

Invited Paper

TRANSPORT AND ENERGY IN SRI LANKA: ARE THE PRIORITIES RIGHT?

J. Diandas

Transport and Energy Advisor

A I Macan Marker & Co.

12 Galle Face Court 1

Colombo 3

Sri Lanka

Abstract:- Various studies in many countries, including Lanka, have shown conclusively that when measured in transport achieved per unit of fuel consumed, buses and trains are far more efficient than cars and lorries, by factors ranging from 2 1/2 to 5. The paper summarises Sri Lanka data in this respect. In 1987, transport accounted for 59% of petroleum sales out of which petrol comprised 13%. Petrol attracts higher taxes in all countries than diesel, in reflection perhaps of the sumptuary nature of its use. Yet since 1961, Sri Lanka's petrol price has increased at only half the rate of increase of the diesel price. Assuming an elasticity of petrol demand to price of -0.3 (i.e. a 10% price increase would reduce demand by 3%), an increase of petrol price from Rs. 13.50 to Rs. 20.25 would put Rs. 800 million into government hands while reducing car travel by 15%. Priorities concerned with easing national economics, road congestion and air pollution would therefore require sharply increasing the price of petrol, raising off-street parking fees to Rs. 20 per hour, taxing off-street parking, physically restraining on-street and off-street parking, pedestrianising suitable streets, giving clear priority to public transport, electronic road pricing, lorry axle-weight-distance taxes, rigid prosecution of over-loaded lorries, invigorating railway marketing and some institutional changes.

BACKGROUND BASED ON PREVIOUS STUDIES

The information for this paper is based on the following:-

- (a) Chapter 28 (Energy and Transport) of the Sri Lanka Transport Sector Study, Diandas FES 1983.
- (b) "Energy Pricing and Demand Management", D. Chandrasekara, SLEMA Journal, Sep - Oct 88.

A paper approved by the Editorial Committee of the Sri Lanka Energy Managers Association for publication in the SLEMA Journal. This paper is based on a SLEMA public lecture delivered by the author in 1988.
Paper No. J48901.

- (c) Sri Lanka Energy Balance 1987 and Energy Data issued by Ceylon Electricity Board, Sri Lanka.
- (d) Data in Ceypetco Statistical Review (Ceylon Petroleum Corporation, Sri Lanka) 1986 and Central Bank Review of the Economy of Sri Lanka for 1985, 1986 and 1987.

The inspiration for the paper comes directly from the following sentences of Mr Chandrasekara in (b) above -

- (a) "Energy demand is greatly influenced by pricing policy"
- (b) "Consumption of gasoline decreased in the period 1972 to 1977 due to price increases and low economic growth"
- (c) Gasoline consumption will continue to grow with economic growth, in the absence of a large price hike"
- (d) "The factors that influence pricing policy include the consumers' ability to pay eg gasoline"
- (e) "Price of gasoline has to be high enough to discourage unwanted travel"
- (f) "If fuel price is low, conservation cannot be encouraged"

By way of introduction, Chapter 28 of 1983 FES publication is reproduced in full in the next section together with Figures 1-4 and Tables 1-3.

ENERGY AND TRANSPORT

Since electricity is not used for transport (since the demise of Colombo's trams and trolley buses), petroleum products are the only commercial fuel used for transport in Sri Lanka.

Essential petroleum statistics are set out in Table 1, the various sections of which show:-

- (a) Domestic sales in gallons
- (b) All sales (including bunkers and re-exports) in tons.

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Private buses show high performance in the early years because it was devoted to tours, hires, pilgrimages etc., which usually have full pre-booked trips with no empty or light return journeys.

Cars are shown to have declined in passenger-miles per gallon because the estimation has taken account of the following opposing trends:-

(a) The recent influx of new cars probably obtain more miles per gallon. This becomes significant as the proportion of new cars increases.

(b) As long distance car travel has appeared to decline, the average occupancy is assumed to reduce from a mix with some full car loads to an average of just over half a passenger together with the driver. However, the fact that many car occupants (eg. spouses, parents or driver) are performing only a chauffeuring function, and are hence not really travellers at all, has not been taken into account.

There are what are known as aggregate averages and like all such averages are firstly based on prevailing average load factors and secondly hide a range of extremes. Thus, a car carrying 8 people would perform upto 200 passenger-miles per gallon, whereas a bus carrying only 10 passengers would get only 100 passenger-miles per gallon.

Perhaps, the most significant picture of Energy used for travel is given by the following total figures for 1979, the last year before significant entry of private buses complicates the statistics:-

MODE	PASSENGER MILES		FUEL	
	Million	%	M gal	%
Bus	13,300	78	33	50
Train	2,500	15	7	10
Public transport	15,800	93	40	60
Car & taxi	1,100	6	26	39
Motor cycle	200	1	1	1
Total	17,100	100	67	100

However, it should not be forgotten that walking forms a very large part of personal travel and that bicycles too are used for a substantial amount of travel. Both of these forms of personal travel cost nothing at all in commercial fuels. Even buggy carts and titikkalays are returning to fashion in some provincial towns for school and other local journeys where time is not perceived as a precious factor. Here too, the only Energy used is muscle power furnished by food.

For goods transport, on an even more qualified basis than for passengers, because none of the figures are based on recorded data, the Energy intensity is shown thus for 1981:-

Mode	Million ton-miles	Million gallons	Ton-miles per gal
Lorry	684	30	22½
Railway	154	2	76
Tractor/trailer	50	6	8
Bullock cart	20	—	
Total	908	38	24

The changes over the period of study, on this qualified basis, as shown in the lower half of Figure 3 have been as follows:-

Mode	Basis	Ton-miles per gallon		
		1964	In between	1981
Lorry	Estimated	22½	22½	22½
Railway	Table 9.5 ⁴	21	60	76
Tractor/trailer	Estimated	8	8	8

Lorry and tractor figures do not change because they are based on constant assumptions as to miles per gallon and average load. The railway figure is low in 1964 because steam locomotives were still at work. Coal has been converted to oil equivalent in the tables, but the steam process is an inefficient method even if oil is used as fuel in a steam locomotive.

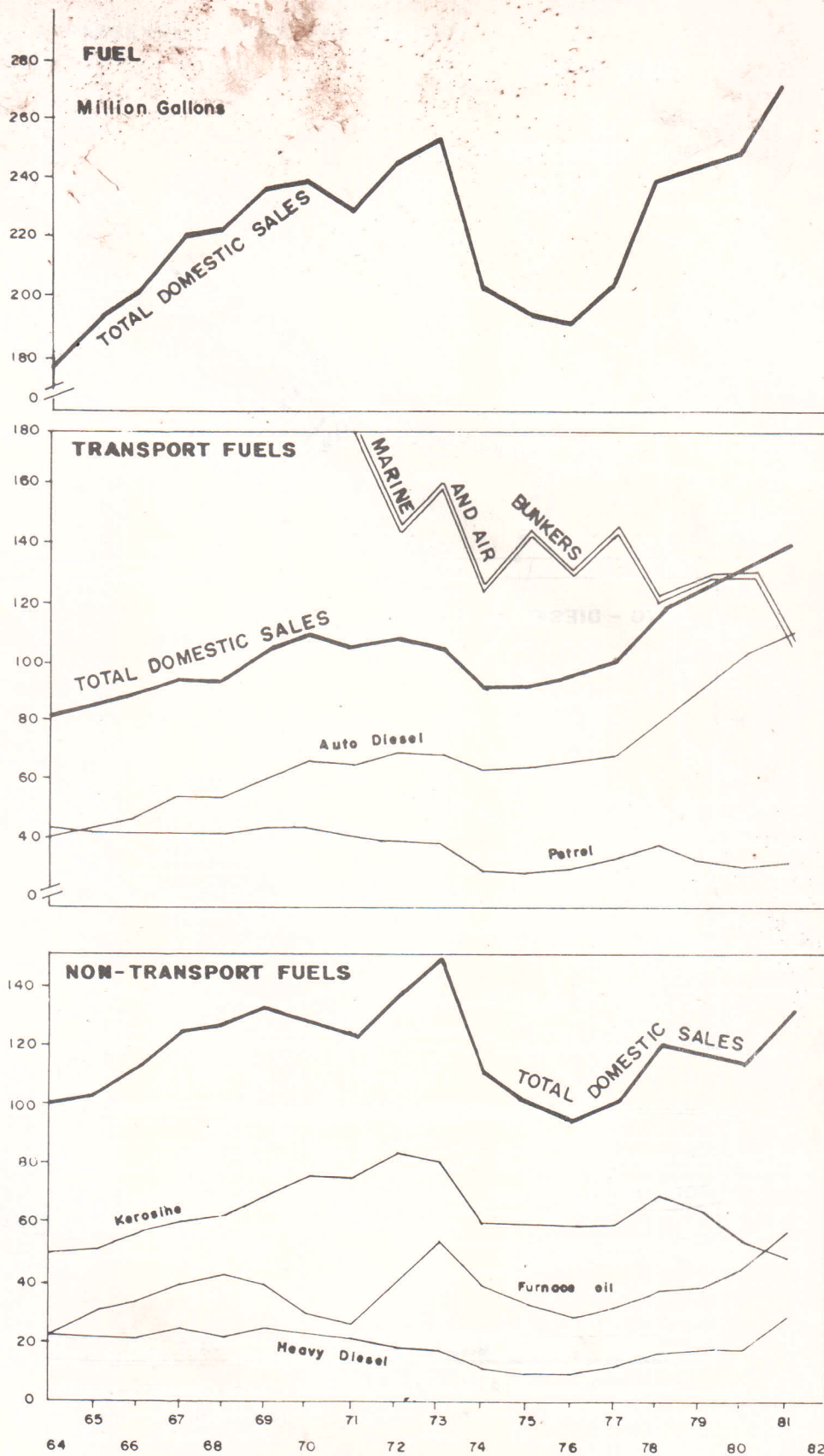


Fig 1 - Usage of all fuels

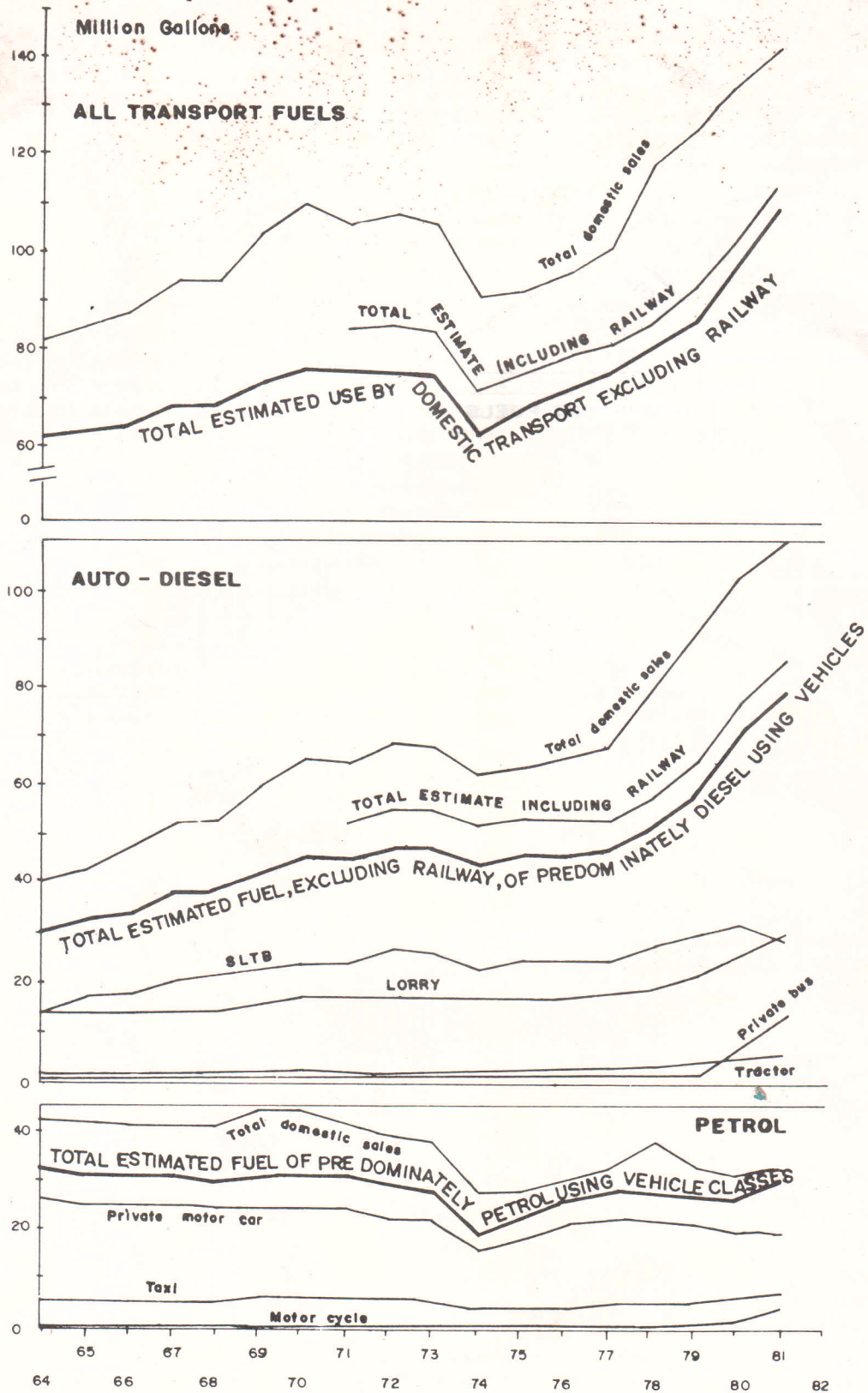


Fig 2 - Usage of Transport Fuels

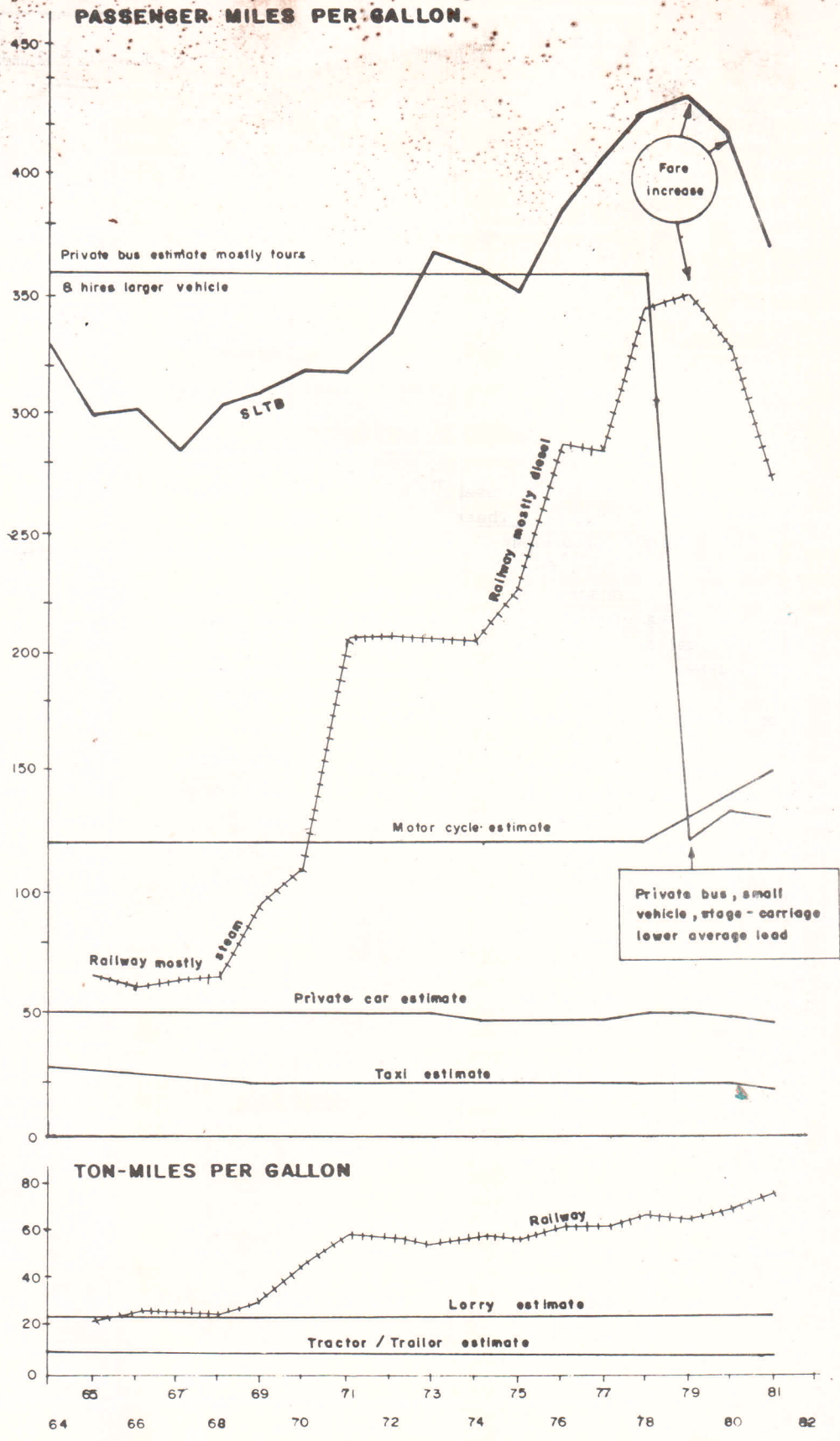


Fig 3 - Energy Intensity

- (c) Imports (crude oil and refined products) in tons
- (d) Process losses (excess of imports over all sales)
- (e) Value of imports, gross and net re-exports, in million rupees
- (f) Transport fuel as a percentage of net imports

Figure 1 displays domestic sales of petroleum products in two sections which deal with:-

- (a) Transport fuels (petrol and auto-diesel; bunkers is also shown)
- (b) Non-transport fuels (kerosene, heavy diesel and furnace oil)

Petrol (gasoline) and auto-diesel are the pre-eminent transport fuels. Their use has risen from 82 million gallons in 1964 to 142 million gallons, increasing from 46% to 53% of total domestic oil consumption. Within the transport fuels, auto-diesel has risen from 40 to 110 million gallons while petrol has declined from 44 (in 1969) to 32 million gallons.

By and large petrol is used by cars, taxis and motor cycles for private travel and auto-diesel is used by buses, trains and lorries. However, some small vans and buses use petrol whereas some motor cars (7000 registered in the last few years) use diesel.

Further qualification is needed for the fact that-

- (a) Some auto-diesel is used by tractors (for on-farm and off-farm transport as well as agriculture), fishing boats and construction machinery.
- (b) Kerosene, mostly used for domestic lighting and cooking, is also used for some tractors, fishing boats and lorries.
- (c) Some petrol is used for small scale electric generators.

Table 2 sets out a computation of probable fuel usage based (except for CTB) on estimates of vehicle mileage which in turn is based on an estimate of the vehicle population in each category developed in reference [1]. The estimates shown in Figure 2, do not match the Petroleum Corporation sales very closely. This may be due to the net diversion of transport fuels to other uses, or to inept steps in the

estimation processes. For example, all lorries are estimated to perform 15 miles per gallon whereas a lower figure, say 12 mpg, might have been more appropriate. Likewise motor car mileage may have been underestimated. While it would be useful for some surveys to be done and also closer study of the historical data, to establish a better explanation for domestic transport fuel sales and their trends, it is nevertheless useful to make tentative assessments of the modal figures displayed in Figure 2.

On this qualified basis together with the estimation of passenger miles and the railway figures shown in reference [1], the following tentative performance figures emerge for Energy intensity of passenger transport in 1981.

Mode	Million passenger miles	Million gallons	Passenger miles per gallon
CTB bus	10,669	29	368
Private bus	1,900	15	127
Total bus	12,569	44	286
Railway	1,855	7	273
Public transport	14,424	51	283
Car	882	19	46
Taxi	126	7	19
Motor cycle	543	4	150
Private transport	1,551	30	52
All	15,975	81	197

The changes over the period of study are shown in the upper half of figure 3 approximately as follows:-

Mode	Basis	Passenger miles per gal		
		1964	In between	1981
-CTB bus	Actual	284	433	368
-Private bus	Estimated	360	120	127
-Train	Estimated	67	352	273
-Private car	Estimated	50	48	46
-Taxi	Estimated	25	20	19
-Motor cycle	Estimated	120	130	150

All information based on reference [1]

TABLE 2 ENERGY INTENSITY OF PASSENGER TRANSPORT MODES

YR	CTB			PRIVATE BUS			RAILWAY			CAR			TAXI			MOTOR-CYCLE		
	10 ⁶ PM	10 ⁶ gal	PM per gal	10 ⁶ PM	10 ⁶ gal	PM per gal	10 ⁶ PM	10 ⁶ gal	PM per gal	10 ⁶ PM	10 ⁶ gal	PM per gal	10 ⁶ PM	10 ⁶ gal	PM per gal	10 ⁶ PM	10 ⁶ gal	PM per gal
64	4,525	14	330	114	.3	360	1453			26	50	120	4.8	25	98	.8	120	
65	5,040	17	291	116	.3	360	1498	22.5	67	25	50	115	4.8	24	96	.8	120	
66	5,582	18	302	127	.4	360	1537	23.1	61	25	50	112	4.9	23	89	.7	120	
67	6,184	21	284	142	.4	360	1585	24.6	64	25	50	107	4.9	22	82	.7	120	
68	6,823	22	303	160	.5	360	1678	25.4	66	24	50	110	5.2	21	77	.6	120	
69	7,156	23	307	179	.5	360	1781	18.5	96	24	50	114	5.7	20	74	.6	120	
70	7,605	24	317	201	.6	360	1909	12.3	148	24	50	115	5.8	20	76	.6	120	
71	7,605	24	317	221	.6	360	1734	8.0	217	24	50	115	5.8	20	77	.6	120	
72	8,987	27	333	229	.6	360	1907	8.8	217	22	50	115	5.8	20	68	.6	120	
73	9,571	26	368	226	.6	360	2051	8.7	216	22	50	101	5.1	20	73	.6	120	
74	8,319	23	362	219	.6	360	1726	8.0	216	15	47	87	4.4	20	55	.5	120	
75	8,796	25	352	226	.6	360	1780	7.8	228	18	47	87	4.4	20	56	.5	120	
76	9,614	25	385	238	.7	360	1867	6.5	287	21	47	89	4.5	20	72	.6	120	
77	10,150	25	406	251	.7	360	1735	6.1	284	22	47	92	4.6	20	77	.6	120	
78	11,928	28	426	287	.8	360	2305	6.7	344	22	49	92	4.6	20	98	.8	120	
79	12,994	30	433	300	2.5	120	2531	7.2	352	21	49	99	4.9	20	183	1.4	130	
80	13,375	32	418	1100	8.3	133	2361	7.2	328	19	48	119	6.0	20	335	2.4	140	
81	10,669	29	368	1900	14.6	130	1855	6.8	273	19	46	126	6.6	19	543	3.6	150	

Source: Tables 9.2*, 10.1*, 28.2*, 15.9* (10⁶ PM here is slightly different from T 15.9*)

Note: for CTB and railway passenger miles per gallon is a reflection of actual performance on basis of operators' records.
for all other modes passenger miles per gallon is a reflection of the assumptions used as components of the computation of vehicle miles and energy used.

PM == Passenger-mile
10⁶ == Million

* Tables in Sri Lanka Transport Sector Study. FES 1983

TABLE 3 ENERGY INTENSITY OF GOODS TRANSPORT MODES

YR	LORRY			RAILWAY			TRACTOR/TRAILER			BULLOCK CART			TOTAL		
	10 ⁶ TM	10 ⁶ gal	TM per gal	10 ⁶ TM	10 ⁶ gal	TM per gal	10 ⁶ TM	10 ⁶ gal	TM per gal	10 ⁶ TM	10 ⁶ gal	TM per gal	10 ⁶ TM	10 ⁶ gal	TM per gal
T	15.9*	28.2*	9.5*	9.1*	9.1*	28.2*	15.9*	28.2*	6.6*						
64	322	14.3	22½	218	9.3	1.7	13	1.7	8	22			575	16.0	36
65	322	14.3	22½	196	8.9	1.7	13	1.7	8	21			552	25.3	22
66	324	14.4	22½	212	8.9	1.8	14	1.8	8	21			571	25.1	23
67	331	14.7	22½	212	8.9	2.1	17	2.1	8	21			581	25.7	23
68	339	15.1	22½	221	9.7	2.4	19	2.4	8	21			600	27.2	22
69	352	15.6	22½	220	7.3	2.7	22	2.7	8	20			614	25.6	24
70	371	16.5	22½	231	5.0	2.8	22	2.8	8	20			644	24.3	27
71	382	17.0	22½	207	3.6	2.6	20	2.6	8	20			629	23.2	27
72	384	17.1	22½	211	3.7	2.4	19	2.4	8	20			634	23.2	27
73	387	17.2	22½	204	3.8	2.5	20	2.5	8	19			630	23.5	27
74	389	17.3	22½	197	3.4	2.7	22	2.7	8	19			627	23.4	27
75	390	17.3	22½	186	3.3	3.0	24	3.0	8	19			619	23.6	26
76	391	17.4	22½	172	2.8	3.1	25	3.1	8	19			607	23.3	26
77	396	17.6	22½	159	2.8	3.1	25	3.1	8	19			599	23.5	25
78	428	19.0	22½	174	2.7	3.5	28	3.5	8	19			649	25.2	26
79	492	21.9	22½	160	2.5	4.4	35	4.4	8	19			706	28.8	25
80	583	25.9	22½	144	2.1	5.3	42	5.3	8	20			789	33.3	24
81	684	30.4	22½	154	2.0	6.2	50	6.2	8	20			908	38.6	24

Source: Tables* in this report as stated (T = Table)*:

Note: For railway ton-miles per gallon is a reflection of actual performance on basis of railway records subject to estimated allocation of fuel between goods & passenger services. for other modes ton-miles per gallon is a reflection of the assumptions used as components of the computation of vehicle miles and energy used.

TM = Ton-mile
10⁶ = Million

* Tables in Sri Lanka Transport Sector Study. FES 1983

Train and lorry figures here are also aggregate averages and the range of values masked by the average can be much wider than in the case of passengers. The influence of empty return journeys can be considerable. Furthermore, some journeys can be circuitous by one mode, thereby incurring extra Energy use. There is a clear need for detailed observation of actual Energy use for particular lorry and rail trips.

The motorised barge on inland waterways may possibly enter the transport arena provided funds are available for waterway rehabilitation and institutional inertia can be overcome. This uses less Energy per ton-mile provided speed is kept down to about 4 mph.

Again, consideration has to be given to the fact that carts, whether pushed by man or hauled by animal, use no commercial fuel. Carts are discussed in Chapter 25 of reference [1].

Wire shoots and aerial tramways are another form of no-energy or low-energy short distance transport, which have passed out of fashion during the years of cheap oil fuel. They are discussed in Chapter 27 of reference [1].

Bunkers are transport fuel used by ships and air crafts. Table 1 and figure 4 show that a considerable quantity of locally refined oil is sold as bunkers both to foreign and locally owned ships and planes. In 1981 the figures (in thousand tons) were:-

	Foreign	Local	Total
Marine	241	25	266
Air	104	31	135
Total	345	56	401

In terms of percentage, bunkers declined from 40% to 21% of total sales as shown in the following selected years:-

	1971		1977		1981	
	'000 tons	%	'000 tons	%	'000 tons	%
Domestic fuel	853	52	768	51	1,049	56
Other local sales	24	1	47	3	111	6
Total local	877	53	815	54	1,160	62
Bunkers	665	40	545	36	401	21
Re-exports	121	7	160	10	329	17
Total sales	1,663	100	1,520	100	1,890	100

The net foreign cost of transport fuels for domestic use (including some used for non-transport uses such as fishing) is shown in the last column of table 1 to have increased enormously as follows:-

Year	Net cost Rs M	Transport fuels	
		%	Rs M
1970	127	40	51
1974	561	41	230
1978	1,773	45	798
1981	6,492	45	2,921

Thus the cost of transport fuel has increased 57 fold in the last twelve years.

A final point about Energy, or rather commercial Energy, for transport is that it usually joins with expensive machinery to substitute for labour and time. In the case of passengers, time may be important and perceived as very important, hence profligate use of Energy condoned, but goods are rarely in much hurry for their own sakes.

FURTHER DATA USED FOR DISCUSSION

Table 4 sets down a summary of Energy consumption in Sri Lanka for the three years 1985 - 1987. Hydro-electricity is converted to the common denominator at 2176 kcal/kWh based on 1987 diesel generation, although this probably understates the true worth of this source of Energy. The Central Bank probably converts at 3,000 kcal/kWh. The last column of this table shows the approximate importance of Energy sources and types:-

Source & type	10 ⁹ Kcal	%	%	%
autodiesel	5,060	8	32	46
petrol	1,466	3	9	13
transport fuels	6,526	11	41	59
other fuels	4,559	7	29	41
total oil	11,085	18	70	100
hydro-electricity	4,740	8	30	
coal	14			
total "Commercial"	15,839	26	100	
wood etc	45,800	74		
total	61,639	100		

TABLE 6 - 1987 TRANSPORT FUEL

	10 ³ MT Ton	10 ⁶ Litres	10 ⁹ Kcal	10 ⁶ Pax -km	Pax-km per Litre	Rs Million		
						Cost at 564/Kcal (note 1)	Margin	Sales (note 2)
<u>Public transport</u>								
<u>diesel</u>								
transport boards	87	104	886	15,600	150	500	345	845
private buses	127	152	1,293	11,400	75	730	506	1,236
total bus	214	256	2,179	27,000	105	1,230	851	2,081
railway	20	24	204	2,400	100	115	80	195
public transport	234	280	2,383	29,400	105	1,345	931	2,276
<u>Private transport</u>								
petrol	140	186	1,466	3,720	20	828	1,683	2,511
diesel	57	68	580	1,360	20	327	226	553
Total	197	254	2,046	5,080	20	1,155	1,909	3,064
Total passenger	431	534	4,429	34,480		2,500	2,840	5,340
<u>Goods, diesel</u>				<u>T-Km</u>	<u>T-Km</u>			
lorry	202	242	2,057	2,420	10	1,162	805	1,967
tractor	11	13	112	39	3	63	43	106
railway	6	7	61	175	25	35	22	57
total	219	262	2,230	2,634		1,260	870	2,130
Grand total	650	796	6,659			3,760	3,710	7,470

note 1 Cost

Net per ton Rs5,784

net per Kcal 564

note 2	Factors	Kcal/Litre	Litre/T	Kcal/T	Rs/Litre	Rs/mcal
	diesel	8.51	1,196	10,182	8.13	.95
	petrol	7.86	1,332	10,474	13.50	1.71

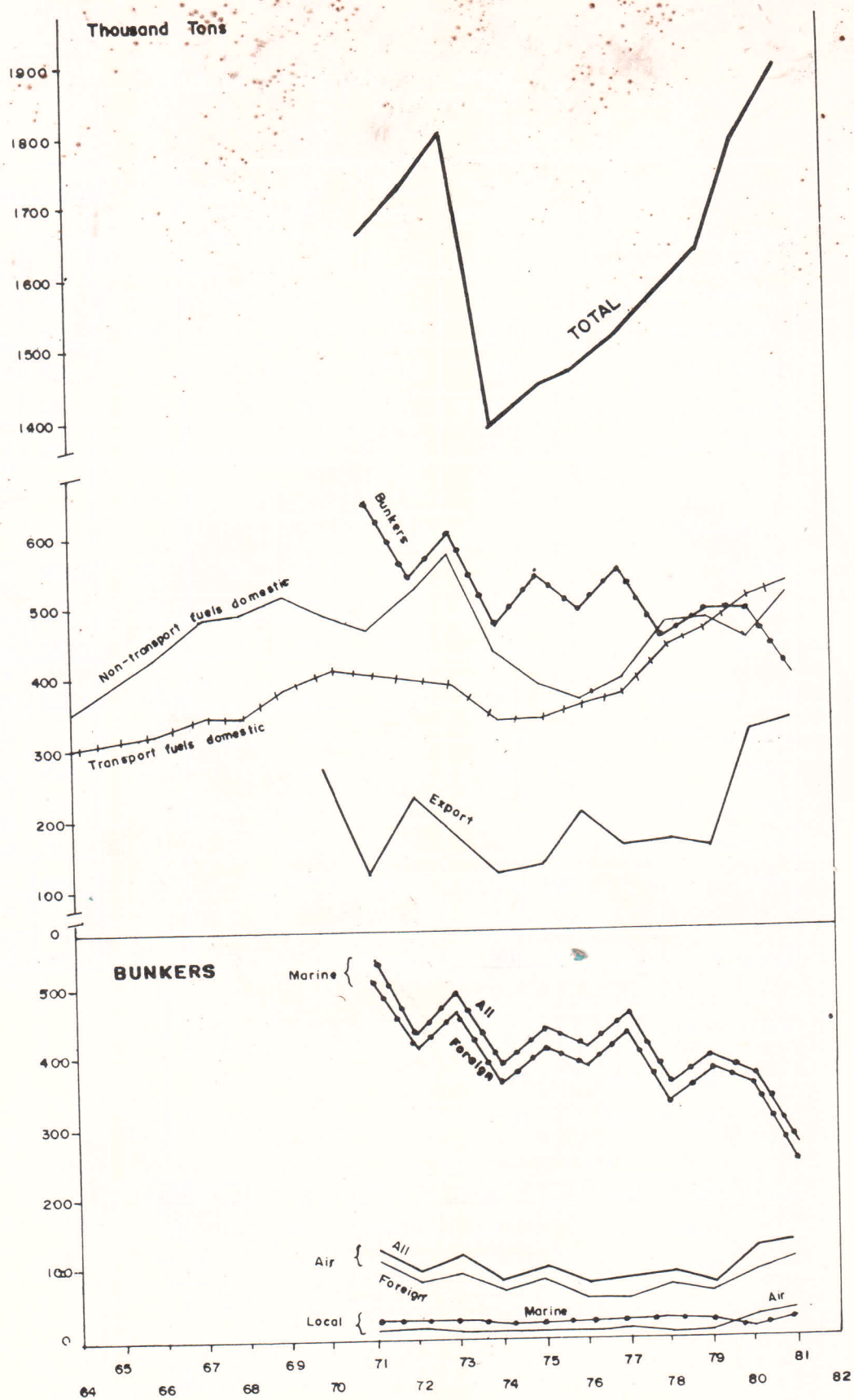


Fig 4 - All Petroleum Product Sales

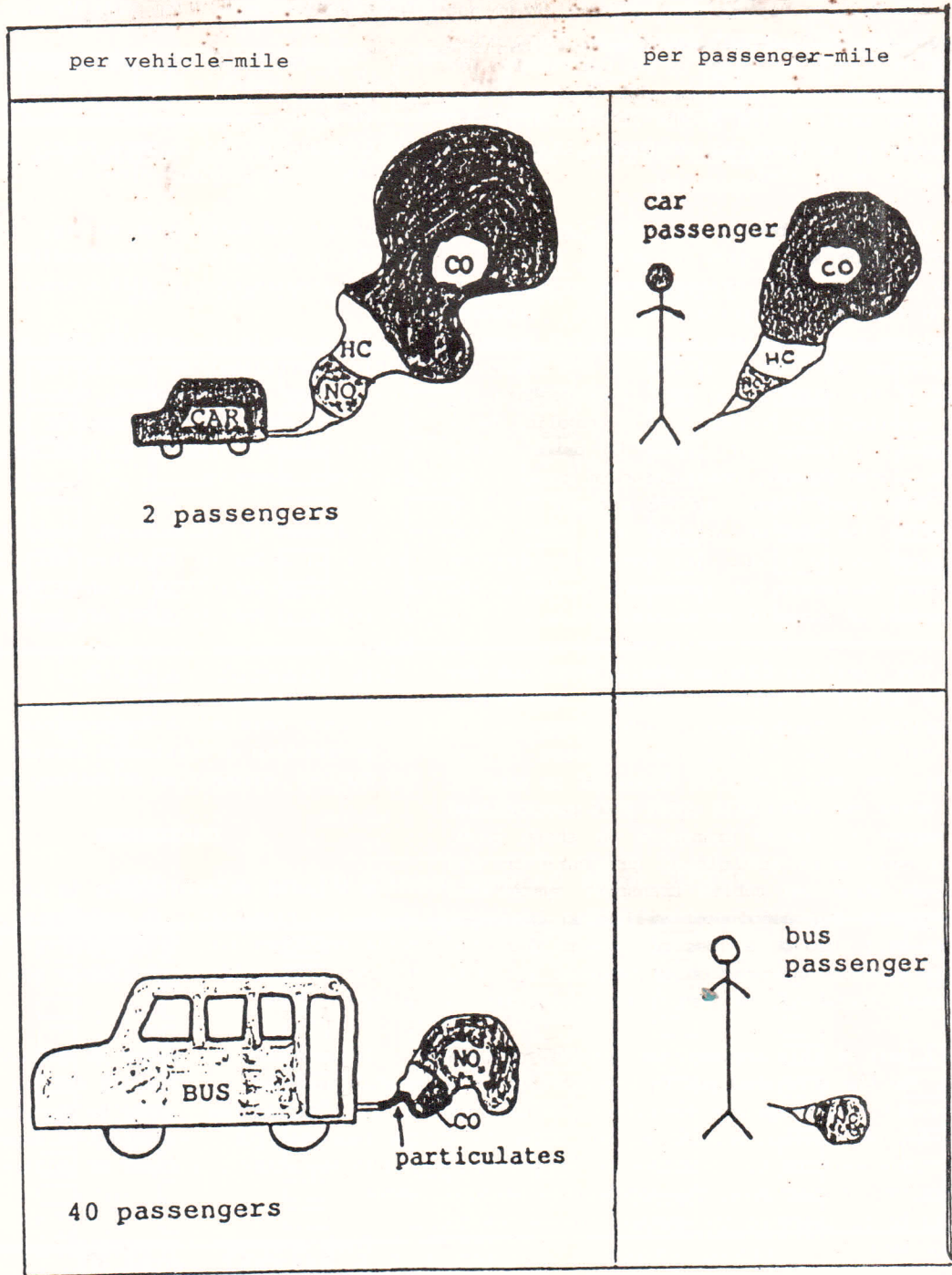


Fig 5 - Pollution by Car and Bus
per vehicle-mile and per passenger-mile

The surplus has increased by Rs. 800 Million. Even if the cost remained unchanged at Rs. 828 Million because the refinery could not reduce its petrol output percentage, there would still be a cash advantage to the Corporation (or to government) of nearly Rs. 700 Million before counting sales of the excess 28 Million litres by export. If there are no buyers it could be flared or evaporated.

It has also been argued that increases in petrol price would have no effect because so many cars are owned by government or business, which are immune to price elasticity. However, I believe that the elasticity mentioned above is an average which takes account of the inelastic part of the market. In fact Chandrasekara [2] has asserted that "consumption of gasoline decreased in 1972 to 1977...due to price increases". Furthermore, observation on rural roads and even trunk roads confirms a lower level of motoring (as against lorries and buses) than obtained in the 1950s. Yet even if consumption did not decrease, the government would be the recipient of a useful extra cash inflow.

The question then arises of how high the price should be raised to achieve appropriate priorities. Chandrasekara [2] has suggested:-

"If the gasoline price increase is too steep, the demand will be depressed as some of the motor car users will shift from personalised transport to public transport in short term. This will mean additional pressure on the already stretched public transport system and the demand for autodiesel will also increase. There will also be a loss of revenue from the lower gasoline consumption as happened in 1974. Further, there will be a shift to diesel cars".

A part of this argument-set has already been met. For the stretched public transport system, it would be appropriate to allocate a part of the Rs. 689 Million annual windfall shown in a previous section to buy new or second-hand buses. For diesel cars, the appropriate measure would be to increase the annual license fee to compensate.

However, the real problem is one of political will, which itself rests upon the strength or clout of motoring opinion. A 50% price increase might be absorbed, but increasing the price by a factor of four (say Rs. 54/- per litre) might set up:-

- (a) a total brain draining of Energy Mangers, not to speak of other professionals.
- (b) a professionally led coup d'etat.

PRIORITIES IN GOODS TRANSPORT

It is apparent from table 6 that transport of goods by rail is more Energy efficient than by lorry, provided ofcourse that:-

- (a) Origin and destination are rail-served
- (b) The goods can stand transhandling
- (c) The quantities will fill a train

There can be no question that some commodities can travel as readily by train as lorry. They include cement, tea, rubber and salt. However, to the consigner of goods, lorry transport appears to have many overt and covert advantages.

A desire to shift such goods back to trains in order to conserve auto diesel, which (unlike petrol) is in short supply from the refinery, many measures are needed including,

- (a) institutional changes
- (b) a lorry axle weight-distance tax
- (c) prosecution of overloaded lorries
- (d) Further invigoration of railway marketing

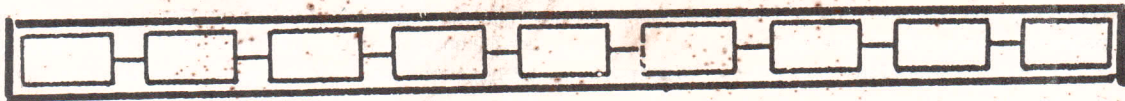
CONCLUSIONS

Sri Lanka is profligate in the use of Energy for transport. It could save considerable transport fuel by constraining the use of cars and shifting suitable goods from lorry to train.

Increasing the price of petrol is a useful tool for constraining car-use with a bonus of giving ready money to the government for improving public transport or appropriating to any other investment or welfare programmes.

Along with petrol price increase, several other measures could be adopted in parallel which would mitigate pollution and congestion as well as reduce expenditure on petroleum and motor car maintenance. These measures include:-

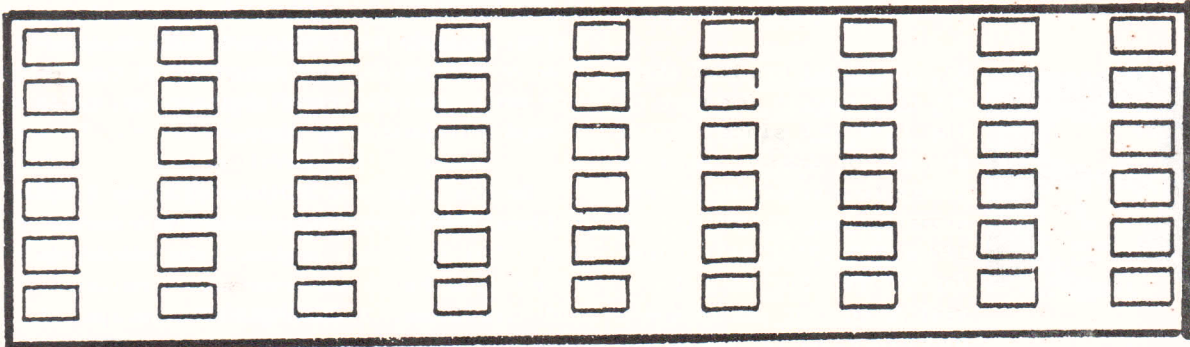
Bombay 9-car suburban train length 750ft



12m

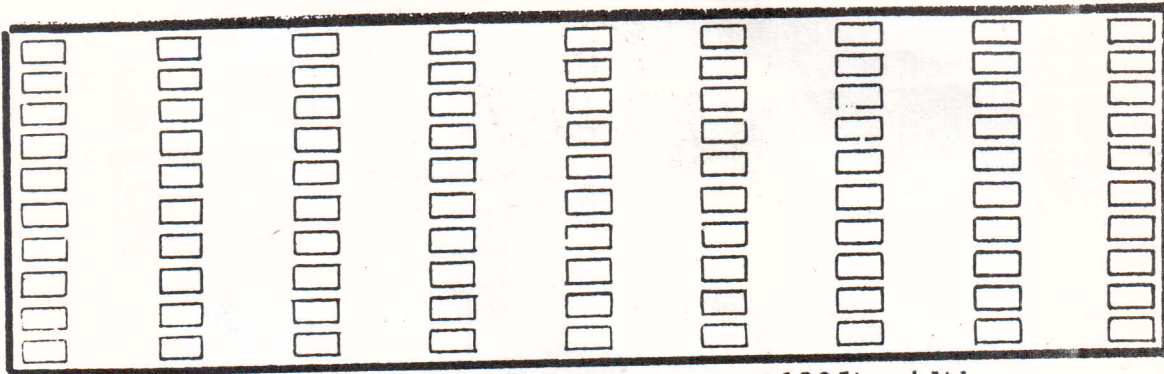
track width including return track = 40ft total width

36 buses in 4 lanes spread over 720ft



6 lanes forward and 2 returns = 80ft width

900 cars in 10 lanes spread over 720ft



36m

10 lanes forward and 2 return = 120ft width

Fig 6 - Space need for moving 3,600 people in fully loaded train, buses and cars

- (a) increasing parking charges up to the commercial rent value of the land squatted on (say Rs. 20 per hour in Fort)
- (b) taxing off-street parking
- (c) reducing on-street and off-street parking
- (d) pedestrianising suitable streets
- (e) affording priorities for public transport
- (f) electronic road pricing

REFERENCES

- [1] Sri Lanka Transport Sector Study, FES 1983
- [2] "Energy Pricing and Demand Management", D. Chandrasekara, SLEMA Journal, Vol 2 No. 1, Sep - Oct 88.

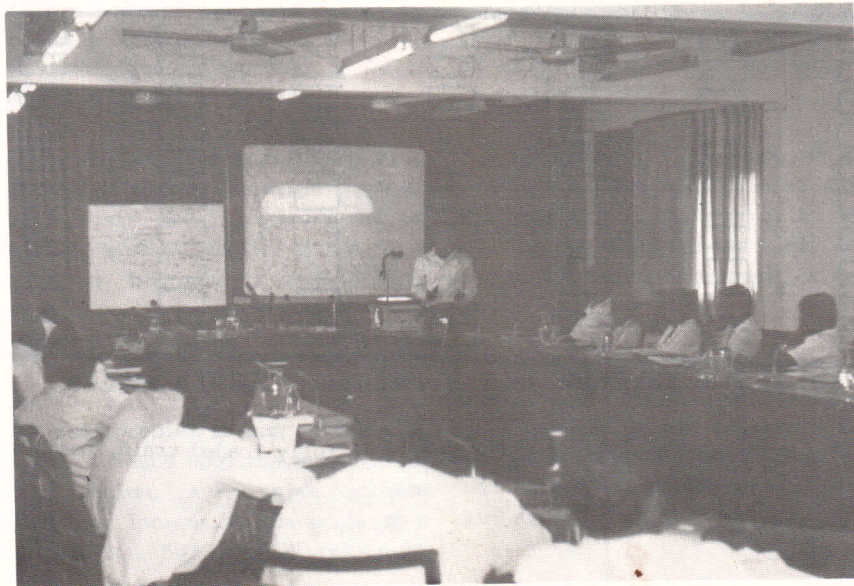


Mr. J. Diandas has been student of transport for most of his life and since 1973 a student of Energy. Because income from transport professionalism was meagre in the 1940s and 1950s he studied for and qualified as a Chartered Accountant and became a partner of a firm of auditors. Since 1980 he has been increasingly engaged in transport consultancy and research into transport and Energy problems. He is the

author of one book (Sri Lanka Transport Sector Study FES 1983), of a monograph "Sri Lanka Energy Situation" for Peoples Bank in 1977 and of numerous other publications and conference papers including two papers and a conference overview in "Energy in Sri Lanka", (Munasinghe of, SLAAS 1982). He has attended dozens of international conferences abroad. He is a member of several learned and professional bodies including Chartered Institute of Transport London (Chairman Sri Lanka Section in 1988/89), Sri Lanka Association for Advancement of Science (President Section F in 1984, Council Member for 4 out of the last 11 years), Institute of Chartered Accountants Sri Lanka (Council Member 1971-72), Transportation Research Forum USA, Sri Lanka Association of Economists, Institute of Rail Transport India, Institution of Engineers Sri Lanka (Companion) as well as SLEMA.

He has a private library of some 8,000 volumes, mostly on transportation but including 1,000 on Energy topics. Has served in Corporation Boards and Government Commissions and Committees, including Chairmanships of Level Crossing Inquiry Committee 1971 and Central Consultation Committee of the CTB 1975-77.

Mr. Diandas is a Corporate Member of SLEMA and is presently a member of Board of Directors.



The SLEMA Training Course on Steam Generation is presently underway. The picture a section of the participants following a lecture by Mr D K G Senasinghe of Ceylon Petroleum Corporation on Steam Generation. There are 38 participants.