HYDRO TASMANIA

GREENHOUSE CHALLENGE

PROGRESS REPORT 1999

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Progress Report 1999, Public Statement

COMPANY PROGRESS

Hydro Tasmania is responsible for generating more than half of Australia's renewable electricity. During 1999 Hydro Tasmania generated 9880 GWh of electricity at a greenhouse emission intensity of 2 tonnes CO_2/GWh, compared with the national average for electricity production of more than 910 tonnes CO_2/GWh.

EMISSIONS UPDATE

Estimated greenhouse emissions from Hydro Tasmania's operations in 1999 were 19,550 tonnes carbon dioxide equivalent (CO_2-e). The main sources of these emissions were remote area diesel generation (62%), thermal generation to support the hydro system (22%), and vehicles (8%). A predicted proving run of thermal generation was undertaken (to guarantee electricity supply during critical maintenance on the Poatina hydro power station). This led to an increase above 1998 emission levels of about 3,500 tonnes. The increase was lower than the expected 6,500 tonnes, and substantially below the static efficiency forecast of 123,000 tonnes.

ACTION PLAN PROGRESS

Five of the seven action streams initiated in Hydro Tasmania's Cooperative Agreement in 1997, and that are still part of Hydro Tasmania's responsibilities, were developed further in 1999:

- The King Island Wind Farm saved 1760 tonnes CO_2 in its first full year of operation;
- The Tasmanian wind potential study has progressed into a commitment to commence the first stage of a 130 MW wind farm on Tasmania's west coast;
- A seven-month cloud seeding program was completed in 1999, providing additional water to the hydro system, thereby replacing an estimated 100 GWh of expected thermal generation (and saving 70,000 tonnes CO_2-e). An experimental program and a review of the statistical approach to quantifying the benefits of cloud seeding are planned for 2000.

- Greater hydro system efficiency, made possible by the new generator despatching system (energy management system), further reduced the need for thermal generation during the Poatina outage.
- Identification of opportunities to increase the efficiency of the generation system by activities such as refurbishment has been done after an initial 6-month delay. A report is due in 2000. New investigations commenced into the potential for installing mini-hydro systems in Hydro sites and waterways, with two sites selected for prefeasibility studies.

Two of the streams were not progressed in 1999:

- Hydro Tasmania deferred the energy efficiency stream that commenced with internal energy audits of sites now owned by Aurora Energy. We now intend to revise the 1998 energy management program to focus on Hydro Tasmania properties, and set targets for reducing Hydro Tasmania's internal electricity consumption as part of a major environmental review in 2000.
- A review of the 1998 vehicle fleet study was scoped late in 1999, and the 1999 goal of identifying emission targets and developing business cases based on the revised study's recommendations, has been carried over into 2000.

FORECAST EMISSIONS AND SAVINGS

Hydro Tasmania expects to meet a greenhouse emission target of 16 kt CO_2-e in 2000. Meeting the target will rely on mitigation measures delivering savings of up to 57 kt. Achieving this target will be difficult if the drought conditions experienced in Tasmania during 1999 continue into 2000. 1999 was the driest year on record in most parts of Tasmania.

Emission forecasts beyond 2001 are uncertain as future generation output and emissions will depend on decisions yet to be taken on new developments and opportunities.

Hydro Tasmania remains committed to the Greenhouse Challenge program as part of the program to manage Australia's greenhouse emissions. Beyond 2000 Hydro Tasmania will continue to focus its Greenhouse Challenge activities on the opportunities offered by our renewable energy based system and expertise and opportunities to economically mitigate emissions from our general business operations.

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Section 1 - Management Statement

This Greenhouse Challenge Annual Report for 1999 reports all significant amendments, outstanding commitments and variations from the Hydro-Electric Corporation's original agreement of November 1997 and Annual Report for 1998.

I verify that monitoring and reporting by business activity and by gas type continues to be undertaken and that all the supporting information will be retained and kept available for verification should the Commonwealth request it.

Hydro Tasmania's dams, power stations and water management infrastructure are responsible for generating more than half of Australia's renewable electricity. Hydro Tasmania will continue to focus its Greenhouse Challenge activities on the opportunities offered by our renewable energy based system and expertise. We are determined to efficiently maximise the use of renewable energy sources in supplying electricity in Tasmania, and we will pursue the potential to supply renewable energy to markets outside Tasmania. Whilst doing this we will continue our program to economically mitigate emissions from our general business operations.

Geoff Willis
Chief Executive Officer
Hydro-Electric Corporation

Signature ……

Date ……

Section 2 - Introduction

The Hydro-Electric Corporation signed a Greenhouse Challenge Cooperative Agreement with the Commonwealth in November 1997. Under that Agreement there is a commitment for Hydro Tasmania to report, on an annual basis, greenhouse gas emissions and progress in the implementation of mitigation programs. This report fulfils that commitment for 1999.

Section 3 - Changes in 1999

There were no changes internal to the organisation during 1999 that significantly affected Hydro Tasmania's Greenhouse Challenge activities or responsibilities.
Some external influences arose that will impact on Hydro Tasmania's Greenhouse Challenge performance.

Parliamentary approval of the Commonwealth's mandated renewables greenhouse response measure during 1999 has encouraged the pursuit of further renewable energy opportunities in preference to reliance on fossil fuels for future electricity generation.

1999 was the driest year on record for most parts of Tasmania. Drought conditions decrease the capability of the hydro system to produce and store renewable energy, therefore increasing the likelihood of thermal generation in the near future.

Section 4 - Emissions Inventory Update

Greenhouse gas emissions from the activities of Hydro Tasmania in 1999 are shown in Figure 4.1 below. Emission estimates for 1990 and 1996 are also presented, as is a forecast for 2000. Last year's forecasted values for 1999 are provided for reference.

Table 4.1: 1999 Greenhouse gas emissions inventory (tCO2-e).

	'Old' Hydro[2]		'New' Hydro		
Emission Sources	**1990**	**1996**	**1999**	**1999**	**2000**
			Forecast	**Actual**	*Forecast*
Hydro Power Stations	0	0	*0*	**0**	*0*
HEC Energy Use	2,277[1]	0	*6*[1]	**3**[1]	*0*
Bell Bay Power Station	536,250	0	*6,533*	**4356**	*0*
Diesel stations	10,370	13,128	*12,184*	**12,061**	*12,600*
Vehicle Fleet	12,140	7,131	*1,800*	**1,573**	*1,673*
Taxis/Hire cars [2.]	*100*	*156*	*80*	**60**	*61*
Aircraft Hire	*60*	*59*	*44*	**68**	*140*
HFCs in Air-conditioning	*324*	*338*	*228*	***153***	*153*
SF_6 in switchgear	837	935	*1,081*	***1081***	*1081*
Disposal of Oil	346	*415*	*100*	***200***	*200*
Net emissions CO_2-e	**583,198**	**22,162**	***22,050***	**19,552**	***15,908***
Unit emissions (tCO_2-e/GWh)	64.65	2.44	*2.27*	**2.0**	*1.60*

NOTES TO THE TABLE
1. This figure is not included in the total to avoid double counting of thermal generation .
2. 'Old Hydro' refers to the fully integrated electricity business that existed before July 1998, when the Hydro was responsible for electricity generation, transmission, distribution and retail. 'New Hydro' refers to the current company that retains the generation and consultancy functions.
3. Figures in Italics are approximations.

4.1 Trends in Emission Inventory

The inventory table (Table 4.1) shows:

- the significant impact of thermal generation (Bell Bay Power Station) on annual emission levels (1990 and 1999);
- the 1999 actual total emissions figure of 19,552 tonnes is significantly lower than the 22,050 tonnes forecast last year, mainly because less thermal generation was required than expected; and
- the first full year of operation of the King Island wind farm led to lower emission totals for the diesel power stations, despite 2% growth in the electricity load on the island. The wind farm reduced emissions by 1760 tCO_2-e in 1999, some 240 tonnes less than forecast.

4.2 Changes in Measurement of Inventory

There have been no significant changes to the methodology of emission measurement since those described in the 1998 Annual Report.

Section 5 - Emission Forecast Revision

Emission forecasts for Hydro Tasmania beyond 2001 remain uncertain. Future generation output and emissions will vary on the basis of opportunities such as the mandated renewables initiative contained in the National Greenhouse Strategy and new developments (eg Basslink, energy trading and the introduction of natural gas to Tasmania). The emission forecast from 1999 is predicated on the present 'business as usual' scenario of no Basslink, no Natural Gas, no energy trading – as it has been assumed in previous forecasts of emissions– with thermal generation from the Bell Bay Power Station supplementing the hydro system.

It is worth noting here that it is difficult to forecast energy and emissions because of the inherent variability of annual rainfall, upon which hydro generating capacity is fully dependent.

The emissions forecasts made in 1998 and 1999, showing the trends 'with measures' and under the 'static efficiency' scenario, are shown in Figures 5.1 and 5.2.

The sharp increase in emissions for 1999 on the 'static efficiency' trend exists because the Bell Bay thermal power station was to be operated to meet demand during the outage of Poatina hydro power station. Bell Bay station did generate in 1999, but only as a proving run, producing far less emissions than shown by the 'static efficiency' projection. The measures that reduced the level of thermal generation are the new energy management system and the cloud seeding program, both of which work by increasing hydro system efficiency, thereby deferring thermal generation.

Figure 5.1: Hydro Greenhouse Gas Emissions Record and Projections (end of 1998)

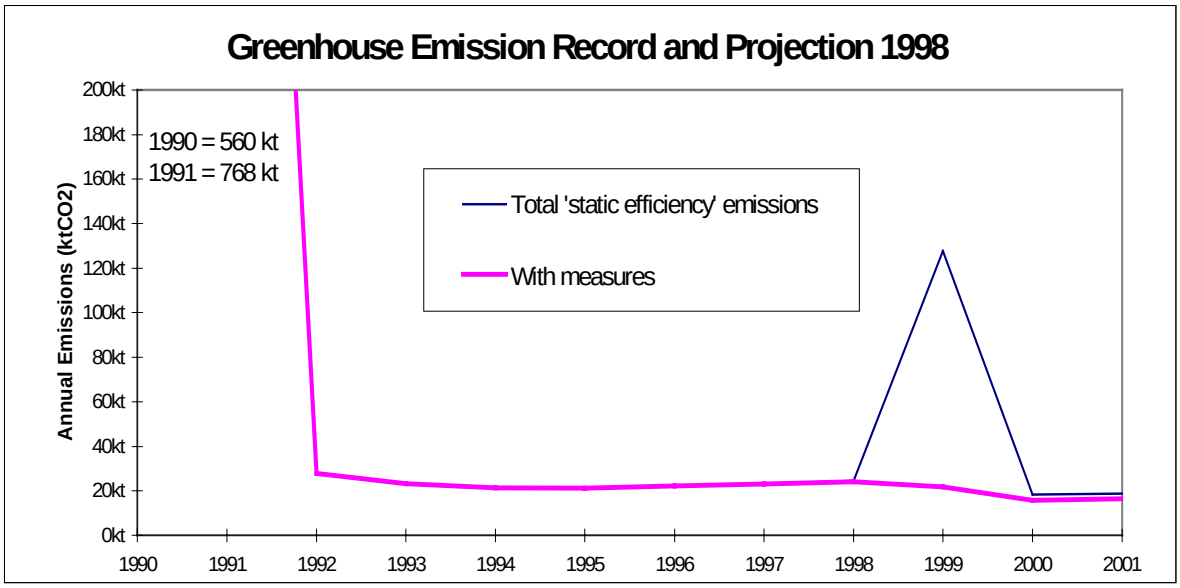
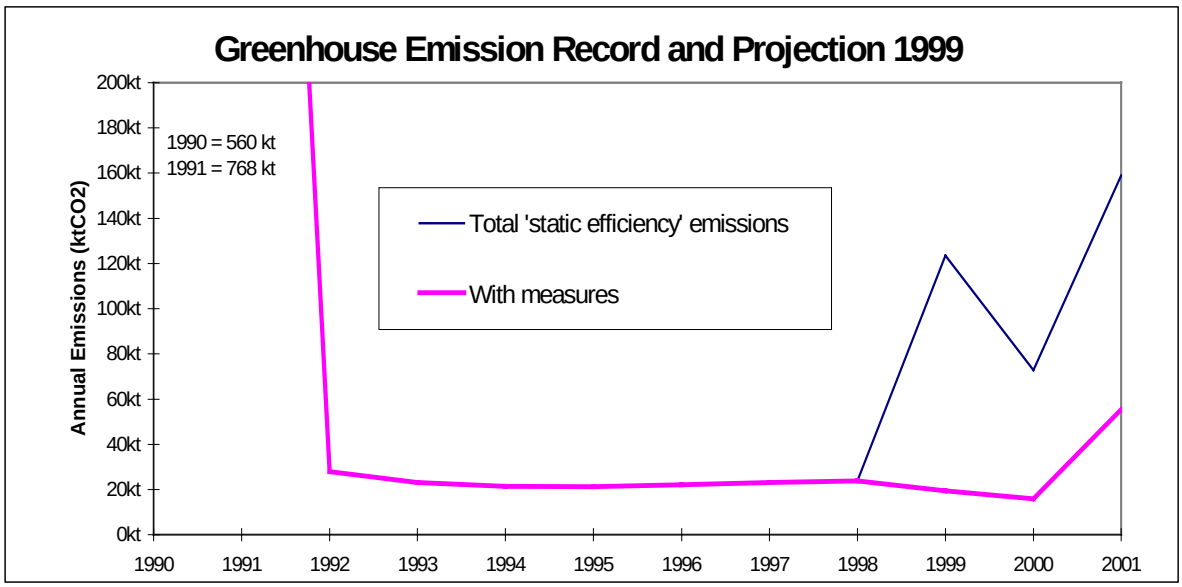


Figure 5.2: Hydro Greenhouse Gas Emissions Record and Projections (end of 1999)



There are three differences between the 1998 and 1999 forecasts:

1. There is a 2.5 kt difference between the forecast and actual estimates of emission savings for 1999. The difference is because there was less thermal generation than expected, even compared to the 1998 'with measures' trend.
2. The 'static efficiency' emissions forecast is now higher for 2000, reflecting a decrease in hydro system production because of drought conditions in Tasmania since 1998. Drought conditions lead to an earlier requirement for thermal generation as hydro storages become depleted.
3. An increase in the emission trend is forecast, even with current measures, around 2001, because the thermal requirement is expected to exceed the benefits of actions that are designed to replace thermal electricity.

Section 6 - Program Performance

6.1 Summary of Abatement Achievements in 1999

Table 6.1 shows predicted and estimated actual emission savings from Greenhouse Challenge activities during 1999. These figures should be viewed in the context of Hydro annual total emissions in 1999 being 19.5 kt.

Table 6.1: Emission savings and targets for 1999 and targets for 2000 (ktCO2-e).

Greenhouse Mitigation Action	Actual savings 1999	Target savings 1999	New target savings 2000	Ultimate[2] potential savings
King Island Wind Farm[1]	**1.76**	**up to 2**	**up to 2**	**up to 2**
Energy Management System [1]	***34***[3]	**0**	***34***[4]	***34***
Cloud Seeding [1]	***69***[3]	**0**	***23***[4]	**up to 98**
Generation System Efficiencies [1]	**0**	**0**	**0**	***66***
Wind Development[1]	**0**	**0**	**0**	**23**[5]
Hydro Vehicle Fleet Study	**0**	**0**	**0**	**0.3**
Internal Energy Management [1]	**0**	**0**	**0**	**0.5**
SF_6 Management Procedure	**0**	**0**	**unmeasured**	**0.7**
TOTAL	About 105	Up to 2	57	224

NOTE: Figures in italics are approximations.

Differences between expected and realised greenhouse emission savings (Notes to Table 6.1):

1. Emission savings from these programs are realised only when thermal generation would otherwise have been used.
2. In time, and if future load is met by thermal generation, there will be an 'ultimate' year in which thermal generation could be being replaced to the full potential of all these actions.
3. Actual emission savings were achieved because Bell Bay thermal power station operated to supplement Poatina outage.
4. Emission saving potential is limited by the expected amount of thermal generation under a 'static efficiency' scenario. In 2000 'static efficiency' Bell Bay thermal generation would have emitted 55 tCO_2-e.
5. Assumes 10 MW installed wind capacity. Under appropriate conditions 130 MW could be installed.

6.2 Changes to Predicted Performance

The following table (Figure 6.2) shows the new predicted emissions picture for 2000, compared to the 1997 and 1998 scenarios for 2000.

Table 6.2: Comparison of progressive estimates of 'Year 2000 emissions (ktCO2-e).

Year 2000 emissions	1997 estimate for year 2000	1998 estimate for year 2000	1999 estimate for year 2000
'Static' emissions	101	17.8	73
With measures	22	15.4	15.9
Savings in emissions	79	2.4	57

Table 6.2 shows once again the influence of thermal generation on Hydro Tasmania's target emission levels. The likelihood of requiring thermal generation in 2000 has increased as discussed in Section 5.

The estimated emission level for 2000, with measures, has increased by 0.5 kt CO_2-e since 1998. The causes for this are:

1. total savings from King Island wind farm during 1999 were 300 tonnes less than expected, and the lower 1999 result has been used to estimate the 2000 benefit; and
2. the deferment of the vehicle fleet study has delayed saving an anticipated 200 tonnes of emissions.

Table 6.3 Record and status of 1998 and 1999 Action Plans

Greenhouse Mitigation Action	Date Complete	Target completion date	Comment
King Island Wind Farm	1998		Operation continues.
Tasmanian Wind Potential Study	1998		
Cloud Seeding Business case	1998		Complete and approved
Energy Management System	1998		Installed and under testing.
Generation System Efficiencies		2000	Delayed to accommodate critical work on Poatina P.S.
Internal Energy Management Study	1998		2 site audits completed, 1998
Vehicle Fleet Management Study	1998		Report and cost/benefit analysis completed 1998.
Wind Strategy Development	Continuing	Ongoing	Phase 2 of wind study (refining resource) commenced 1999. New wind atlas to be completed. Renewable energy strategy approved by Board, 1999
Cloud seeding (provide support for Poatina outage)	1999		
Cloud seeding experimental program	Commenced but deferred	2001	Gauges installed, experiment deferred to allow full time seeding for Poatina outage.
Generation System Efficiencies	Continuing	2000	Studies of options undertaken, 1999. Report due 2000
Internal energy management program		2001	Deferred. Recommendations to be reviewed in 2000.
Vehicle Fleet Management Business cases	Deferred	2001	Deferred Recommendations to be reviewed in 2000.
SF_6 management procedure	Commenced	2000	Draft policy complete. Implementation pending review of Environmental Management System, 2000

Deferred Undertakings

Hydro Tasmania intended to set targets for reducing its own use of electricity as part of a major environmental review in 1999. The review has been deferred until after June 2000. Hydro Tasmania uses electricity in its administrative centres, power stations and pumping facilities. All the electricity generated in mainland Tasmania at present is from renewable sources and in consequence, reducing the organisation's use of electricity will not reduce greenhouse gas emissions. This situation is likely to change in the next few years and an internal energy management program remains an important part of Hydro Tasmania's greenhouse emission mitigation plans.

Motor vehicles contributed eight per cent of Hydro Tasmania's greenhouse gas emissions in 1999. In 1999, Hydro Tasmania planned to prepare business cases and identify emission reduction targets based on the recommendations of a 1998 vehicle fleet study. The study was determined in review to be out of date. An update of the study was scoped late in 1999, to be done by December 2000. Therefore the 1999 goal of identifying emission targets and developing business cases has been carried over into 2000.

New Actions during the Report Period

Emission-mitigating actions that commenced within the report period but which were not predicted in the 1998 Report are:

- In July 1999, Hydro Tasmania announced plans to develop a large commercial wind farm at the 'Woolnorth' property on Tasmania's west coast. Fully developed at 130 MW, the wind farm would produce electricity from wind energy, with the potential to reduce greenhouse gas emissions generated by the burning of fossil fuels by about 400,000 tonnes of carbon dioxide per year. The first stage of the development is to install 10.5 MW of wind turbines. The availability of renewable energy certificates and the construction of Basslink will determine the economics of any expansion of wind development beyond the 10.5 MW.
- During 1999, Hydro Tasmania identified eight suitable sites for mini-hydro construction in Tasmania and assessed their economic and technical potential. Possible developments at Butlers Gorge and Monpeelyata canal have been selected for prefeasibility studies.

6.4 Progress in General Greenhouse Management Commitments

Greenhouse Challenge activities were reported to the Hydro Board in March, June, September and December 1999. The organisation's participation and progress in the Challenge was reported to the community in the 1998 Annual Environmental Report. Hydro staff awareness of participation in the Greenhouse Challenge was developed through articles in internal publications.

Section 7 – Action Plans for 2000

During 2000, Hydro Tasmania will pursue activities initiated in previous years, such as wind power investigations and development, cloud seeding, and refining performance of the Energy Management System. The deferred activities in internal energy management and vehicle fleet efficiency will recommence with a review of previous studies and preparation of business cases for the implementation of recommendations.

Meetings will be held to identify further cost effective activities to reduce greenhouse gas emissions.

Table 7.1: 2000 Greenhouse Challenge Action Plans

2000	Greenhouse Mitigation Action	Description
1	Pursue the Renewable Energy Strategy	Hydro Tasmania's strategy to promote opportunities for, and develop, commercially viable renewable energy options and expertise.
2	Woolnorth wind farm	Prepare EIA and obtain approval. Commencement of construction of Stage 1 (10MW) planned for end of 2000.
3	Wind Power Feasibility Program	Continue to model the resource, complete refined wind atlas.
4	Cloud Seeding	Continue experimental program. External review of estimating benefits.
5	Generation System Efficiencies	Feasibility studies of preferred options. Report on study.
6	Mini hydro investigations	Prefeasibility studies of 2 preferred options.
7	Hydro Vehicle Fleet Management Study	Review previous studies and recommendations. Set targets. Prepare business plans.
8	Internal Energy Management Study	Estimate energy use at Hydro Tasmania sites specifically. Review study and recommendations. Set targets and prepare business plans.
9	SF_6 Management	Implement new procedure.