

ENERGY AND MINING

ENERGY

Department of Industry, Technology and Resources

The Department of Industry, Technology and Resources merges the functions of the former Departments of Industry, Commerce and Technology, and Minerals and Energy. The Department promotes the effective use of Victoria's resources for the long-term benefit of the community; and aims to achieve growth and international competitiveness for Victorian industry.

The Minister for Industry, Technology and Resources is responsible for the administration of a number of Acts of Parliament. A list of these Acts can be found on pages 82-3 of this *Year Book*. The administration of this legislation relates to minerals, stone, groundwater, petroleum, and pipelines.

Subject to the Minister, the Department of Industry, Technology and Resources provides support services directed at maximising the productive use of the State's mineral and petroleum resources. The Department also develops policies, and plans procedures and programmes relating to the development and utilisation of Victoria's energy resources. A more complete description of the Department and associate agencies may be found in Chapter 17 of this *Year Book*.

The Department plans, monitors, co-ordinates, and implements energy policies and delivers energy conservation programmes. The Victorian Government has established a comprehensive energy planning programme which has two major functions. First, the formulation of a series of energy policy statements on specific energy issues were released for public comment, and a consolidated, major policy statement has been released (*Victoria's Energy: Strategy and Policy Options*). Second, the programme involves the continuous review, co-ordination, and integration of energy planning within Victorian Government agencies, including integration of the Government's economic, urban, and environmental policies.

Key issues in current energy planning are: to develop and maintain effective and equitable energy pricing policies; to improve the efficiency of portfolio agencies by means of management reforms; to develop new uses, and encourage the most appropriate uses of Victoria's energy resources; to avoid costly over-supply or under-supply of electricity, natural gas, and transport fuels by means of flexible planning strategies and the promotion of more efficient usage; to promote energy conservation; and to develop renewable energy resources such as solar energy, wind power, tidal energy, and fuels produced from biomass and wastes.

A Coal Policy Unit has been established to administer all coal leasing and provide advice on coal policy matters. It is intended that coal leasing and allocation be maintained within a consistent State wide framework of energy policy and resources law.

Two programmes have been developed to promote energy conservation – the Home Energy Advisory Service, and the Government Energy Management Program. The Home Energy Advisory Service has been established as a free service available to householders; at present the service is available in the Melbourne metropolitan area to holders of Commonwealth health cards. For eligible households an assessment is made of the patterns of energy use in the home. This assessment identifies the means by which energy may be saved without any reduction in comfort levels. The Service can provide a grant of up to \$250 for energy saving improvements to a home.

The Government Energy Management Program has been set up to promote management of energy in Victorian Government agencies and in the operation of their transport fleets.

The Department conducts geological, groundwater, coal, petroleum, stone, and mineral surveys; produces geological maps; and issues scientific reports. Drilling operations are carried out and the

results are used in sedimentary basin studies and in the evaluation of petroleum, mineral, coal, and groundwater potential. A comprehensive library and a geological museum are maintained; a core library retains cores and cuttings from drilling operations. The administration of petroleum, pipeline, mining, and extractive industry legislation ensures that exploration for, and the production of, minerals and petroleum (both on-shore and off-shore), and quarrying are regulated and controlled.

Technical advice is available for mineral exploration and prospecting. Six stamp batteries located at Bendigo, Wedderburn, Maldon, Rutherglen, Mount Egerton, and Bright, provide an ore crushing service to enable test crushings to be carried out at nominal cost. Information is available on mining law and on mining and quarrying statistics. Reclamation of mine-damaged land is undertaken in areas where such action is essential.

General

Management of energy

Victoria has huge resources of energy. Beneath relatively shallow layers of overburden throughout a large part of Gippsland are an estimated 70,000 megatonnes of readily available brown coal. Beneath the waters of Bass Strait are reserves of gas which should last at least thirty years at the current level of consumption. Oil reserves there, although probably limited to a life-span of a further twenty-five years, are currently providing seventy-two per cent of Australia's refinery requirements. Solar energy (and its derivatives) is limited in its usefulness by the technology currently available to harness it; work is progressing in this field.

An Energy Planning Task Force, representing all the energy agencies of the industry, technology and resources portfolio was set up to commence building the framework for a Victorian energy plan. This work culminated in the publication of the report, *Victoria's Energy: Strategy and Policy Options*. Other co-ordinating bodies are the Victorian Energy Development Committee, which oversees the Victorian Energy Advisory Service and co-ordinates all energy information and education services; and the Customer Policy Implementation Committee, which is developing improved and co-ordinated customer policies for the energy utilities, such as the provision of easier ways for energy customers to pay their gas and electricity accounts.

The Coal Corporation of Victoria was formed on 1 January 1985 to absorb the research and development role of the former Victorian Brown Coal Council, and to promote future coal development.

The *Nuclear Activities (Prohibitions) Act* 1983 prohibits the exploration for, and mining of, uranium, the establishment of nuclear facilities, including power reactors, and the possession of nuclear material without appropriate licences.

Brown coal

Location

Victoria's largest resources of fossil fuels are the huge deposits of brown coal in the Central Gippsland region. These deposits, which form the bulk of primary energy available to Victoria, are comparable in extent with other major deposits of brown coal in the world. Smaller deposits exist in other areas in south-eastern Victoria at Gelliondale, Alberton, and in the south-central region at Anglesea, Bacchus Marsh, and Altona.

The total brown coal resources are assessed at 202,000 megatonnes, or approximately two million petajoules (PJ) of energy, of which 70,000 megatonnes (or some 700,000 PJ) is regarded as readily accessible reserves, which are defined as coal in seams greater than three metres thick, less than 300 metres deep, and with overburden to coal ratio of less than 2:1. Most seams, in fact, are much thicker than three metres (commonly 100 metres), and lie under shallow overburden (as little as 30 metres in some areas). Victorian brown coal reserves account for about one-quarter of Australia's readily available fossil fuels in terms of energy content.

To date less than two per cent of these reserves have been used. Brown coal production by the State Electricity Commission of Victoria from the La Trobe Valley amounted to 37.1 megatonnes in 1984-85. Production from the Alcoa mine at Anglesea remained constant at about 1.2 megatonnes: this coal is used to produce electrical power for the Company's aluminium smelter at Point Henry, near Geelong. Australian Paper Mills Ltd produced 89,500 tonnes of coal from their Bacchus Marsh field during 1984-85 for use in their Fairfield plant.

*Other uses for brown coal**Briquettes*

Raw brown coal is heated and compressed into regular shaped pellets of a convenient size called briquettes to produce a high grade solid fuel having a moisture content of about 15 per cent. Briquettes are transported more economically than raw coal. They are used in power stations and as a stock fuel for the production of char, and may be used to produce liquid hydrocarbons and town gas. Only coal from the Yallourn open cut is used for making briquettes: approximately three tonnes of raw coal are used to produce a tonne of briquettes, including the coal used for raising steam in the process of drying. The production of briquettes was 802,000 tonnes in 1984-85.

Char

Char is a form of high-grade carbon made by the carbonisation of brown coal. It can be used as a source of carbon or as a reducing agent in chemical and metallurgical industries. There are two privately owned plants operating in Victoria at present for the production of char. Both are in the La Trobe Valley, and both purchase briquettes and small amounts of brown coal from the State Electricity Commission. The larger plant, at Morwell, has an output capacity of 60,000 tonnes a year.

Conversion

The brown coal deposits are large and easily accessible, and the coal has been shown to be amenable to the process of gasification, pyrolysis, solvent refining, and hydrogenation. The potential for its conversion has been widely recognised, and a number of proposals are under consideration. The most significant of these, a recently commissioned pilot plant at Morwell, tests the technology used in the production of liquid hydrocarbons. The plant is being operated by Brown Coal Liquefaction (Victoria) Pty Ltd, a wholly owned subsidiary of Nippon Brown Coal Liquefaction Limited, a consortium of five Japanese companies. The plant processes fifty tonnes of dried coal per day.

Combustion

Raw brown coal is burned in power station boilers with *in situ* milling and flue gas drying. When pulverised, it may be burnt in fluidised bed boilers; after drying it may be used in a variety of furnaces or boilers. The net wet specific energy of Victorian brown coal varies from about seven to thirteen gigajoules per tonne, depending on location.

Other

It is feasible to produce a wide variety of chemicals from brown coal, either directly or by gasification and synthesis. The high surface area of brown coal makes possible the production of high quality active carbons, while its ion exchange properties have been applied to metal recovery and absorption processes. Victorian brown coal has also been demonstrated to be an effective soil conditioner.

Electricity*State Electricity Commission of Victoria*

The State Electricity Commission of Victoria (SEC) is a semi-government authority with the principal responsibility of generating or purchasing electricity for supply throughout Victoria (which has an area of approximately 228,000 square kilometres). It may own, develop, and operate brown coal open cuts and briquetting plant and develop the State's hydro-electric resources. It is required to meet all expenditure involved with operating its power and fuel undertakings and to provide for statutory transfers to the Consolidated Revenue of the State. In 1984-85, operating revenue was \$1,621m. At 30 June 1985, it had net fixed assets of \$6,126m and a staff of some 22,500.

The SEC was established by an Act of the Victorian Parliament in 1921 and now operates under the *State Electricity Commission Act 1958*. Since it began operating, the SEC has expanded and co-ordinated the generation, purchase, and supply of electricity on a State wide basis to the stage where its system provides almost all the electricity produced in Victoria and its transmission covers almost the entire population of the State. At 30 June 1985, it distributed electricity directly to 1.42 million customers and indirectly to a further 277,800 through eleven metropolitan councils which buy power in bulk for retail distribution under franchises granted by the Victorian Government before the SEC's establishment.

Existing electricity system

Of the State's recoverable fossil fuel reserves, brown coal represents 94.6 per cent, natural gas 2.6

per cent, and oil 2.8 per cent. The SEC has committed itself to increasing the proportion of total Victorian electricity requirements satisfied with coal-based energy.

Victoria's electricity system is based upon the State's extensive brown coal resource in the La Trobe Valley, 140 to 180 kilometres east of Melbourne in Central Gippsland, which is one of the largest single brown coal deposits in the world.

The coal is young and soft with a moisture content between 60 to 70 per cent, and occurs in thick seams from relatively close to the surface to a depth of several hundred metres. The coal can be won continuously in large quantities and at low cost by specialised mechanical plant.

The major brown coal fired generating plants in the system are the 1,600 MW Hazelwood and 1,450 MW Yallourn 'W' power stations. Other brown coal-fired plants are Morwell (170 MW) and Yallourn 'D' and 'E' (340 MW). These stations are all located in the La Trobe Valley and generate three-quarters of the State's electricity requirement. Yallourn 'C' (106 MW) ceased operation on 30 September 1984.

Other thermal stations are Jeeralang (465 MW) gas turbine station in the La Trobe Valley and Newport 'D' (500 MW) gas fired station in Melbourne. There are hydro-electric power stations in north-eastern Victoria: Kiewa (184 MW), Dartmouth (150 MW), and Eildon/Rubicon/Cairn Curran (135 MW). Victoria is also entitled to about 30 per cent of the output of the Snowy Mountains hydro-electric scheme and half of the output of the Hume hydro-electric station near Albury.

The SEC's total installed generating plant capacity at 30 June 1985 was 6,603 MW, including both capacity within the State and that available to it from New South Wales. In 1984-85 electricity generated by the SEC in its thermal and hydro-electric power stations and purchased totalled 27,339 GWh.

Power station construction

Construction of the Loy Yang 'A' power station complex south-east of Traralgon in the La Trobe Valley was authorised by the Victorian Government in 1976. Coal-fired, Loy Yang will provide base load electricity for the Victorian grid and almost double the State's generating capacity. The project nominally comprises two 2,000 MW power stations, Loy Yang 'A' and Loy Yang 'B', in eight 500 MW units. The first two units of Loy Yang 'A' came into service in 1984 and 1985.

POWER STATIONS' LOCATION, RATING, AND PRODUCTION, VICTORIA

Station	Maximum output achieved (MW)		Electricity generated (GWh)	
	1983-84	1984-85	1983-84	1984-85
Brown coal thermal stations -				
Hazelwood	1,210	1,200	6,829	7,565
Yallourn	408	360	2,042	1,501
Yallourn W	1,472	1,452	8,248	8,375
Morwell	160	152	1,059	868
Loy Yang A	534	1,000	376	4,057
Total	..	..	18,554	22,366
Other thermal stations -				
Newport D	501	500	3,210	2,097
Spencer Street	60	..	2	..
Jeeralang	505	507	1,377	833
Total	..	..	4,589	2,930
Hydro stations -				
Kiewa	201	199	337	282
Eildon-Rubicon (incl. Cairn-Curran)	102	116	189	232
Dartmouth	108	133	6	11
Total	..	..	532	525
Stations operated by other bodies	1,455	1,391	2,077	1,518
Total input to system	..	..	25,752	27,339
Electricity generated for export and pumped storage operation	..	..	520	1,347
Victorian system requirement	..	..	25,232	25,992

Source: State Electricity Commission of Victoria, *annual reports*.

Transmission and distribution

Except for some isolated and remote areas of the State, the distribution of electricity throughout Victoria has been completed. Main transmission is by 500, 330, 220, and 66 kV transmission lines which supply the principal distribution centres and interconnection between generating sources. Three 500 kV transmission lines and six 220 kV lines link the La Trobe Valley stations with Melbourne and the State grid while three 300 kV lines provide the interstate link with New South Wales, two of these through the Snowy scheme.

Major development of Victoria's transmission system in 1984-85 included completion of the second and third 500 kV lines from Loy Yang power station to Hazelwood terminal station. Construction of a 500 kV line between Sydenham and South Morang to reinforce supply to the western area of the State was completed in December 1984. Construction of a 220 kV line between Moorabool, near Geelong, and Ballarat came into service in October 1985. Construction of a fourth 500 kV transmission line between the La Trobe Valley and Melbourne began in October 1985.

Petroleum*Exploration*

Exploration for petroleum has been carried out in Gippsland since the 1920s, and almost continuously in the offshore waters of the Gippsland Basin in eastern Bass Strait since 1960.

During recent years there have been some investigations of sediments beneath those in which hydrocarbons have been previously located. Discoveries from these investigations, although small, are important at a time when oil supplies from the known reservoirs are becoming depleted. They confirm the potential existence of oil and gas reservoirs in deeper sediments.

A major investigation into the oil and gas potential of the Otway Basin, which commenced in 1984 as a joint project, has been completed. Participants in this project are the Department of Industry, Technology and Resources, Victoria; Department of Mines and Energy, South Australia; Mines Department, Tasmania; and the Commonwealth Bureau of Mineral Resources.

At 31 December 1985, there were 16 Petroleum Exploration Permits, and 1 Production Licence onshore in Victoria; offshore, there were 6 Exploration Permits for Petroleum, and 12 Production Licences for Petroleum. All of the Production Licences are held by Esso-BHP. In addition, two offers of Petroleum Exploration Permits have been made by the Minister.

Development of Bass Strait fields

The initial stage of development took place between 1967 and 1971, when the four commercial fields discovered at that time were developed as an integrated system. These were the Barracouta and Marlin gasfields, and the Halibut and Kingfish oilfields, together with a small oil reservoir in the Barracouta field. This resulted in the construction of the five first-generation platforms.

The second stage of development took place from 1973 onwards, with construction of three second-generation platforms and the completion of one sub-sea well. The sub-sea well has since been abandoned.

Four third-generation platforms have now been constructed, bringing the total number of platforms in Bass Strait to twelve. Construction of a thirteenth platform has commenced. During 1983 and 1984 much activity was associated with the advancing age of the platforms and petroleum fields. This entailed strengthening of the foundations of three of the first generation platforms. The need to carry out this work arose from studies by Esso-BHP at the instigation of the Department of Minerals and Energy (now the Department of Industry, Technology and Resources). Gas lift and water handling facilities have now been progressively introduced on various platforms to boost declining oil-flow rates and remove increasing amounts of water which enters together with the oil as reservoirs are depleted.

EXPLORATION WELLS COMMENCED, VICTORIA, 1984-85

Well	Spud date (a)	Operator	Status	Depth drilled
Offshore Gippsland -				metres
Barracouta-5	22.1.85	Esso-BHP	Oil and gas well	1,770
East Kingfish-1	30.11.84	Esso-BHP	Oil show	2,638
Grunter-1	15.9.84	Esso-BHP	Oil and gas well	3,809

EXPLORATION WELLS COMMENCED, VICTORIA, 1984-85 - *continued*

Well	Spud date (a)	Operator	Status	Depth drilled
Omeo-2	12.5.85	Aust. Aquitaine	Aborted	293
Omeo-2A	15.5.85	Aust. Aquitaine	Dry	3,400
Perch-2	11.2.85	Esso-BHP	Oil well	1,321
Speke-1	14.6.84	Aust. Aquitaine	Dry	2,772
Tuna-4 (b)	18.5.84	Esso-BHP	Oil well	266
Turum-3	8.3.85	Esso-BHP	Oil and gas well	2,996
Whiting-2	23.4.85	Esso-BHP	Oil well	3,550
Onshore Gippsland -				
Comley-1	17.6.85	Mincorp	Dry	528
Fairhope-1 Otway	25.6.85	Mincorp	Dry	569
Barton Corner-1	5.4.85	Beach	Dry	2,100
Fahley-1	28.4.85	Beach	Dry	3,211

(a) The date drilling commenced.

(b) Tuna-4 drilled a total of 3,321 metres, of which 266 were drilled during 1984-85.

Source: Department of Industry, Technology and Resources.

Production

During 1984-85, crude oil production reached its highest level ever (see table below) and consisted primarily of 19.2 million tonnes (24.0 gigalitres) of stabilised crude and 1.7 million tonnes (3.2 gigalitres) of LPG products. This was made possible by Commonwealth Government policy changes which forced local refiners to absorb given quantities of Bass Strait crude oil and allowed the export of crude oil produced in excess of local requirements. Other influencing factors were improvements at the gas processing and crude oil stabilisation plant at Longford, and a new drag-reducing additive in the main delivery pipelines which has permitted greater through-put with no additional pumping capacity.

**ROYALTIES FROM OIL AND GAS
PRODUCTION, VICTORIA
(\$'000)**

Year	Amount received	Amount paid to Commonwealth	Amount retained by Victoria
1979-80	132,639	43,337	89,302
1980-81	171,839	54,567	117,272
1981-82	159,760	52,321	107,439
1982-83	188,280	62,665	125,615
1983-84	257,937	84,245	173,692
1984-85	293,934	96,473	197,461

Source: Department of Industry, Technology and Resources.

CRUDE OIL PRODUCTION, VICTORIA (a)

Year	Barrels		Kilolitres	
	During year	Average barrels/day for year	During year	Average kilolitres/day for year
1979	149,790,661	410,385	23,790,661	65,180
1980	128,993,885	352,442	20,508,424	56,034
1981	134,281,582	367,895	21,349,102	58,491
1982	127,069,873	348,137	20,202,530	55,349
1983	137,337,035	376,266	21,834,881	59,822
1984	159,395,400	435,507	25,341,888	69,430

(a) After processing.

Source: Esso Australia Ltd.

Reserves

The Bass Strait oil and natural gasfields will supply Victoria and other markets with natural gas until well into the twenty-first century at the anticipated rate of consumption. It is estimated that an energy equivalent of 8 million terajoules will be available if new gasfields are not discovered. The crude oil reserves, equivalent to 8.5 million terajoules, will be seriously depleted by the late 1980s

unless new discoveries are made in Victoria and Australia during the next few years.

The crude oil from the Bass Strait oilfields is deficient in the heavier lubricating fractions and the main commercial derivatives are light petroleum liquids ranging from heating oil to motor spirit. Victoria and Australia still depend on overseas crude oil for production of medium to heavy lubricating oils.

The declared commercial reserves from the licence areas are lower than in 1981 (except for natural gas) because additional reserves have not been detected.

ESTIMATED HYDROCARBON RESERVES, VICTORIA (gigalitres)

Item	1981	1982	1983	1984
Crude oil	227	217	210	192
Natural gas	181	178	181	162
Condensate	29	28	23	21
LPG	61	59	51	47

1 gigalitre = 10⁹ litres.

Source: Bureau of Mineral Resources, Canberra.

Refining

The two refineries in Victoria are Shell Refining (Australia) Pty Ltd at Corio near Geelong, and Petroleum Refineries (Australia) Pty Ltd at Altona. Shell Refining (Australia) Pty Ltd also operates a plant at its Corio refinery for the production of lubrication oil. A third major refinery was built by BP Refinery (Westernport) Pty Ltd at Crib Point in 1965; this installation ceased to operate in April 1985. Refining capacity is set out in the following table:

REFINING CAPACITY, VICTORIA, AT 1 DECEMBER 1985

Refinery	Location in Victoria and year refinery came on stream	Primary processing capacity (a)
Shell Refining (Australia) Pty Ltd	Corio near Geelong 1954	110,000 to 132,000 BSD
(Lubricating oil plant)	Corio near Geelong 1954	5,000,000 tonnes/year
		3,000 BSD
		145,000 tonnes/year
Petroleum Refineries (Australia) Pty Ltd	Altona near Melbourne 1949	100,000 BSD
		4,670,000 tonnes/year

(a) BSD: barrels per stream day.

Source: *Oil and Australia*. Australian Institute of Petroleum Ltd.

Each refinery also imports crude oil from the Middle East for the production of special products including bitumen, asphalt, and certain other heavy products. A certain amount of light ends such as motor spirit and aviation jet fuel are also produced in the process of treating these imported crude oils.

Transportation

Indigenous processed crude oil is shipped by tanker from Long Island Point to refineries in Sydney and Brisbane and by pipeline to Victoria's two local refineries.

The refineries in Victoria import between 4.5 and 5 million barrels (0.7 to 0.8 million kilolitres) of crude oil each year from the Persian Gulf, and also import approximately 1.3 million barrels (0.2 million kilolitres) of wholly or partially refined products from overseas or from other States in Australia. Approximately 35 million barrels (5.6 million kilolitres) of wholly or partially refined products are exported to overseas destinations such as New Zealand or the Pacific Islands, or transported to other States within Australia.

Marketing

Motor spirit in two grades – 97 octane (super grade) and 89 octane (standard grade) – and a wide range of other petroleum products were marketed in Victoria during 1985 through a number of industry terminals, depots, and retail outlets, the majority of which are operated by the six major oil companies. The 89 octane standard grade has now been replaced by unleaded petrol, which was phased in from 1 July 1985. At 30 June 1983, Victoria had the capacity to store 3,246,200 kilolitres of crude oil and petroleum products in bulk at 21 installations (including refineries) in Melbourne (14), Geelong (1), Crib Point (1), Long Island Point (1), and Portland (4).

PRINCIPAL PETROLEUM PRODUCTS MARKETED, VICTORIA
(megalitres)

Item	1982	1983	1984
Aviation gasoline	16.02	15.37	14.59
Motor spirit –			
Super	4,017.28	3,995.06	4,134.21
Standard	262.75	227.18	205.11
Total	4,280.03	4,222.24	4,339.31
Power kerosene	4.73	3.96	4.20
Aviation turbine fuel	480.45	416.52	432.11
Lighting kerosene	31.80	28.01	25.45
Heating oil	98.33	87.46	75.75
Automotive distillate –			
Inland	1,251.71	1,276.79	1,342.43
Bunkers	43.78	5.75	6.94
Total	1,295.49	1,282.54	1,349.37
Industrial diesel fuel –			
Inland	40.59	38.67	92.64
Bunkers	81.17	54.36	55.77
Total	121.76	93.03	148.42
Fuel oil –			
Inland (a)	182.20	90.94	86.26
Bunkers	351.98	310.20	344.01
Total	534.18	401.14	430.27
Grand total (b)	6,862.79	6,550.27	6,819.46

(a) Excluding refinery fuel.

(b) Other petroleum fuels, including refinery oil, are no longer included as principal petroleum products marketed.

Source: Oil and Gas Division, Department of National Development and Energy, Canberra.

Liquefied petroleum gas (propane and butane)

Liquefied petroleum gas (LPG) is produced at the Esso-BHP fractionation plant at Long Island Point and by Victoria's two refineries. The principal distributor in Victoria is the Gas and Fuel Corporation of Victoria. A number of oil companies and other marketing companies also distribute LPG throughout the State in accordance with the provisions of the *Gas Franchise Act 1970*. The Long Island Point facilities produce over 75 per cent of the total production of LPG in Victoria. The establishment of the Long Island Point facilities is described in the 1977 edition of the *Victorian Year Book*.

Annual production of propane and butane at the Long Island Point plant is now approximately 2 million tonnes. The total storage capacity at the plant comprises six tanks, each of 10,000 tonnes capacity of either butane or propane and a 20,000 tonne capacity tank to store butane. Nearly all the production at Long Island Point is shipped to Japan, and over 80 per cent of Victoria's total LPG production is exported overseas.

Ethane gas

Ethane gas is produced at the Long Island Point fractionation plant and has, since 1972, been conveyed through a pipeline to the Altona Petrochemical Company Limited at Altona. Hydrocarbon Products Proprietary Limited at West Footscray have a plant using ethane gas as a feedstock, which is conveyed by pipeline from Altona.

Gas industry

The Gas and Fuel Corporation of Victoria is the largest gas undertaking in Australia, the sole reticulator of gas in Victoria, and a major marketer of liquefied petroleum gas (LPG). Constituted on 6 December 1950, it was formed by merging the interests of the privately-owned Metropolitan and Brighton Gas Companies with the State Government. (Through its predecessor, the Metropolitan, the Corporation is descended from the first gas company in Victoria – The City of Melbourne Gas and Coke Company founded in 1850 and incorporated in 1853.)

The merger gave the newly-formed Corporation an unusual status – that of a public authority owned jointly by the State and private shareholders. With its expanded capital structure, the Corporation was able to build a plant at Morwell to gasify indigenous brown coal, with the objective of improving Victoria's gas supply. Commissioned in 1956, the Lurgi high pressure brown coal gasification works

supplemented metropolitan gas production until the introduction of natural gas in 1969.

Commercial reserves of natural gas were discovered in the offshore Gippsland Basin in 1965 by Esso-BHP from whom the Corporation purchases, under agreement, the State's natural gas requirements.

Supply is drawn from the Marlin, Barracouta, and Snapper fields in Bass Strait, and transported by pipeline to an onshore treatment plant at Longford, near Sale. When specification quality has been achieved, the gas is measured by meter as it leaves the plant; this determines payment to Esso-BHP and royalties to government. Before it enters the Corporation's transmission system, an odorant is added to give the gas a distinctive smell, for safety reasons.

The Corporation reticulates gas, 99 per cent of which is natural gas, through a 20,000 kilometre network of underground transmission pipelines and mains to more than one million industrial, commercial, and domestic consumers.

At Highett, scientific work in support of the Corporation's operations and the gas industry generally is carried out in modern laboratory facilities, and a training complex undertakes field staff training requirements.

As a public body the Corporation has a responsibility to operate in accordance with economic and social objectives designated by the Victorian Government. The Energy Victoria Committee is an important part of the State Government's policy and is supported by the Corporation's Public Energy Services Department, designed to encourage energy conservation and provide assistance to low income energy consumers.

MINERALS

Geological Survey of Victoria

The Geological Survey of Victoria, formally established in 1856, was brought under the control of the Minister of Mines in 1867, and subsequently under the Minister for Minerals and Energy (September 1977), and the Minister for Industry, Technology and Resources (September 1985).

The early work of the Survey included detailed surface and subsurface geological mapping of the important goldfield areas. In the 1890s, studies were extended to the black coal deposits in South Gippsland, culminating in the discovery of the Wonthaggi coalfield in the early 1900s.

In the period from 1910 to 1920, the Survey intensified its mapping programmes, and undertook surveys of the brown coal deposits of the La Trobe Valley. The Department initiated the re-opening of the Morwell Open Cut at Yallourn North, and developed the brown coal fields as a source of fuel before this responsibility was transferred to the State Electricity Commission of Victoria in 1920.

In more recent times, the Survey has kept up with developments in petroleum exploration, groundwater investigation, engineering geology, palaeontology, stratigraphy, and extractive industries. Studies carried out on the tertiary stratigraphy and micropalaeontology of the onshore Gippsland Basin set a basis for the discovery of the oil and gas fields of Bass Strait during the mid-1960s. The Survey is also involved in salinity investigations of the Riverine Plains, and in the assessment of low grade geothermal energy (hot groundwater of 40°-80°C).

In summary, the main activities of the Survey are: the investigation of Victoria's geological structure, and mineral and groundwater resources, and the provision of basic information on these matters in the form of geological maps, reports, and advice to industry, the public, and Commonwealth and Victorian Government departments. The Survey also serves as geological consultant to government agencies, and provides scientific information for the appraisal, development, and conservation of Victoria's sub-surface resources.

Exploration

Expenditure on mineral exploration in Victoria by private companies totalled \$11.1m during 1983-84, 63 per cent of which was on gold exploration. In real monetary terms this was far less than the high levels of expenditure in 1981-82. Major exploration projects are underway in the Stawell, Ballarat, Bendigo, and Maldon goldfields, and many old gold mines in other parts of Victoria are being re-assessed.

Exploration in the Murray Basin has successfully delineated a number of heavy mineral deposits (rutile, ilmenite, and zircon) which have commercial potential.

Mineral and stone production

Mineral and stone production is summarised in the following tables. Of note is the sharp increase in the production of gold, which is the result of a combination of improved gold prices in Australia (due

to the decrease in the value of the Australian dollar in relation to overseas currencies), and the commissioning of the Wonga Open Cut at Stawell by the Western Mining Corporation and Central Norseman Gold Corporation Limited Joint Venture.

Establishments not subject to the Extractive Industries Act produced only \$8.5m or 4.6 per cent of the value of total Victorian stone production. These largely consisted of local government authorities and itinerant excavators producing gravel and other road construction materials. Demand for crushed and broken stone is high because of road building and construction activities in the La Trobe Valley, and the duplication or upgrading of the Hume, Princes, and Ballarat Highways.

MINERAL PRODUCTION, VICTORIA

Mineral	Unit	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Brown coal	megatonne	32.099	32.895	32.103	37.565	34.708	33.199
Metallic minerals –							
Antimony ore	tonne	—	—	—	—	—	376
Bauxite	tonne	1,965	1,143	3,123	8,493	8,585	12,829
Gold bullion (a)	kg	26	41	65	87	115	150
Iron ore	tonne	8,409	1,791	170	—	—	1,102
Non-metallic minerals –							
Diatomite (b)	tonne	378	634	634	1,499	682	538
Gypsum	kilotonne	201	277	370	416	88	207
Kaolin (b)	kilotonne	37	47	36	58	47	84

(a) Gold bullion is not yet refined and may contain small amounts of other metals such as silver.

(b) Refined and unrefined.

Source: Office of Minerals and Energy.

STONE PRODUCTION, VICTORIA, 1983-84

Item	Establishments operating (a)			Total Victorian production (b)	
	Number	Production	Value	Production	Value
		tonnes	\$	tonnes	\$
Clays –					
Brickclay and shale	26	998,968	2,644,367	998,968	2,644,367
Fireclay	3	4,661	51,861	4,661	51,861
White and other clays	6	38,413	102,712	38,413	102,712
Total	35	1,042,042	2,798,940	1,042,042	2,798,940
Crushed and broken stone –					
Basalt	48	9,837,600	88,771,996	9,852,900	88,804,961
Dacite, rhyolite, toscanite, and rhyodacite	7	1,888,154	17,262,704	1,888,154	17,262,704
Granite	14	882,766	8,355,683	896,210	8,428,282
Hornfels	12	707,314	5,441,325	707,314	5,441,325
Limestone	6	120,261	525,467	493,944	1,143,533
Sandstone	16	556,749	2,361,541	980,245	3,329,501
Quartz, shale, and schist	6	202,718	779,108	233,526	917,294
Total	109	14,195,562	123,497,824	15,052,293	125,327,600
Dimension stone –					
Granite, marble, slate, limestone, and sandstone	6	17,814	623,234	17,814	623,234
Earth and soil	20	234,052	1,249,200	278,987	1,342,868
Gravel	77	1,543,263	6,480,077	3,493,551	10,831,487
Limestone –					
For agriculture	12	98,048	1,112,730	98,048	1,112,730
For cement	2	1,348,205	4,699,129	1,348,205	4,699,129
For other purposes	1	12,754	53,439	12,754	53,439
Total	15	1,459,007	5,865,298	1,459,007	5,865,298
Salamander	9	367,762	973,307	375,412	988,607
Sand –					
For concrete	47	2,262,788	13,470,493	6,951,032	30,266,844
For other purposes	89	4,052,056	15,170,892		
Total	136	6,314,844	28,641,385	6,951,032	30,266,844
Scoria	20	1,007,534	4,650,815	1,183,651	5,120,359
Tuff	8	108,058	199,904	108,058	199,904
Other construction materials –					
Filling	15	508,919	1,238,897	628,387	1,478,833
Grand total (c)	450	26,798,857	176,218,881	30,590,234	184,843,974

(a) Establishments holding titles under the *Extractive Industries Act 1966*.

(b) Includes production from sources not subject to *Extractive Industries Act 1966*.

(c) This compares with 502 establishments operating during 1982-83.

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