reduction in volume, water recycling and treatment.

Besides setting treated wastewater discharge quality requirements, the new licences also set performance targets related to asset management. Power and Water has developed a program of works to provide improvements to its sewerage operations during the life of the existing licences. The works are identified in our 2007/08 Statement of Corporate Intent, and have a total cost of approximately \$35 million over the next 4 years.

The Controller of Water Resources has issued the following licences to the Power and Water Corporation:

Location	Licence number	Expiry date
Berrimah	WDL 146	31 October 2011
Katherine	WDL 151	31 October 2011
Larrakeyah	WDL 149	31 October 2011
Leanyer/Sanderson	WDL 147	31 October 2011
Ludmilla	WDL 150	31 October 2011
Palmerston	WDL 148	31 October 2011
Alice Springs	WDL 139	31 December 2007

Our other facilities at Adelaide River, Batchelor, Borroloola, Humpty Doo, Kings Canyon, Pine Creek, Tennant Creek and Yulara do not require a licence as they either discharge into an area that has not had environmental values (beneficial uses) declared or no wastewater is discharged off the site because of large storage capacity and high evaporation rates. Where there is remaining water it is irrigated to land on the site.

Waste Discharge Licences prescribe quantitative discharge limits for several measurements including dry and wet weather flow, pH, biochemical oxygen demand (BOD), suspended solids, *Escherichia coli* (*E.coli*), total nitrogen, free ammonia and total phosphorus. These indicators measure the strength of the discharge and predict the possible impacts the discharge may cause to receiving waters.

Table 2 provides a summary of our compliance against our Waste Discharge Licences for each measurement at each location. Not all of our discharges complied with all the quantitative discharge limits for several reasons.

Firstly, our new waste discharge licences recently issued in October 2006 contained, for the first time, quantitative discharge limits. This means that there has been a transition period during which we are fine-tuning our treatment processes, monitoring programs and reporting protocols, and improving the reliability of our flow measurements.

Secondly, an external contractor engaged to collect our samples did not collect all scheduled samples. This contract has been voided and samples are now collected by Power and Water officers.

Thirdly, examination of the data suggests that some of the quantitative limits are not appropriately determined and need reviewing.

Power and Water Corporation is also undertaking several other activities to improve sewage treatment performance and to better evaluate the impact of our discharges on receiving waters. These activities include:

- reviewing and implementing the Darwin Sewage Strategy;
- recycling more treated sewage;
- reducing inflow and infiltration to control excess sewage flows;
- implementing our trade waste policy to control the liquid wastes that business may put into our sewers;
- reviewing and developing standard operation procedures and guidelines so that the operators have the tools and knowledge to effectively run our wastewater collection and treatment facilities;
- contributing to Darwin Harbour Regional Plan of Management to protect and enhance freshwater, estuarine and marine water quality of the region; and
- supporting research and development that aims to improve our management of wastewater, water discharges and recycled water.

Table 2: Compliance of Northern Territory sewage discharge with Waste Discharge Licences

Treatment facility	Annual Inflow volume (ML)	Discharge Point	Annual outflow volume (ML)	Dry weather flow	Wet weather flow	Scheduled samples collected	pH	BOD	Suspended solids	E.coli	Total nitrogen	Free ammonium	Total phosphorus
Alice Springs	2,706	Blatherskite Park	568	-	-	Yes	Yes	Yes	Yes	Yes	-	-	-
		Tree Farm	302	-	-	No	Yes	Yes	No	Yes	-	-	-
		EP7	238	-	-	No		No	Yes	Yes	Yes	No	Yes
		EP10	650	-	-	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		B/C	0	-	-	-	-	-	-	-	-	-	-
Berrimah	242	Berrimah	223	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes	
Katherine	817	Katherine River	159	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Larreakeyah	1,405	Larreakeyah	1,405	No	Yes	No	Yes	No	No	No	Yes	Yes	
Leanyer/Sanderson	6,000	Buffalo Creek	5,202	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
		Northlakes Golf Course	248	-	-	No	Yes	-	-	Yes	-	-	-
		Marrara Sports Complex	126	-	-	No	Yes	-	-	Yes	-	-	-
Ludmilla	4,324	East Point	4,080	Yes	Yes	No	Yes	No	No	Yes	No	Yes	
Palmerston	2,514	Palmerston	1,856	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	

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.

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

Our Remote Operations group has a training program in place for Essential Services Operators (ESOs). ESOs are people on the ground in remote communities who are responsible for the day-to-day operation of power, water and sewerage services and managing fuel at remote community power stations. ESO courses include hands-on training in responding to incidents, and 73 participants were trained in 2006-07.

Fuel spill clean-up kits are available at each remote power station, as well as at other strategic locations. We are 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 because of the potential health impacts.

Incident Report Database

Power and Water maintains a database of all environmental incidents that occur as a result of our activities. Staff and external sources report the incidents.

It enables us to identify recurrent problem areas and implement corrective measures.

In line with s14 of the *Waste Management and Pollution Control Act*, we notify the Environment Protection Agency of all spills or overflows, and consult the Department of Health and Community Services about sewage overflow management and clean-up.

Incidents that “generally represent those incidents that have the potential to incur a penalty in line with Environmental Offence Levels 1 through 3” are posted on the EPA Register. Such incidents are deemed to have caused, or the potential to cause, environmental harm.

Power and Water achieved its objective of zero pollution incidents causing environmental harm and no incidents that occurred in 2006-07 were posted on the EPA Register.

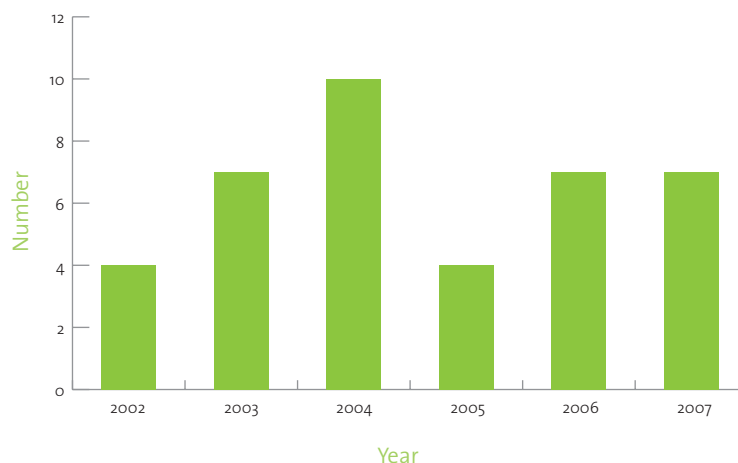
For details go to <http://www.nt.gov.au/nreta/environment/waste/register/incidents.html>

Sewerage System Overflows

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

There were no instances recorded of impacts on human health or the environment as a result of overflows.

FIGURE 1: SEWERAGE SYSTEM OVERFLOWS



Fuel Spills

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

In 2005-06, there were nine minor (500L or less) and two major spills. The two major spills totalled 43,000L.

This compares with 14 minor, one moderate (500L to 1,000L) and two major spills in 2006-07. Of the 14 minor spills, eight were 50L or less.

The two major spills totalled 6,400L:

- A spill of 3,000L of hydraulic oil occurred at Channel Island Power Station in August 2006. The spill was due to human error in failing to isolate a gas turbine oil pump. The oil was fully contained and cleaned up.
- A spill of 3,400L of diesel was discovered at one of Yulara's diesel powered bores in December 2006. The cause was determined to be theft. A bund contained the spill and 3,000L was retrieved for reuse. There was no environmental impact.

The increasing trend in the frequency of hydrocarbon spills is considered to be due to better reporting of smaller spills, particularly hydraulic and lubricating oils.

FIGURE 2: HYDROCARBON SPILLS



Chemical Leaks

There was one incident reported during the year; a minor leak of chlorine gas.

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.

Glossary

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.

Combined cycle: a system where heat recovery steam generators extract energy from the exhaust gases of gas turbines to produce steam. This steam is used to drive a steam turbine to further generate electricity. Recovering heat from the exhaust gas greatly improves the overall efficiency of the power station.

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

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, are 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.

Top End: generally regarded as that area of the Northern Territory north of Mataranka, east to the Gulf of Carpentaria and west to the Joseph Bonaparte Gulf.

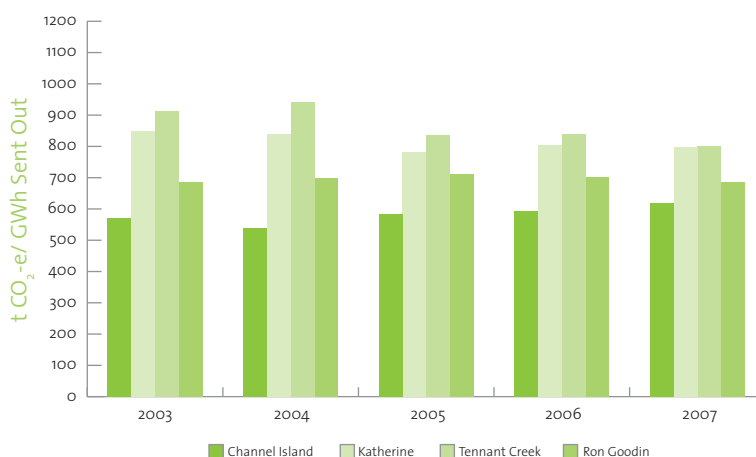
Vulnerable: a classification of the status of rare plants or animals that are vulnerable to extinction.



Appendix 1: Key Performance Indicators

KPI 1 – Greenhouse Gas Efficiencies

GREENHOUSE GAS EFFICIENCIES FOR MAJOR NT POWER STATIONS



In 2006-07 our major power stations in Darwin, Katherine, Tennant Creek and Alice Springs emitted an estimated 869,603 tonnes of CO₂-e, up from 793,850 tonnes in 2005-06. This is due to the current boom in the NT economy. The emissions equate to 635.2 tonnes of CO₂-e per GWh sent out, up from 615.1 tonnes in 2004-05, and is mainly due to the increased use of diesel at Channel Island Power Station because of gas supply difficulties.

The current industry averages for thermal power generation are: overall, 903 tonnes of CO₂-e/GWh sent out; black coal, 944 tonnes; brown coal 1,341 tonnes; and gas, 551 tonnes.

KPI 2 – Oxides of Nitrogen Emissions

EMISSIONS OF NO_x PER GWH SENT OUT, MAJOR NT POWER STATIONS

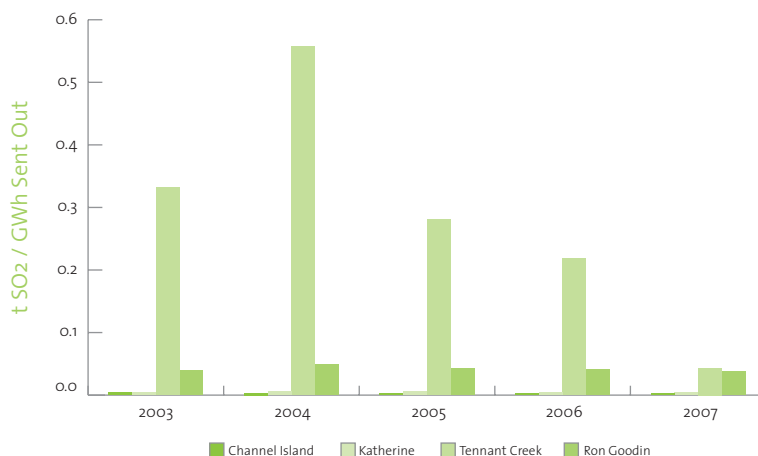


In 2006-07 our major power stations emitted an estimated 3,809 tonnes of NO_x, up from 3,690 tonnes in 2005-06. This equates to 2.78 tonnes of NO_x/GWh sent out, down from 2.86 tonnes in 2005-06.

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; and gas, 1.40 tonnes.

KPI 3 – Sulfur Dioxide Emissions

EMISSIONS OF SO₂ PER GWH SENT OUT, MAJOR NT POWER STATIONS

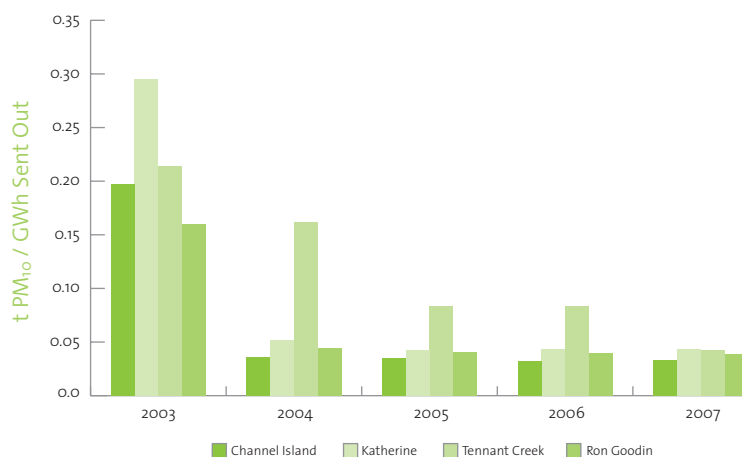


In 2006-07 our major power stations emitted an estimated 11.09 tonnes of SO₂, or 0.008t/GWh sent out. Comparable figures for 2005-06 are 16.41 tonnes and 0.013t/GWh sent out.

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; and gas, 0.034 tonnes.

KPI 4 – Particle Emissions

EMISSIONS OF PM₁₀ PER GWH SENT OUT, MAJOR NT POWER STATIONS

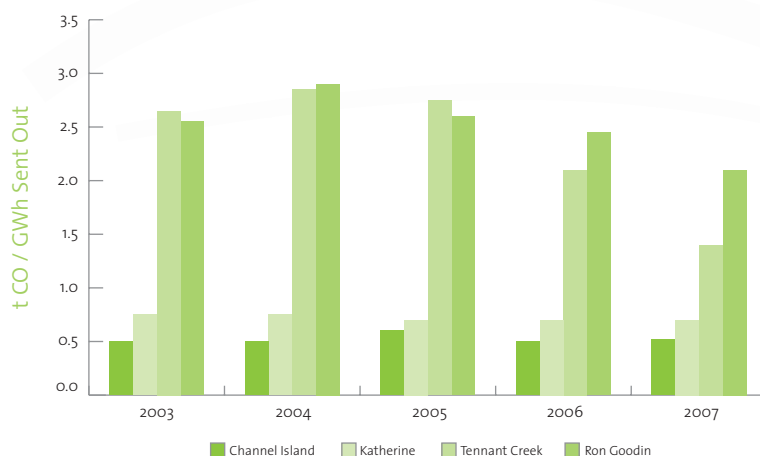


In 2006-07 our major power stations emitted an estimated 47.12 tonnes of PM₁₀, or 0.034t/GWh sent out. Comparable figures for 2005-06 are 44.41 tonnes and 0.034t/GWh sent out.

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; and gas, 0.08 tonnes.

KPI 5 – Carbon Monoxide Emissions

EMISSIONS OF CO PER GWH SENT OUT, MAJOR NT POWER STATIONS



In 2006-07 our major power stations emitted an estimated 1,082 tonnes of CO, or 0.79 tonnes of CO/GWh sent out. Comparable figures for 2005-06 are 1,076 tonnes and 0.83 tonnes of CO/GWh sent out. No industry averages are available for CO.

KPI 6 – Water Usage in Power Generation

In 2006-07 Channel Island Power Station used 646.79ML of potable water as cooling tower makeup on the steam turbine condensing system, down from 1264.26ML in 2005-06. This is equivalent to 0.59/GWh sent out from Channel Island (1.19ML/GWh in 2005-2006), and is a result of improved water management.

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, and gas, 0.65ML.

KPI 7 – Renewable Energy

In the calendar year 2006, Power and Water's target for Renewable Energy Certificates (RECs) was 27,960, up from 21,557 in 2005.

During the year we created 35,568 RECs, leaving 7,608 to be carried over to 2007. 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 8 – Efficient Water Use

In 2006-07 we lost 4,744ML, or about nine per cent of the total potable water supplied. This continues the improving trend compared with 2005-06 (4,933ML) and 2004-05 (6,617ML).

Greenhouse gas emissions from our water and wastewater activities in 2006-07 totalled 19,734 tonnes of CO₂-e, slightly up from 19,665 tonnes in 2005-06. This is equivalent to 0.30 tonnes of CO₂-e/ML of potable water supplied (same as 2004-05), and 0.14 tonnes of CO₂-e/ML of wastewater pumped (down from 0.20 tonnes in 2004-05).

In 2006-07 we reused 1,175ML of treated wastewater, or six per cent of the available volume. Comparable figures for 2005-06 are 1,983ML and 10 per cent. The extended 2006-07 wet season is largely responsible for the reduction.

In 2006-07 we reused 1,175ML of treated wastewater, or six per cent of the available volume.

KPI 9 – Powerline Losses

The Darwin – Katherine, Tennant Creek and Alice Springs transmission and distribution grids lost 171GWh in 2006-07. This is equivalent to 0.0217GWh per circuit kilometre, or 11 per cent overall.

Comparable figures for 2005-06 are 87GWh and 0.0111GWh per km (6%) and for 2004-05 are 159.44GWh and 0.0214GWh per km (10%).

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

KPI 10 – Undergrounding of Powerlines

Currently we have 2,370 km of our 8,108 km transmission and distribution networks underground, or 29 per cent. This is the same percentage as 2005-06 despite the Nightcliff undergrounding project and is due to the growth in high voltage overhead lines to service rural areas. The undergrounding of such lines is only economically feasible in urban areas.

Appendix 2: 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
 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 Corporation 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 also 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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