THE PARLIAMENT OF THE COMMONWEALTH
OF AUSTRALIA

ENERGY USE, DISTRIBUTION AND CONSERVATION IN THE ACT

REPORT OF THE JOINT COMMITTEE ON THE AUSTRALIAN CAPITAL TERRITORY

JULY 1981

Australian Government Publishing Service Canberra 1981

ISBN 0 642 06732 5

Printed by C. J. Thompson, Commonwealth Government Printer, Canberra

TABLE OF CONTENTS

JOINT COMMITTEE ON THE AUSTRALIAN CAPITAL TERRITORY

The Joint Committee on the Australian Capital Territory was first appointed by resolution of both Houses of Parliament in 1957 and has been re-appointed in succeeding Parliaments. Both Houses resolved to appoint a Joint Committee on the last sitting day in 1956 but time did not permit the appointment of members. The present Committee was appointed for the life of the 32nd Parliament by resolutions of the Senate and the House of Representatives in December 1980.

The duties of the Committee as specified in its Resolution of Appointment are to inquire into and report on:

(a) all proposals for modification or variations of the plan of lay-out of the City of Canberra and its environs published in the *Commonwealth of Australia Gazette* on 19 November 1925, as previously modified or varied, which are referred to the committee by the Minister for the Capital Territory, and

(b) such matters relating to the Australian Capital Territory as may be referred to it by:

  (i) the Minister for the Capital Territory, or

  (ii) resolution of either House of the Parliament.

TERMS OF REFERENCE FOR THE ENERGY INQUIRY

The Committee is asked to consider and report on:

- review existing sources of supplies of energy for the A.C.T. and the outlook for demand and supply of energy for the A.C.T. in the future;
- measures which might be taken to develop and distribute future energy supplies and protect the A.C.T. from shortages or disruptions to energy supplies;
- an assessment of the adequacy or otherwise of delivery, distribution and storage facilities for petroleum and related products within the A.C.T. and the A.C.T. subregion; and
- initiatives which the Government, in its territorial and municipal role, should consider to encourage and facilitate energy conservation within the Territory, particularly with regard to liquid fuels, consistent with the Federal Government's national energy conservation programme.

MEMBERSHIP OF THE COMMITTEE IN THE 32ND PARLIAMENT

Chairman	Senator M. E. Reid[1]
Deputy Chairman	Mr K. L. Fry, M.P.
Members	Senator G. Georges
	Senator L. W. Neal
	Senator E. A. Robertson
	Mr J. M. Bradfield, M.P.
	Mr A. G. Dean, M.P.
	the Hon. J. D. M. Dobie, M.P.
	Mr N. J. Hicks, M.P.
	Mrs. R. J. Kelly, M.P.
Clerk to the Committee	Mr M. Adamson[2]

[1]Senator Reid was elected Chairman on 13 May 1981 following the death of Senator Knight who had been elected Chairman of the Committee at its first meeting on 4 December 1980. Mr K. L. Fry was Acting Chairman during the period 13 March 1981 - 13 May 1981.

[2]Mr Adamson replaced Mr Bergin as Clerk to the Committee on 18 May 1981.

MEMBERSHIP OF THE COMMITTEE IN THE 31st PARLIAMENT

Chairman	Senator J. W. Knight
Deputy Chairman	Mr K. L. Fry, M.P.
Members	Senator M. A. Colston
	Senator S. M. Ryan
	Senator B. C. Teague
	Mr W. E. Burns, M.P.
	Mr A. G. Dean, M.P.
	Dr the Hon. D. N. Everingham, M.P.
	Mr J. W. Haslem, M.P.
	Mr P. E. Lucock, CBE, M.P.
Clerk to the Committee	Mr P. F. Bergin

ABBREVIATIONS

AAIB	Australian Association of Independent Businesses
ACT	Australian Capital Territory
ACTEA	ACT Electricity Authority
ACTION	Australian Capital Territory Internal Omnibus Network
AGL	Australian Gas Light Company
ASA	ACT Automotive Services Association
BP	BP Australia Limited
Caltex	Caltex Oil (Australia) Pty Limited
CSIRO	Commonwealth Scientific & Industrial Research Organisation
CNG	Compressed Natural Gas
DAS	Department of Administrative Services
DCT	Department of the Capital Territory
DOT	Department of Transport
EVE-80	Electric Vehicle Exposition
H&C	Department of Housing and Construction
IDC	Interdepartmental Committee
LPG	Liquified Petroleum Gas
NCDC	National Capital Development Commission
ND&E	Department of National Development and Energy
NERDDP	National Energy Research Development & Demonstration Program
NECP	National Energy Conservation Program
RSPS	Research School of Physical Sciences (Australian National University)
Shell	Shell Company of Australia Limited
TJ	Tetrajoules

RECOMMENDATIONS

Recommendation 1

The Committee notes that drafting instructions have been prepared to amend the Fuels Control Ordinance as proposed by the Senate Regulations and Ordinances Committee and recommends that urgent action be undertaken to put these into effect. (para 55, p. 12)

Recommendation 2

The Committee is concerned about the delay in the formal establishment of the Fuels Use Advisory Committee and recommends that it be established without further delay. The membership of the Committee should comprise four representatives of the oil companies operating in the ACT, plus four service station representatives, the Fuels Controller and perhaps a representative from the House of Assembly or the community. (para 59, p. 13)

Recommendation 3

The Committee recommends that in any emergency declared under the Fuels Control Ordinance priority be given to providing fuel for the public transport system and emergency services. Private vehicles should be rationed on an 'odds and evens' system and a maximum limit able to be purchased at any one time should be set. (para 65, p. 14)

Recommendation 4

The Committee recommends that the ACTEA conduct a survey of the generating equipment within the ACT with a view to establishing whether or not there are adequate emergency facilities within the ACT. (para. 73, p. 16)

Recommendation 5

The Committee recommends that the Department of the Capital Territory investigate the possibility of providing funds to allow for the further development of electric vehicles. (para 93, p. 20)

Recommendation 6

The Committee recommends that the Minister for the Capital Territory take immediate measures to eliminate the petrol pricing differential between the ACT and NSW. (para 105, p. 22)

Recommendation 7

The Committee recommends that the DCT in association with the NCDC and the major energy suppliers establish an ACT Energy Information Centre to provide information to energy consumers. This centre should become the focal point in the event of a fuel emergency being declared. The work of the centre should be incorporated under the responsibilities of the Controller of Fuels. (para 113, p. 24)

Recommendation 8

The Committee recommends that the Government give priority to the feasibility study being undertaken on a possible railway link from Canberra to Gunning and further recommends that the Government expedite the provision of an XPT rail service between Canberra and Sydney. (para 141, p. 30)

Recommendation 9

To make the public more aware of energy conservation in housing the Committee suggests that the Housing Industry Association and the ACT Chapter of the Royal Australian Institute of Architects consider awarding annual prizes for energy conservation conscious design in housing. The Committee further recommends that the DCT and NCDC jointly prepare and promote a pamphlet on energy efficiency in housing and ways householders can achieve greater energy economies in their own homes. (para 157, p. 34)

Recommendation 10

The Committee recommends that the terms of reference for the IDC on conversion of government buildings from oil to natural gas be extended to that of energy conservation in government buildings and that it be made a standing committee. (para 169, p. 38)

Recommendation 11

The Committee is concerned at the lack of attention given to energy conservation and efficiency in school design and recommends that higher priority be given to maximising energy conservation in new designs for school buildings. (para 173, p. 38)

CHAPTER 1—INTRODUCTION

1. The availability of energy supplies is an important issue in today's society. Within the Australian Capital Territory (ACT) there have been several disruptions to petrol supplies as a result of industrial disputes. While these short term disruptions have caused inconvenience to local residents, they have also served to provide an insight into what may happen in the long term. It is generally acknowledged that Australia is fortunate in that it is richly endowed with a range of energy sources. However, the question of access to supplies of petroleum is one which looms large in the future for all Australians, particularly given the dependence on oil of the society of which Canberra is a part. It was against this background of short term disruptions to petrol supplies as well as the long term outlook for the availability of energy that this inquiry was undertaken.

2. The former Minister for the Capital Territory suggested on 15 November 1979 that the Committee inquire into energy supplies and related energy issues in the Territory. The Committee considered the terms of reference suggested by the Minister and proposed two minor amendments. These amendments were accepted by the Minister and he formally referred the question of energy supplies to the Committee for inquiry and report. The Committee formally accepted the inquiry at its meeting on 27 November 1979.

3. On 17 September 1980 the Committee reported to the Parliament that it had been unable to complete the inquiry during the life of the 31st Parliament. It recommended that the Committee be reconstituted in the 32nd Parliament and that the inquiry be referred to the new Committee. On 9 January the Minister for the Capital Territory referred the inquiry to the present Committee. The terms of reference for the inquiry which were the same as those which were referred to the previous Committee are set out on page iv.

4. The inquiry was advertised in the major metropolitan newspapers and the Committee invited a range of organisations and persons with an interest in energy supplies to make submissions. The Committee received 61 submissions and held its first public hearing of the inquiry on 24 March 1980. The previous Committee held five public hearings and this Committee held a further three. In all 69 witnesses representing 32 organisations appeared before the Committee. Appendix I contains a list of the witnesses who gave evidence. Appendix II lists the organisations which made submissions but were not called to give verbal evidence. The transcript of evidence taken at those hearings is available from the House of Representatives Committee Office and the National Library. Public hearings were held in Canberra, Sydney, Melbourne and Adelaide. In addition, the Committee held informal discussions with individuals and organisations with special qualifications in the field of energy supplies.

5. A representative of the ACT House of Assembly Standing Committee on Development appeared before the Committee at a public hearing on 12 May 1980 and outlined the Assembly's views on a range of energy matters. The Committee was provided with copies of the Report of the Standing Committee on Management of the ACT House of Assembly on the Fuels Control Ordinance 1979.

6. In this report the Committee has given special emphasis to energy conservation since it considers this issue to be of particular importance even though it is only one item in the terms of reference. Chapter 8 deals with conservation in transport, Chapter 9 with conservation in the home and Chapter 10 with conservation in commercial buildings. One chapter (6) deals with petrol prices, as the Minister for the Capital Territory has indicated that he expects the Committee to comment on this issue. The earlier chapters deal with other parts of the terms of reference, namely supply of and demand for energy. A special chapter has also been devoted to the issue of energy research, particularly the suitability of Canberra as a centre for such research.

CHAPTER 2—SUPPLY AND DEMAND

SUPPLY

7. The Department of National Development and Energy (ND&E) noted that the ACT is part of a much larger distribution network and like most regional areas in Australia is largely unable to affect the aggregate supply situation. In its submissions ND&E outlined the general energy supply outlook for Australia and suggested that the pattern of energy demand and supply will change dramatically over the next 20 years.

> 'As an energy rich country with extensive economically recoverable resources of black coal, brown coal, uranium, shale oil and adequate supplies of natural gas, Australia is comfortably placed to cope with the changing circumstances in the energy market'.[1]

8. The ACT differs from the Australian States in that wood, the sun and wind are the only energy sources naturally available within the Territory. These sources account for a very small proportion of existing energy supplies. According to the Department of the Capital Territory (DCT) 'The ACT's energy position is different from that of the States in that there are no indigenous sources of energy in the Territory (other than its potential for solar energy) nor are there any significant production facilities'.[2]

9. It was estimated by the National Capital Development Commission (NCDC) that 73 per cent of the energy consumed in the ACT during 1978–79 was derived from petroleum products. Electricity accounted for 25 per cent. The estimates of energy use by primary sources of utilisation are set out in the Table I. The Table was part of the submission to the previous Committee and was lodged in February 1980. However NCDC advised that it still considered its estimates to be current. The Table indicates that the major user of energy in the ACT is the transport sector which is also the major user of petroleum.

Table 1: Energy use in the A.C.T.: 1978–79 by primary source and utilisation sector
Energy in TJ

Source	*Domestic*	*Commercial industrial govt administration*	*Transport*	*Total*
Petroleum products	1 380	2 700	10 800	14 880
Electricity	2 630	2 350	..	4 980
Wood	330	..	..	330
Coke coal briquettes	25	..	..	25
Solar	25	..	..	25
Total	**4 390**	**5 050**	**10 800**	**20 240**

Source: NCDC Submission (transcript, p. 182).

As already noted the ACT is totally dependent on external sources for its supplies of liquid fuels and electricity. At present there are no facilities for the reticulation of natural gas. This situation will change in the near future.

PETROLEUM

10. According to DCT in excess of 260 million litres of motor spirit was sold in the ACT during 1978–79 with most of that spirit being supplied from New South Wales. Information received from ND & E was that:

> 'The ACT is almost entirely supplied with petroleum products by rail and road from Sydney, although some supplies are brought by road from Eden. A small, but variable amount is brought by road from Victorian refiners. Almost all supplies from Sydney are drawn from the three refineries, Australian Oil Refining Pty Ltd (100 per cent Caltex owned), Shell Refining (Aust) Pty Ltd and Total Refineries Aust Ltd, with the balance imported through the port of Sydney'.[3]

ELECTRICITY

11. Electricity is supplied to ACT consumers by the ACT Electricity Authority (ACTEA) which purchases electricity from the Snowy Mountains Hydro-Electric Authority and the Electricity Commission of New South Wales. The total quantity purchased during 1978–79 was 1385 gigawatt hours of which the Snowy Mountains Scheme provided about half. However the amount available from the Snowy Mountains Scheme is limited and this means that as the requirement for electricity grows an increasing proportion will be purchased from other sources. According to ACTEA, arrangements have been made to ensure that its requirements are provided by the NSW Electricity Commission.

GAS

12. The Australian Gas Light Company Limited (AGL) has been granted the franchise to market Cooper Basin natural gas in the ACT. The future demand for natural gas will be largely dependent on Canberra's growth rate and according to ND & E there will be no supply problem in the long term.

ALTERNATIVE SOURCES

13. In a submission to the Committee from the Department of Engineering Physics, Research School of Physical Sciences (RSPS) of the Australian National University the dependence on existing sources of supply was noted but the suggestion was made that alternative sources are readily available.

> 'Renewable energies such as firewood, direct solar and wind energy account for only about 2 per cent of the total used (most of this being firewood). Yet the ACT is reasonably well endowed with solar energy (about 2600 hours sunshine per annum) and very well endowed with wind energy in the near mountains. Both of these renewable sources have the potential for supplying very significant amounts of energy if appropriately developed.[4]

Alternative sources of energy have been commented on and their utilization supported in a number of submissions to the Committee but as yet the contribution of these sources to energy supply is limited.

14. In respect of nuclear power ND & E commented that 'The generation of nuclear power would not appear to be economically justifiable in Australia before the 1990's'.[5]

15. The Committee has reviewed the existing sources of supply of energy to the ACT and **concludes that:**

- **(a) the Australian Capital Territory is almost totally dependent on outside supplies of energy;**
- **(b) this dependence on outside suppliers is unlikely to change in the immediate future.**

DEMAND

16. The overall demand for energy in the ACT is a product of a number of factors, particularly the nature of the urban environment and the climatic conditions. Canberra has the most severe winter of any mainland capital which means a significant energy requirement for heating. The layout of Canberra is unique being, as it was pointed out by ND & E, 'geographically extended with a low overall population density and considerable distances between centres of activity' which 'makes a viable and efficient public transport system difficult to organise'.[6]

17. There was also reference to the relatively narrow industrial/commercial base of the ACT. It was suggested that the major factor influencing future energy demand within the Territory will be population movements. While liquid fuels and electricity will continue to be the main source of the energy requirements of the ACT, the introduction of natural gas will provide a major new source of energy for industrial and commercial use. An assessment by the NCDC of energy usage in 1985 is set out in Table 2 which is based on a population growth of 12 per cent between 1978–79 and 1985.

Table 2: Energy use in the A.C.T.: 1985 by primary source and utilisation sector
Energy in TJ

Source	*Domestic*	*Commercial industrial govt administration*	*Transport*	*Total*
Petroleum products	210	250	12 070	12 530
Electricity	3 250	2 930	..	6 180
Natural Gas	900	2 740	..	3 640
Wood	310	..	..	310
Coke coal briquettes	20	..	..	20
Solar	200	..	..	200
Total	**4 890**	**5 920**	**12 070**	**22 880**

Source: NCDC submission (transcript, p. 189).

18. In making its projections NCDC noted that 'projections of energy consumption for 1985 are at best a hazardous undertaking in the current climate of rapidly increasing oil prices and the imminent introduction of natural gas'[7]. However, it was estimated that while petroleum products will continue to be the largest single primary source of energy its share of the total energy supply will decline from 73 per cent in 1978–79 to 55 per cent in 1985 as a result of the introduction of natural gas, which is expected to supply some 16 per cent of energy requirements. It was also expected that there will be an eightfold increase in solar installations. However, solar heating will only account for 1 per cent of consumption.

19. It was suggested in the submission by ND & E that wood resources close to Canberra were substantial in relation to the City's population and that because a reasonable proportion of Canberra's energy requirements are used for domestic and commercial space heating, wood might remain for some time as a useful fuel. Its significance will depend to some degree on the ease and cost of supply and on the costs associated with the installation of domestic combustion heaters.

20. A comparison of the current (1978–79) and projected (1985) ACT energy use as percentages of total energy consumption is set out in the following table:

Table 3: Comparison of current (1978–79) and projected (1985) A.C.T. energy use by source as percentages of total A.C.T. energy consumption

Source	*1978–79*	*1985*
	%	%
Petroleum products	73	55
Electricity	25	27
Natural gas	..	16
Minor sources	2	2

Source: NCDC Submission (transcript, p. 153).

21. While acknowledging that in the present state of uncertainty it is not possible to make specific predictions on the future demands for and supply of energy, **the Committee concludes that:**

(a) the introduction of natural gas to the ACT will lead to a diversion of demand for energy from petroleum to natural gas; and

(b) there will be some increase in consumption of alternative energy sources such as sun and wood; but

(c) petroleum will continue to be the main source of energy in the immediate future.

ENDNOTES

1. Transcript of evidence page 78.
2. Transcript p.9.
3. Transcript p. 84.
4. Transcript p. 1228.
5. Transcript p. 80.
6. Transcript p. 83.
7. Transcript p. 185.

CHAPTER 3—PETROLEUM DELIVERY DISTRIBUTION AND STORAGE

22. As noted earlier the ACT is dependent upon outside sources for its supplies of petroleum products. One problem in regard to an assessment of petroleum delivery, distribution and storage is the lack of Government-based statistics on fuel consumption.

DELIVERY

23. According to DCT the delivery network is 'well diversified, employing both road and rail to transport fuel to the region'.[1] The DCT also noted that while the ACT region 'is located at the end of the fuel-distribution chain for the NSW marketing area, there have been few major problems in supply during recent years'.[2] As noted in para 10 the three Sydney refineries supply almost all the ACT oil supplies.

24. Rail is the main method of delivery to the ACT and accounts for over 50 per cent of liquid fuel supplies. The Shell Company of Australia Limited (Shell) informed the Committee that it would be introducing a block train method of delivery which would allow a 24 hour turnaround in petroleum products. According to Shell the block train would involve a significant reduction in delivery time to the ACT and thus 'will substantially enhance the oil industry's ability to service Canberra requirements by the most economical and expeditious means'.[3]

DISTRIBUTION

25. There are 9 oil companies operating in the region. Shell has the largest fuel facilities in the ACT and it is also the largest supplier of fuel to the region. Shell, BP Australia Limited (BP) and Caltex Oil (Australia) Pty Limited (Caltex) have appeared before the Committee. In its submission the DCT set out details relating to the oil companies operating in the region:

- *Shell Co. of Australia Limited* operates the largest fuel storage facilities in the ACT. It is also the largest supplier of fuels to the region. Its Fyshwick Depot receives stocks of oil from the Clyde refinery in Sydney, bulk delivered by rail tanker.
- *Mobil Oil Australia Ltd* supplies Canberra and its environs through two depots at Queanbeyan and Eden. The latter has the larger storage capacity because it also serves the southern coastal districts. Liquid fuels are taken from the refinery at Kurnell by ship to Eden, where they are subsequently transported by road either direct to a service station in the ACT or to the depot.
- *BP Australia Ltd* supplies the ACT from Port Kembla bulk storage tanks, with some 95% of the liquid fuel being transported by rail tanker.
- The supplies of *Amoco Aust Pty Ltd* are drawn from the Kurnell oil refinery and are delivered by rail. This distribution and delivery pattern is the same for both Caltex Oil (Aust) Pty Ltd and Ampol Petroleum Ltd.
- *Total Aust Ltd* has two sources of supply. Oil stocks are delivered by rail from its refinery at Matraville and also from Port Kembla via Eden by road tanker.
- *Esso Australia Ltd* depot obtains its requirements from the Kurnell refinery by both road and rail. Individual service stations are, however, supplied directly from Spotswood in Victoria by road tanker.
- *Golden Fleece Petroleum's* agent receives its supplies from Kurnell, 80% of which are delivered by rail.[4]

26. These oil companies service over 80 service stations within the ACT as well as service stations in the surrounding region. The service stations in turn distribute supplies of petrol to the motorist.

27. Plans to increase its storage capacity have been announced by Caltex:

> '. . . We have made plans to build a 1,200 kilolitre storage tank at our present Canberra depot. This will cost us about $250,000 . . . The new tank will increase that [our storage capacity] to eight days or eight days plus'.[5]

Caltex also referred to a suggestion for a pipeline from Sydney to Canberra as it was involved in a pipeline from Sydney to Newcastle. It suggested that while some research had been carried out the economics of the project 'at best, are marginal'.[6] However, it was acknowledged that the pipeline may 'eventually become a reality'.[7]

STORAGE

28. The Committee was advised that the long term storage situation for crude oil and petroleum products within Australia is currently being reviewed by the Commonwealth Government. However, there are factors which could be considered special to the ACT and the storage facilities of the ACT have been reviewed in the light of these particular factors, particularly the complete dependence of the ACT on outside sources of supply.

29. The Department of National Development and Energy suggested that storage facilities could be placed into three categories: first, operational storage within the industry; secondly, storage owned and operated by users, and finally, emergency storage provided at public expense. The Department made specific reference to consumer user storage as an important factor since it could reduce panic buying. It was also suggested that 'major and essential users, given the recent history of supply interruptions, will be motivated to increase their ability to hold larger levels of stocks of petroleum products'.[8]

30. An assessment of existing storage facilities was undertaken by NCDC as part of a planning study. According to NCDC 'The existing storage capacity has been developed by the petroleum suppliers and seems adequate for commercial purposes. Effective storage is nearly three weeks'.[9] The summary of existing storage capacities for petroleum products as set out in the NCDC submission is at Table 4.

31. The DCT also made an assessment of current storage capacity. According to DCT the service stations had a storage capacity of 14 days peak cover of automotive spirits. (9.5 million litres) This was in addition to the storage capacities of the private oil companies which had 8.1 days of super petrol (5.4 million litres) and 15.6 days of standard (1 million litres). All Government storage of petrol is approximately 1 million litres.

Table 4: Existing Storage Capacities for Petroleum Products—A.C.T. and Queanbeyan

Product	*Total bulk storage (ML)*	*Total service station storage (ML)*	*Total bulk and service station storage (ML)*	*Effective total storage (ML)*	*Average weekly consumption (1978–79) (ML)*	*Consumer storage (ML)*	*Total storage (=effective plus consumer)* (ML)	*Number of week's supply*
Petrol[a]	5.9	9.5	15.4	11.5	5.2	2.6	14.1	2.7
Distillate	4.3	0.1	4.4	3.3	1.3	0.4	3.7	2.7
Heating oil	4.2	..	4.2	3.1	1.8[b]	2.7	5.8	3.3
Fuel oil	1.7	..	1.7	1.3	1.7[b]	2.5	3.8	2.3
LPG	0.7	0.01[c]	0.7	0.5	0.5[d]	0.5	1.0	2.0

Source: The existing total capacities for storage of petroleum products in the A.C.T. have been compiled from information supplied to the Department of the Capital Territory by oil companies supplying the A.C.T.

Notes:

(a) Although a breakdown of petrol capacities for standard and super is available for the bulk storages, it is not available for the suburban service stations. However, the bulk storage figures indicate total capabilities of: Super — 4.8ML, or 1 week's supply; Standard — 1ML, or 2.2 week's supply. Hence the petrol storage capacities are not as great for super (about 90% of consumption) as indicated by the average 'petrol' figures in the table. On the other hand, an improvement could be effected if the oil companies could co-operatively rationalise their operations to reduce the relative oversupply of storage for standard. Of course, if necessary, vehicles can operate on standard petrol.
The non-availability of breakdowns for standard and super from the suburban service stations make the average 'petrol' figures presented here somewhat less than definitive.

(b) Weekly consumptions for these items are estimated for a 20 week 'year'.

(c) Service station facilities for filling small size gas bottles are not included.

(d) Weekly consumption for this item is figured on a 32 week 'year' to account for the current predominance of demand for LPG in the domestic and commercial sectors.

32. There are factors which indicated that the storage at service stations is not always fully utilised. 'Service station stocks are rarely maintained at maximum capacity'.[10] While the storage capacity in service stations represents about 14 days peak cover 'a more realistic figure for ACT service station peak cover is 7 days'.[11] According to DCT 'it is possible to state that the Territory's approximate private storage capacity is equal to fifteen day's cover from depot and service station sources'.[12] According to the ACT Automotive Services Association 'the storage facilities in Queanbeyan and the ACT are adequate for normal usage'.[13]

33. The DCT also referred to the public storage capacity and acknowledged that 'it is adequate to meet the region's needs during times of industrial peace'.[14] However, it was suggested that while 15 days might be adequate, should there be a decision to increase storage capacity a Government financial commitment would be necessary.

34. A further factor which must be taken into account is the tendency of motorists to maintain their tanks at capacity during times of emergency. Reference was made to a recent emergency and the panic buying which had resulted. According to DCT the figure of 7 days (para 32) is itself subject to variation according to the actions of motorists, obviously in situations of fuel disruption motorists anticipate shortages and top up tanks. As DCT stated 'the storage that we had at the time of the freeze also included about 90,000 vehicles with full tanks'.[15]

35. One factor to note is that the Canberra Bus Service (ACTION) has a storage capacity of 50,000 litres at Belconnen and according to DCT 'a storage capacity large enough to meet its consumption needs for about 2 months'.[16]

36. While there is existing storage capacity within the ACT it is not always fully utilised. It is not reasonable to expect service stations to carry full tanks on all occasions since the costs involved in such a decision would inevitably be passed on to the motorist. There were a number of suggestions put to the Committee to increase Government fuel storage capacity including the modification of existing storage tanks at the Belconnen Sewerage Works, and pipelines from the various refineries. These matters will be considered in the next chapter when ways to overcome the shortages and disruptions are considered.

37. The Committee concludes that:

(a) there is generally within the ACT 15 days supply of petrol from private sources;

(b) Government storage is of the order of three weeks supply of petrol;

(c) storage capacity for the ACT Internal Omnibus Network is approximately 2 months usage.

ENDNOTES

1. Transcript p. 11
2. Transcript p. 11
3. Transcript p. 700
4. Transcript p. 9-10
5. Transcript p. 723
6. Transcript p. 729
7. Transcript p. 726
8. Transcript p. 92
9. Transcript p. 156
10. Transcript p. 13
11. Transcript p. 13
12. Transcript p. 13
13. Transcript p. 1336
14. Transcript p. 14
15. Transcript p. 44
16. Transcript p. 14

CHAPTER 4—CRISIS MANAGEMENT

PETROLEUM

Background

38. A crucial factor concerning the availability of liquid fuel in the ACT is that there is no local production capacity. The ACT is therefore dependent on outside supplies over which it has no control. The *Fuels Control Ordinance* 1979 was introduced in June of that year as a result of disruptions to fuel supplies. The DCT in its submission referred to earlier disruptions and made reference to 1974 'when a particularly severe winter combined with an industrial dispute in the petroleum industry resulted in Canberra experiencing severe shortages of liquid fuel'.[1]

39. The ACT Automotive Services Association (ASA) referred to the dependence of the ACT on outside sources of supply and noted that 'the lack of direct control over ACT energy supplies rendered most local measures ineffectual'.[2] The ASA went on to suggest that it is a national matter and it would be more appropriate 'to examine the whole energy supply situation at a national level and enact measures to provide the Australian Government with authority which will also encompass the Territory'.[3] This dependence was in part acknowledged by DCT: 'In the last fuel strike the Department was very much in the hands of oil companies and service station proprietors in its efforts to gain an insight into what fuel stocks were available'.[4]

Storage

40. The dependence on outside sources was also acknowledged by ND&E which noted that the ACT 'is particularly vulnerable to supply interruptions'.[5] It was also noted that more attention is being given to the possibility of greater product storage as an effective buffer against supply interruptions. Reference was made to a national review of the long term storage situation for crude oil and petroleum products and to the establishment of the National Petroleum Advisory Committee which is a mechanism for liaison and co-operation between State/Territory and Commonwealth Governments and the oil industry in the planning of appropriate strategies. The DCT is represented on the Committee which provides advice on:

- 'appropriate arrangements for the equitable allocation of liquid fuels during any period of supply shortages; and
- priorities for the allocation of liquid fuels during periods of shortage which accord most closely with Australia's overall national interests, having regard to the overall supply situation with respect to liquid fuels in Australia and the actual or anticipated position with respect to any particular petroleum product shortages'.[6]

There was also mention made by ND&E of consideration being given to the need for a national organisation to work with the States/Territories at the time of an emergency.

41. It is noted in Chapter 3 that the ACT has in addition to petrol stored by private motorists and the Government, some 15 days supply of petrol on hand at any one time. It was suggested by DCT that 'it might therefore be desirable for increased storage capacity to be provided from both public and private funds'.[7] This need for an increase in fuel storage was supported by the ACT House of Assembly which recommended that 'the Government establish an adequate fuel storage depot to relieve shortages and supply fuel for essential services during times of crisis'.[8]

42. According to NCDC existing facilities provide for nearly three weeks storage, which is sufficient for day-to-day needs, but it 'provides little balance for emergency needs'.[9] Methods suggested to increase storage capacity were the construction of bulk

fuel storage depots and the investigation of a possible liquid fuel pipeline from the coast to the ACT. Reference was made to a planning study of a tank farm at Fyshwick which would have provided security of supplies for the Government sector by providing another week's supply. The cost of this proposal would be $2.5m. An alternative suggested was the modification of the disused tanks at the Belconnen Water Pollution Control Centre which could provide for a month's supply of petrol or fourteen week's supply of distillate.

43. The question of a liquid fuels pipeline from the coast was raised with the representatives of BP. The Committee was advised by the Company that 'The company did consider it some years ago. We are not currently considering it . . . We do not believe that a pipeline would be economical in the short term'.[10] A factor which would need be taken into account in any decision on Government storage of petrol is the need to ensure that the petrol is used regularly and not just left in tanks, because according to the ASA 'motor spirit has a limited storage life. Means would need to be devised to provide for the regular turnover of any motor spirit held in such storage. This appears impractical, short of the Government entering into the marketing of petroleum'.[11]

44. The ASA referred to the large under-utilised storage capacity at most service stations and suggested that while the lessees of service stations maintain 7 to 10 days supply many of the stations are capable of storing enough for 21 to 30 days. 'There are 87 service stations in the ACT and their storage capacity ranges from 40,000 litres in a small station to 300,000 in a large one . . . some fill to capacity while others carry only sufficient to cover use and delivery patterns. Most stations are not filled to capacity'.[12] A factor militating against the petrol stations using their full capacity was the present practice of COD settlement for all motor spirit purchases. It was suggested that money would be tied up with no return.

45. It was also suggested by the ASA that 'greater utilisation of on-site storage could be expected if the Government deferred collection of the excise/levy until the point of retail sale, as is the practice with sales tax'.[13] It has been pointed out that depending on conditions of storage, gasoline has a limited life and that after a certain time deterioration starts to occur. Optimum storage conditions would involve the product being stored underground and being turned over on a regular basis. Petrol should not be stored in an isolated form for greater periods than 3 months at a time as long term storage may cause a deterioration in the product.

46. On-site storage of petrol would alleviate any problems associated with deterioration as this stock would be expected to be turned over regularly. Another advantage of this proposal is that the storage capacity would be at the service station itself and thus available to the motorist. Other proposals for increases in storage facilities would not only involve construction costs but would not necessarily guarantee that the petrol in storage would be available to the public.

Petrol freeze

47. The ASA referred to the problems involved in freezing all petrol stocks during an emergency. 'The operator cannot sell what is his, what he has bought and paid for'.[14] It was suggested that such action could discourage service station operators from obtaining petrol from other than their normal source of supply. 'We can get independent petrol as was proved in the last strike'.[15] The ASA claimed that during the 1980 emergency an extra one million litres of petrol found its way into the ACT. The operators considered they had a right to sell this petrol.

48. An alternative to freezing the stocks of petrol would be for the Fuels Controller to decide a fixed amount to be set aside for essential services and then allow each service station to sell the excess. The ASA suggested 10 per cent of storage capacity which is around one million litres.

49. The Committee acknowledges the claims made by the ASA but is also conscious of the responsibility of Government authorities in a time of crisis. It would, however, suggest that a complete freeze of all petrol stocks is not the most appropriate way of dealing with the issue. A better method would be to determine the quantity required for emergency services and direct that this amount be set aside at service stations. The Committee considers that the determination of percentage capacity should be left to the Fuels Controller. Such a method would ensure that the burden of the freeze would spread equitably among the operators.

50. Consideration should be given to compensating the operators for holding the emergency petrol stocks. The operator has to pay cash for the petrol yet he is unable to sell it. One suggestion was for the Fuels Controller to purchase the petrol from the operator and when the emergency is lifted sell it back to the operator. While the Committee acknowledges the merit of this proposal it would suggest that the alternative of an interest free loan might be more administratively appropriate.

Fuels Control Ordinance

51. As mentioned earlier, the Fuels Control Ordinance introduced on 19 June 1979 is a response to a disruption to fuel supply. The Ordinance provides for the declaration of an emergency in relation to fuel. Such an emergency was declared on 20 June 1979 and remained in effect for 28 days. The state of emergency was not extended as it was considered that the crisis had passed. A further emergency was declared on 12 March 1980 and petrol sales were restricted to essential users who were required to obtain vouchers from an office set up by the ACT Emergency Services.

52. Concern was also expressed about the powers given to the Fuels Controller under the Ordinance. The ASA suggested 'if there is sufficient co-operation we do not need an ordinance'[16] Reference was made to the provisions of the Ordinance which allowed for the inspection of premises, books and documents. It was suggested that such powers should be restricted to documents dealing with fuel. The Committee agrees with this view.

53. The Senate Standing Committee on Regulations and Ordinances also expressed reservations about certain provisions under the Ordinance. Particular objections and the response to them by the Minister for the Capital Territory are set out in pages 32 and 33 of the transcript. In summary the Committee was concerned with the wide powers granted to Inspectors, the extent of delegation of important powers, the serving of notices and the powers of search and entry.

54. The Minister for the Capital Territory agreed to amend the Ordinance to overcome some of these objections. On 28 September 1980 drafting instructions effecting the amendments agreed upon were sent to the Attorney-General's Department. However, these amendments have not yet been tabled in Parliament.

Recommendation 1

55. ***The Committee notes that drafting instructions have been prepared to amend the Fuels Control Ordinance as proposed by the Senate Regulations and Ordinances Committee and recommends that urgent action be undertaken to put these into effect.***

Co-operation with N.S.W.

56. A major constraint in the emergency situation is the necessity to work with NSW authorities. According to DCT 'we must work with New South Wales because we rely on fuel from New South Wales'.[17] The NSW Energy Authority, in a letter to the Committee, advised that it works in close co-operation with the ACT authorities. It stated that:

> 'In the event of a fuel emergency such as the one experienced in June-July 1979 longstanding arrangements for liaison between appropriate Commonwealth officers in Canberra and officers of the Energy Authority of NSW will be maintained. The Commonwealth Officers will be continuously informed as to the extent of restrictions proposed for New South Wales. They are in turn expected to implement restrictions no less severe than those applying in New South Wales. Providing this co-operation occurs, an equitable situation will exist in Canberra and Queanbeyan'.[18]

Fuels Use Advisory Committee

57. During the course of the Committee's inquiry and after the public hearing with the Department of the Capital Territory, the Minister for the Capital Territory announced that it was proposed to establish a Fuels Use Advisory Committee comprising representatives of the oil companies, the Automotive Services Association and departmental officers. According to a statement by the Minister on 10 April 1980, the Committee would 'advise the Minister on restrictions that should be made when emergencies occur but it would also have the responsibility, with the Controller, of advising on other steps to be taken in a future emergency such as the building up of stockholdings'.[19]

58. In April 1981 the Committee was advised that the Fuels Use Advisory Committee had yet to be established on a formal basis. A problem had arisen regarding oil company representation on the Committee. DCT advised '. . . action did not proceed to formally establish the Committee although it still operates as required on an informal basis'.[20]

Recommendation 2

59. ***The Committee is concerned about the delay in the formal establishment of the Fuels Use Advisory Committee and recommends that it be established without further delay. The membership of the Committee should comprise four representatives of the oil companies operating in the ACT, plus four service station representatives, the Fuels Controller and a representative from the House of Assembly or the community.***

Miniumum quantities

60. As well as concern about the availability of petrol supplies, concern has been expressed about the tendency of motorists to keep their petrol tanks full in times of emergency or potential emergency. The House of Assembly suggested that 'consideration should be given to a minimum purchase quantity as well as a maximum prescribed quantity of fuel. If the minimum amount payable was realistic it would ensure that car owners would not merely top up'.[21]

61. In a submission, the ACT Branch of the Federation of Australian Motorcyclists suggested 'that in the event of the introduction of fuel rationing, motorcycles be allocated no less than the amount of fuel allocated to motorcars, on a per vehicle basis. Similarly, if a licence-based system of rationing were to be introduced, motorcyclists be allocated no less than other motorists'.[22]

Public Transport

62. A further factor to be taken into account is the increased usage of public transport during the time of emergency or possible emergencies. The DCT advised that 'the opening of the Belconnen Transport Depot in 1979 with a storage capacity of 500,000 litres of distillate has helped give the Canberra Bus Service (ACTION) a storage capacity large enough to meet its consumption needs for about two months'.[23] It would therefore appear that the stock of distillate would be adequate in the short term to permit the operation of public transport. The DCT referred to an increased usage of public transport as a consequence of the disruption to fuel supplies.[24]

63. One effect of the fuel emergency of March 1980 was that the loadings on ACTION buses had increased dramatically and in some instances loads had increased by 50 per cent. On the same subject the Department of Transport (DOT) stated that 'The provision of public transport in a fuel supply shortfall situation is of critical importance because motor spirit shortages result in increased demand for these services. Severe disruptions to the economy as a whole would result if people were unable to get to work'.[25] The Department also referred to the advantages of meeting the demand for non-discretionary travel by public rather than private transport.

64. The Committee is aware that in situations where fuel supplies are disrupted, steps must be taken to ration available supplies and to determine priorities. During past emergencies steps have been taken to ensure supplies to essential services while also attempting to provide private motorists with a basic source of supply. Two methods of achieving this which it supports are a rationing of fuel to private vehicles on the basis of odd and even number plates and the setting of a maximum amount of petrol able to be purchased at any one time.

Recommendation 3

65. ***The Committee recommends that in any emergency declared under the Fuels Control Ordinance priority be given to providing fuel for the public transport system and emergency services. Private vehicles should be rationed on an 'odds and evens' system and a maximum limit able to be purchased at any one time should be set.***

NATURAL GAS

66. A franchise in principle has been granted to AGL for the reticulation and sale of natural gas in the ACT. One of the objectives of the granting of the franchise is the conservation of liquid fuels. According to DCT a feasibility study of the provision of natural gas 'demonstrated that the project was economically viable and consistent with the Government's policy objectives'.[26]

67. Subject to the completion of the pipeline from Dalton to Canberra, natural gas should be available in Canberra by the end of 1981. A subsidiary company, AGL Canberra Limited, has been established in Canberra. It will have a permanent workforce of some 60 to 75 persons and an expected capital investment of $30 million over 10 years. The gas will be brought to Canberra by the Pipeline Authority and AGL pays a haulage charge for transportation. Under the agreement with the Pipeline Authority, AGL could supply gas to Canberra but 'AGL would first have to be satisfied that it had the

gas available without the possibility of any deleterious effect on its consumers in the 'Sydney Region' (a term which is used to describe Sydney, Newcastle and Wollongong)'.[27]

68. According to ND&E 'An important consideration for the Canberra market is the long term availability of natural gas from the Cooper Basin. On the basis of present information there is no reason to believe the longer term supplies to Canberra will be a problem. In this context it should be noted that the Canberra demand represents only about 4 per cent of the total Sydney demand'.[28] However AGL in its submission referred to possible pressure from the South Australian Government to provide for that State's supply of natural gas from the Cooper Basin since 'The present contract for the supply (of natural gas) to Adelaide expires in 1987, and no further gas will be available for that market until certain prior obligations of the Producers to the New South Wales market are fulfilled'.[29] However AGL did comment on the overall supply situation. 'Analysis shows that even with a substantial export program, the presently known deposits could be sufficient to supply Australia's expected demands until about the year 2010'.[30] This conclusion assumed that it will be possible to link supply and demand. It was also suggested that eventually it would be possible to manufacture a substitute natural gas from coal.

ELECTRICITY

69. As noted in para 11, ACTEA is supplied with electricity by both the Snowy Mountains Hydro-Electric Authority and the Electricity Commission of New South Wales. In 1979–80, 47 per cent of that electricity came from the Snowy Mountains Scheme. According to ACTEA 'the amount of energy available from the (Snowy Mountains) Scheme was fixed. As the Territory's total requirement for electricity grows, the proportion required from the Electricity Commission of New South Wales will increase'.[31]

70. The question of the future demand for electricity will be influenced by the introduction of natural gas. If natural gas were not introduced, ACTEA 'would have expected continued growth in demand of 10-12 per cent per annum for many years'.[32] Another variable could be the increase in electricity prices.

71. Conversion from oil heating to electric heating plus the increased use of domestic appliances will lead to an increase in purchases from the New South Wales Electricity Commission and thus prices will probably follow New South Wales prices. At present ACTEA rates 'are significantly lower than the average Australia-wide tariff'.[33]

72. ACTEA noted that 'Canberra has been fortunate in that very little disruption has occurred in the past'.[34] It went on to note that as an increasing proportion of electrical energy was to come from thermal generation then the likelihood of disruptions would increase. However, it did not consider that there was a practicable method of protecting the total community from the occasional interruptions to the electricity supply. It went on to claim 'the most practical insurance against interruption is localised emergency generation'.[35]

Recommendation 4

73. ***The Committee recommends that the ACTEA conduct a survey of the generating equipment within the ACT with a view to establishing whether or not there are adequate emergency facilities within the ACT.***

ENDNOTES

1. Transcript, p. 12
2. Transcript, p. 1331
3. Transcript, p. 1331
4. Transcript, p. 41
5. Transcript, p. 91
6. Transcript, p. 93
7. Transcript, p. 14
8. Transcript, p. 280
9. Transcript, p. 141
10. Transcript, p. 489
11. Transcript, p. 1331
12. Transcript, p. 1338
13. Transcript, p. 1332
14. Transcript, p. 1341
15. Transcript, p. 1340
16. Transcript, p. 1345
17. Transcript, p. 40
18. Letter received 3 February 1980
19. Transcript, p. 760
20. Letter dated 24 April 1981
21. Transcript, p. 273
22. Transcript, p. 1209
23. Transcript, p. 14
24. Transcript, p. 61
25. Transcript, p. 309
26. Transcript, p. 14
27. Transcript, p. 935
28. Transcript, p. 89
29. Transcript, p. 934
30. Transcript, p. 934
31. Transcript, p. 844
32. Transcript, p. 845
33. Transcript, p. 87
34. Transcript, p. 846
35. Transcript, p. 846

CHAPTER 5—ENERGY RESEARCH

74. During the course of the inquiry it became evident that Canberra was well placed to become the energy research centre of Australia. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) suggested 'Canberra, with its relatively small population and modern design, presents the Government with unique opportunities to assess new technologies in operation'.[1]

75. There are a number of organisations within the Australian Capital Territory which have the capability for energy research and development. The Department of National Development and Energy suggested the following organisations in the ACT have an energy research and development capability:

- ANU — General university capability for research with particular expertise in;
  - solar energy applications
  - nuclear fusion energy
  - nuclear waste management
  - modelling studies (Centre for Resource and Environmental Studies)
- BMR — Geological studies to support the fullest development of Australian mineral and energy resources including;
  - detailed field and laboratory research
  - resource assessment
  - establishment of national geoscience data bases
- CSIRO — Division of Mathematics and Statistics Capability to develop mathematical models and statistical methods to assist in solving problems arising in energy research.
- CSIRO — Fuel Geoscience Unit—ACT Section Capability for research relating to recovery of petroleum.
- CSIRO — Divisions of Plant Industry and Land Use Research Capability to carry out studies relating to the use of agricultural feedstocks for alternative fuels such as ethanol.

76. A submission from the Research School of Physical Sciences of the Department of Engineering Physics at the ANU noted that a considerable amount of energy research is being carried on in the ACT and the ACT could become a strong energy research centre near the seat of Government.[2]

77. The Department of the Capital Territory noted that it only had limited capacity for research as it had no research facilities or resources but can gain from such research. The National Capital Development Commission referred to its program for house design particularly its technical paper, *Low Energy House Design for Temperate Climates*. According to the National Capital Development Commission 'This Technical Paper continues to be the most sought after of all Commission priced publications and repeat orders from Australian States indicate a wide distribution'.[3]

78. Organisations within the Australian Capital Territory have been the recipients of some grants under the National Energy Research, Development and Demonstration Program (NERDDP). Details of the grants are set out below:

	1979–80	*1980–81*
Australian National University	$	$
Department of Engineering Physics		
(a) Ammonia Chemical Heat Pipe Demonstration Program (80/0259, 79/9428)	66 100	18 000
(b) Demonstration and Performance Testing of a Parabolic Dish Collector (79/9427)	82 900	

	1979–80	*1980–81*
	$	$
Plasma Research Laboratory		
(a) Energy Transport in Magnetically Confined Plasma for Fusion Research (80/0257)	–	137 400
Laser Physics Laboratory		
(a) Internal Confinement Fusion (79/9423)	148 700	–
Bureau of Mineral Resources		
(a) Equipment for In-House Seismic Data Processing System (79/9273)	124 800	–
CSIRO		
Commonwealth Regional Renewable Energy Resources Info Services 1980–81—1982–83 (80/0479)	–	150 000
Physical Technology Unit		
Fossil Fuel Conservation—Dynamic High-Temperature Nuclear Magnetic Studies (80/0384)	–	74 750
Fuel Geoscience Unit		
(a) In-situ Biological Production of Surfactants for Enhanced Oil Recovery (80/0366)	–	22 160
(b) Oil Shale Methodology (jointly with BMR) (80/0368)	–	45 375
(c) Permian Coals of Eastern Australia (jointly with BMR) (80/0369)	–	14 500
Division of Mathematics and Statistics		
Integration of Wind Power on a Large Scale into State Electricity Grids (80/0395)	–	7 900
The Joint Academics of Australia		
Challenge of Social Adjustment posed by the Changing Position of Liquid Fuel (80/0074)	—	20,760
University of New South Wales (Royal Military College)		
Hydraulic Powered Seismic Energy Source (79/9024)	25,958	–

79. The Department of Engineering Physics has had considerable experience with energy research and while acknowledging that significant achievements have been made suggests that more could be done. Professor Kaneff of the School commented on the tendency to overrate overseas projects while underrating local projects, 'I think the buying of other people's technology is definitely counter-productive in many ways'.[4] It was suggested 'the Australian Capital Territory could establish and sustain a measure of industrial research, development and production of certain energy systems and thereby maintain an energy industry which could be of significant benefit for future energy uses especially for establishing pilot schemes which could be assessed not only for local needs but also nationally'.[5] Industries which were suggested were solar and wind systems and electric vehicles. The Committee now comments on each of these in turn.

WIND RESEARCH

80. Mr Vallee, President of the ACT House of Assembly, suggested that Canberra could become the wind research centre for Australia. Dr Inall from RSPS suggested 'a new source of energy which can be developed immediately is from Wind Driven Generators',[6] and that it was practicable for the use of wind energy for electricity generation and water pumping. Reference was made to previous studies of wind in the Brindabellas and it was claimed, 'A valuable contribution would be made to the ACT's energy future were funds to be made available for a more comprehensive study of the local wind resources, for a detailed simulation study of employing wind in conjunction with existing and potential pumped storage, and for the construction, installation and testing of new design wind turbines (suited to the local environment) as a pilot scheme to ascertain the practical feasibility of larger and more extensive wind energy utilisation for this and other suitable areas'.[7]

81. It was suggested that the ACT Electricity Authority could commission immediately a design study. The study would be directed by staff of the Australian National University with assistance from the Snowy Mountains Engineering Corporation and other consultants. The cost of the complete project is of the order of $40 million. The Committee would not, at this stage, suggest that the complete project should go ahead but would endorse the proposed study, particularly an environmental impact study.

SOLAR

82. The Research School of Physical Sciences noted that research and development of solar energy is already under way and should be encouraged and supported further. 'A 20 per cent total energy contribution from the sun by the year 2000 should be realisable in practice, given the allocation of adequate resources and reasonable encouragement'.[8] The School is involved in the development of cost competitive high temperature sun tracking solar collectors. This research is to provide power generation for remote townships and mining centres. A Solar Power Station is being built in western New South Wales to provide power for the town of White Cliffs. A grant of $800 000 from the NSW Government funds this project. The Committee had the opportunity of seeing one of the solar collectors in operation and would suggest that the Department of the Capital Territory maintain a watching brief on the work being undertaken with a view to applying the research in the Territory.

83. A further development of this work involves the use of thermochemical energy to collect solar energy. The process breaks down ammonia into hydrogen and nitrogen. The heat required to break down the ammonia is obtained from the sun. Thus it is possible to store the sun's energy. 'You store the materials and when you need the energy back you recombine them in a standard commercial process—the Haber process—for synthesising ammonia from nitrogen hydrogen. You get back your solar heat and you get back your ammonia'.[9] However, funds for this project had been withdrawn. According to Professor Kaneff it showed the complete lack of understanding of what scientific research is all about.

84. According to ND&E the solar ammonia project had received funding under the NERDDP. However, the Department advised a definite view concerning the practicality of such a project is not possible at present. When asked to comment on the submission from the Department of Engineering Physics, the Department of National Development and Energy advised that it considered the submission to be over-optimistic in its presentation of the potential effect of solar energy. The Committee would, however, suggest that this project is worthy of further investigation.

ELECTRIC VEHICLES

85. Since world oil pricing and supply actions have highlighted the fragility of the oil supply situation and demonstrated our vulnerability to disruptions in that supply there has been a revival of interest in substitute fuels and new technology to replace conventional petroleum fuels in transport applications.

86. An Electric Vehicle Exposition (EVE-80), sponsored jointly by the South Australian Energy Council and the South Australian Department of Transport, was held in Adelaide from 26 to 29 August 1980. It attracted widespread support from researchers throughout Australia and was attended by a number of eminent overseas experts in the field as well as a representative of the Committee Secretariat. The papers presented were of great assistance to the Committee, and were considered together with the evidence received from witnesses and from submissions. A summary of the information

presented at the exposition as well as other background material relating to electric vehicles can be found at Appendix III.

87. The advantages of electric vehicles are obvious. They appear to offer liquid fuel conservation, security of fuel supplies, reduction in atmospheric pollution and a reduction in vehicle noise. The disadvantages are twofold—present traction battery technology falls short of the requirements for widespread commercial and private acceptance and the initial cost of the vehicles and the cost of replacement battery packs make them generally unacceptable to most users.

88. The Department of the Capital Territory told the Committee that it had 'considered the purchase of electric cars which operate from rechargeable batteries' but 'considers that on current capabilities electric cars do not yet offer a realistic alternative to petrol- or diesel-powered vehicles'.[10] This view was generally endorsed by NCDC which suggested that substitution of electricity as an energy source for transport in Canberra is 'still futuristic in its application to personalised private transport' and that the electric car 'has many problems to overcome'[11] before it could achieve a share of the market.

89. In the course of the inquiry the Committee inspected electric vehicles in Adelaide, Sydney, Melbourne and Canberra. While acknowledging the progress made in the States the Committee is particularly interested in the two vehicles being developed within the ACT.

90. Mr Cantor of Sutton demonstrated his vehicle to the Committee. It was suggested that this vehicle, though in an early stage of development, could be developed as an acceptable commuter unit. The proposal was for five to ten vehicles to be tested out in ACT conditions.

91. The other development was by Hub-Power Pty Ltd, which is producing a light commuter or commercial vehicle which 'has many unique features. Its design concept eliminates the gear box; the drive shaft; and the differential; as is used in the normal type of automobile'.[12] Some road testing had been carried out but it was claimed that funds were necessary to produce an 'on road' vehicle.

92. The Committee believes Canberra is ideally placed as an energy research centre and strongly supports and encourages research carried out by the ANU and the CSIRO into areas of alternative sources of energy and fuel and electric vehicles.

Recommendation 5

93. ***The Committee recommends that the Department of the Capital Territory investigate the possibility of providing funds to allow for the further development of electric vehicles.***

ENDNOTES

1. Transcript, p. 350
2. Transcript, p. 1231
3. Transcript p. 231.
4. Transcript p. 1315.
5. Transcript p. 1231.
6. Transcript, p. 1247
7. Transcript, p. 1235
8. Transcript, p. 1229
9. Transcript p. 1319.
10. Transcript, p. 19
11. Transcript, p. 211
12. Transcript, p. 1374

CHAPTER 6—PETROL PRICES

94. As indicated earlier 73 per cent of the energy consumed in the ACT is derived from petroleum products and while this percentage is likely to decrease with the introduction of natural gas, petroleum products will still be the major source of energy in the ACT. The price of petrol can significantly affect the demand for and supply of energy so it is relevant to this inquiry. In addition the Minister for the Capital Territory has, in a public statement, indicated that he expected the Committee to consider this issue.

95. The Trade Practices Commission, in its *Report on Price Discrimination in the Petroleum Industry*, noted 'retail price competition in Hobart and Canberra was less intense than in other cities . . . Canberra October and December 1979 retail prices appeared to be two tiered—one level for self serve sites and other high volume sites in their immediate area and another for conventional sites in residential neighbourhood areas away from self serve sites and other sites'.[1]

96. These findings are confirmed in details of average retail prices for premium grade petrol provided to the Committee by the Australian Bureau of Statistics. These are set out in Table 5.

Table 5: Average retail prices petrol—premium grade (cents per litre)

Quarter	*Sydney*	*Melbourne*	*Brisbane*	*Adelaide*	*Perth*	*Hobart*	*Canberra*
Mar. 78	17.8	16.7	17.9	17.2	17.7	21.2	19.1
June 78	17.8	16.9	18.0	16.9	17.7	21.6	19.0
Sept. 78	18.3	16.6	17.9	17.3	17.6	18.8	18.8
Dec. 78	21.8	20.4	21.9	20.9	21.4	20.7	21.2
Mar. 79	23.0	20.7	22.3	21.1	21.4	22.2	22.3
June 79	24.2	23.4	25.0	23.9	23.8	25.1	25.3
Sept. 79	25.6	26.4	26.1	25.0	26.0	28.5	27.1
Dec. 79	28.9	28.1	28.5	29.4	28.9	29.5	29.8
Mar. 80	27.6	27.7	27.9	29.0	28.6	29.5	30.0
June 80	32.6	31.4	31.5	32.0	32.6	32.9	34.9
Sept. 80	31.2	30.1	30.1	30.2	31.0	34.0	34.3
Dec. 80	32.0	30.9	30.6	30.5	31.8	33.7	35.1
Mar. 81	33.2	34.8	31.3	35.3	34.2	34.8	35.8

Source: Australian Bureau of Statistics, Canberra, 26 February 1981.

Notes:

(a) The average petrol prices shown are the averages of prices charged by a number of selected retailers in each city. The retailers have been selected as representative to measure price change over time. Thus the prices do not purport to be the actual averages relating to all retail sales of petrol in the various periods and should be regarded as no more than approximate indicators of relative price levels.

(b) Petrol is priced for Consumer Price Index purposes as at the week day closest to the 15th of the first month of the quarter.

(c) General price increases may be reflected in different quarters in different cities as a result of such factors as the requirement for increases to be approved by State Prices Commissioners in some States. Any comparison of relative price levels at particular points of time should take account of this.

97. The Table shows that Canberra and Hobart prices are higher than those of the other State capitals. During 1980 the Canberra price was well above the other State capitals, in fact, for the December 1980 quarter the price was 4c a litre above the Sydney price.

98. What is of more concern to the Committee, however, is the difference in price between petrol sold in the ACT and that sold in the surrounding areas of NSW. The ACT has become an island of high petrol prices.

99. The ASA referred to 'the price differential of 2c a litre because of the action taken by the New South Wales Government'.[2] The action referred to was that of the NSW Prices Commission in setting the maximum wholesale and retail prices for petrol below those set by the Prices Justification Tribunal.

100. The difference in price is affected by several factors. One of these is the rent charged for the service station site. The complicated nature of leasing arrangements and ownership of the sites makes it difficult to determine average rent differentials applying between New South Wales and the ACT. The variation in price is also influenced by the degree of competition and level of service provided by the service stations.

101. The Committee is aware of Government measures to ensure that the petrol price differential within Australia is limited. The Government provides a subsidy to ensure that the price of petrol is no more than 0.4c a litre above that recommended for the major capital cities. However, action by the NSW Government has distorted the Government's initiative as far as the ACT is concerned.

102. It was suggested by BP that Canberra is regarded as merely an inland town and as such benefitted from the inland freight differential. However, it was not acknowledged that Canberra is Australia's largest inland town and as such should benefit from economies of scale. BP, however, countered that Canberra's volume meant it was not possible to operate two shifts. It was further suggested that there was the additional cost of delivering the product to Canberra which was in contrast to the other cities which were all located on the coast. The 2c difference was also referred to by other petroleum companies,—according to Shell 'at present with NSW being price controlled there is a difference of approximately 2c a litre in the wholesale reseller of motor gasoline price between NSW and the ACT and then there is the customer pays element of the differential which gives you a margin of say 2.5c, we are forced to sell at a price which is 2c lower in NSW than it is in Canberra because of price control in NSW'.[3] This contention was countered by Caltex which while acknowledging that it had not taken account of pricing of every site in Queanbeyan, noted a number of sites where prices in Queanbeyan were on a par with or less than a cent above those in the ACT.

103. Consequent upon the abolition of the Prices Justification Tribunal, a new Act proclaimed on 26 June 1981 provides for the establishment of a Petroleum Products Pricing Authority headed by a Commissioner. Although it is expected that no discontinuity will result from the abolition of the Prices Justification Tribunal and the establishment of this new body, the overall affect on future petrol pricing is uncertain.

104. No evidence was given to the Committee to substantiate a difference in wholesale price between NSW and the ACT. This situation is affecting the viability of some service stations and disadvantaging consumers in the ACT.

Recommendation 6

105. ***Therefore the Committee recommends that the Minister for the Capital Territory take immediate measures to eliminate the petrol pricing differential between the ACT and NSW.***

ENDNOTES

1. Trade Practices Commission Report on Price Discrimination in the Petroleum Industry, October 1979— May 1980, A.G.P.S. p. 51.
2. Transcript p. 1353
3. Transcript p. 708

CHAPTER 7—ENERGY CONSERVATION

106. The final part of the Committee's terms of reference require it to consider Government initiatives for energy conservation within the Territory, with particular reference to liquid fuels and to the Federal Government's national energy conservation program. It is proposed in this Chapter to consider energy conservation in general and in the following chapters to consider conservation under three of the broad user categories, namely transportation, housing, and commercial and community services.

THE NATIONAL ENERGY CONSERVATION PROGRAM

107. The National Energy Conservation Program (NECP) was launched in October 1979 with two themes based on research findings. The themes were:

(1) to make the public aware that liquid fuel is a finite resource and that time is needed to develop alternative energy sources;

(2) the individual can make a contribution which will be both in terms of personal interest in saving money and in the national interest by saving valuable liquid fuel.The campaign is funded from a $2 million budget which was contributed by the Commonwealth and State Governments (excluding Queensland). It involves a media campaign including T.V. commercials and a campaign booklet featuring Peter Wherrett and Larry Pickering. A number of other information bulletins have been produced which while giving information on the oil situation generally, also suggest specific measures which industry could take to conserve fuel. The Northern Territory Department of Mines and Energy is a participant in the program but there is no reference to participation by DCT.

108. In its submission DCT claimed 'the Department's responsibilities are largely operational in nature'.[1] The NCDC noted that publicity and education about energy conservation would be of benefit to the community. It suggested 'consideration could be given to a community relations campaign in Canberra complementary to the national energy conservation campaign'.[2] The Committee considers that such a campaign could be of special benefit to the ACT given the introduction of natural gas into the Territory. It could lead to a considered assessment of the benefits to be obtained from conversion to natural gas. Such a campaign could be co-ordinated with the establishment in the ACT of an energy information centre.

ENERGY INFORMATION CENTRE

109. Future usage of energy will undoubtedly be affected by the availability of information on the various sources of energy. During the course of the inquiry the Committee inspected the Energy Information Centre operated by the Gas and Fuel Corporation of Victoria and the Solar Energy Information Centre operated by the NSW Energy Authority. Both centres provide consumers with a wide range of information on energy matters and are doing much to encourage a swing away from oil usage. The Committee understands that the South Australian Government has established such a centre.

110. The establishment of such a facility in the ACT could have a significant influence on energy demand. It could provide information on alternative sources of energy as well as on matters such as house design, house siting and energy conservation methods. The NCDC's publication on Energy Conservation in House Design would be of particular relevance.

111. The desirability of the establishment of such a centre was raised with both the Australian Gas Light Company and the ACT Electricity Authority, both indicating support. They referred to their own efforts in advising potential customers but as the ACT Electricity Authority acknowledged 'one of the biggest problems that has beset energy marketing in the State capital cities has been the contrived product differentiation which people use to support very costly and not terribly productive advertising campaigns'.[3]

112. The ACT Electricity Authority went on to state its support for an Energy Advisory Office within the ACT but suggested that it would like to consult with the other major energy supplier, i.e. AGL. The concept was supported by AGL which also suggested that the initiative should come from the private rather than the public sector. The Committee would, however, suggest that there is a role in the public sector for such a centre particularly for the provision of information on the matter of house design and siting since these issues can be of crucial importance to energy conservation.

Recommendation 7

113. ***The Committee recommends that the DCT in association with the NCDC and the major energy suppliers establish an ACT Energy Information Centre to provide information to energy consumers. Such a centre should become the focal point in the event of a fuel emergency being declared. The work of the centre should be incorporated under the responsibilities of the Controller of Fuels.***

ENDNOTES

1. Transcript p. 21
2. Transcript p. 238
3. Transcript p. 915

CHAPTER 8—CONSERVATION IN TRANSPORT

INTRODUCTION

114. As noted in Table 2, transport accounts for more than half the energy used in the ACT. It is also the major user of petroleum products with the private motorist being the most significant user. According to NCDC the consumption of petroleum products in the ACT is distributed among various types of vehicles, approximately as follows:

Cars—78%
Motorcycles—2%
Trucks, mainly freight movement—15%
Buses, public transport—5%'[1]

115. The ND & E stated that the energy conservation campaign had concentrated on the private motorist. 'So far, in the national effort we have tended to work more by sectors, taking first the use of liquid fuels as the most immediate and largest problem of energy use and therefore the area in which conservation is perhaps most acutely needed. Within that broad sector we have so far tended to work particularly on transportation. Even within the transport sector we have concentrated on the private motorist'.[2]

116. In its submission NCDC referred to an agreed transport policy with DCT and set out the portion of the policy that most related to energy. The particular parts of the policy are:

'• the early build-up of new employment centres adjacent to public transport terminals . . . ;
• the promotion of cycling as a transport mode by the construction of a metropolitan cyclepath system . . . ;
• the development of an express inter-town public transport system . . . ;
• concern for the extent, location and design of the highway network so as to minimise energy consumption, provide a high level of service for off-peak freight and private car usage, and protect the natural and social environment . . . ;
• the discouraging of unnecessary use of the private car for commuting purposes . . . '.[3]

THE PRIVATE MOTORIST

117. According to DCT the only fuel which could replace significant quantities of petroleum is liquified petroleum gas (LPG). However, a range of methods were suggested to reduce the consumption of fuel by the private motorist but these did not involve a change in the motorist's mode of transport.

118. The first method was for a reduction in car sizes. It was suggested that if it was possible to discourage larger capacity vehicles through the registration system, and if a 25 per cent reduction in the number of medium to large cars was achieved, this could result in a 10 per cent reduction in consumption of liquid fuel. In its submission DCT noted that all motor vehicles of less than 2 tonnes in weight are subject to a common registration fee —an arrangement which had administrative advantages. The DCT also suggested that 'there is little, if any, evidence that decisions taken by motorists as to the size or purpose of vehicles purchased are at all influenced by registration costs'.[4] That was in March 1981 and later that month it was announced there would be reduced registration charges for LPG powered vehicles. The Committee considers that such measures could be used to encourage registration of vehicles with smaller engine capacity. According to NCDC the average 4 cylinder car has a fuel consumption rate of 0.6 kwh per km whilst the average 6 or 8 cylinder car consumption is 1.06 kwh per km.

119. Other methods suggested were improved aero-dynamics which would lead to the elimination of drag as well as encouraging energy conserving choices in optional extras such as steel belted radial tyres and fuel injection systems.

120. The Department of Transport referred to traffic flow and noted 'In urban areas, fuel consumption is increased by decelaration, accelaration, idling and low speed driving'.[5] According to NCDC 'good road systems allow vehicles to operate at optimum energy efficiency provided that excessive speeds are not encouraged'.[6] Earlier NCDC had suggested that 'stop/start urban conditions are inefficient as is congestion . . . the road system should be designed so that average travel speeds do not drop below 30 kph'.[7] It went on however to suggest that the introduction of traffic signals introduces stop/start conditions which can increase fuel consumption. The introduction of area traffic control is expected to lead to some fuel saving. The DCT advised that in administering Canberra's roads it means to reduce fuel consumption by such methods as co-ordinated traffic signals and the avoidance of congestion points.

121. A further issue commented on by NCDC was that of speed limits. It was suggested that 'road networks should not encourage the need for speeds in excess of 80 —100 kph. If liquid fuel supply becomes a problem, consideration should be given to reducing speed limits. In the US a maximum speed limit of 55 mph (about 90 kph) has been adopted as a conservation measure'.[8]

122. At present the peak-hour car occupancy in Canberra is 1.2 and average daily car occupancy is 1.38. It was suggested that 'if car occupancy rates for work related trips could be doubled, then an overall 20 per cent saving in fuel consumption in private cars could be made'.[9]

123. The encouragement of car pooling, which is permitted in the ACT providing passengers do not pay more than the average cost of running the vehicle, was suggested by NCDC. However, little has been done to encourage this in the ACT. According to DCT 'experience elsewhere in Australia indicates that car pooling is unlikely to make a significant contribution to energy conservation'.[10] This aspect of conservation should be publicised as it could achieve fuel economies in the ACT provided it received support from the public. The proposed Energy Information Centre would have responsibility for encouraging greater public awareness in this area.

124. The NCDC also referred to increased car occupancy schemes and suggested that this could be encouraged by parking charges. However, DOT suggested 'The cost of increased parking restrictions . . . would be partly borne by those retail areas which are not well served by public transport and which are not close to major business centres'.[11] The DCT noted 'the amount of free parking in the city and elsewhere will progressively diminish. This policy may have the effect of encouraging greater use of public transport for commuting purposes'.[12]

125. Other suggested energy conservation measures are the switch from petroleum to other sources of fuel for the private motorist. The Committee has in an earlier chapter commented on an electric vehicle trial for the ACT and NCDC suggested 'synthetic alternatives to petroleum fuels are a feasible proposition in technology terms now'.[13] However, it was further suggested that 'synthetic fuels and electrification of the urban car are not likely to be implemented to any significant degree within the next 10 to 15 year period'.[14]

126. It was also noted that it may be worth investigating the use of LPG and CNG (Compressed Natural Gas) as energy sources. The Department of Transport considered certain types of vehicles as being particularly suited for LPG operation, eg. taxis. About 80 Canberra taxis use LPG. The Department went on to suggest that natural gas could be used as a motor spirit substitute.

PUBLIC TRANSPORT

127. There was considerable reference in the submissions to public transport. Action for Public Transport suggested that a single passenger in a car consumes 250 per cent more fuel than if travelling by bus. The organisation suggested that there were many initiatives and incentives needed to upgrade Canberra's public transport system such as low or free fares, and construction of the Civic interchange. The organisation also suggested upgrading the train service to and from Canberra. Similar points were made by the Society for Social Responsibility in Science —ACT. The NCDC noted that the public transport system accounts for 8 per cent of person journeys and provided details of energy consumption for 100 passenger kilometres, a range of bus occupancy and road factors for buses.

128. The DCT has claimed that buses are a more energy efficient mode of transport than private cars not primarily because of better engine efficiency but from better passenger load capacity per vehicle. The Department went on to suggest 'the obvious way of encouraging energy conservation is to foster greater use of public transport'.[15] It was noted that the ACT Bus Service (ACTION) is totally dependent on the regular supply of liquid fuel. Examinations have been conducted into the operational benefits of electric transport such as trolley buses and trams as well as the purchase of electric cars. In regard to trolley buses it was considered 'the high cost of infrastructure such as overhead cables and substations appears to make their use cost-prohibitive on all but the most densely trafficked routes'.[16] The NCDC also suggested that most public transport and freight vehicles are powered by diesel engines and are not conducive to conversion to LPG. The DCT estimated that it would cost about $3 000 per unit to convert buses to gas.

129. It was acknowledged during the Inquiry that it would not be possible for ACTION to operate at a profit. The Department of the Capital Territory agreed that while the fostering of public transport encouraged energy conservation this shifts the burden of cost from the private pocket to the public purse, but should be seen more in the light of public transport being a 'public good' with deficits not seen as evil but as unavoidable. The subsidy to ACTION has been rising from $586 000 in 1970-71 to $10 109 300 in 1979–80. However, the per capita subsidy to ACTION compares favourably with the subsidy provided in other capital cities as shown in Table 6 prepared by the Parliamentary Library Statistical Service.

130. During the inquiry concern was expressed about the utilisation of ACTION buses during off-peak periods. Information provided by the Department of the Capital Territory, while not a firm statement of overall usage pattern, does give an indication of utilisation.

Table 6: Capital city public transport services, subsidy per capita, 1979–80

City	*$*
Sydney, Newcastle (1978–79)	54.40[a]
Melbourne (1978–79)	37.00[b]
Brisbane	not available
Adelaide	50.70[c]
Perth	39.70[d]
Hobart, Devonport, Burnie	33.84[e]
Canberra	41.89[f]

Source: Commonwealth Parliamentary Library Statistical Service.

Notes:

(a) State government contribution towards running expenses of train, bus and ferry services. Separate figures for Sydney are not available.

(b) State government subsidies to train, tram and bus services.

(c) State government contribution to the cost of providing train, tram and bus services.

(d) State government subsidies to train, bus and ferry services.

(e) State government subsidies to bus services. Separate figures for Hobart are not available.

(f) Commonwealth Government payments to cover operating losses on Canberra bus services.

131. Of the bus fleet of 354 (including 22 articulated buses) 85 per cent were used during the morning peak and 90 per cent during the afternoon peak. After 6.30 p.m. only 33 per cent of the fleet was utilised. However, 50 per cent of passengers were carried during peak hours. One matter of note was that after 6.30 p.m., while 33 per cent of the fleet was operating, only 3 per cent of the passengers were carried. The Committee suggests that this question of after hours service be kept under review. Action for Public Transport referred to the need to provide incentives to encourage people to use the bus transport system in out-of-peak hours and that pensioners and unemployed people should be allowed to travel free in off-peak hours.

132. Action for Public Transport claimed that while day tickets and monthly tickets were available, the availability of these concessional fares is not well known. 'It is only when people like ourselves are really fighting for buses that you know all the lurks'.[17] The Committee would suggest that the availability of concessional fares should be publicised. The concessional tickets available for adult travelling as from 18 January 1981 are:

Cash fare: 50 cents a section
Fare Go —pre purchase: 40 cents a section
Bus card (unlimited travel for one month): $22.00
Day tripper (unlimited travel for one day): $2.00

133. While there have been significant increases in the cash fare, as was noted by Action for Public Transport, the cost of the monthly ticket has only increased from $18.00 on 17 August 1978 to $22.00 on 18 January 1981. The availability of concessional fares should be publicised by the proposed Energy Information Centre.

CYCLING

134. Cycling and walking while considered minor modes of transport are certainly energy efficient. NCDC suggested that motor cycle modes did not appear significantly

better in energy consumption terms than a car with an occupancy of 2. The Federation of Australian Motorcyclists suggested that the motorcycle was a viable personal transportation alternative and that 'promotion of the role of the motorcycle as a significant or even major element in the total personal transport spectrum would not only alleviate short-term demand upon available fuel supplies, but in the longer term would allow a far more resource-efficient pattern of personal transportation provision to emerge'.[18]

135. Pedal Power claimed that if a journey is made by bicycle instead of by car 100% of the fuel for that trip is saved. The organisation then went on to suggest several initiatives which could be taken to encourage more people to travel by bicycle and thus lead to a significant drop in the consumption of petrol. Suggestions included—provision of bike racks on buses, showers at work, storage facilities for bikes and the acceleration of the construction program for cyclepaths. It was acknowledged that Canberra already has the most extensive cyclepaths in Australia and many more are planned. It was suggested, however, that the cyclepaths are poorly maintained. Pedal Power provided estimates of travel time for cyclists in comparison with motorists. Details provided are set out in Appendix IV.

136. According to DCT it has in conjunction with NCDC positively encouraged bicycles as a transport and recreation mode. The ACT has over 85km of cyclepaths and the cyclepath system is being developed in accordance with the proposed metropolitan cycleway network. NCDC claims this has meant more people are now riding to work. Through its consideration of variations to the City Plan the Committee is aware of and involved in the development of the cycleway network.

137. While the cycleway network is being extended, there are other facilities which must be provided if more people are to be persuaded to cycle to work. Pedal Power referred to the need for showers and cycle storage facilities at the place of work. NCDC advised that while bicycle racks have been installed in recently completed offices there are many Government office buildings without bicycle racks or storage areas. However, the provision of these facilities is dependent on whether the Department of Administrative Services sponsors the installation of such facilities. Details of bicycle storage facilities in ACT buildings managed by the Department of Administrative Services is set out below.

Bicycle Storage Facilities in ACT Buildings Managed by The Department of Administrative Services—1981

Building	*Storage Facilities (No. of Bicycles)*	*Building*	*Storage Facilities (No. of Bicycles)*
Acton House	..	East Block	40
Admin. Building	3	Edmund Barton Building	
Albemarle	..	Trade and Resources	6
Alexander/Fishburn	12	B.A.C.A.	15
Anzac Park West	..	Primary Industry	24
Barton Offices	..	P.M. & C.	22
Beauchamp House	..	General Purpose Building	..
B.M.R. Building	..	Gorman House	..
Benjamin Offices		Juliana House	..
A-B Block	63	Law Courts	..
E-F Block	34	P.S.B. Building	20
J-K Block	30	Scarborough House	28
N-P Block	26	Sirius Building	17
Cameron Offices	12	Hinkler Building (former Tariff Board)	..
Civic Offices		Treasury Building	..
South Building	12		
North Building	6		
		TOTAL	370

138. The provision of change and storage facilities is of particular importance if more motorists are to be persuaded to forsake their cars and travel instead by bicycle. Pedal Power suggested there is a need to put more emphasis on cycling as a way to save petrol and that 'bicycle facilities should be made obvious, not only to encourage cyclists to use them but also to encourage non-cyclists to try them'.[19] This is another function which could be carried out by the proposed Energy Information Centre.

RAIL

139. As noted earlier the proportion of road transport which is used for carrying freight accounts for around 15 per cent of the consumption of petroleum products. According to NCDC 'Freight movement to and within the ACT is performed mainly by truck transport —except for some specialised bulk commodities. It would be possible to make substantial economies in the use of petroleum products by the transfer of road freight to rail, particularly if electrification proceeds'.[20] The electrification of the Sydney/Canberra and Sydney/Melbourne rail link was commented on in other submissions. However, NCDC suggested that there would need to be studies of freight movement and in particular a need 'to determine whether freight terminals in both the ACT *and in Sydney* for ACT traffic would significantly encourage the use of rail for freight transport'.[21]

140. The Department of the Capital Territory, in a statement issued on 22 April 1981, commented on the potential for the development of rail travel claiming it could not only compete with air travel between Canberra and Sydney in terms of time taken but would be using only about 15 per cent of the energy and for about one third of the real cost. At present NSW State Rail Authority and DCT are discussing ways the organisations could work together to improve the rail service between Sydney and Canberra. As a result of recent developments a daily same day return service now operates between these two capitals and investigations are being carried out to determine the feasibility of providing a spur link from Canberra to Gunning. This would improve the time taken for the Canberra/Sydney as well as the Canberra/Melbourne run and would increase the attractiveness of rail travel.

Recommendation 8

141. ***The Committee welcomes these developments and suggests that the Government give priority to the feasibility study being undertaken on a possible railway link from Canberra to Gunning and further recommends that the Government expedite the provision of an XPT rail service between Canberra and Sydney.***

OTHER TRANSPORT CONSIDERATIONS

142. A further factor referred to by ND & E was the design of new suburbs. 'Such design should take account of the implications of Canberra's decentralised suburban structure and the implications this has on private and public transport costs'.[22] In its submission NCDC referred to the existing metropolitan structure and 'high proportion of self-containment in each of the individual towns'.[23] It noted that the Metropolitan Policy Plan is currently being reviewed. According to NCDC 'another issue in the Commission's general metropolitan planning has been increasing the proportion of high density residential development, particularly close to the town centres and the future inter-town public transport route'.[24]

143. The Committee suggests that in the debate on the Metropolitan Policy Plan the issue of energy conservation should be given priority. The NCDC advised that since 1975 there has been a steady demand for medium density housing and this type of housing now accounts for more than 20 per cent of all dwelling units constructed. Since fuel costs would be a factor influencing house purchase, the demand for medium density should be catered for and encouraged by the planners.

ENDNOTES

1. Transcript, p.207
2. Transcript, p. 114
3. Transcript, p.205
4. Transcript, p.19
5. Transcript, p.317
6. Transcript, p.215
7. Transcript, p.213
8. Transcript, p.215
9. Transcript, p.213
10. Transcript, p.20
11. Transcript, p.315
12. Transcript, pp.20-21
13. Transcript, p.211
14. Transcript, p.219
15. Transcript, p.17
16. Transcript, p.19
17. Transcript, p. 1098
18. Transcript, p.1208
19. Transcript, p.1149
20. Transcript, p.219
21. Transcript, p.219
22. Transcript, p.95
23. Transcript, p.202
24. Transcript, p.203

CHAPTER 9—CONSERVATION IN HOUSING

144. The amount of energy consumed in buildings has been estimated at between 20 to 30 per cent of the gross energy produced in Australia. In Canberra over 60 per cent of the energy consumed in buildings is for heating. ND&E noted that the energy demand for the ACT differed from the States.

> 'The ACT has a relatively narrow industrial/commercial base with its main industries in the tertiary sector. Energy demand in the ACT therefore, has a quite different sectoral distribution from that in the States. The ACT's extremes of temperature in both winter and summer also affect energy consumption. Canberra has the most severe winter of any mainland capital, resulting in a significant energy requirement for heating'.[1]

145. According to a 1976 study 61 per cent of energy used in Government houses in Canberra is for space heating, 20 per cent for water heating and 19 per cent for cooking. A detailed research program on the scope for energy conservation in house design was undertaken by NCDC. The investigation concentrated on the means of reducing space heating energy and found 'that substantial improvements in terms of energy gain and retention could be derived from careful siting, appropriate building shape and window design, location and form of landscaping and provision of insulation'.[2]

146. The results of the study were published as an NCDC Technical Information Paper entitled *Low Energy House Design for Temperate Climates*. This is one of the most sought after of NCDC's publications.

147. The increase in the price of oil has discouraged the use of oil for heating and there has been some conversion from oil to electricity. According to NCDC 'the current market price forces are discouraging oil use in fixed installations. Electricity and shortly natural gas are displacing oil use in terms of consumer preference'.[3] This claim was supported by ACTEA.[4] Other conservation measures suggested were passive solar design, solar heating and thermal insulation.

148. The DCT referred to its role in both public and private housing. In respect of public housing there is an upgrading program for older government houses. Roof insulation has been installed and oil heaters are being replaced by electric heaters. There are also investigations on the possibility of installing solar water heaters in houses to be upgraded. For houses being constructed there will be performance standards for energy conservation. 'The standards will take into account the orientation and mass of the house, the location of windows, and ceiling and wall insulation'.[5]

149. The ACT House of Assembly suggested that the installation of solar heating water systems and thermal insulation be encouraged. At its meeting on 3 October 1979 the Assembly agreed 'that the Assembly is of the opinion that the Government should investigate the desirability of allowing a taxation concession to persons who make their homes more energy efficient by either installing thermal insulation or a solar hot water system, and that the concession should be equal to expenditure on these items up to a maximum of $1 200'.[6] The Solar Energy Industries Association of Australia claimed that approximately 1 500 domestic solar water heating systems and 75 solar swimming pool systems are currently operating within the Canberra area.

150. According to NCDC approximately 25 per cent of energy could be saved by insulating ceilings or walls and savings of 50 per cent if both ceilings and walls were insulated. CSIRO referred to its research on energy consumption and conservation in buildings and quoted 'that initiatives to promote wall insulation in houses in the ACT, in addition to ceiling insulation, merit consideration'.[7]

151. The Department of the Capital Territory, however, noted that questions of comfort and energy consumption have been left to the discretion of the individual owners. The ACT Building Regulations have been traditionally concerned with health

and safety. While there was reference to countries which have adopted mandatory building regulations to promote energy conservation in buildings, in regard to insulation DCT commented:

> 'Were the Department to recommend to the Government that all private residential dwellings should be fully insulated by legislative decree, there would need to be careful regard for the cost impact of such a mandatory imposition on the home owner. The costs of full ceiling and wall insulation in a standard (fifteen square) home are estimated at between $1000 and $1500. The increasing price of all energy resources suggests that market forces will increasingly make it more attractive for home owners to insulate their houses voluntarily. It appears that Australian governments have not as yet deemed it necessary to encourage such decisions by the use of direct grants, tax deductions or other forms of incentive'.[8]

152. The ACT Branch of the Australian Institute of Architects suggested the establishment of an Energy in Buildings Advisory Panel. The Committee in informal discussions with Mr James Ridgeway, a visiting author and journalist on energy conservation issues from the United States, discussed the merits of awarding prizes for building designs which took account of energy conservation and energy efficiency in planning. This was thought to be an appropriate way of encouraging such an approach to building design. The Committee suggests that the Housing Industry Association as well as the Royal Australian Institute of Architects give consideration to providing an annual prize for new buildings which have been constructed to take account of energy conservation and efficiency.

153. The Committee inspected a low energy consumption house designed by the CSIRO at Highett and Mr Bonham of the University of NSW at Duntroon has provided the Committee with details of a low energy consumption house he has constructed in the ACT. Mr Bonham has also provided details of a seminar on solar housing which he organised.

154. NCDC provided details of measures which could be implemented in subdivisional planning to reduce energy consumption. It was noted that 'the most desirable feature in a suburban layout, from an energy conservation point of view is the orientation of blocks to the north'.[9]

155. However, according to NCDC 'A difficulty which is encountered in the application of these principles to Canberra is that in many areas the landform does not facilitate orientation to the north. This is reinforced by the strong preference which Canberra residents have for views. (Unfortunately, some of the best views are to the west, e.g. the Brindabellas, an orientation which is poor in energy terms)'.[10] A further factor is 'aligning blocks to the north also has implications for drainage, as roads are designed to carry overland flow, to produce blocks free from flooding. On east-west roads there is also a problem of sun glare'.[11]

156. Individual householders can take steps to improve the energy efficiency of their own houses by applying principles which minimise heat loss in winter and heat gain in summer. A summary of low energy design principles can be found in the publication referred to earlier called *Low Energy House Design for Temperate Climates*.[12] More detailed suggestions for controlling heat gain or loss through walls, ceilings, floors and windows in dwellings are described in a publication entitled *Energy Conservation and Thermal Comfort for Australian Housing*.[13] Some of these measures do not involve a great deal of expense. To make householders aware of the information contained in these publications the Committee considers that the DCT and the NCDC could prepare and promote a pamphlet, based on this information and make it readily available throughout the ACT to existing and intending homeowners and builders.

Recommendation 9

157. ***To make the public more aware of energy conservation in housing the Committee suggests that the Housing Industry Association and the ACT Chapter of the Royal Australian Institute of Architects consider awarding annual prizes for energy conservation conscious design in housing. The Committee further recommends that the DCT and NCDC jointly prepare and promote a pamphlet on energy efficiency in housing and ways householders can achieve greater energy economies in their own homes.***

ENDNOTES

1. Transcript, p. 83
2. Transcript, p. 231
3. Transcript, p. 239
4. Transcript, p. 912
5. Transcript, p. 24
6. Transcript, p. 294
7. Transcript, p. 353
8. Transcript, p. 25
9. Transcript, p. 226
10. Transcript, p. 226
11. Transcript, p. 226
12. National Capital Development Commission Technical Paper, No. 22, September 1977.
13. Department of Housing and Construction, A.C.T. Region, eds. Haines, M. and Wheeler, T.

CHAPTER 10—CONSERVATION IN COMMERCIAL BUILDINGS AND COMMUNITY SERVICES

BACKGROUND

158. Energy is used in ensuring that buildings are made comfortable for the occupants. This involves heating buildings during cold periods and cooling them when it is hot. However, some of this energy is wasted and it is not always possible to ensure that either the warm air or cool air is retained in the building. According to NCDC 'the commercial sector offers significant scope for energy savings in the areas of heating and air conditioning systems, in addition to thermal design of buildings and comfort levels. There also may be some scope in the areas of lighting and re-using waste heat'.[1] The Commission went on to state 'In the past NCDC has not imposed energy design criteria on private developers under its design and siting powers and DCT has not included such matters in leasing conditions. Under its design and siting responsibilities, the Commission has not specifically reviewed energy aspects of submitted designs'.[2]

159. There are, however, significant cost pressures to convert from oil to alternative forms of heating as well as for a reduction in expenditure on energy. The previous Committee had informal discussions with representatives of the Lend Lease organisation in Sydney and were informed of energy savings which had been made by that organisation ($470 000 or 15 per cent of energy costs). The savings which were mainly attributable to housekeeping measures such as the reduction of the number of lights in parking areas as well as the installation of photo electric cells which ensure that lights operated only at night rather than all day.

160. It was suggested that publicity and education about energy conservation would be beneficial and that consideration be given to community relations campaigns in Canberra complementary to the National Energy Conservation campaign. This could be conducted by the proposed Energy Information Centre. The Victorian Gas and Fuel Corporation operates an Energy Management Centre which is concerned with the most expedient utilisation of the indigenous energy sources of Australia. The Centre which is staffed by a team of experienced mechanical and chemical engineers has as its main objectives:

- to help educate commerce and industry on the efficient use of energy thereby directly cutting their own energy costs and reducing the drain on the nation's energy resources;
- to provide first hand information on the current energy situation so as to assist senior executives with long term energy cost planning;
- to encourage a positive attitude towards energy management by indicating potential cost savings and other benefits;
- to motivate senior executives to implement effective energy management programs within their own companies and to encourage staff to undertake formal training courses in energy management.

The Committee suggests that the Commonwealth authorities should consider enrolling responsible officers at the courses conducted by the Victorian Centre.

161. A further matter relating to energy conservation in buildings is that of energy audits. Enersonics Pty Ltd, a company which is involved in energy conservation provided a paper which describes methods which have achieved average economically justified savings of 27 per cent. The Company provided details of 14 case studies where an energy audit had proved to be a good investment and a valuable part of building management. As part of its energy conservation campaign the Commonwealth has been encouraging energy audits in the private sector. The Committee would suggest there is a need for such audits to be conducted in Commonwealth buildings.

COMMONWEALTH BUILDINGS

162. Responsibility for energy conservation in buildings in the ACT appears to be divided. The Department of Housing and Construction (H & C) referred to a study on behalf of the Department of Administrative Services (DAS) which revealed 'a general situation in which managers in both occupancy and property management were not held accountable for the use of energy'.[3] It appeared that the building owner generally had very little control over the use of energy for which he paid. The Department of Housing and Construction is required to deal with a number of Government instrumentalities. DAS in the ACT is just one of the organisations of building managers dealt with by H & C, others include the Schools Authority, the Department of the Capital Territory, Department of Defence and instrumentalities such as Telecom and CSIRO. H & C went on to stress that its role is only advisory and that it can only make suggestions.

163. The Department suggested there was a need to monitor the energy consumption of buildings in the ACT 'energy usage must be measured before savings can be quantified and it is recommended that all non residential buildings in the Australian Capital Territory with significant energy usage be monitored and evaluated after completion to assess the effectiveness of energy use and where energy savings could be achieved and incorporated in future designs. This essential property management function is not currently requested or funded by most departments and authorities for which the Department of Housing and Construction is the design, construction, operation and/or maintenance agent and consequently is not done'.[4]

164. This proposal would appear to have much to commend it. The Department of Administrative Services has scope through its property function for introducing energy conserving measures into office buildings which it controls in the Territory. There was reference to the development of guidelines for new offices. However, this development was only in the very early stages. The Department provided a summary of a report on energy use patterns by the Department of Construction in May 1978. That study found that the energy bill for the Department in 1976–77 was $3.3 million. That same report noted 'the divided responsibility for operation and service . . . the lack of direct accounting and reduction in service budgets leads to a loss of incentive for the most directly able to keep energy consumption in check'.[5]

165. The Department of National Development and Energy referred to a letter which the then Minister had sent to all other Ministers seeking information on energy consumption. The Committee was advised that it was found that 'the scope for departments and instrumentalities to conserve liquid fuels was reported to be limited in many cases by conservation measures previously introduced'.[6]

166. The Committee was provided with details of the consumption of fuel in a number of Commonwealth office blocks as well as the number of occupants in each building and thus the consumption of fuel oil per occupant. These statistics which are set out below (Table 7) indicate that consumption of fuel oil varies significantly from building to building from over 800 litres per occupant for the Hotel Kurrajong and the Cameron-Benjamin Offices to below 400 for the Barton Offices and the Treasury building and as low as 95 litres for the Anzac Park West Offices.

Table 7: Fuel consumption, number of occupants and litres per occupant in A.C.T. buildings managed by the Department of Administrative Services 1978–79

Building	*Consumption (litres)*	*Occupants*	*Litres per occupant*
Acton House	94 980	155	613
Admin Building	539 710	1 385	390
Albemarle	63 686	620	103
Alexander/Fishburn	101 750	813	125
Anzac Park West	111 923	1 179	95
Barton Offices	261 238	804	325
Barton—Training	2 109	[c]	
Beauchamp House	17 977	50	360
B.M.R. Building	134 659	475	283
Cameron/Benjamin Offices	2 444 484	3 020	809
Civic Offices	315 694	634[b]	498
Commonwealth Archives	21 381	[c]	
East Block	117 454	122[a]	
Edmund Barton Building	969 454	2 389	406
General Purpose Building	52 327	42[a]	
Gorman House	19 733	[c]	
Juliana House	113 195	370	306
Hotel Kurrajong	57 953	65	892
Law Courts	66 406	[c]	
P.S.B. Building	70 622	273	259
Scarborough House	140 446	601	234
Sirius Building	65 488	545	120
Tariff Board	54 743	159	412
Treasury Building	625 837	1 683	371
Tudor House	7 261	[c]	

Source: Department of Administrative Services.
Notes:
(a) Also revenue leases to Telecom/Australia Post—occupants unknown.
(b) Area includes Legislative Assembly—occupants unknown.
(c) Special purpose type building.

167. There is cause for concern at the lack of awareness of energy conservation by Commonwealth departments and instrumentalities, particularly, since there would appear to be no incentive for that energy conservation. There definitely appears to be scope for an increased involvement by the Department of Housing and Construction in the control of energy supplies. In regard to liquid fuels the Department stated 'we do not look at oil storage in general nor do we check electricity usage as such. There is generally no provision in particular buildings for monitoring these individual units. It is something that can be done but is not generally being done. We can make provision but it would cost money to install meters and proper metering devices. We do not do very much of it now'.[7] The Department later suggested that there should be a budget set for the building and its energy input and the owner should be aware of what is being consumed. In response to a question as to whether or not it was possible to control the amount of oil a building used the Department responded 'we are not in a position to do that. We are just checking to make sure they have oil for current needs'.[8]

168. Some heating appliances in government buildings are being converted to natural gas and this work is being oversighted by an interdepartmental committee (IDC), chaired by the DCT and with members from NCDC, H & C and DAS. According to AGL 'Practically all government buildings will move from oil heating to natural gas'.[9]

Recommendation 10

169. ***The Committee recommends that the terms of reference for the IDC on conversion of government buildings from oil to natural gas be extended to that of energy conservation in government buildings and that it be made a standing committee.***

SCHOOL BUILDINGS

170. A study of energy use in ACT school buildings was commenced in 1979 and a final report on this study was produced in April 1980. New designs were developed to incorporate suggestions on energy conservation and a reassessment of previous designs was undertaken to eliminate recurring faults. Stirling College was the subject of a specific submission in which it was claimed 'a series of medium to long term design changes are required to improve the educational efficiency of the colleges and schools and also to reduce future energy requirements'.[10]

171. Problems arose at Stirling College because of a decision not to air-condition the Library at the College. The decision was made at the design stage though 'Both the Department (Housing and Construction) and the private architect questioned the decision at the time'.[11] Steps are now being taken to overcome the problem including the installation of air-conditioning.

172. Energy audits of six schools have been undertaken to determine energy use patterns. It was suggested that 'significant economies of energy could be achieved in existing schools by changes of lighting usage, etc.'.[12] However, it was noted that energy efficiency is only one factor to be considered in school design.

Recommendation 11

173. ***The Committee is concerned at the lack of attention given to energy conservation and efficiency in school design and recommends that higher priority be given to maximising energy conservation in new designs for school buildings.***

COMMUNITY SERVICES

174. A range of community services are operated by DCT and these have varying energy demands. DCT in its submission suggested some possibilities for energy savings. The first was for a reduction in garbage services. If garbage collections were reduced from twice a week to once a week this would mean a saving of approximately 100 000 litres of diesel fuel.

175. Three of the outdoor swimming pools in the ACT are heated and a solar heating plant has been installed at one of these (Macquarie). A solar heating plant has been installed for the indoor heated pool at the Erindale Centre in Wanniassa. The solar units are being monitored and it was concluded 'that it was a viable means of conserving fossil fuels but was only marginally viable in economic terms'.[13] It was suggested however, that recent price increases would mean that solar heating would become more economic.

176. The Lower Molonglo Water Quality Control Centre is a major consumer of distillate, using 3 million litres a year. It was suggested that there was potential for conversion to natural gas and this is being examined by the authorities. According to NCDC the incinerator could be converted to natural gas and other options are being considered.

ENDNOTES

1. Transcript, p. 227
2. Transcript, p. 237
3. Transcript, p. 449
4. Transcript, p. 450
5. Transcript, p. 748
6. Transcript, p. 797
7. Transcript, p. 461
8. Transcript, p. 460
9. Transcript, p. 1052
10. Transcript, p. 1490
11. Transcript, p. 780
12. Transcript, p. 781
13. Transcript, p. 23

CHAPTER 11—CONCLUSIONS

177. The earlier chapters of this report have considered the terms of reference of the inquiry and recommendations have been made for consideration. There have also been a number of suggestions which the Committee would hope are noted by the authorities. Both the formal recommendations and the suggestions are set out in the front of this report.

178. It has been suggested that the introduction of natural gas to the ACT will lead to a diversion of demand from petroleum to natural gas and that there will also be increases in the consumption of energy from alternate sources. However, petroleum will continue to be the main source of energy in the immediate future. In regard to the adequacy of petroleum delivery, distribution and storage in the ACT, it is concluded that there is around 15 days' supply of petrol from private sources and 3 weeks from Government sources. In addition the storage capacity for the bus network is around 2 months' supply.

179. With regard to the disruptions to supplies, particularly petrol supplies, the Committee has recommended that steps be taken to redraft the Fuels Control Ordinance and for the formal establishment of the Fuels Use Advisory Committee. Supply of petrol to the private motorist should be available at the service station and the Committee has recommended that rather than freeze all fuel stocks during an emergency, only a certain percentage of stock be retained for emergency service. This petrol should be purchased by the authorities or at least compensation should be provided to the service station owner for the costs involved in storing the fuel. Such a procedure would encourage service station operators to obtain and sell petrol rather than placing a complete ban on such sales. During times of emergency the Committee would support a system of rationing fuel to private motorists on the basis of odd and even number plates and the setting of a maximum amount of petrol able to be purchased at any one time.

180. The Committee believes Canberra is ideally placed as an energy research centre and supports research currently being carried out by the ANU and the CSIRO into areas of alternative sources of energy and fuel. The question of energy conservation by means of electric vehicles has been considered in some detail and the Committee has recommended an electric vehicle trial for the ACT. Such a trial was proposed by CSIRO and endorsed by other organisations.

181. In respect of energy conservation it would appear that the main avenue for conservation is in transport. At present the principal method of transport is the private car and the Committee has suggested that the registration system be revised to encourage cars with smaller engine capacity. The role of the public transport system has been noted, particularly that the level of subsidy to the bus service compares favourably with other capital cities. The encouragement of cycling has also been suggested. The Committee has noted recent improvements to the rail service between Canberra and Sydney and has indicated that priority be given to a feasibility study currently being undertaken on a proposed railway link between Canberra and Gunning. As a greater incentive to encourage rail travel as air fares continue to rise the Committee recommends that the Government expedite the provision of XPT trains on the Canberra to Sydney link.

182. In respect of conservation in housing the Committee has suggested that residents need to be more aware of steps that can be taken to reduce energy consumption and this could be achieved by the publication of a pamphlet outlining steps that can be taken. Such booklets are freely distributed in some States. As a further measure to increase general awareness about energy conservation in housing the Committee has recommended that annual prizes be awarded for designs which take account of energy conscious criteria.

183. The divided responsibility for energy conservation in Commonwealth buildings is also commented on in some detail. The comparative heating costs in a range of Government buildings has been included as Table 7. Fuel oil consumption ranges from over 800 litres per person per year in the Cameron/Benjamin Offices to 95 litres for the Anzac Park West Offices. The Committee recommends the establishment of a special task force to carry out energy audits in Government buildings and further recommends that high priority be given to energy efficiency and conservation in the design of ACT school buildings.

184. Another matter which has been referred to is that of energy information centres. Such centres have been established in Sydney and Melbourne and one is to be established in Adelaide. Both ACTEA and the Australian Gas Light Company have indicated their support for such a centre and the Committee considers its establishment of crucial importance to energy conservation in the Territory.

185. Energy, both in consumption and conservation is of direct concern to the citizen of Canberra. Citizens need to be aware of what measures can be taken to save energy, particularly the direct personal economic benefits as well as the benefits to the general community. The proposed Energy Information Centre could thus play a dramatic role in the future of the Territory.

M. E. Reid
Chairman

July 1981

APPENDIX I

LIST OF WITNESSES

A.C.T. Automotive Services Association

Mr Edward Lance Murray, President, A.C.T. Automotive Services Association, Northbourne House, Canberra, Australian Capital Territory.
Mr Bruce Livingstone, Vice-President, A.C.T. Automotive Services Association, Northbourne House, Canberra, Australian Capital Territory.

A.C.T. Electricity Authority

Mr William Elwood Bolton, Chairman, A.C.T. Electricity Authority, 221 London Circuit, Canberra.
Mr Bryan William Birch, Secretary, A.C.T. Electricity Authority, 221 London Circuit, Canberra.
Mr John Michael Kain, Planning and Operations Engineer, A.C.T. Electricity Authority, 221 London Circuit, Canberra.

A.C.T House of Assembly

Mr Marc Robinson, Deputy Chairman, Standing Committee on Management, A.C.T. House of Assembly, South Building, London Circuit, Canberra, Australian Capital Territory.

Action for Public Transport

Dr Christopher Lex Watson, Convenor, Action for Public Transport, P.O. Box 1875, Canberra City, Australian Capital Territory.
Ms Gabrielle Watt, Committee Member, Action for Public Transport, P.O. Box 1875, Canberra City, Australian Capital Territory.

Australian Capital Territory Schools Authority

Mr Gordon Ivor Wall, Acting Director (Planning), Australian Capital Territory Schools Authority, Macarthur House, Northbourne Avenue, Canberra, Australian Capital Territory.
Mr Graeme Winston Stephens, Acting Assistant Director (Finance and Services), Australian Capital Territory Schools Authority, Macarthur House, Northbourne Avenue, Canberra, Australian Capital Territory.

Australian Automobile Chamber of Commerce

Mr John Edmund Collins, Executive Director, Australian Automobile Chamber of Commerce, 464 St Kilda Road, Melbourne, Victoria.

Australian Consumers Association

Mr Allan James Asher, Co-ordinator, Public Affairs Unit, Australian Consumers Association, 26 Queen Street, Chippendale, New South Wales.

Australian Gas Light Company Canberra Limited

Mr Herbert Hume, General Manager, Australian Gas Light Company Canberra Limited, representing the Australian Gas Light Company, 111 Pacific Highway, North Sydney, New South Wales.
Mr Grant Alfred King, Manager, Mains and Services, Australian Gas Light Company Canberra Limited, 32 Allara Street, Civic, Australian Capital Territory.
Mr Stephen James Martin Carney, Consultant to Australian Gas Light Company Canberra Limited, 32 Allara Street, Civic, Australian Capital Territory.

BP Australia Limited

Mr Anthony Leonard Maine, Manager, Government and Public Affairs Division, BP Australia Limited, 1 Albert Road, South Melbourne, Victoria.
Mr Robert Allen Goode, Marketing Operations Manager, New South Wales, BP Australia Limited, 1 Albert Road, South Melbourne, Victoria.

Bus and Coach Association of New South Wales

Mr John William Kelley, Chairman, Canberra Branch, Bus and Coach Association of New South Wales, P.O. Box 837, Canberra, Australian Capital Territory.
Mr George Ernest Gourlay, Consultant to Bus and Coach Association of New South Wales, P.O. Box 434, Parramatta, New South Wales.

Caltex Oil (Australia) Pty Limited

Mr Derek Michael Wood, Operations Manager New South Wales, Caltex Oil (Australia) Pty Limited, 167-187 Kent Street, New South Wales.
Mr Peter Anthony Solomons, Marketing Manager Canberra and Southern New South Wales, Caltex Oil (Australia) Pty Limited, 167-187 Kent Street, New South Wales.

Canberra Consumers Inc.

Mr William Spencer Howitt, Member of Executive, Canberra Consumers Inc., Post Office Box 591, Canberra City, Australian Capital Territory.

Commonwealth Scientific and Industrial Research Organisation

Mr Michael James Wooldridge, Principal Research Scientist, Division of Mechanical Engineering, Commonwealth Scientific and Industrial Research Organisation, Melbourne, Victoria.
Dr Hill Wesley Worner, Director, Institute of Industrial Technology, Commonwealth Scientific and Industrial Research Organisation, Canberra, Australian Capital Territory.

Dr John Brotchie, Assistant Chief, Division of Building Research, Commonwealth Scientific and Industrial Research Organisation, Melbourne, Victoria.

Department of Administrative Services

Mr Joseph William Moore, Acting Assistant Secretary, Operations Branch, Transport and Storage Division, Department of Administrative Services, Canberra, Australian Capital Territory.

Mr Allen Alfred Shakespeare, Acting First Assistant Secretary, Transport and Storage Division, Department of Administrative Services, Canberra, Australian Capital Territory.

Mrs Kaye Dal Bon, Acting Assistant Secretary, Planning and Review Branch, Property Division, Department of Administrative Services, Canberra, Australian Capital Territory.

Mr Martin Keith Gillies, Acting Finance Officer, A.C.T. Property Branch, Property Division, Department of Administrative Services, Canberra, Australian Capital Territory.

Mrs Margaret Helen Carlson, Acting Clerk Class 8, Planning and Review Branch, Property Division, Department of Administrative Services, Canberra, Australian Capital Territory.

Department of the Capital Territory

Mr William Ernest Lawrence, First Assistant Secretary, Legislation and Policy Co-ordination Division, Department of the Capital Territory, Canberra, Australian Capital Territory.

Mr David Lander, Assistant Secretary, Urban Affairs Branch, Department of the Capital Territory, Canberra, Australian Capital Territory.

Mr Alan John Frazer, Acting Director, A.C.T. Emergency Services, Department of the Capital Territory, Canberra, Australian Capital Territory.

Department of Engineering Physics, Australian National University

Professor Stephen Kaneff, Head, Department of Engineering Physics, Australian National University, Canberra, Australian Capital Territory.

Dr Edward Kenneth Inall, Senior Fellow, Department of Engineering Physics, Australian National University, Canberra, Australian Capital Territory.

Department of Housing and Construction

Mr Alexander Ross McIntyre, Director, Australian Capital Territory Region, Department of Housing and Construction, Furzer Street, Phillip, Australian Capital Territory.

Mr Charles Thomas James Bubb, Director of Engineering, Department of Housing and Construction, 470 Northbourne Avenue, Dickson, Australian Capital Territory.

Department of National Development and Energy

Mr Thomas Joseph McMahon, Acting Deputy Director, National Energy Office, Department of National Development and Energy, Tasman House, Canberra, Australian Capital Territory.
Mr Ian Warren Morrison, Assistant Secretary, Regional Development Division, Department of National Development and Energy, Tasman House, Canberra, Australian Capital Territory.
Mr John Roland Kjar, Principal Executive Officer, Forecasting and Modelling Section, National Energy Office, Department of National Development and Energy, Tasman House, Canberra, Australian Capital Territory.
Mr Alan Ralph Burdon, Principal Executive Officer, Electricity Section, National Energy Office, Department of National Development and Energy, Tasman House, Canberra, Australian Capital Territory.
Mr Michael Newman Lawrence, Assistant Secretary, National Energy Office, Department of National Development and Energy, Tasman House, Canberra, Australian Capital Territory.
Dr Philip Rowling Nott, Principal Executive Officer, Energy Policy Division, Department of National Development and Energy, Tasman House, Canberra, Australian Capital Territory.

Department of Transport

Mr Michael Gawan-Taylor, First Assistant Secretary, Department of Transport, Civic Permanent Building, Canberra City, Australian Capital Territory.
Mr Garth Lawrence Mansfield, Assistant Secretary, Intermodal Strategic Planning Branch, Department of Transport, Civic Permanent Building, Canberra City, Australian Capital Territory.
Mr Neil Fraser Gentle, Director, Department of Transport, Civic Permanent Building, Canberra City, Australian Capital Territory.
Dr Hugh Bennet Milloy, Executive Officer, Department of Transport, Civic Permanent Building, Canberra City, Australian Capital Territory.

Enersonics Pty Ltd

Mr Alan Mailler Brown, Managing Director, Enersonics Pty Ltd, 428 Burwood Road, Hawthorn, Victoria.

Federation of Australian Motorcyclists

Mr Gregory Mark Armour, Secretary, Federation of Australian Motorcyclists, P.O. Box 183, Jamison, Australian Capital Territory.
Mr Richard Llewellyn, Committee Member (Ex-officio), Federation of Australian Motorcyclists, P.O. Box 183, Jamison, Australian Capital Territory.

Friends of the Earth (ACT)

Ms Marie Catherine Cook, Member, Friends of the Earth (ACT), Post Office Box 1875, Canberra City, Australian Capital Territory.
Ms Rosemary Ann Walters, Member, Friends of the Earth (ACT), Post Office Box 1875, Canberra City, Australian Capital Territory.

National Capital Development Commission

Mr John Wallace Nairn, Chief Engineer, National Capital Development Commission, 220 Northbourne Avenue, Canberra, Australian Capital Territory.

Pedal Power A.C.T. Inc

Mr Roger Graham Horn, Physical Planning Officer, Pedal Power A.C.T. Inc., P.O. Box E305, Canberra, Australian Capital Territory.

Private Citizens

Mr Darryl Ross Whitford, Co-ordinator, Electric Vehicle Research Project, Flinders University, Adelaide, South Australia.
Mr Francis Gordon Henry Peter Fisher, Lecturer in Environmental Science, Monash University, Clayton, Victoria.
Dr Mark Oliver Diesendorf, 20 Earle Street, Lyneham, Australian Capital Territory.

Royal Australian Institute of Architects

Mr Geoffrey Thomas Butterworth, Senior Vice President, ACT Chapter, Royal Australian Institute of Architects, 2A Mugga Way, Forrest, Australian Capital Territory.

Shell Company of Australia Limited

Mr Harold Mervyn Steel, Chairman's Representative and Commercial Manager, Shell Company of Australia Limited, 140 Phillip Street, Sydney, New South Wales.
Mr Ernest John Rowe, Marketing Operations Manager, New South Wales, Shell Company of Australia Limited, Durham Street, Rosehill, New South Wales.

Society for Social Responsibility in Science

Mr Clive James Hurlstone, Secretary for Social Responsibility in Science, P.O. Box 48, O'Connor, Canberra, Australian Capital Territory.
Dr John Thomas Osmond Kirk, Committee Member, Society for Social Responsibility in Science, P.O. Box 48, O'Connor, Canberra, Australian Capital Territory.

Solar Energy Industries Association of Australia

Mr John William Freebody, National Executive Council Member, Solar Energy Industries Association of Australia, P.O. Box 817, Canberra City, Australian Capital Territory.
Mr Robert Alexander Bourke, National Secretary, Solar Energy Industries Association of Australia, P.O. Box 817, Canberra City, Australian Capital Territory.

Stirling College Association

Mr Robert Bruce Whan, Parent, Stirling College Association, Canberra, Australian Capital Territory.

Miss Mary Catherine Robertson, Convenor of Subcommittee (Ventilation) of School Board, Stirling College Association, Canberra, Australian Capital Territory.

Mr Paul Andrew Griffiths, Student, Stirling College Association, Canberra, Australian Capital Territory.

Miss Julie Maria Betts, Student, Stirling College Association, Canberra, Australian Capital Territory.

Miss Michelle Harper, Student, Stirling College Association, Canberra, Australian Capital Territory.

APPENDIX II

Persons and organisations who made submissions but did not appear at public hearings:

Australian Association of Independent Businesses Ltd
Australian Boiler Constructions Pty Ltd
Australian Bureau of Statistics
Australian National University
Mrs S. Anderson
Mr A. J. Bonham
Bus Proprietors Association of NSW (ACT Branch)
Blue Skies Engineering
City of Queanbeyan
O. Cartledge, Fraser
Canberra College of Advanced Education
Canberra South Branch of the Liberal Party
Mr D. R. L. Davies
Department of Defence
Mr G. F. Elliott
Energy Authority of NSW
Dr R. Gerritsen, ANU
Dr Harris, Dr Williams, CCAE
Hub Power Pty Ltd
Mr D. V. Huntley
Hughes Insulation Service
Mr H. Julienne
Mr G. Mailath & Associates
Dr B. Martin
Monaro Fuels Supplies
Propartners
Silent Power Company Pty Limited
Ms Judith Turley, Permaculture
Mr P. Vallee, MHA
Mr J. Wood and Mr P. Cullen, CCAE

APPENDIX III

ELECTRIC VEHICLES—BACKGROUND MATERIAL

The major factor inhibiting the development of a truly competitive traffic-compatible electric vehicle is the lack of a suitable electrochemical power source. Dr D.A.J. Rand of the CSIRO presented a paper at EVE-80 in which the characteristics of a 'suitable' electrochemical power source were defined as follows:

- high energy density (for long range);
- high power density (for acceleration and hill climbing performance);
- long life (for low operating costs);
- great simplicity and small size;
- low materials and manufacturing costs;
- low maintenance;
- low self-discharge;
- rapid and efficient rechargeability;
- good high and low temperature operation;
- good temperature control;
- easy replaceability.

That paper goes on to describe the two main power sources available for vehicle propulsion as being the secondary (or rechargeable) storage battery and the fuel cell. The battery consists of an assembly of secondary cells which are chemically reversible to the extent that they are capable of being electrically charged. A battery, therefore, stores electricity and to function requires a plentiful supply of outside electricity. A fuel cell consists of two electrodes which can catalyze the conversion of a particular fuel and an oxidant to electricity —thus fuel cells make electricity and require a plentiful supply of fuel (for example hydrogen or methanol).

The lead-acid battery is and, according to Dr Ernst Voss of BARTA Batterie AG (West Germany) at EVE-80, will be for the foreseeable future 'the most widely used secondary energy storage system'. The lead-acid battery is a self-controlling and self-regulating power source of high reliability but it suffers the major drawbacks of not producing much electrical energy per unit weight and of wearing out too quickly.

The CSIRO, in its submission to the Committee, commented that the 'current limitations on the energy-density and lifetime of standard lead-acid batteries leave electric vehicles at a disadvantage in commercial terms'[1] but further stated that the intensive research being conducted both in Australia and overseas would indicate that the development of more highly-efficient lead-acid batteries and other types of batteries is predictable in 'the medium term'.[2] The CSIRO Division of Mineral Chemistry is itself presently conducting research into batteries and battery technology.

The need to develop a more fuel diversified transport system is obvious. Although endowed with substantial energy resources, Australia has only limited resources of petroleum. According to Mr D.J. Ives of the Department of ND&E conservation of petroleum products and substitution of other energy sources for oil are key elements of Australian energy policy. Mr Ives went on to say that electric vehicles appear to have significant potential in Australia, and that future increases in the price of oil will serve to raise their economic appeal to consumers. The paper did however point to some possible secondary costs associated with the introduction of a substitute technology—such as adjustment costs in manufacturing, and infrastructure.

Electric vehicles have already achieved significant success in industrial applications, and their choice, according to Mr M.G. Munns (Lansing Australia Pty Ltd) is based on

reliability, competitive performance and cost benefit. As Mr Munns stated commercial enterprise does not encourage any other basis for their use. The electric vehicle's advantages of cleanliness, absence of toxic fumes and lack of noise, as well as the now increasingly important factor of liquid fuel conservation have all contributed to the acceptance by industry of electric vehicles. Furthermore, the freedom to adapt and design vehicles for specific purposes without the constraints imposed by conventional engines, gear boxes and drive axles is an advantage. The weight factor of the batteries, a disadvantage in attempts to apply electric vehicle technology to road vehicles, is, in certain types of 'lift trucks', positively utilised in providing a counter balance to the load.

From the evidence and from consideration of the EVE-80 papers, it would appear that at the present stage of electric vehicle technology, reliable utilisation of the vehicles is limited to areas where low-speed, limited range, stop-go operation over a preplanned route is not a positive disadvantage. These limitations obviously point to the urban delivery van as the most viable usage. Before electric vehicles can be expected to effect significant penetration into the private transport sector considerable improvements to their range, acceleration and battery life must be achieved along with the reduction in capital cost of both vehicles and batteries. The Committee believes that the research and development being carried out in Australia and elsewhere is working to that end, and that the objectives will eventually be achieved.

The Senate Standing Committee on National Resources in its recent report on *The Replacement of Petroleum Based Fuels by Alternative Sources of Energy* recommended that research and development into electric vehicles receive a high priority and that support be provided for demonstration programs for small passenger/commuter vehicles as well as for commercial vehicles.

According to a press release by the Minister for National Development and Energy (Senator Carrick) the Government has provided, over the last two years, $1.3 million in grants for electric vehicle developments under its National Energy Research, Development and Demonstration Program. The main research projects have concentrated on short range commercial vehicle applications. The Budget allocation for NERDDP was increased by 50 per cent to $13.5 million which is expected to provide a stimulus to research and development activity including electric vehicle research.

The National Energy Research Development and Demonstration Program has provided support to the Energy Authority of New South Wales for its in-service evaluation of a number of electric vehicles within its conventional fleet. The Department of Administrative Services told the Committee that it has an electric car and bus presently on trial but indicated that the vehicles had quite serious shortcomings.

The papers presented at EVE-80 detailed quite extensive in-service assessments being conducted overseas. The Greater London Council announced in 1977 a 'London goes Electric' scheme and offered three companies (Lucas Batteries Limited, Chloride Technical Limited and Crompton Electric Cars Limited) financial support to enable them to place a number of electric vehicles with fleet operators at a cost, to the operators, of no more than a similar gasoline vehicle. In a paper delivered at the exposition Mr G.G. Harding of Lucas detailed the experience gained by his company in this program. Details were also given of in-service programs in the US, in Japan and Taiwan. Dr N.P. Yao of the Argonne National Laboratory in Illinois stated that the US Department of Energy is required by Public Law 94-413 (later amended by 95-238) to arrange for placement, within the next 6 years, of up to 10 000 electric or hybrid vehicles with private fleet operators, individuals, state and local government fleets, and federal agency fleets.

The Department of Transport informed the Committee that it believed a large market for electric cars in the ACT to be possible in future years. The Department described a Bureau of Transport Economics study carried out in Melbourne which

indicated that 11 per cent of vehicles perform services which could be achieved by electric vehicles. The Department of Transport stated that a similar survey in the ACT to assess a potential market would 'provide a useful input to transport infrastructure planning'.[3]

The CSIRO informed the committee that it considered it timely to conduct a trial of electric vehicles in a community-wide transport system in Australia, at present. According to the CSIRO: 'An electric vehicle demonstration program would make a contribution to the conservation of liquid fuels, provide experience for manufacturing and service industries and administrative bodies and furnish a testing ground for research developments'.[4]

The ACT, with its range of terrains and relatively high proportion of short trip distances, is ideally suited to such a demonstration. Canberra is a city large enough to provide a significant testing ground and the demonstration would provide vital user statistics to aid the research and development technology being carried out throughout the country. The CSIRO provided a draft of trial guidelines detailing the three stages which should be carried out consecutively to facilitate such a demonstration. The draft guidelines follow:

TRIAL GUIDELINES FOR ELECTRIC VEHICLE DEMONSTRATION AS PROPOSED BY THE COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION

It is suggested that a comprehensive demonstration of electric vehicles in the A.C.T. would comprise three consecutive phases:

(i) Appointment of an Advisory Council to determine the form of the demonstration;
(ii) Evaluation of a limited number of electric vehicle types for selection of one to be used in the demonstration;
(iii) Operation of the demonstration incorporating a period of comprehensive data collection for statistical analysis.

(i) *Advisory Committee*

Organisations with a direct interest and capacity to advise in an electric vehicle demonstration include:

The Department of the Capital Territory
The Department of Transport
The Department of Administrative Services
The Bureau of Transport Economics
National Energy Research Development and Demonstration Council
Australian Road Research Board
CSIRO
Australian Electric Vehicles Association

The Advisory Committee would determine the form of the demonstration. Electric Vehicles are ideally suited to fixed route trips, such as milk or dry cleaning deliveries, postal services, other courier and parcel delivery services. The Government courier service which operates around some four or five major points (Civic Centre, Phillip Centre, Parliamentary Triangle, Cameron Offices, etc) may be a suitable operation. Private operators may also be considered. The number of vehicles, service and recharging points and general infrastructure and operating guidelines would also be decided.

The Committee would select a limited range of vehicles for evaluation prior to the demonstration and recommend the vehicle type for purchase. It is suggested that the

Advisory Committee should approve the appointment of a demonstration supervisor who would be responsible to the Committee. It would approve the design of the data collection and statistical analysis experiment and report the results to the Government.

(ii) *Evaluation of Production Vehicles*

A number of commercial electric vehicles have been developed world-wide, particularly in Britain, Japan and the US. The majority are two seater delivery vehicles of 1 tonne total weight. It is suggested that a minimum of three types should be evaluated in terms of availability, performance, compatibility with local traffic, general freight capacity, and service factors.

A minimum of 25 vehicles would be required for the demonstration. It is expected that they would cost in the vicinity of $15 000 each. The infrastructure of service and charging points would also require analysis.

(iii) *The Demonstration*

The vehicles in operation would need to be carefully logged with respect to distances travelled, charging, speed, service, battery performance etc. The variation in performance in all these characteristics can be analysed statistically and the impact of each on vehicle operation efficiency determined. The data would permit the calculation of the fuel efficiency of the electric vehicles in terms of distances travelled.

The demonstration would need to be carried out over at least twelve months. Other significant results of the demonstration could be acceptance of electric vehicles by the public, proof of their compatibility with existing cars and national information for determining the future place of these vehicles in the Australian transport scene. It has been calculated on the basis of the proportion of short run trips in the total use of motor vehicles that electric vehicles could replace 6% of internal combustion engine vehicles. However, a reliable estimate could only be made with field data from such a demonstration.

(iv) *Project Supervisor*

It is suggested that a full-time supervisor is required during the demonstration to ensure that records are kept on all aspects of vehicle operations, driver reactions, vehicle services etc. The supervisor would also carry out training of drivers and service personnel. The supervisor could perhaps be employed by the Department of Administrative Services, if the Government courier service were used for the demonstration.

(v) *Role of CSIRO*

Research in two Divisions of CSIRO is relevant to the aims of the demonstration. The Division of Mechanical Engineering has conducted a statistically based study of motor vehicle performance. It involved petrol-powered vehicles operating in normal traffic conditions on a major arterial road in Sydney. Many measures of performance were recorded and the data analysed statistically. Similar measurements would be required in the statistical analysis of the electric vehicles.

The Division of Mineral Chemistry has developed a number of devices for testing the level of charge and other factors in lead-acid storage batteries. It was found that such devices, which are essential for determining battery performance, were either non-existent or unreliable. The Division would wish to see these devices tested in the field along with other developments, especially in battery efficiencies, that can be anticipated.

Both Divisions would wish to contribute to the demonstration in an advisory capacity and with direct involvement in areas as described above.

CSIRO
April 1980

ENDNOTES

1. Transcript, p. 351
2. Transcript, p. 351
3. Transcript, p. 322
4. Transcript, p. 351-352

APPENDIX IV

PEDAL POWER SURVEY OF TRAVEL TIMES IN CANBERRA

This appendix shows the results of two surveys conducted by Pedal Power members to compare the times taken for journeys in Canberra by different modes of transport: cars, bicycles travelling on roads, bicycles following cycle paths, and buses. In the first survey, conducted early in 1978, the trip times are the averages of several journeys, usually five. In the second, conducted in January 1980, times are either the longer of two measurements or the average of three or more.

The columns in the table on the following page show the end points of the journey, the time taken in minutes when the trip is taken by the various modes of transport, the times of the bicycle and bus modes relative to the car time (i.e. the ratio of bicycle or bus time to car time), and the ratio of times taken by bicycle following cycle paths to bicycle on roads. The small number of data does not allow a detailed statistical analysis. Nevertheless the following conclusions can clearly be drawn:

(1) The fastest mode of transport is the car, followed in order by bicycle on roads, bus, and bicycle on cycle paths.

(2) Most (23 out of 28) of the trips by bicycle on roads take between 1.3 and 2.1 times as long as the same trip by car. The average is about 1.7 times as long.

(3) Bicycles on roads are slightly faster than buses, whereas bicycles on cycle paths are slower than buses. Cycling on the roads is generally 10-30 per cent faster than following the paths.

Pedal Power surveys of travel times in Canberra

Trip		*Time (in minutes) for travel by*				*Time relative to car trip*			*Time for cycle on paths relative to cycle on roads*
from	*to*	*car*	*bicycle on roads*	*bicycle on paths*	*bus*	*bicycle on roads*	*bicycle on paths*	*bus*	
Survey 1									
Spence	Macarthur House	17.4	28.9	..	..	..	1.66	..	..
Kambah	Civic	24.4	42.2	..	49.6	1.73	..	2.03	..
Kambah	Parkes	15.3	31.7	..	..	2.07	..	..	..
Evatt	Watson	13.0	27.0	..	..	2.08	..	..	..
Rivett	Phillip	6.2	18.5	..	..	2.98	..	..	..
Barton	Acton	10.0	25.0	25.0	..	2.50	2.50	..	1.00
Rivett	Garran	19.0	25.0	..	..	1.32	..	..	..
Pearce	Parkes	15.0	29.0	33.0	..	1.93	2.20	..	1.14
Pearce	Yarralumla	13.0	26.0	30.0	..	2.00	2.31	..	1.15
O'Connor	Civic	..	18.0	17.6	..	..	..	..	0.98
Macquarie	Braddon	20.8	27.0	..	..	1.30	..	..	..
Giralang	Parkes	20.0	35.0	42.0	35.0	1.75	2.10	1.75	1.20
Cook	Civic	23.0	24.0	32.3	40.0	1.04	1.40	1.74	1.35
Pearce	Civic	17.3	35.5	38.6	35.0	2.05	2.23	2.02	1.09
Melba	CSIRO Black Mtn	16.3	27.0	..	..	1.65	..	..	..
Weetangera	Civic	20.2	21.2	..	..	1.05	..	..	..
		Average				1.81	2.13	1.89	1.13

Trip		Time (in minutes) for travel by				Time relative to car trip			Time for cycle on paths relative to cycle on roads
from	*to*	*car*	*bicycle on roads*	*bicycle on paths*	*bus*	*bicycle on roads*	*bicycle on paths*	*bus*	
Survey 2									
Watson	Woden	20.0	30.0	..	40.0	1.50	..	2.00	..
Curtin	Civic	15.0	20.0	30.0	30.0	1.30	2.00	2.00	1.50
Giralang	Civic	15.0	25.0	35.0	25.0	1.70	2.30	1.70	1.40
Latham	Civic	15.0	..	45.0	35.0	..	3.00	2.30	..
Wanniassa	Civic	20.0	..	50.0	40.0	..	2.50	2.00	..
McGregor	Civic	25.0	..	43.0	45.0	..	1.70	1.80	..
Curtin	Campbell Park	20.0	30.0	..	40.0	1.50	..	2.00	..
Latham	Belconnen Mall	5.0	..	15.0	5.0	..	3.00	1.00	..
Holder	Civic	20.0	35.0	40.0	35.0	1.80	2.00	1.80	1.10
Holder	Phillip	10.0	13.0	..	25.0	1.30	..	2.50	..
Melba	Civic	20.0	32.0	35.0	..	1.60	1.80	..	1.10
Flynn	Civic	20.0	32.0	35.0	..	1.60	1.80	..	1.10
Kaleen	Civic	20.0	25.0	35.0	25.0	1.30	1.80	1.30	1.40
Dickson	Civic	10.0	12.0	20.0	10.0	1.20	2.00	1.00	1.70
Deakin	Civic	10.0	20.0	20.0	20.0	2.00	2.00	2.00	1.00
Kambah	Civic	25.0	..	50.0	40.0	..	2.00	1.60	..
Mawson	Civic	15.0	35.0	25.0	..	..	2.30	1.70	..
Latham	Civic	20.0	30.0	40.0	40.0	1.50	2.00	2.00	1.30
Giralang	War memorial	15.0	25.0	..	35.0	1.70	..	2.30	..
	Average				1.54	2.15	1.82	1.29	
	Average for both surveys					1.68	2.14	1.84	1.22

Source: Transcript pp. 1159 and 1160.