

# Chapter 12

## ENERGY

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# Chapter 12

## ENERGY

### 12.1 PRIMARY ENERGY CONSUMPTION

In 1983-84 primary energy consumption in Tasmania, at almost 84 petajoules, had appeared to have levelled off after two decades of steady increase. As in other States, the rate of increase in energy consumption declined following disruption in oil supplies and steep increases in prices in the seventies.

**12.1 Total Energy Consumption, Tasmania and Australia (Petajoules)**

Year	Tasmania	Australia
1960-61	39.1	1336.6
1970-71	65.5	2210.3
1977-78	77.4	2973.8
1978-79	81.3	3044.5
1980-81	81.9	3139.4
1981-82	84.9	3230.1
1982-83	80.7	3110.2
1983-84	83.7(p)	3224.2(p)

Source: Department of Resources and Energy

Energy usage in Tasmania for the year 1983-84 was 2.6 per cent of total Australian consumption, less per head of population than all States except New South Wales and South Australia.

**12.2 Total Energy Consumption Per Head, by State, 1983-84 (p) (Gigajoules)**

NSW	190.4
Vic.	225.2
Qld	233.4
WA	231.7
SA	191.3
Tas.	192.5

Source: Department of Resources and Energy

#### 12.1.1 Consumers

The manufacturing industry is the largest consumer of energy, using 40 per cent in 1983-84, of which basic metal production used almost half. The transport sector accounted for 24 per cent and the residential sector, 14 per cent.

**12.3 Energy Consumption, Tasmania (Petajoules)**

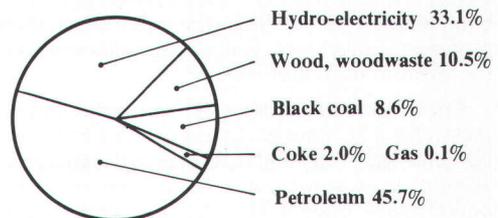
Sector	1982-83	1983-84
Industry (a)		
Agriculture	1.9	1.9
Mining	4.3	4.1
Manufacturing	33.3	33.5
Electricity, gas and water	4.1	5.5
Construction	1.0	1.1
Wholesale retail trade	1.9	2.0
Transport and storage	19.1	20.5
Communications, finance and business services	0.3	0.3
Public administration	0.3	0.3
Community services	0.9	0.8
Entertainment and personal services	0.5	0.5
Residential	11.8	11.9
Lubes, bitumen and solvents	1.2	1.3
Total	80.7	83.7

Source: Department of Resources and Energy

#### 12.1.2 Energy Sources

Most of Tasmania's energy needs have been met from imported petroleum products, and hydro-electricity. Small amounts, although increasing in more recent years, have been derived from black coal, wood and coke.

**Energy Sources Tasmania 1983-84**



## 12.2 PETROLEUM

Australia imports about 25 per cent of its crude oil requirements and prices its locally produced crude oil at world parity. This has resulted in a marked stabilization in the consumption of all petroleum products in recent years. In Tasmania, consumption has fallen twelve per cent since 1980-81.

### 12.4 Sales of Petroleum Products, Tasmania (Megalitres)

1980-81	1044
1981-82	1121
1982-83	908
1983-84	916
1984-85	915

Source: Department of Resources and Energy

All Tasmania's petroleum is imported from interstate refineries to bulk depots at Hobart, Bell Bay and Devonport. Despite early hopes for finding sufficient oil in Bass Strait to meet the State's needs, tests have not found sufficient deposits to be commercially viable. At least that was the case until a new discovery, as Mr Andrew Horton reported in the accompanying article reprinted from *The Islander*, in 1985 provided renewed hope.

### 12.2.1 Bass Strait's New Burst of Energy

by Andrew Horton

Reprinted from *The Islander*, Number 2, November, 1985

**The discovery of oil and gas in Bass Strait has put Tasmania on the national petroleum map.**

**The flow from Yolla 1, about 150 kilometres offshore from Burnie, has proved to be the consortium which is developing the field in the Bass Basin lease areas that the expensive search for black gold—Texas tea—has not been in vain.**

It has also proved that exploration areas which have already been picked over are worth further examination when new and more sophisticated technology becomes available.

The Bass Basin was exhaustively tested by Esso-BHP in the late 1960s and through the 1970s, without finding enough oil or gas to be commercially viable. Since then, that company's senior executives have probably pondered about the wisdom of pulling out.

The present consortium is headed by Amoco Australia. The other partners are Cue Petroleum NL and Bass Strait Oil & Gas NL. The consortium was formed after a former Esso geologist and Hobart resident Mr John Davidson began

to believe that the area was worth a much closer examination.

The present success at Yolla 1 is linked to Mr Davidson's knowledge of the Bass Basin lease areas and to his persistence in seeking partners who shared his enthusiasm.

When Amoco Australia read Mr Davidson's data they must have recognised the potential which existed in the old lease-area. It costs hundreds of thousands of dollars a day to operate a drilling ship and to deploy manpower in remote areas, and the decision to go ahead is taken only after careful assessment of the data.

But now, after months of test drilling, work at Yolla 1 has been suspended. In exploration terms this means that the area has been put on reserve for further testing and for commercial development.

The consortium is after other fish in the ocean, even though the flow of 300 barrels a day from Yolla 1 has been confirmed using only a small choke (drilling hole), and the known reserves of gas are already enough to fire a 200-megawatt power-station.

Seismic testing for a possible test-hole at Yolla 2 has been under way for the past five weeks, and the Tilana test-hole near Yolla 1 has been tested and evaluated using the oilrig Diamond M Epoch. The consortium now has its eyes on the Pelican field in the T22P lease-area.

If all or some of these test-holes are proved to have commercial quantities of oil and gas, their potential is enormous. In order to maintain its 90-per cent self-sufficiency Australia must continue its search for reserves of light crude.

The possibility of a new commercial field in Bass Strait is creating tremendous interest in the industry at a time when the traditional wells in the Gippsland field off Victoria are at peak production.

When the Gippsland fields start to decline as the major producer of light crude there will be a frantic search for new supplies in commercial quantities. Bass Basin may well be the solution.

The prospect of Australia being a net importer of light crude has sent many shudders down the spine of an industry which is already resigned to the fact that it has to import heavy crude from countries where oil politics often override rational economic judgment.

The discovery at Yolla 1 is of major importance to Tasmania. The well has the capacity to produce between 2500 and 3000 barrels of oil a day, a flow which is equal to that of the best Gippsland wells once the small choke is opened.

The Minister for Mines, Mr Roger Groom, has indicated his government's enthusiasm for having the oil and gas piped to the North-West Coast. And while it isn't known how much money that operation would cost, Mr Groom is on record as having pledged any help which the government can give—presumably help in the form of dollars and in the form of advice on markets for oil and gas in Tasmania.

Mr Groom wants more than simply the royalties which would accrue from each barrel. The fact that Bass Basin is inside Tasmania's border means that the State has an overwhelming case for getting the biggest slice of the action.

Of course there are difficulties. The consortium has said that its first port of call in selling its oil will be the Tasmanian Government. But this whole approach assumes that Tasmania *needs* the amount of oil and gas which the field has the potential to produce.

A compromise might be made: provide Tasmania with enough oil for its requirements, and sell the rest to the other States. These avenues will be explored as more positive information flows from the analysis of data gathered this year and in 1986.

There are other major reasons why the State Government is keen to be involved with the development of the Bass Basin:

Firstly, because of the onshore physical infrastructure required to take the Bass Basin oil, such involvement will provide potential for a whole new industry in the State.

Secondly there may be a spin-off in terms of jobs and possibly in terms of ancillary industries which might be attracted to the State if a big source of oil and gas was available and was backed by guaranteed reserves.

It's an ideal project which the Tasmanian Development Authority could exploit interstate. The TDA has not been involved in the Bass Basin project, but that situation is likely to change over the next few months.

The gas reserves in the basin are a slightly different proposition. While oil is the ultimate objective, gas is the cream on the cake. It's a side benefit which the State could capitalise on heavily as an alternative to hydro-electricity.

While the Hydro-Electric Commission might not take kindly to the upstaging of its traditional source of energy—water—by huge supplies of gas, it has acknowledged the significance of the Yolla 1 discovery and will undoubtedly watch with interest as the consortium proceeds to test for a possible Yolla 2 and then move on to the Pelican field by early next year.

Of course the litmus-test will be whether the product can be brought to shore at a price that's competitive with hydro power.

## 12.3 ELECTRICITY

Tasmania's electricity requirements are provided by the Hydro-Electric Commission from a system based almost entirely on hydro installations. The total installed generator capacity at June 1985 was 1.940 million kW of which 87 per cent (1.7 million kW) was supplied by an integrated hydro network. An oil-fired thermal station of 240 000 kW is located at Bell Bay.

During the 1984-85 financial year total energy generated was a record 8194 million kWh, an increase of 1.7 per cent over 1983-84; total sales amounted to 7503.6 million kWh of which almost 67 per cent was taken by the major industrial sector.

### 12.5 Electricity Sales, 1984-85, Tasmania (million kWh)

Residential	905.2
Industrial	448.4
Hot water	560.7
Off peak	267.2
Lighting	110.9
Commercial	184.3
Bulk commercial	85.5
Major industrial	12.3
HEC villages, unread meters	4943.0
Total	7503.6

Source: Hydro-Electric Commission Report

Consumption by the major industrial sector in 1984-85 rose by 1.9 per cent over the previous year while the retail load measured at major sub-stations was up by 2.6 per cent. The increased demand followed an increase of 1.9 per cent in customers, to 199 197.

### 12.6 Electricity Consumers, Tasmania

Consumers	1984	1985
Residential	158 448	161 755
Public utilities	4 303	4 533
Industrial	16 637	16 692
Commercial	14 594	14 598
Major industrial	17	17
Miscellaneous	1 388	1 602
Total	195 387	199 197

Source: Hydro-Electric Commission Report

For the first year in the past nine the yield from catchment rain and snow was better than the long term average. This enabled water storages to recover by about 10 per cent to nearly 41 per cent at 30 June.

Financially it was a pleasing year for the Hydro-Electric Commission, with a profit of \$4.475 million being posted after losses in the two previous years. Income for the year at \$238.160 million was 10.4 per cent higher than the previous

year. Retail customers contributed \$157.529 million while sales to the major industrial sector totalled \$77.454 million; miscellaneous income amounted to \$3.177 million. Operating expenses increased by 6.7 per cent to total \$72.513 million while financial charges rose by 11.0 per cent to \$124.710 million. The cost of fuel for the Bell Bay thermal station was \$11.021 million which was charged against the Fuel Cost Equalisation Provision. A further instalment of \$6 million was credited to the Provision during the year.

A total of \$6.745 million was paid to the State Treasury as a 5 per cent surcharge on retail electricity accounts, an increase of 13 per cent over the previous year.

During the year \$173.045 million was spent on capital works bringing the total capital expenditure to \$1 580.624 million.

### 12.7 Hydro-Electric Commission Capital Expenditure, 1984-85

Project	\$ million
Pieman River Power Development	88.075
Anthony Power Development	15.870
King River Power Development	30.943
Gordon Power Station, No. 3 Machine	4.587
Raising Great Lake	0.174
Bass Strait Islands Power Stations and Reticulation	2.986
Power Station Extensions	1.039
Substations	2.916
Transmission Lines	2.046
Lake Margaret Power Scheme	5.000
Distribution System and Services	10.386
Sundry Buildings	1.000
Stores, General Plant, etc.	6.581
Construction Equipment	1.442
<b>Total</b>	<b>173.045</b>

Source: Hydro-Electric Commission Report

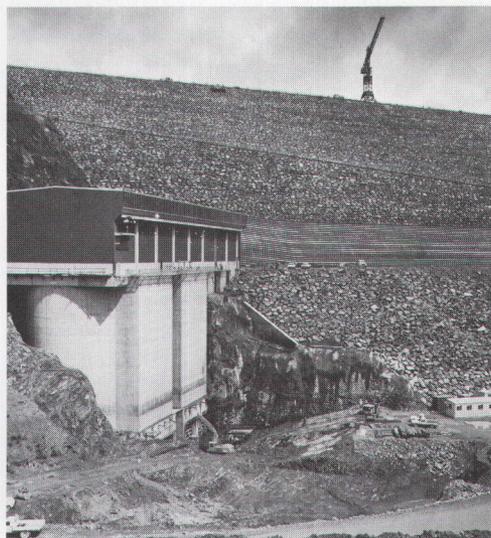
The capital works construction spotlight remained firmly on the Pieman, King and Anthony power developments. Together, these developments involve both the largest underground engineering construction activity undertaken in Australia during the past 30 years and the formation of considerable length of roads providing tourist access through spectacular country.

On-site employment on power developments declined from 1210 to 1135 at Pieman but the build up at Queenstown for the King River and Anthony Power Developments from 500 to 620 ensured a steady level of field workforce during 1984-85.

### 12.3.1 Construction Projects

#### Lower Pieman

At Lower Pieman the task of placing about 6 million tonnes of rockfill forming Reece Dam was completed, and a start was made on the concrete facing of the dam. The rockfill placement was accomplished 13 weeks ahead of schedule. As a tribute to one who for many years advanced the development of the State's water power resources, the final placement of rockfill was carried out on 17 December 1985 in the presence of Mr Eric Reece, Premier of Tasmania from 1958 to 1969 and again from 1972 to 1975.



Reece Power Station and Dam nearing completion.

Concrete placement for the dam face started on a three shift basis in June 1985. By year's end 25 per cent of the face had been completed. Plinth grouting was 75 per cent complete and about 22 per cent of the curtain grouting of the right abutment was complete. A shortage of carpenters limited progress in several areas, principally on concreting the spillway which, as a result, reached only two-thirds completion. The two intake structures progressed steadily and by 30 June both were more than half complete. The associated power tunnels were fully grouted and painting of the steel lining of one of them was completed.

The design, supply and installation of plant and equipment for the power station proceeded to program ready for commissioning in 1986. Deliveries were completed for the two 115.6 MW generating sets, parts of which were manufactured in the Commission's workshops at Moonah. By 30 June 1985 both turbine spiral casings had been assembled and tested.

In the Lower Pieman storage area, clearing of the lake foreshore from the dam, to about five km upstream was almost complete. Clearing near the town of Rosebery was about 50 per cent complete and salvage of timber was well advanced under the general management of the Forestry Commission. It was anticipated that all timber that could be harvested would be salvaged before flooding.

### **King River**

On the King River Power Development, designs for Crotty Dam, King Power Tunnel and King Power Station allowed the location of the structures to be finalised. Hydraulic model testing of the spillway was completed.

Crotty Camp was further enlarged to accommodate 330 people. A fresh water supply was installed, camp roads sealed and electricity supply was connected from Queenstown. At Lynchford Camp all 57 caravan units were delivered. At Queenstown, construction headquarters for the project, 15 existing houses were bought and refurbished and 11 new homes were under construction.

The four wheel drive track to Mt Jukes Saddle was improved and construction of Mt Jukes Road began. When completed, this road will link Crotty Dam and King Power Station, about six km away.



*The site of the Crotty Dam for the King River Power Development.*

At Crotty damsite a right bank access road from the Kelly Basin Road was constructed and sluicing for the right bank plinth line was completed. The gate shaft bench for the headrace tunnel was excavated and stabilised with gunite. At the tunnel portal level the works area for 'rubber' mounted tunnelling was constructed and fill was being placed for the 'rail-bench' works area. Rail tunnelling was scheduled to begin in February 1986.

Specifications for the procurement of the 143 MW generating set and associated equipment for the power station were issued.

The 6.6 km Newall Road was virtually completed. At the King River the bridge abutments were exposed and, despite frequent flooding, a plinth for the central pier was concreted in the river.

### **Anthony**

Roadworks dominated the Anthony Power Development. Nearly 30 km of road design, including entrances from the southern and northern ends of the development, were issued for construction.

The first three kilometres of Anthony Road North was sealed and from the south, the road advanced 10.5 km to reach Newton Creek. Access roads to the Newton Pump Station and the works area were 70 per cent complete.

Stripping and sluicing of the White Spire, Henty, and Newton damsites progressed during the year.

Specifications for procurement of the 84 MW generating set and associated equipment for the power station were issued.

### **Gordon Power Station — 3rd Machine**

At the existing Gordon underground power station, preparations began for the installation of a third 144 MW hydro-electric generating set. The turbine was received and the generator is due for delivery in February 1986. The work is programmed for completion in late 1987.

### **Alternative Works Projects**

One major road project, Strahan-Henty, was completed under the Commonwealth-funded alternative works program and excellent progress was made with another—the Heemskirk road, linking Zeehan and Lower Pieman. Much of the Heemskirk road was sealed and the balance will be sealed next summer. Bridges over Piney Creek and Heemskirk River were completed. Commonwealth funds, part of the financial agreement drawn up between State and Commonwealth Governments following work on the Gordon River Power Development Stage 2 being halted, were also used for an extensive program of underground supply works in several cities and towns.

### **12.3.2 Future Expansion**

A further review of the long term forecast is in progress. This review is primarily intended as a basis for planning the further power developments that will be required to meet growing demands after the early 1990's. Although the work is not complete it appears likely that the load forecast in 1983 for the 1990's will eventuate two or three years later than indicated in the 1983 forecast.



*Roadworks for the Anthony Power Development.*

Any such deferment of load would enable the development of the remaining economic hydro resources to precede further thermal development.

The addition to the generating system of Reece Power Station in 1986 and the King River and Anthony Power Developments in the early 1990's will together meet the forecast load with reliability and economy for about the next ten years.

A continuing program of investigations is aimed at deriving the best development program for the mid-1990's and beyond.

The hydro potential remaining undeveloped outside the World Heritage area is likely to play an important part in any future development. Possible schemes under active examination during the year included Sailor Jack, Que, Lower Pieman tributaries and Lower Henty Schemes. Not all of these now appear to be economic.

Preliminary investigations have been undertaken on the potential redevelopment of the Lake Margaret Scheme (bought by the Commission during the year from Mt Lyell Mining and Railway Company) and a possible addition to Butlers Gorge Power Station.

Further data have been collected for a possible coal-fired power station in the Fingal Valley, with research being assisted by the consulting engineers Merz and McLellan and Partners. Those investigations have been completed to the extent that it can be confidently predicted that sufficient coal exists for the economic development of a 400 MW power station; operational cost levels had been determined; and

preliminary environmental studies were carried out.

Tenders were again called world-wide for a wind generating plant for King Island. The tenders were under study at year's end.

### 12.3.3 Energy Planning

In line with the Government's requirements for the Commission to undertake a wide role in the planning for all energy resources as well as electricity, extensive studies were initiated to define the extent and relative costs of energy resources available to the State and the likely levels of future requirements.

Work is in progress in the preparation of a series of reports on the individual energy resources and requirements. Initially this work has concentrated on those areas with the potential to reduce the dependence of the State on imported oil fuels. To the forefront has been an examination of the prospects of wood and wood wastes contributing to a greater extent to meeting energy requirements.

Work was also in progress on the examination of shale oil treatment and the extraction of liquid fuels from vegetable oils.

The Commission was represented on a number of relevant national committees notably, National Petroleum Advisory Committee, National Fuels Emergency Consultative Committee and the National Oil Supplies Advisory Committee. As part of oil fuels emergency planning the Commission monitors stocks of oil products in the State as a basis for advice to Government.

## 12.4 COAL

Approximately 10 per cent of Tasmania's energy is derived from coal. Although substantial deposits exist throughout Tasmania, particularly in the Fingal Valley in the north-east, the quality is not as high as for example, NSW coal. Nevertheless, over recent years, coal has been increasingly used as a fuel source for industry.

The Cornwall coal company, the State's only producer, is currently producing and selling 350 000 tonnes per annum from the Duncan colliery near Fingal and the Blackwood colliery at Mt Nicholas, near Cornwall. It supplies coal to Associated Pulp and Paper Mills Ltd, Australian Newsprint Mills Ltd, Goliath Portland Cement Company Ltd, Edgell-Birdseye (Division of Petersville), Wander (Australia) Pty Ltd, Tasmanian Breweries (Cascade), Cadbury Schweppes Pty Ltd, Royal Derwent Hospital, and Tioxide Australia Pty Ltd.

## 12.5 WOOD

The use of wood as an energy source for domestic heating has been growing steadily over recent years. In 1976 total domestic wood use in Hobart homes was an estimated 1.24PJ; by 1980 this had increased 6.5 per cent to 1.32PJ. In 1980, 12 726 homes in Hobart had wood-fired space heating; in 1985 an estimated 88 000 homes in Tasmania were using firewood or coal for domestic heating.

### 12.8 Overseas Imports, Solid Fuel Space Heaters, Tasmania

Year	Number	Value (\$'000)
1981-82	3645	755
1982-83	6271	1576
1983-84	4848	1502
1984-85	3838	1352

This increasing trend has been linked to rising oil prices; it may also be at least partly due to recent improvements in the efficiency of wood

burning heaters. Certainly, import figures show a demand for solid fuel space heaters with New Zealand being the main supplier.

The Forestry Commission has estimated that the demand for firewood is at least 300 000 tonnes a year, although it could be substantially more since it is relatively easy, and common, for consumers to take their trailers to the bush and collect their own. Indeed firewood has been in such demand that stocks in Launceston wood yards ran out during the 1984 winter.

To date, supply at source (if not always in the yards) is considered to be plentiful, although at some distance from the major population centres. It has been estimated that at least two million tonnes of logging residues per year are available, mainly in State forests some 50 to 100 km from Hobart and Launceston. The Forestry Commission provides licences permitting the collection of firewood from Crown land. In addition the Commission provides designated 'free firewood' areas for advertised periods during the summer as part of a campaign to educate consumers to collect or buy their firewood in the summer when it is easier and cheaper to collect.

Firewood, when compared with other fuels on a cost per unit of energy basis, is the least expensive. A good wood heater provides heat at a third of the cost of oil and electricity and a quarter of the cost of LP gas.

## 12.6 ENERGY RESEARCH

### 12.6.1 Hydro-Electric Commission

#### Wind Energy

A research project on the use of wind energy which is mainly funded by the National Energy Research Development and Demonstration Council (NERDDC) was continued. The initial NERDDC grant was extended to cover studies into the technical and operational aspects of including significant amounts of wind generation into a predominantly hydro system. This research project complements the Commission's own continuing investigations of the potential of the

### 12.9 The Cost of Firewood Compared to other Fuels, 1985

Type of fuel	Calorific value per unit	Typical cost per unit delivered	Typical price per unit of energy	Efficiency of fuel use	Cost per unit useful energy
Air dry fire-wood. Good wood heater	16MJ/kg	\$40.00/tonne	0.25¢/MJ	50-70%	0.42-0.5¢
Air dry fire-wood. Open fire	16MJ/kg	\$40.00/tonne	0.25¢/MJ	10-20%	1.25-2.5¢
Heating oil	38MJ/kg	44¢/litre	1.15¢/MJ	75%	1.53¢
L.P. gas	50MJ/kg	78¢/kg	1.56¢/MJ	75%	2.08¢
Electricity	3.6MJ/kWh	5.66¢/kWh	1.57¢/MJ	100%	1.57¢

Source: *Firewood*, Forestry Commission Tasmania, 1985.

wind energy resource. During the year the wind monitoring program was extended to sites on the West Coast, and North and North East Coasts. Studies were also made into the behaviour of a windfarm in the generating system.

#### **Solar Electric Water Heating**

The continuing program of field and laboratory testing indicated that, in suitable locations, the solar contribution could be sufficient to replace up to 45 per cent of the energy needed for normal domestic hot water heating. Two new systems and one existing system were evaluated at the Moonah Laboratories. Research on King Island was completed and a report was being prepared at the end of the year.

#### **Power Use Survey**

A draft report was prepared on the eight year survey conducted by the Australian Housing Research Council, the State Housing Department and the Commission. The project concerned the energy requirements of and use by domestic customers in public housing in Tasmania, and their response to energy conservation measures.

#### **Energy Conservation**

A program is being undertaken involving monitoring the effects of energy saving methods introduced into United Milk Tasmania's Devonport works following advice from the Commission's Energy Management Centre. The program is being funded by the Department of Resources and Energy.

#### **Wood Energy Systems**

The performance of about twelve existing wood energy systems is being assessed as the basis for putting together a demonstration information package aimed at providing information to potential users. The project is being funded in part by a grant of \$95 000 from the NERDDC and will take about a year to complete.

### **12.6.2 Forestry Commission**

The Forestry Commission recognises the value of wood as a renewable form of stored energy. To ensure wood fuels can contribute to Tasmania's energy supplies (both domestic and industrial), locally based employment, and economic activity, a number of measures have been initiated, as follows:

#### **Industrial Fuelwood**

To encourage industrial fuelwood demand, and to demonstrate modern wood combustion technology to industry, the Forestry Commission obtained, and is administering, a \$95 000 NERDDC grant. The grant is to be used to assist a company to convert an oil fired boiler to wood firing.

The objectives are to demonstrate a fuelwood supply system and to cost and technically evaluate boiler performance when fired by wood instead of oil.

#### **Fuelwood/Firewood Recovery Trials**

Future firewood supplies will increasingly be drawn from integrated harvesting operations. The Commission is establishing trials, in conjunction with industry, to obtain costs of firewood recovery from such operations, and to develop new recovery techniques.

With more wood available for firewood in log form there are opportunities to mechanise the cross cutting and splitting operation to contain costs. The Commission is working closely with the developer of prototype equipment to foster this innovation.

### **12.6.3 University of Tasmania — The Centre for Environmental Studies**

The Centre for Environmental Studies at the University is a multi-disciplinary research and post-graduate teaching centre which includes energy research among its range of activities. This research is centred upon use of fuelwood, and energy conservation.

#### **Fuelwood Research**

In 1978 studies of fuelwood use in Tasmania were commenced following more general studies of the Tasmanian energy system. Two years later, some preliminary performance tests on domestic wood-burning heaters began. In 1981 the Centre's Home Heating Laboratory was established. Fuelwood research is directed at both issues in Australia as well as issues in developing countries. Recent projects with local application have included:

- a review of information available on logging residue quantities in the Tasmanian southern forests;
- construction of a sophisticated calorimetry room, designed specifically for domestic heater testing (this project was undertaken jointly with the University's Department of Civil and Mechanical Engineering);
- commercial testing of wood heaters for Australian and overseas manufacturers;
- review of wood heater safety literature, a study of Tasmanian Fire Department records, and a survey of heater installations in Hobart;
- an assessment of heater safety test methods to assist with the establishment of an Australian standard for heater installations;
- testing of heater flue systems, hearth designs and heater clearance specifications;
- preliminary measurements of emissions from some commercially available wood heaters (in co-operation with the Tasmanian Department of the Environment);

#### **Energy Conservation**

The Centre is involved in several research projects involving energy conservation including:

- Energy Audits. The technique of energy auditing is being researched with emphasis on the presentation of economic benefits and costs for management.
- Domestic Energy Use. Domestic energy conservation is being investigated with studies on domestic insulation, low energy household electric appliances (a research project on appliance energy labelling), and some limited work on solar hot water systems; and
- Fuel Conservation. A study looking into the options for restructuring motor vehicle taxes and charges to encourage fuel conservation.

#### **Other Studies**

A number of minor projects are underway at the Centre including some work on wind and photovoltaic electricity supply for rural households, energy forecasting techniques, energy policy alcohol fuels. None of these has been developed to the extent of the fuelwood and conservation programs.

#### **Department of Chemistry**

Research is also being undertaken by Professor Larkins, head of the Department of Chemistry, principally in the field of energy chemistry, particularly in relation to the production of synthetic liquid fuels and the characterisation of catalyst systems for energy conversion processes. The work involves research collaborations with scientists in industrial, CSIRO and university laboratories and is funded from various sources including the national Energy Research Development and Demonstration Council, ARG5, CSIRO and industry. The major projects currently being undertaken are listed below.

#### **Hydroliquefaction of Victorian Brown Coal**

Research relating to kinetic and mechanistic studies on the liquefaction of low rank coals particularly using synthesis gas.

#### **Structure and Reactivity of Australian Coals**

A program of research principally designed to use such physical techniques as Fourier transform infrared spectroscopy, photoelectron spectroscopy and NMR spectroscopy is currently in progress to further elucidate our understanding of the chemical characteristics of Australian coals.

#### **Upgrading of Coal Derived Liquids**

A new program of work is planned to develop suitable catalysts for the upgrading of liquids derived from the conversion of brown coal.

#### **Catalytic Conversion of Light Hydrocarbons to Liquid Fuels**

This project is a collaboration with scientists at the BHP Melbourne research laboratories and is funded for a two year period under the NERDDC program. The University of Tasmania sub-

program is part of a major research effort by BHP to establish new routes for the conversion of natural gas (methane) to transport fuels.

#### **Liquid Fuel Production via Slurry Phase Fischer-Tropsch Processes**

This research is being undertaken in conjunction with CSIRO Division of Energy Chemistry, Lucas Heights, with support from the National Research Fellowship Scheme (National Interest Category).

#### **Characterisation of Adsorbed Species on Catalyst Surfaces**

This program is designed to obtain information at a fundamental level on the characteristics of adsorbed species on catalyst surfaces.

#### **Direct Methane Conversion to Liquid Hydrocarbons**

This project is designed to develop and evaluate catalysts which may be suitable for the direct conversion of methane. At present catalysts suitable for the partial oxidation of methane are being studied.

#### **12.6.4 Hobart Technical College — Claremont Annexe**

Staff and students at the annexe have been involved in a number of research projects involving solar energy. The two major projects are:

- the setting up of a demonstration and experimental facility to test conventional solar collectors outdoors under Tasmanian conditions. This will allow the thermal characteristics of the collectors to be monitored, and provide information on their installation and maintenance; and
- a working demonstration of a solar floor coil system which allows a number of test parameters to be measured. The main aim of the project is to show the effectiveness of a concrete floor as a storage medium and demonstrate the maximum effective solar contribution that can be made with a system of this kind.

#### **12.6.5 Private Energy Research**

Several Tasmanian companies are involved in energy research and development in the State. Projects being developed in 1985 included:

- a continuous charcoal retort by Circular Head Energy Supplies Pty Ltd at Smithton. The company has been developing the retort since 1980 and has so far spent \$300 000 on the project. This includes a State Government grant of \$50 000 for 1981-82 and a Commonwealth Department of Science and Technology grant of \$78 000 in 1984. The company is optimistic that it can produce metallurgical grade charcoal for industry. Fines from the process would be suitable for fuel grade charcoal.

- small scale hydro-electric systems by Tamar Designs Pty Ltd at Deviot. The company began development of micro hydro-electric systems in 1975. They received a NERDCC grant of \$97 000 for the period 1983-85 to develop small scale hydro-electric systems capable of operating under a wide range of water flows. Other projects undertaken by the company include automatic start-on-demand small scale hydro-electric systems, and multi-nozzle turbine systems capable of producing flat efficiency-to-power ratio curves. The small scale systems are capable of producing up to 1 MW output. The automatic start-on-demand systems are limited to 15 KW output.
- installation of a fluidised-bed wood-fired boiler system by United Milk Tasmania Pty Ltd at its Legerwood factory. The system is unique in Australia, being the only fluidised bed to use wood waste. The waste is obtained from nearby sawmills. The system was installed in order to reduce the factory's energy costs; previously it had used LPG. The boiler is connected to a thermal oil circulation system which transfers heat for two major uses, steam generation (9 tonne per hour at 1100 kPa), and heating of air for drying processes. The system became operational in November 1985.

## 12.7 ENERGY MANAGEMENT

### 12.7.1 Hydro-Electric Commission

The Commission operates an Energy Management Centre with the objective of providing advice on all energy uses to the industrial, commercial and public sectors. Advice is based entirely on the best economic interests of the client and frequently results in significant savings of electricity and other energy consumption.

In the industrial and commercial sectors individual energy assessment studies were undertaken for twelve clients ranging through food processors, timber works, oil installations, laundries and concrete works. Assessments were also undertaken in nine public facilities including libraries, schools, swimming pools and hospitals.

The Centre has planned and administers the Government's Energy Management Program which is aimed at reducing the cost of energy used in government activities. This program continues to be an outstanding success with estimates of cost savings to Government reaching \$1.9 million a year.

Because of the existing type of energy use in the different sectors, savings in the Government sector have been mainly in respect of electricity while the potential for savings assessed in the commercial and industrial sector generally relates to oil fuels.

To assist in improving the general perception of the benefits available from sound energy management, the Centre has a continuing program of public seminars. Those conducted during the year included one on Maximum Demand Control and another on Wood Energy Systems.

### 12.7.2 Forestry Commission

Since much of the near urban forest resource is privately owned, the Commission is working closely with the Tasmanian Farmers and Graziers Association and the Commission's Private Forestry Division to identify private landowners willing to sell firewood.

To reduce the impact of winter shortfalls in firewood supply, wood merchants and home owners are being encouraged to stockpile wood in the summer by the Commission offering lower royalties in the summer months; mounting a summer education campaign through media articles encouraging summer firewood purchase; indicating the difficulty in extracting dry firewood from the forest in wet winter weather; promoting the benefits, in terms of heating efficiency, of having dry wood to burn in winter.

The Commission aims to improve firewood recovery from existing logging operations through liaison with the forest industries and encouraging existing contractors to use their equipment to recover firewood as part of normal harvesting operations.

## 12.8 REFERENCES

### ABS Publications:

- Domestic Firewood and Coal Usage, Tasmania* (8204.6).
- National Energy Survey: Household Appliances, Facilities and Insulation, Australia.*
- National Energy Survey: Household Energy Consumption.*
- Survey of Household Energy Sources, Tasmania*, November 1975. (Uncatalogued)
- Survey of Household Energy Sources and Home Insulation, Tasmania*, June 1978 and November 1979. (Uncatalogued)

### Other Publications:

- Department of Resources and Energy, *Energy Demand and Supply*, Australian Government Publishing Services.
- Forestry Commission Tasmania, *Firewood*, 1985.
- The Hydro-Electric Commission, Tasmania, *Annual Report 1984-85*.