Chapter 16

ENERGY

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The Australian Bureau of Statistics conducted a survey of all industries except agriculture to determine the level of energy consumption in the 1986-87 financial year. Nationally the estimate of total energy consumption was 2 791 000 terajoules. The Tasmanian energy consumption component of the national total was 53 100 terajoules, or just under two per cent.

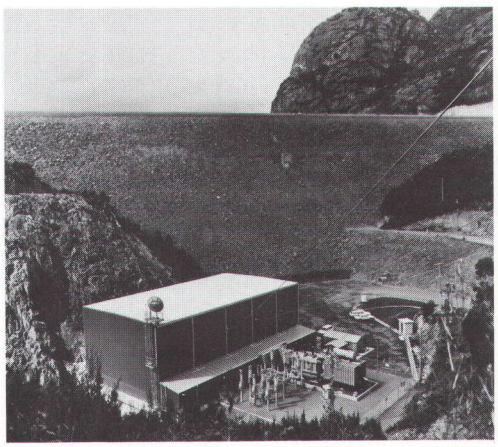
About 20 000 industrial and commercial establishments were included in the survey. Data were collected on the source of the energy consumed and the purpose for which it was used.

In the 1985-86 financial year a survey was conducted of the energy consumption patterns of households in private dwellings, and on the incidence of dwelling insulation by type of dwelling.

It should be noted that in the estimates of energy consumption by industry an element of double counting exists. Fuels, such as coal and natural gas, used to generate electricity were counted in the consumption figures for those fuels as well as in the figure for electricity.

16.1 ENERGY CONSUMPTION, BY INDUSTRY, TASMANIA, 1986-87

Type	*Amount (terajoules)*	*Proportion (%)*
Electricity	24 402.9	46.0
Automotive petrol	3 147.6	5.9
Automotive diesel	5 281.0	9.9
Liquefied petroleum gases	971.0	1.8
Fuel oil	5 269.9	9.9
Black coal	8 615.2	16.2
Wood	3 980.9	7.5
Other	1 433.3	2.7
Total	53 101.8	100.0



The Mackintosh Power Station at the foot of the Mackintosh Dam.
Photo: Hydro-Electric Commission

Not surprisingly, the Tasmanian source of energy consumed pattern differed markedly from the national pattern. Some 46 per cent of energy (24 403 terajoules) consumed in Tasmania was electricity. (Virtually all was generated from hydro schemes.) Nationally only

12 per cent of energy consumed was electricity: the main source of energy was black coal (31 per cent of all energy consumed), followed by natural gas (16 per cent). Of the 856 800 terajoules of energy from black coal, 88 per cent was consumed in the electricity and gas supply industry, primarily for electricity generation.

In Tasmania, black coal accounted for 16 per cent of energy (8615 terajoules), while natural gas was not reported as an energy source used. Other major energy sources were automotive diesel (5281 terajoules) and fuel oil (5270 terajoules), 9.9 per cent each, wood (3981 terajoules or 7.5 per cent) and automotive petrol (3148 terajoules or 5.9 per cent). This contrasts with national consumption figures of only 2.6 per cent for fuel oil and 0.6 per cent from wood.

The manufacturing sector used approximately 75 to 80 per cent of all energy consumed by industry in Tasmania during 1986-87. Because the energy consumption figures for certain sectors of the manufacturing industry are confidential, exact energy consumption figures are not available.

Around one-quarter of total energy used by the manufacturing industry was used by the paper, paper products, printing and publishing industry class (10 872 terajoules or 20.5 per cent). If wood, wood products and furniture (which includes sawn timber and woodchip production) are added (3084 terajoules), then these two industries used around a third of the total energy consumed by the manufacturing sector. (Nationally these two industry classes used only eight per cent of the total energy consumed by manufacturing.)

Other major manufacturing energy users in Tasmania were food, beverages and tobacco (2685 terajoules or 5.1 per cent) and cement, concrete and other non-metallic products (2211 terajoules or 4.2 per cent).

Other principal industry consumers of energy were mining (seven per cent of total energy consumption); community services, recreation, personal and other services (five per cent); and road transport (four per cent).

Major non-manufacturing industrial users of electricity include the mining sector (1468 terajoules) and community services, recreation, personal and other services (1572 terajoules). The road transport sector consumed 34 per cent of the 5281 terajoules of automotive diesel fuel

16.2 ENERGY CONSUMPTION BY INDUSTRY DIVISION, 1986-87

	Tasmania		*Australia*	
Industry	*Terajoules*	*%*	*Terajoules*	*%*
Mining	3 931	7	125 265	5
Manufacturing	n.p.	n.p.	851 806	31
Electricity and gas	n.p.	n.p.	1 330 695	48
Water, sewerage and drainage	144	..	7 083	
Construction	818	..	35 140	1
Wholesale trade	1 060	2	30 189	1
Retail trade	1 131	2	45 212	2
Road transport	2 143	4	76 574	3
Rail, water, air and other transport	1 420	3	118 891	4
Storage and services to transport	374	1	13 212	..
Communication	150	..	6 840	..
Finance, property and business services, and public admin.	1 102	2	60 618	2
Community services, recreation, personal and other services	2 730	5	89 028	3
Total	53 102	100	2 790 554	100

used by industry in Tasmania and only eight per cent of the automotive petrol used.

In 1987-88, the Australian Bureau of Agricultural and Resource Economics (ABARE) estimated that Tasmania produced 600 kilotonnes of raw black coal, of which 380 kilotonnes were saleable. Preliminary figures for 1988-89 are 645 and 407 kilotonnes respectively. In a 1986-87 industry energy survey, the Australian Bureau of Statistics estimated that one tonne of Tasmanian black coal would provide 22.8 gigajoules of energy.

Gas is only a minor energy source in Tasmania. Town gas is manufactured and reticulated in Launceston only. Bottled LPG is a minor domestic, commercial and motor fuel in the State. In 1988-89, Tasmania produced 56 million megajoules of gas (available for issue through the mains). In 1987-88 this figure was 54 million megajoules.

16.1 HOUSEHOLD ENERGY USAGE

A 1985-86 household energy survey estimated energy usage patterns for 142 300 households in Tasmania. The survey estimated that the average Tasmanian annual household expenditure on reticulated energy was $537. This compares with an Australian average of $564. Households in NSW recorded the lowest average figure ($512), and those in the Northern Territory the highest ($765).

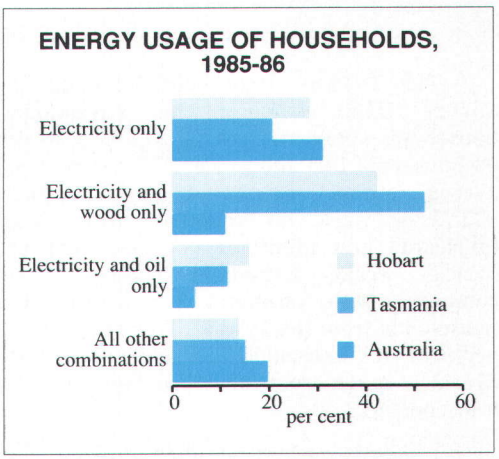
Tasmanian households, on average, consumed 34 100 megajoules of reticulated electricity.

16.3 AVERAGE CONSUMPTION OF RETICULATED ELECTRICITY, 1985-86 (megajoules)

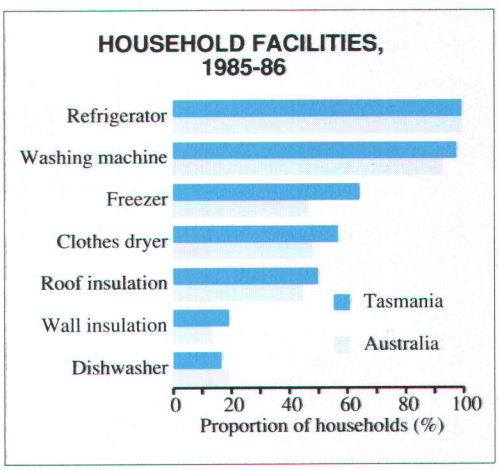
Purpose	*Tasmania*	*Australia*
Cooking only	14 400	16 000
Main heating only	n.a.	11 900
Hot water only	26 800	23 000
Cooking and main heating	n.a.	17 900
Cooking and hot water	32 100	27 900
Main heating and hot water	35 700	21 500
Cooking, main heating and hot water	41 700	28 200
All households	34 100	22 900

Households that used reticulated electrical energy for cooking, main heating and hot water, consumed (on average) 41 700 megajoules of electrical energy a year. The average for all Australian households was 28 200 megajoules.

Of the 142 300 single households in private dwellings in Tasmania, 74 200 use a main energy combination of electricity and wood, and 29 400 used electricity only.



Tasmanian households that only used electricity consumed, on average, 40 800 megajoules of reticulated energy annually in 1985-86. This compares with consumption figures of 32 000 megajoules and 34 200 megajoules for households that had main energy combinations of electricity and wood only, and electricity and oil only (respectively).



Ownership of electrical appliances and insulation was also estimated in the survey. Ninety-nine per cent of Hobart and Tasmanian households owned a refrigerator. However, only 16.5 per cent owned a dishwasher and 64.2 per cent a freezer, compared with 19.7 per cent and 46.4 per cent respectively for Australia.

16.2 HOUSEHOLD ENERGY EXPENDITURE

The 1988-89 Household Expenditure Survey (HES) estimated that Tasmanian households spent an average $13.95 a week on household fuel and power (2.6 per cent of average weekly household income), and $22.72 a week on motor vehicle fuel, lubricants and additives (4.2 per cent of average weekly household income). This compares with estimates for Tasmanian households from the 1984 HES of $10.91 (2.8 per cent) for household fuel and power and $16.43 (4.2 per cent) for motor vehicle fuel, lubricants and additives.

16.4 AVERAGE WEEKLY HOUSEHOLD ENERGY EXPENDITURE, TASMANIA ($)

	1988-89	*1984*
Average weekly household income	541.32	392.47
Household fuel and power -		
Electricity (selected dwelling)	12.10	8.81
Electricity (other dwelling)	0.19	0.13
Total electricity	12.28	8.94
Mains gas	0.08	0.09
Bottled gas	0.48	0.53
Total gas	0.56	0.62
Heating oil	0.52	0.48
Kerosene and paraffin	0.03	0.10
Wood (for fuel)	0.55	0.76
Fuels nec	n.a.	n.a.
Total other fuels	1.10	1.35
Total fuel and power	13.95	10.91
Motor vehicle fuel, lubricants and additives -		
Petrol	21.70	15.98
Diesel fuel	0.23	0.12
LPG and other gas fuels	n.a.	n.a.
Oils, lubricants and additives	0.74	0.32
Total	22.72	16.43

In Hobart where 1988-89 average weekly household income was estimated at $557.73, $14.28 was spent on household fuel and power, and $19.31 on motor fuel, lubricants and additives. This compares with estimates from the 1984 HES of $11.58 and $18.46 respectively, from an average weekly household income of $443.34.

16.3 PETROLEUM PRODUCTS

The total sales of petroleum products in Tasmania in 1988 was 850.6 megalitres or 2.3 per cent of all Australian sales. (Tasmania has 2.7 per cent of the Australian population.)

Slightly more than half the sales were petrol (leaded and unleaded). Nationally petrol sales made up 46.0 per cent of all petroleum products. Unleaded petrol sales accounted for 13.6 per cent (60.0 megalitres) of all petrol sales in Tasmania.

Between 1987 and 1988 there was a 1.7 per cent rise in sales of petrol in Tasmania. Total sales of all petrol in 1987 were 434.9 megalitres and 442.3 megalitres in 1988. (Nationally, petrol sales increased 3.4 per cent from 16 214.8 megalitres to 16 774.0 megalitres over the same period.)

Petrol and automotive diesel sales are substantial revenue earners for the State Government. Since 1983-84 franchise fees levied on petrol and automotive diesel sales have provided a 33 per cent increase in revenue to the government.

16.5 FRANCHISE LICENCE FEES, TASMANIA, ($m)

Year	*Petrol*	*Automotive diesel*	*Total*
1983-84	10.3	0.9	11.2
1984-85	11.7	2.2	13.9
1985-86	13.3	3.2	16.5
1986-87	29.4	7.1	36.5
1987-88	29.6	7.6	37.2

Source: Petroleum Gazette 1989/2.

16.6 CONSUMPTION OF PETROLEUM PRODUCTS, TASMANIA

	1988		*1987*	
Product	*Megalitres*	*Per cent*	*Megalitres*	*Per cent*
Liquefied petroleum gas	1.3	0.1	1.4	0.2
Aviation gasoline	3.5	0.4	3.2	0.4
Petrol (leaded and unleaded)	442.3	52.0	434.9	50.6
Aviation turbine fuel	32.8	3.8	34.1	4.0
Lighting and power kerosene	1.6	0.2	2.0	0.2
Heating oil	13.4	1.6	13.2	1.5
Automotive diesel fuel	251.1	29.5	253.1	29.5
Industrial/marine diesel fuel	7.2	0.9	12.2	1.4
Fuel oil	73.3	8.6	77.4	9.0
Lubricants	8.6	1.0	9.7	1.1
Bitumen	15.0	1.8	16.5	1.9
Other	0.5	0.1	1.0	0.1
All products	850.6	100.0	858.8	100.0

16.4 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 1989 was 2.315 million kW, of which 90 per cent (2.075 million kW) was supplied by the hydro network. An oil-fired thermal station of 240 000 kW is located at Bell Bay. This capacity had not changed from the previous financial year.

16.4.1 Supply

In 1988-89, total energy generated was 8 908 GW.h, an increase of 125 GW.h (1.4 per cent) on the figure for 1987-88. Total energy sales for the financial year amounted to 8 225 GW.h, an increase of 68 GW.h (0.83 per cent) on the 1987-88 period.

On 16 June 1989 a new record system peak power demand of 1 450.5 MW was established. This exceeded the record for the previous year by 104.9 MW.

During 1988-89 the net number of HEC customers connected to the HEC system rose by 4 217 (about two per cent) to 215 744. Major new industrial customers were the Aberfoyle Hellyer Mine at Que River, Southern Aluminium Limited's automobile wheel casting plant at Bell Bay, and Australian Glass Manufacturer's Company in Moonah.

16.7 ELECTRICITY SALES, TASMANIA (million kWh)

Purpose	*1988-89*	*1987-88*
Residential	944.8	938.9
Industrial	545.1	531.1
Hot water	565.9	578.8
Off-peak	247.2	250.2
Lighting	n.a.	113.4
Commercial	384.9	253.8
Bulk commercial	65.8	68.6
Major industrial	5 419.7	5 381.9
HEC use, unread meters	51.5	40.7
Total	8 224.9	8 157.4

Source: HEC Annual Report.

Total income for 1988-89 was $345.6 million, an increase of seven per cent over the figure for 1987-88 of $322.9 million. The net profit for the year of $10.3 million just exceeds the combined losses for the two previous years ($4.3 million in 1986-87 and $5.5 million in 1987-88).

An increase in retail tariffs, together with a small growth in energy consumption, contributed to an increase of 5.3 per cent in income from the retail sector (from $199.7 million in 1987-88 to $210.3 million in 1988-89). Income from the major industrial users rose by 10.4 per cent from $106.5 million to $117.6 mil-

lion in the same period. The sales in 1987-88 had been partially depressed by unusually warm weather conditions in the early part of the winter.

16.8 ELECTRICITY CONSUMERS, TASMANIA

	Number	
Consumers	*1989*	*1988*
Residential	175 472	172 109
Public utilities	5 062	4 816
Industrial	17 761	17 306
Commercial	15 865	15 549
Major industrial	21	18
Miscellaneous	1 563	1 729
Total	215 744	211 527

Source: HEC Annual Report.

16.4.2 Water Storage

Total water storages at the end of 1988-89 were 34.9 per cent compared with 29.7 per cent the previous financial year. Rainfall in one month (October 1988) boosted storages by 10.8 per cent.

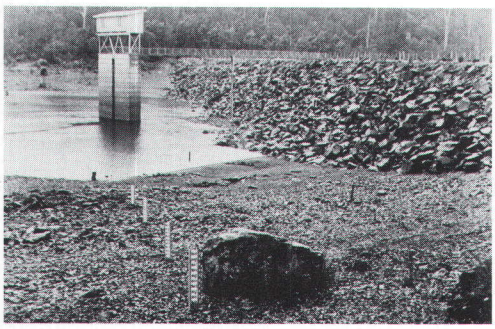
The total energy equivalent in HEC water storages was 5 021 gigawatt hours at 1 July 1989. This compares with 4 281 gigawatt hours the previous year.

In April 1990, the HEC's West Coast water storages dropped to below 25 per cent of capacity and fuel costs for the 240 megawatt thermal power station at Bell Bay were expected to top $40 million. Bell Bay can supply 20 per cent of the State's power needs but uses more than 30 000 tonnes of fuel each month (at a cost of $2 million a week).

16.9 POWER STATION OUTPUT (excluding King and Flinders Islands)

	Energy (MW.h)		*Average load (MW)*		*Peak load (MW)*	
Power station	*1988-89*	*1987-88*	*1988-89*	*1987-88*	*1988-89*	*1987-88*
Waddamana	4 933	2 086	0.6	0.2	20.3	20.0
Butlers Gorge	70 045	80 856	8.0	9.2	12.1	12.2
Tarraleah	603 800	672 362	68.9	76.5	91.0	91.0
Lake Echo	53 597	125 212	6.1	14.3	34.0	34.5
Tungatinah	517 282	499 159	59.1	56.8	132.5	132.5
Liapootah	450 005	448 690	51.4	51.1	87.0	87.0
Wayatinah	262 555	262 520	30.0	29.9	44.0	43.0
Catagunya	232 012	228 691	26.5	26.0	49.0	48.0
Repulse	146 798	142 645	16.8	16.2	32.0	32.0
Cluny	90 430	85 722	10.3	9.8	19.0	19.0
Meadowbank	182 745	167 503	20.9	19.1	42.0	42.0
Poatina	810 328	1 761 104	92.5	200.5	342.0	347.0
Trevallyn	533 856	469 669	60.9	53.5	84.0	83.5
Tods Corner	9 543	9 295	1.1	1.1	1.5	1.4
Fisher	293 581	159 064	33.5	18.1	47.0	47.0
Rowallan	39 323	30 460	4.5	3.5	11.1	9.5
Lemonthyme	335 120	220 996	38.3	25.2	58.0	58.0
Wilmot	146 341	97 357	16.7	11.1	32.5	33.0
Cethana	443 545	290 917	50.6	33.1	99.0	100.0
Devils Gate	331 702	215 994	37.9	24.6	66.5	65.0
Paloona	146 918	94 031	16.8	10.6	32.0	33.0
Gordon	1 577 312	1 481 688	180.1	168.7	387.0	389.0
Bell Bay (thermal)	58 577	55 200	6.7	6.3	240.0	120.0
Mt Lyell	—	443	—	0.1	—	3.7
Mackintosh	326 942	242 303	37.3	27.6	92.0	87.0
Bastyan	351 058	251 746	40.1	28.7	81.5	80.0
Reece	890 146	687 446	101.6	78.3	240.0	240.0
Total system	8 908 494	8 783 159	1 017.0	999.9	1 450.5	1 345.6

With 11 of the past 14 years recording lower-than-average rainfall, Tasmania's major hydro catchments are at levels similar to late 1966, just prior to the disastrous 1967 bush fires. Lake Gordon in the South-west is holding only 12.5 per cent of its capacity and Lake King William is at 15 per cent capacity. If these levels were to continue on into the summer, then power rationing would be necessary.



Water level markers and the outlet valve at Lake Echo. Photo: Mercury

The HEC had to fire up the second of the two 120 megawatt generators at Bell Bay in January 1990. The first unit was put into action in November 1989. Low-sulphur fuel for the power station is shipped from the United States and stored at the 45 000-tonne storage tanks at Bell Bay.

16.4.3 Operating Expenses

Operating expenses decreased by 0.8 per cent from $702.3 million in 1987-88 to total $101.4 million in 1988-89, while financial charges decreased by 6.2 per cent to $150.9 million.

During 1988-89, $145.95 million was spent on capital works bringing the total capital expenditure to date to $2 091.9 million.

16.11 HYDRO-ELECTRIC COMMISSION CAPITAL EXPENDITURE ($m)

Project	*1988-89*	*1987-88*
Anthony Power Development	44.85	37.94
King River Power Development	70.68	56.72
Gordon Power Station No. 3 machine	—	10.00
Bass Strait islands reticulation	0.22	0.43
Power station extensions	0.70	1.49
Substations	2.43	10.02
Transmission lines	1.86	2.63
Distribution systems & services	20.79	17.31
Sundry buildings	4.99	11.98
Stores, general plant etc.	4.16	5.48
Construction equipment	- 4.74	- 4.02
Total	145.95	150.0

16.10 HEC WATER STORAGES AT 1 JULY

	Useful water in storage (megacubic metres)		*Energy equivalent (gigawatt hours)*		*Proportion of full energy (per cent)*	
	1989	*1988*	*1989*	*1988*	*1989*	*1988*
Lake Augusta	1	1	2	2	4	3
Great Lake	1 216	854	2 589	1 819	39	28
Arthurs Lake	237	197	419	348	58	48
Lake St Clair	149	156	200	209	76	80
Lake King William	101	39	136	52	19	7
Lake Echo	279	187	488	327	55	37
Tungatinah	23	24	31	32	28	28
Lake Mackenzie	5	8	11	18	24	40
Lake Rowallan	16	26	15	25	13	22
Lake Pedder	12	54	4	21	3	13
Lake Gordon	2 987	3 693	1 124	1 410	24	31
Lake Murchison	—	16	—	8	—	25
Lake Mackintosh	4	20	2	10	2	7
Total	5 030	5 275	5 021	4 281	34.9	29.7

16.4.4 Major Construction Projects

Under construction, with an estimated total cost of more than half a million dollars, were the King River and the Anthony power developments, both on Tasmania's West Coast.

To take into account the availability of capital and a lower load forecast, the Commission reprogramed the completion dates of the King scheme to March 1992 and the Anthony scheme to mid-1994. This involved some reduction in employment.

At the King site, manpower was reduced from 682 to 404 by natural attrition and voluntary redundancy.

King River Power Development

At the Crotty damsite, the main activities in 1988 included the virtual completion of the river diversion tunnel, inlet structure and dewatering shaft.

Work on the seven-kilometre-long King headrace tunnel, which runs beneath Mt Jukes to the King Power Station, was completed in 1989. This tunnel will carry water from Lake Burbury in March 1992. It was 'holed through' four months ahead of schedule.

At the King Power Station, the foundation and walls were completed in 1989 and the roof was being erected. Preparations for the installation of the turbine were underway.

The creation of Lake Burbury meant that the Lyell Highway had to be diverted. It was rerouted to cross the lake at its narrowest point, where a major new bridge will span the lake.

Anthony Power Development

At the Anthony site, the workforce was reduced from 548 to 361 with no forced retrenchments.

At the Henty Dam the final concrete pour was completed in May 1988 and the diversion closure took place in July 1988. Water was diverted to Lake Murchison via the Henty Canal and the Anthony River for the Pieman River Power Development.

The Henty Canal is also receiving water from the newly completed White Spur Dam and Canal. Tunnelling began in 1989 for access to the Anthony underground power station and the seven-kilometre-long Anthony headrace tunnel. At Newton Creek, the pump station building was completed and the installation of pumps and motors was well advanced.

During the year, work continued on access roads to the Anthony Power Station and headrace tunnel access portals.

16.4.5 Future Expansion

Annual load growth has fluctuated markedly in recent years. There have been shifts between high and low growth in both the major industrial and retail sectors. State population growth is slow and unemployment relatively high. These factors, together with higher foreign exchange rates and high interest rates have created an economic climate in which industry is having difficulties reaching decisions about new developments.

Under these conditions an annual load growth of between one and two per cent would be a reasonable forecast. The Commission reviewed its long term load forecast during the 1987-88 year. However, at this stage there is not sufficient evidence to upgrade the previous forecasts and overall it remains unchanged.

16.12 HEC FORECAST EXPANSION, TASMANIA (MW)

Year	*1990*	*1995*	*2000*
Average load	1 063	1 160	1 227
Peak load	1 476	1 598	1 691

Investigation of future power scheme options is an on-going function. During the year investigations continued to define the cost and scope of such hydro-electric options as the Lower King, Que, Lake Augusta and King Racelines, and potential redevelopment of old existing schemes at Tarraleah and Lake Margaret.

In addition, analysis continued on the costs of energy production from a range of options including thermal, wind power and wave power. Also considered were the prospects of improving the efficiency of the system by reducing generation and transmission losses.

Liquid Fuels from Oilseed in Tasmania*

Tasmania is the only Australian State with neither petroleum resources nor petroleum refining capacity. It is also the only State without access to supplies of natural gas. It is dependent entirely on imports for hydrocarbon fuels, and in particular for all liquid fuels for transport applications.

It is clear that energy planning for Tasmania must take stock of any resource within the State which might yield liquid fuels. All such resources are, therefore, to be identified and measured, and the cost of producing fuels from each is to be estimated: oilseed is one such potential energy source.

Although the search for substitutes for petroleum fuels has been extended to vegetable oils relatively recently, their potential has long been recognised. Rudolf Diesel claimed in 1912 that: 'The use of vegetable oils for engine oils may seem insignificant today. But such oils may become, in the course of time, as important as petroleum and the coal tar products of the present time.'

The properties of vegetable oils generally make them more suited to compression ignition (diesel) engines than spark ignition (petrol) engines.

Through the process of transesterification, an ester with fuel properties approximating those of automotive diesel oil can be produced from vegetable oils. Esters have been shown to be usable fuel sources for compression ignition engines and do not appear to adversely affect performance. The esters of vegetable oils have solvent properties when in contact with thermoplastics and also oxidise copper. Further work is required to evaluate fully the effects of the ester fuel on engines, including the investigation of corrosion problems, coking and lubricant oil dilution.

At present no major oilseed crops are grown in Tasmania. Only two oilseed crops are suitable for Tasmanian conditions: these are rapeseed and sunflower seed. Some cropping of rapeseed and sunflower seed has been undertaken in the past, but low harvesting yields and the high transport costs associated with sending the seeds to mainland processing mills made returns to farmers uneconomic. Sunflower crops are subject to bird damage and are less viable economically than rapeseed as a source of oil.

Breeders inspecting 'Canola', a high quality variety of rapeseed, in flower.

Liquid Fuels from Oilseed in Tasmania - *continued*

In pursuing the costs of possible fuels, the food uses of vegetable oils, or the impact of oilseed cultivation on other cash crops, has not been considered. It has been assumed that to grow oilseed will be a business decision, made by individual farmers, which will depend on such factors as land suitability and current cropping returns.

About 35 000 hectares of arable land in Tasmania could be used for oilseed cultivation each year without the displacement of existing crops. A rapeseed crop has been estimated to yield about three tonnes of seed per hectare. The extraction of vegetable oil from rapeseed in Tasmania appears to be economic. Consequently, the establishment of an oilseed industry, including an extraction plant, could be beneficial to the Tasmanian economy.

The presence of the extraction plant within the State would enable up to 20 per cent of the current automotive diesel oil usage to be replaced by vegetable oil should a sustained shortage of transport fuel arise in the future. The estimated cropping area of 35 000 hectares would yield between 70 000 and 105 000 tonnes per annum of oilseed. Returns to oilseed growers would be about the same as for peas.

Oil extraction is economic only when undertaken in a central plant. Up to two large solvent extraction plants could be established with an output oil cost of about $779 per tonne. This would be competitive with similar plants on the Australian mainland and compares with prices of about $900 per tonne for vegetable oils on the food market.

The wholesale ester fuel cost at the retail outlet (exclusive of taxes and based on the assumed private sector rate of return) is about 64 cents per litre, assuming all the oilseed meal can be sold on the world market. A price based on this figure is not competitive. At an estimated cost of $1.46 per litre, farm-sale ester production is not currently economic.

**This article is an extract from Energy Planning Discussion Paper No.3, Hydro-Electric Commission.*

Energy Planning

The Hydro-Electric Commission continued investigation of the State's energy resources during 1987-88 and 1988-89.

Priority was given to the means of reducing the extent to which the State is dependent on imported liquid fuels.

Tanker 'Iron Gippsland' at Bell Bay discharging 33 000 tonnes of low-sulphur fuel for use at the thermal power station.
Photo: Advocate

This led to the publication of two discussion papers, *Liquid Fuels from Oil Shale in Tasmania* and *Liquid Fuels from Oilseed in Tasmania*, covering the use of local resources as possible sources of transport fuels.

In 1989 the Commission also issued a discussion paper on *Demand for Firewood for Domestic Use in Tasmania* to complement an earlier report on *Energy from Wood in Tasmania.* These may be used to form the basis for policies which will improve the reliability and cost stability of firewood supplies in this State.

A further discussion paper *Battery Powered Electric Vehicles in Tasmania* was issued during the year. A further paper, *Methanol from Black Coal in Tasmania,* is well advanced, and will show how methanol might be used in the future as a substitute for petrol and automotive distillate.

The HEC Energy Advisory Centre has conducted a Government Energy Management Program which has reduced electricity costs in

State Government buildings by about $3.2 million annually (from the base year 1981-82).

The HEC has become involved in energy audits at large companies, including Pasminco-EZ at Risdon, and in smaller businesses. The audit involves a survey of what power a firm uses, how it is used and how it could be used more efficiently.

The Commission continued to represent the State on a number of national bodies concerned with energy matters. These include the National Advisory Committee, the National Fuels Emergency Consultative Committee, and the National Oil Supplies Advisory Committee.

16.5 RESEARCH

The Hydro-Electric Commission, together with research institutions such as the University of Tasmania and the TSIT, is involved in ongoing energy research programs. These programs have looked at ways of improving the efficiency of energy use in Tasmania as well as alternative sources of energy.

Recent HEC programs have investigated wave, wind and solar power as alternative energy options; evaluated industrial wood-fired energy systems; monitored the performance of domestic heat pumps; and collected and analysed data on distribution load patterns for transformer substations and on individual domestic residences.

Wave Power

Following discussion and exchange of information with several organisations, the Commission received three proposals for the construction and operation of a wave power plant on King Island.

After some year's research and negotiations, arrangements were finalised with a Norwegian company, Norwave, to study the feasibility of the construction of a wave power plant on the island. If built, the plant will be a first for Australia and will supply a considerable part of the island's electrical energy requirements.

The proposed development would be similar to one built on the west coast of Norway. Wave energy is used to lift sea-water up a tapered concrete channel into a small reservoir. From here it is released through a hydro-electric power station back into the sea.

The proposed 1.2MW wave power plant on King Island is similar to this one constructed in Norway.

Tidal Power

To harness the power of tides, large (and expensive) barriers need to be built across tidal estuaries and bays. Reversible flow turbines make use of incoming and out-going tides. An average of about eight megawatts could be obtained by harnessing the tidal power of the Tamar Estuary.

Wind Energy

The performance of the operational privately owned wind turbine now operating on Flinders Island is being monitored as part of the Commission's continuing wind power studies.

Problems associated with generating electricity from wind relate mainly to lack of control over when the wind blows. Electricity is not produced on still days. Large areas of land are needed for wind farms and some people object to their appearance and the noise they make. Despite these problems wind turbines are now cheaper than other ways of generating power in some remote areas.

Data Loggers

These units, developed within the Commission to help measure customer load patterns, are also proving useful in other areas.

Data gathered are being used as a basis for simulating loads on distribution transformers. This will result in better use of feeder and transformer capacity. In 1989 about two hundred customers had data loggers installed at their premises to measure energy use under the different tariffs.

Natural Gas Power Station

A new power station, using natural gas from the Yolla gas and oil field, is being considered for the North-West Coast. The Yolla field, discovered five years ago, is 90 kilometres north of Burnie. If built, the new station is likely to be sited near Burnie and cost more than $150 million. The Yolla field is rich in light oils, enough to meet 40 per cent of the State's petroleum and 140 per cent of its LPG requirements.

16.6 REFERENCES

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