Table I.72 (3) ENERGY DEMAND FORECAST IN KLANG VALLEY AREA
(LOW CASE)

(Unit: Tcal)

SECTOR		1985	1990	1995	2000	2005	Ave. Annual Growth Rate (%)			
							90/85	95/90	00/95	05/00
HOUSEHOLD	LPG	645.7	842.6	1019.3	1270.1	1491.6	5.47	3.88	4.50	3.27
	KEROSENE	341.3	436.8	515.5	584.2	631.6	5.06	3.37	2.53	1.57
	CHARCOAL	96.4	125.0	149.9	181.2	207.4	5.33	3.70	3.87	2.74
	LPG SHOWER	0.0	195.3	234.5	283.2	324.4	0.00	3.73	3.85	2.75
	SUB-TOTAL	1083.4	1599.7	1919.2	2318.7	2655.0	8.11	3.71	3.87	2.73
RESTAURANT	LPG	329.6	406.3	502.0	615.9	719.2	4.27	4.32	4.17	3.15
	KEROSENE	39.4	48.6	60.1	73.7	86.0	4.29	4.34	4.16	3.14
	CHARCOAL	50.1	61.8	76.4	93.7	109.4	4.29	4.33	4.17	3.15
	FIRE WOOD	8.6	10.6	13.1	16.0	18.7	4.27	4.33	4.08	3.17
	COAL	0.9	1.1	1.3	1.6	1.9	4.10	3.40	4.24	3.50
	SUB-TOTAL	428.6	528.4	652.9	800.9	935.2	4.28	4.32	4.17	3.15
HOTEL	LPG	16.0	20.4	27.2	33.9	40.7	4.98	5.92	4.50	3.72
	FUEL OIL	57.8	73.6	98.0	122.4	146.8	4.95	5.89	4.55	3.70
	SUB-TOTAL	73.8	94.0	125.2	156.3	187.5	4.96	5.90	4.54	3.71
TRANSPORTATION	LPG	21.4	297.5	548.4	799.3	1044.7	69.28	13.01	7.83	5.50
	GASOLINE	6843.7	7257.9	8820.4	10220.2	11916.4	1.18	3.98	2.99	3.12
	DIESEL OIL	4633.1	4918.8	5143.2	5352.6	5570.4	1.20	0.90	0.80	0.80
	SUB-TOTAL	11498.2	12474.2	14512.0	16372.1	18531.5	1.64	3.07	2.44	2.51
MANUFACTURING INDUSTRY	LPG	147.9	162.5	205.4	248.8	292.3	1.90	4.80	3.91	3.28
	FUEL OIL	1720.3	1890.7	2389.1	2894.6	3400.1	1.91	4.79	3.91	3.27
	DIESEL OIL	517.3	568.6	718.4	870.4	1022.4	1.91	4.79	3.91	3.27
	KEROSENE	7.5	8.2	10.4	12.6	14.8	1.80	4.87	3.91	3.27
	SUB-TOTAL	2393.0	2630.0	3323.3	4026.4	4729.6	1.91	4.79	3.91	3.27
TOTAL	LPG	1160.6	1729.3	2302.3	2968.0	3588.5	8.30	5.89	5.21	3.87
	KEROSENE	388.2	493.6	586.0	670.5	732.4	4.92	3.49	2.73	1.78
	CHARCOAL	146.5	186.8	226.3	274.9	316.8	4.98	3.91	3.97	2.88
	LPG SHOWER	0.0	195.3	234.5	283.2	324.4	0.00	3.73	3.85	2.75
	FIRE WOOD	8.6	10.6	13.1	16.0	18.7	4.27	4.33	4.08	3.17
	COAL	0.9	1.1	1.3	1.6	1.9	4.10	3.40	4.24	3.50
	GASOLINE	6843.7	7257.9	8820.4	10220.2	11916.4	1.18	3.98	2.99	3.12
	FUEL OIL	1778.1	1964.3	2487.1	3017.0	3546.9	2.01	4.83	3.94	3.29
	DIESEL OIL	5150.4	5487.4	5861.6	6223.0	6592.8	1.28	1.33	1.20	1.16
GRAND TOTAL		15477.0	17326.3	20532.6	23674.4	27038.8	2.28	3.45	2.89	2.69

Source: Forecasted by the Study Team

Table I.73 COMPARISON OF ENERGY DEMAND FORECAST IN KLANG VALLEY AREA

(Unit: Tcal)

Demand Forecast Method	Sector	1985	1990	1995	2000	Variable Used
Macroscopic Forecast [Base Case]	Residential [A1]	1,172.3	1,404.4	1,810.3	2,665.5	GDP, GRP
	Commercial [A2]	446.4	533.3	687.4	975.7	GDP, GRP
	Industrial [A3]	2,393.0	3,231.4	4,433.3	7,698.3	GRPM
	Transportation [A4]	11,498.2	14,611.7	18,546.3	26,818.3	GRP, Population
	Total [A]	15,509.9	19,780.8	25,477.3	38,157.8	
Forecast based on Field Survey and Macroscopic Forecast	Residential [B1]	987.0	1,490.4	1,806.0	2,553.1	Population
	Commercial [B2]	492.9	642.7	792.6	1,153.4	Number of Hotels, Number of Seats in Restaurants
	Industrial [B3]	2,393.0	3,231.1	4,433.3	7,698.3	GRPM and Employees in Manuf. Industry
	Transportation [B4]	11,498.2	14,611.7	18,546.3	26,818.2	GRP, Population
	Total [B]	15,371.1	19,975.9	25,578.2	38,223.0	
Ratio						
[B1]/[A1]	Residential	0.8419	1.0612	0.9978	0.9578	-
[B2]/[A2]	Commercial	1.1037	1.2051	1.1530	1.1821	-
[B3]/[A3]	Industrial	1.0000	1.0000	1.0000	1.0000	-
[B4]/[A4]	Transportation	1.0000	1.0000	1.0000	1.0000	-
[B] / [A]	Total	0.9911	1.0099	1.0040	1.0017	-

Source: Forecasted by the Study Team
Note: Excluded demand for power generation, charcoal, firewood and coal

Table I.74 ARABIAN LIGHT PRICE (FOB RAS TANURA)*1 AND PETROLEUM PRODUCTS & LPG PRICES (FOB SINGAPORE)*2

Year	Arabian Light US$/bbl	Arabian Light US$/kl	Fuel Oil (US$/kl)	LPG (US$/ton)	Kerosene (US$/kl)	Regular Gas. *3 (US$/kl)	Premium Gasoline (US$/kl)	Diesel Oil (US$/kl)
1965	1.800	11.32	11.67	-	26.88	24.26	-	23.44
1966	1.800	11.32	11.76	-	26.83	24.25	-	23.02
1967	1.800	11.32	11.61	-	26.33	24.44	-	22.67
1968	1.800	11.32	11.60	-	25.75	23.80	-	21.47
1969	1.800	11.32	11.53	-	25.85	23.74	-	21.82
1970	1.800	11.32	11.33	-	25.87	21.67	-	18.60
1971	2.194	13.80						
1972	2.468	15.52	15.64	-	26.57	23.15	-	22.54
1973	3.293	20.71	20.04	-	34.18	31.47	-	28.59
1974	11.45	72.02	68.04	-	87.22	98.63	-	83.43
1975	10.72	67.43	72.80	-	91.62	112.70	-	82.79
1976	11.51	72.40	73.65	-	97.39	121.47	-	93.87
1977	12.40	77.99	81.65	-	106.02	132.90	-	103.11
1978	12.70	79.88	85.54	-	115.93	138.12	-	110.43
1979	17.26	108.56	103.35	244.96	144.54	151.54	164.46	140.68
1980	28.67	180.33	172.92	404.56	241.61	237.14	259.33	234.54
1981	32.50	204.42	213.51	473.42	285.35	271.08	290.15	266.59
1982	34.00	213.85	201.89	371.00	269.16	249.86	269.84	256.05
1983	29.50	185.55	184.72	346.65	235.11	226.17	254.19	230.00
1984	29.00	182.40	175.11	346.79	212.21	214.26	241.24	205.93
1985	20.08	176.62	182.39	312.59	217.23	234.16	240.03	208.39

Sources: OPEC Annual Statistical Bulletin 1982
"Sekiyu Shiryou Geppoh" June 1986 (in Japanese)
Singapore Trade Statistics 1965-1985

Notes: *1 Arabian Light: FOB Ras Tanura/Average price in the year
(See supplementary table on the next page.)
1965-Oct.1974: API 34.00-34.09 dg. (Posted or Tax Reference Price)
Nov.1974-1985: API 34.0 dg. (Official Price)

*2 Petroleum Products and LPG: FOB Singapore price

*3 1965-1978: Motor Spirits

Supplementary Table for Table I.74

ARABIAN LIGHT FOB RAS TANURA PRICE (1959-1986)

Year	Date	*1 34.00-34.09	*2 34.0
1959	FEB.13	1.900	
1960	AUG. 9	1.800	
1971	FEB.15	2.180	
1971	JUN. 1	2.285	
1972	JAN.20	2.479	
1973	JAN. 1	2.591	
1973	APR. 1	2.742	
1973	JUN. 1	2.898	
1973	JUL. 1	2.955	
1973	AUG. 1	3.066	
1973	OCT. 1	3.011	
1973	OCT.16	5.119	
1973	NOV. 1	5.176	
1973	DEC. 1	5.036	
1974	JAN. 1	11.651	
1974	NOV. 1		10.463
1975	OCT. 1		11.510
1977	JAN. 1		12.090
1977	JUL. 1		12.704
1979	JAN. 1		13.339
1979	APR. 1		14.546
1979	JUN. 1		18.000
1979	NOV. 1		24.000
1980	JAN. 1		26.000
1980	APR. 1		28.000
1980	AUG. 1		30.000
1980	NOV. 1		32.000
1981	OCT. 1		34.000
1983	FEB. 1		30.000
1983	MAR. 1		29.000
1985	FEB. 1		28.000
1986	MAY		28.000

Notes: *1 Posted or Tax Reference Price
*2 Official Selling Price

Sources: OPEC Annual Statistical Bulletin 1982
Sekiyu Shiryou Geppoh, June 1986
(in Japanese)

Table I.75 OFFICIAL PRICE AND SPOT PRICE OF CRUDE OIL (1983-1986)

(Unit: US$/bbl)

	Arabian Light		UK Brent	
	Official (34 dg.)	Spot	Official (38 dg.)	Spot
Dec. 2, 1983	29.00	18.35	30.00	28.73
June 1, 1984	29.00	28.49	30.00	29.91
Nov. 2, 1984	29.00	28.03	28.65	27.76
Dec. 7, 1984	29.00	27.75	28.65	27.34
Jan. 1, 1985	29.00	27.83	28.65	26.18
Feb. 1, 1985	28.00	27.66	28.65	27.69
Mar. 1, 1985	28.00	27.67	28.65	27.48
Apr. 5, 1985	28.00	27.67	28.65	28.44
May 3, 1985	28.00	27.31	28.65	26.99
June 7, 1985	28.00	26.60	28.65	26.68
July 5, 1985	28.00	27.18	28.65	26.70
Aug. 2, 1985	28.00	27.11	28.65	27.11
Sep. 6, 1985	28.00	27.68	28.65	27.90
Oct. 4, 1985	28.00	27.88	27.90	28.67
Nov. 1, 1985	28.00	27.82	27.90	29.03
Dec. 6, 1985	28.00	27.95	29.25	28.52
Jan. 3, 1986	28.00	27.50	25.75	26.10
Feb. 7, 1986	28.00	20.22	19.70	18.24
Mar. 7, 1986	28.00		15.50	15.07
Apr., 1986			12.80	

Sources: "Sekiyu Shiryou Geppoh" (in Japanese) etc.

Notes: Spot prices in the first Friday in each month and coresponding official prices thereto.

Official Price:
Arabian Light: FOB Ras Tanura, API 34 dg.
UK Brent: FOB Sullom Voe, API 38 dg.
Spot Price: FOB Origin

Table I.76 TREND OF CRUDE OIL PRICE IN MALAYSIA

Year	Date of Change	Tapis Blend (43.5°)	Miri (38°)	Tempungo (38°)	Labuan (38°)
1978	Dec.	14.30	14.20	14.20	14.12
1979	1 Jan.	15.40	15.05	15.05	14.83
	1 Mar.	16.56	16.18	16.13	15.94
	1 Apr.	18.88	18.45	18.45	18.17
	1 Jun.	21.40	20.90	20.90	20.60
	1 Jul.	24.15	23.70	23.70	23.40
	1 Nov.	27.50	26.75	26.75	26.40
1980	1 Jan.	34.40	33.60	33.60	33.20
	1 Mar.	36.10	35.30	35.30	34.90
	1 Jun.	38.10	37.30	37.30	36.90
	1 Dec.	36.60	137.80	37.80	37.40
1981	1 Jan.	42.10	41.30	41.30	40.90
	1 Feb.	41.60	40.80	40.80	40.40
	1 May	40.80	39.80	39.80	39.40
	1 Jun.	39.90	39.10	39.10	38.70
	1 Jul.	37.90	37.10	37.10	36.70
1982	1 Jna.	37.60	38.50	36.50	36.00
	1 Apr.	37.30	35.60	35.60	35.40
1983	26 Jan.	37.30	35.60	35.60	35.40
	1 Feb.	31.50	29.85	30.10	30.00
	1 Oct.	30.95	29.85	30.10	30.00
1984	1 Jan.	30.95	29.85	30.10	30.00
1985	1 Feb.	28.65	27.95	28.40	28.30
	Sep.	27.90	27.25	27.90	27.60

Source: International Crude Oil and Product prices. Jan. 1986

1986 Apr	Official Price	Discounted price	Discount rate in this year	
Tapis	17.10	13.50	Feb. average	14.6%
Tembungo	17.10	13.35	Mar.	29.0%
Labuan	16.80	13.20	May	21.3%
Miri.Light	16.45	13.00	(From April)	
Bintul	15.75	12.45		

Table 1.77 RECORDS AND PROJECTION OF ARABIAN LIGHT OFFICIAL PRICE AND PETROLEUM PRODUCTS & LPG FOB SINGAPORE PRICES (CURRENT PRICE)

Year	Arabian Light US$/bbl	Arabian Light US$/kl	Fuel Oil (US$/kl)	LPG (US$/ton)	Kerosene (US$/kl)	Regular Gasoline (US$/kl)	Premium Gasoline (US$/kl)	Diesel Oil (US$/kl)
Actual								
1975	10.72	67.43	72.80	-	91.62			82.79
1976	11.51	72.40	73.65	-	97.39			93.87
1977	12.40	77.99	81.65	-	106.02			103.11
1978	12.70	79.88	85.54	-	115.93			110.43
1979	17.26	108.56	103.35	244.96	144.54	151.54	164.46	140.68
1980	28.67	180.33	172.92	404.56	241.61	237.14	259.33	234.54
1981	32.50	204.42	213.51	473.42	285.35	271.08	290.15	266.59
1982	34.00	213.85	201.89	371.00	269.16	249.86	269.84	256.05
1983	29.50	185.55	184.72	346.65	235.11	226.17	254.19	230.00
1984	29.00	182.40	175.11	346.79	212.21	214.26	241.24	205.93
1985	28.08	176.62	182.39	312.59	217.23	234.16	240.03	208.39
Projection								
1990	24.31	152.91	152.18	314.21	198.08	199.30	216.38	189.87
1991	26.67	167.75	166.33	338.80	216.30	214.77	233.12	207.36
1992	29.35	184.61	182.41	366.73	236.99	232.36	252.14	227.23
1993	32.22	202.66	199.62	396.64	259.15	251.18	272.50	248.50
1994	35.31	222.09	218.15	428.83	283.00	271.44	294.42	271.40
1995	38.78	243.92	238.97	465.00	309.79	294.21	319.04	297.12
1996	41.54	261.28	255.53	493.76	331.10	312.31	338.63	317.58
1997	44.47	279.71	273.11	524.30	353.72	331.53	359.42	339.30
1998	47.59	299.33	291.82	556.81	377.80	352.00	381.55	362.42
1999	51.10	321.41	312.87	593.39	404.90	375.02	406.46	388.44
2000	54.65	343.74	334.17	630.39	432.31	398.31	431.64	414.75
2001	58.62	368.71	357.98	671.76	462.96	424.35	459.81	444.18
2002	62.65	394.06	382.16	713.76	494.08	450.79	488.41	474.05
2003	67.16	422.42	409.21	760.75	528.89	480.37	520.40	507.47
2004	71.96	452.61	438.00	810.77	565.94	511.85	554.46	543.05
2005	77.07	484.75	468.65	864.02	605.39	545.37	590.71	580.92
2006	82.52	519.03	501.34	920.82	647.47	581.12	629.38	621.32
2007	88.32	555.52	536.14	981.28	692.26	619.17	670.54	664.32
2008	94.78	596.15	574.89	1048.59	742.13	661.55	716.38	712.20
2009	101.36	637.53	614.35	1117.15	792.92	704.70	763.05	760.97
2010	108.52	682.57	657.31	1191.78	848.20	751.67	813.86	814.04
2011	116.15	730.56	703.07	1271.29	907.11	801.72	868.00	870.59
2012	124.45	782.77	752.87	1357.80	971.19	856.17	926.89	932.12
2013	133.29	838.37	805.89	1449.92	1039.44	914.16	989.61	997.64
2014	142.69	897.49	862.27	1547.87	1112.00	975.81	1056.30	1067.31
2015	152.71	960.52	922.38	1652.30	1189.37	1041.54	1127.40	1141.59
2016	163.80	1030.27	988.90	1767.87	1274.98	1114.29	1206.09	1223.78
2017	175.17	1101.78	1057.10	1886.35	1362.75	1188.86	1286.75	1308.05
2018	187.74	1180.85	1132.51	2017.35	1459.81	1271.32	1375.95	1401.23
2019	201.13	1265.07	1212.83	2156.89	1563.18	1359.16	1470.95	1500.48
2020	215.39	1354.76	1298.36	2305.50	1673.27	1452.69	1572.13	1606.17
2021	230.57	1450.24	1389.42	2463.69	1790.46	1552.27	1679.83	1718.69
2022	246.73	1551.88	1486.35	2632.10	1915.22	1658.27	1794.49	1838.46
2023	263.93	1660.07	1589.53	2811.35	2048.01	1771.10	1916.53	1965.96
2024	282.88	1779.26	1703.20	3008.83	2194.31	1895.40	2050.98	2106.41
2025	303.06	1906.19	1824.25	3219.13	2350.11	2027.77	2194.17	2255.99
2026	324.54	2041.29	1953.09	3442.97	2515.94	2168.67	2346.57	2415.20
2027	347.42	2185.20	2090.34	3681.41	2692.58	2318.75	2508.90	2584.79
2028	371.78	2338.42	2236.46	3935.27	2880.64	2478.54	2681.74	2765.35

Sources: OPEC Annual Statistical Bulletin 1982
"Sekiyu Shiryou Geppoh" June 1986 (in Japanese)
Singapore Trade Statistics 1975-1985

Notes: Arabian Light:
Arabian Light-34 FOB Ras Tanura (Official Price)
1990, 1995, 2000, 2005 and 2010: Given by EPU/Low Scenario (GPS)
Petroleum Products and LPG:
FOB Singapore. Projected by the formulae in Table 1.82.

Supplementary Table for Table I.77

PROJECTED CRUDE OIL PRICE (1990-2028)

	Real-term *1 (US$/bbl)	Annual Ave. Escalation Rate of Crude Price	Escalation Factor *3	Current-term US$/bbl	Current-term US$/kl
1985	28.0*2		1.0000	28.00	176.11
1986	15.0*2		1.0000	15.00	94.35
1987	16.1		1.0500	16.91	106.36
1988	17.3		1.1025	19.07	119.95
1989	18.6	(1986-1990)	1.1576	21.53	135.42
1990	20.0*2	7.457%	1.2155	24.31	152.91
1991	20.9		1.2763	26.67	167.75
1992	21.9		1.3401	29.35	184.61
1993	22.9		1.4071	32.22	202.66
1994	23.9	(1990-1995)	1.4775	35.31	222.09
1995	25.0*2	4.564%	1.5513	38.78	243.92
1996	25.5		1.6289	41.54	261.28
1997	26.0		1.7103	44.47	279.71
1998	26.5		1.7959	47.59	299.33
1999	27.1	(1995-2000)	1.8856	51.10	321.41
2000	27.6*2	1.999%	1.9799	54.65	343.74
2001	28.2		2.0789	58.62	368.71
2002	28.7		2.1829	62.65	394.06
2003	29.3		2.2920	67.16	422.42
2004	29.9	(2000-2005)	2.4066	71.96	452.61
2005	30.5*2	2.018%	2.5270	77.07	484.75
2006	31.1		2.6533	82.52	519.03
2007	31.7		2.7860	88.32	555.52
2008	32.4		2.9253	94.78	596.15
2009	33.0	(2005-2028)	3.0715	101.36	637.53
2010	33.65*2	1.985%	3.2251	108.52	682.57
2011	34.3		3.3864	116.15	730.56
2012	35.0		3.5557	124.45	782.77
2013	35.7		3.7335	133.29	838.37
2014	36.4		3.9201	142.69	897.49
2015	37.1		4.1161	152.71	960.52
2016	37.9		4.3219	163.80	1030.27
2017	38.6		4.5380	175.17	1101.78
2018	39.4		4.7649	187.74	1180.85
2019	40.2		5.0032	201.13	1265.07
2020	41.0		5.2533	215.39	1354.76
2021	41.8		5.5160	230.57	1450.24
2022	42.6		5.7918	246.73	1551.88
2023	43.4		6.0814	263.93	1660.07
2024	44.3		6.3855	282.88	1779.26
2025	45.2		6.7048	303.06	1906.19
2026	46.1		7.0400	324.54	2041.29
2027	47.0		7.3920	347.42	2185.20
2028	47.9		7.7616	371.78	2338.42

Notes: *1 In 1985 prices
*2 Prices given by EPU/Low Scenario (GPS)
*3 Inflation factor: 1985/86 0.0%
After 1986 5.0% p.a.

Table I.78 EXPORTS OF SELECTED PETROLEUM PRODUCTS AND LPG IN SINGAPORE (1975-1985) (1) CONTINUED

	*1 Unit	s.g.	1975		1976		1977		1978		1979		1980	
			Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Kerosene	T,S$	0.78	344	100607	357	109724	497	157901	902	289872	865	346071	946	613392
	KL,US$		441	40404	458	44603	637	67537	1156	134014	1109	160292	1213	293068
Motor Spirit/Premium Gasoline	T,S$	0.75	738	276122	688	274004	736	304806	980	390461	1479	700186	1468	1062201
	KL,US$		984	110892	917	111384	981	130370	1307	180518	1972	324310	1957	507502
Regular Gasoline	T,S$	0.75									117	51040	150	99266
	KL,US$										156	23641	200	47428
Oth.Petrol.Spirit F.P.<23 dg.C	T,S$	0.82	1062	298859	1110	344761	1102	346391	1171	370004	888	395515	117	74198
High Speed Diesel Fuel	T,S$	0.82	2350	564720	2059	555489	2808	814386	3238	920771	3899	1386714	4317	2587526
Other Diesel Fuel	T,S$	0.82	351	82387	513	136632	497	134765	365	99861	181	58009	145	79382
Diesel Oil	T,S$	0.82	3763	945966	3682	1036882	4407	1295542	4774	1390636	4968	1840238	4579	2741106
	KL,US$		4589	379906	4490	421497	5374	554124	5822	642920	6059	852357	5584	1309654
Other Fuel Oils	T,S$	0.96	5134	969420	6364	1201068	7538	1498938	8093	1559807	8548	1986798	9325	3515777
	KL,US$		5348	389325	6629	488239	7852	641120	8430	721131	8904	920240	9714	1679779
Liquefied Propane & Butane	T,S$										88.16	46625	144	121930
	T,US$										88.16	21596	144	58256
Exchange Rate (S$/US$) *2				2.49		2.46		2.338		2.163		2.159		2.093

Sources: See next page.

Notes: *1 Volume: 1,000 ton or 1,000 kl
Value: 1,000 S$ or 1,000 US$
*2 Rate at the end of the year

Table I.78 EXPORTS OF SELECTED PETROLEUM PRODUCTS AND LPG IN SINGAPORE (1975-1985) (2)

	*1 Unit	s.g.	1981		1982		1983		1984		1985	
			Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Kerosene *2	T,S$	0.78	1358	1017452	1079	784701	1375	881636	1981	1173962	1618	948380
	KL,US$		1741	496803	1383	372249	1763	414497	2540	539009	2074	450537
Premium Gasoline	T,S$	0.75	1493	1183101	1513	1147327	1236	891021	1230	861706	1589	1070654
	KL,US$		1991	577686	2017	544273	1648	418910	1640	395641	2119	508624
Regular Gasoline	T,S$	0.75	137	101595	139	97440	220	140953	182	113398	217	142450
	KL,US$		183	49607	185	46224	293	66268	243	52065	289	67672
Oth.Petrol.Spirit F.P.<23 dg.C	T,S$	0.82	24	23566	21	18346	25.11	23362	33.01	25794	54.82	37467
High Speed Diesel Fuel	T,S$	0.82	5010	3328455	5839	3839701	5054	3007652	5998	3282973	7079	3781465
Other Diesel Fuel	T,S$	0.82	33	21522	54	34583	26.38	14856	113	51935	51.40	24558
Diesel Oil	T,S$	0.82	5067	3373543	5914	3892630	5105	3045870	6144	3360702	7185	3843490
	KL,US$		6179	1647238	7212	1846599	6226	1432003	7493	1543022	8762	1825886
Other Fuel Oils	T,S$	0.96	9131	4158948	9468	4197600	9074	3713597	8215	3263550	8652	3460449
	KL,US$		9511	2030736	9863	1991271	9452	1745932	8557	1498416	9013	1643919
Liquefied Propane & Butane	T,S$		196	190034	223	174400	276	203501	247	186560	196	128967
	T,US$		196	92790	223	82732	276	95675	247	85657	196	61267
Exchange Rate (S$/US$) *3				2.048		2.108		2.127		2.178		2.105

Sources: Singapore Trade Statistics 1975-1985
UN Monthly Bulletin of Statistics

Notes: *1 Volume: 1,000 ton or 1,000 kl
Value: 1,000 S$ or 1,000 US$
*2 1983-1985: Including "Vapourising Oil"
*3 Rate at the end of the year

Table I.79 FOB SINGAPORE PRICE OF LPG (DESTINATION: MALAYSIA)

(Unit: US$/ton)

	1979	1980	1981	1982	1983	1984	1985
Average (Total Export of Singapore)	244.96	404.56	473.42	371.00	346.65	346.79	312.59
To Peninsular Malaysia	266.52	387.66	477.28	433.93	371.84	397.08	347.97
Sabah	257.55	468.11	428.70	365.71	344.13	310.49	267.35
Sarawak	254.19	465.93	427.80	365.37	337.41	313.50	304.68
Malaysia (Average)	263.26	408.13	464.79	418.75	364.96	368.18	335.71

Sources: Table I.80

Table I.80 LPG EXPORTS FROM SINGAPORE TO MALAYSIA

	*1 Unit	1979 Vol.	1979 Val.	1980 Vol.	1980 Val.	1981 Vol.	1981 Val.	1982 Vol.	1982 Val.	1983 Vol.	1983 Val.	1984 Vol.	1984 Val.	1985 Vol.	1985 Val.
Total Export of Singapore	T,S$	88.16	46625	144	121930	196	190034	223	174400	276	203501	247	186560	196	128967
	US$		21596		58256		92790		82732		95675		85657		61267
To Peninsular Malaysia	T,S$	15.44	8884	29.57	23993	29.84	29168	43.41	39709	49.65	39269	29.45	25469	48.99	35884
	US$		4115		11463		14242		18837		18462		11694		17047
Sabah	T,S$	3.51	1952	5.30	5193	5.75	5048	6.24	4810	7.41	5424	8.01	5417	4.90	2758
	US$		904		2481		2465		2282		2550		2487		1310
Sarawak	T,S$	3.34	1833	4.96	4837	4.46	3907	6.15	4737	6.79	4873	7.11	4854	8.55	5483
	US$		849		2311		1908		2247		2291		2229		2605
Total Export to Malaysia	T,S$	22.29	12669	39.83	34023	40.05	38123	55.80	49256	63.85	49566	44.57	35740	62.44	44125
	US$		5868		16256		18615		23366		23303		16410		20962
Exchange Rate (S$/US$) *2			2.159		2.093		2.048		2.108		2.127		2.178		2.105

Sources: Singapore Trade Statistics 1979-1985
UN Monthly Statistical Bulletin

Notes: *1 Unit: Volume: 1,000 ton, Value: 1,000 S$ or 1,000 US$
*2 Rate at the end of the year

Table I.81 LPG FOB SAUDI ARABIA PRICE AND CIF JAPAN PRICE (1982-1986)

(Unit: US$/ton)

	1982			1983			1984			1985			1986		
	*3 FOB Saudi.		CIF Japan	FOB Saudi.		CIF Japan	FOB Saudi.		CIF Japan	FOB Saudi.		CIF Japan	FOB Saudi.		CIF Japan
Month	Prop.	But.		Prop.	But.		Prop.	But.		Prop.	But.		Prop.	But.	
Jan.	225	255	276.79	250	255	287.32	225	250	270.06	206	206	241.18	217	217	253.46
Feb.	225	255	272.54	260	270	290.10	225	250	269.24	206	206	242.11	207	207	253.60
Mar.	225	255	274.41	260	270	311.18	225	250	271.01	206	206	239.29	180	180	242.76
Apr.	225	255	274.25	260	270	320.46	225	240	273.06	206	206	245.70	135	135	218.14
May	225	255	272.18	260	270	321.95	225	240	266.43	206	206	240.35	125	110	178.01
May *1				280	280										
June	225	255	275.39	280	280	329.30	225	240	263.98	206	206	242.41			
July	225	255	273.20	280	280	325.82	225	225	261.50	206	206	239.65			
Aug.	225	255	274.10	270	270	313.07	215	215	254.47	206	206	241.68			
Aug.*2							206	206							
Sep.	225	255	274.34	260	260	309.21	206	206	242.19	206	206	241.43			
Oct.	225	255	270.77	225	250	298.24	206	206	242.94	211	211	246.90			
Nov.	235	255	271.75	225	250	281.84	206	206	237.95	211	211	249.01			
Dec.	235	255	279.01	225	250	272.37	206	206	239.90	217	217	248.88			
Ave.			274.16			304.00			258.40			243.57			

Sources: "Sekiyu Shiryou", 1985, 1986 (in Japanese)
"Sekiyu Shiryou Geppoh", Feb. 1983, Feb. 1984, Feb. 1985, June 1986 (in Japanese)

Notes: *1 FOB Saudi Arabia price changed in May, 1983.
*2 FOB Saudi Arabia price changed on Aug. 7, 1984.
*3 FOB Saudi Arabia/Petromin (Prop.=Propane, But.=Butane)

Table I.82 PARAMETERS OF FORECAST FORMULAE FOR PETROLEUM PRODUCTS AND LPG PRICES

	a	b	rr	r
Fuel Oil	6.35137	0.953683	0.987619	0.993790
LPG	60.8631	1.65685	0.614611	0.783971
Kerosene	10.3952	1.22743	0.974887	0.987363
Regular Gasoline	39.8279	1.04289	0.883601	0.940000
Premium Gasoline	43.889	1.12805	0.925203	0.961875
Diesel Oil	9.68094	1.17843	0.980096	0.989998

Note: Regression formulae: $y = a + bx$

Where: y = Petroleum products or LPG prices (FOB Singapore) (US$/kl or US$/ton)

x = Arabian Light-34 price (FOB Ras Tanura/Official price) (US$/kl)

rr, r = Correlation coefficient

Table I.83 AUTOMATIC PRICING MECHANISM (APM)
W.E.F. 1/6/86.

(MONITORING DATE 1/5/86)

(Unit: Msen/liter)

NO	PRODUCT	LOCATION	F.O.B. US$/AG	PRO. COST SEN/LTR	DIS/TRANS COST	MARKETING COST	DEALERS COMMIS.	COMPANY PROFIT	DUTY[1/]	TOTAL	SUBSIDY	RETAIL PRICE
1	PREMIUM	K.LUMPUR	0.538	36.16	2.13	3.17	4.72	3.30	44.52	94.00		94.0
		K.K'BALU	0.525	35.29	4.13	1.64	4.69	3.30	44.52	93.57		94.0
		KUCHING	0.525	35.29	3.51	1.64	4.69	3.30	44.52	92.95		
2	REGULAR	K.LUMPUR	0.420	28.23	2.13	3.17	4.16	3.30	44.52	85.51		86.0
		K.K'BALU	0.420	28.23	4.13	1.64	3.98	3.30	44.52	85.80		86.0
		KUCHING	0.420	28.23	3.51	1.64	3.98	3.30	44.52	85.18		85.0
3	KEROSENE	K.LUMPUR	0.490	32.94	2.13	3.17	3.73	1.11	9.40	52.48		52.5
		K.K'BALU	0.490	32.94	4.13	1.64	2.32	1.11	9.40	51.54		51.5
		KUCHING	0.490	32.94	3.51	1.64	3.98	3.30	44.52	85.18		50.7
4	DIESEL	K.LUMPUR	0.430	28.90	2.13	3.17	2.24	1.30	7.89	45.63		45.7
		K.K'BALU	0.430	28.90	4.13	1.64	2.24	1.30	7.89	46.10		46.1
		KUCHING	0.430	28.90	3.51	1.64	2.24	1.30	7.89	45.48		45.5
5	LPG (Msen/KG)	K.LUMPUR	0.360	43.85	9.25	14.38	21.42	9.00	15.93	113.83		114.0
		K.K'BALU	0.360	43.85	64.41	15.36	21.67	9.00	15.93	170.22	33.22	137.0
		KUCHING	0.360	43.85	30.85	15.36	21.67	9.00	15.93	136.66		137.0

1/ DUTY CHANGES W.E.F 1/6/86:

	CURRENT	NEW	CHANGES
PREMIUM - SEN/LTR	42.50	44.52	2.02
REGULAR - SEN/LTR	42.50	44.52	2.02
KEROSENE - SEN/LTR	7.40	9.40	2.00
DIESEL - SEN/LTR	8.53	7.89	(0.64)
LPG - SEN/KG.	6.46	15.93	9.47

PLANNING DEPARTMENT - 31/5/86.

Table I.84 EX-KL PRICE STRUCTURE

(Unit : Sen/Ltr. LPG Sen/kg)

EFFECTIVE DATE	Premium			Regular			Kerosene			Diesel			LPG		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
7/9/77	33.22	-	74.36	33.22	-	65.99	0.22	9.67	18.04	0.22	1.10	25.96	6.60	-	90.7
2/6/79	33.22	-	76.55	33.22	-	68.10	0.22	5.72	24.2	0.22	2.86	26.4	6.60	-	90.7
30/8/79	28.82	-	8.17	28.82	-	73.69	0.22	11.22	28.6	0.22	10.12	28.6	6.60	-	102.8
25/4/80	28.82	1.54	88.90	28.82	1.54	84.0	0.22	24.42	35.2	0.22	20.46	25.6	6.60	8.58	114.5
16/8/80	28.82	1.54	102.0	28.82	1.54	97.0	0.22	27.50	39.6	0.22	23.54	39.6	6.60	7.70	128.0
18/4/81	24.42	-	108.0	24.42	-	102.0	0.22	25.96	46.2	0.22	22.00	46.2	6.60	-	149
28/7/82	35.84	-	108.0	35.84	-	102.0	0.22	27.00	46.2	0.22	22.05	46.2	7.30	-	134
2/4/83	35.84	-	104.0	35.84	-	98.0	0.22	19.62	46.2	0.22	14.35	46.2	1.31	-	134
1/9/83	35.84	-	106.0	35.84	-	100.0	0.22	16.20	46.2	0.22	11.86	46.2	-	-	134
1/10/83	35.84	-	106.0	35.84	-	100.0	0.22	16.20	46.2	0.22	11.86	46.2	-	-	135
1/11/83	35.84	-	106.0	35.84	-	100.0	0.22	15.0	48.0	0.22	10.66	48.0	-	-	135
1/1/84	35.84	-	106.0	35.84	-	100.0	0.22	-	63.0	0.22	-	38.6	-	-	135
1/2/84	35.84	-	106.0	35.84	-	100.0	0.22	-	63.0	0.22	-	58.1	-	-	135
1/5/84	35.84	-	106.0	35.84	-	100.0	0.22	-	62.5	0.22	-	58.1	-	-	134
1/6/84	35.84	-	106.0	35.84	-	100.0	0.22	-	62.5	0.22	-	57.5	-	-	134
1/7/84	35.84	-	106.0	35.84	-	100.0	0.22	-	61.9	0.22	-	57.5	-	-	134
1/10/84	38.5	-	106.0	38.5	-	100.0	1.5	-	61.9	0.73	-	57.5	4.46	-	134
1/12/84	35.84	-	106.0	38.5	-	100.0	1.5	-	62.7	0.75	-	57.5	4.46	-	134
1/1/85	35.84	-	107.0	38.5	-	101	1.5	-	63.2	0.73	-	58.5	4.46	-	135
1/6/85	35.84	-	114	38.5	-	107	1.5	-	66.2	0.73	-	61.4	4.46	-	141
1/8/85	35.84	-	114	38.5	-	107	1.5	-	63.7	0.73	-	58.4	4.46	-	132
1/11/85	35.84	-	111	38.5	-	103	1.5	-	63.7	0.73	-	58.4	4.46	-	132
1/3/86	40.5	-	99	40.5	-	92	1.5	-	58.9	2.73	-	48.8	4.46	-	121
1/4/86	42.5	-	95	42.5	-	87	1.5	-	54.1	4.73	-	45.7	4.46	-	118
1/5/86	42.5	-	94	42.5	-	87	7.4	-	54.1	8.53	-	45.7	6.46	-	118
1/6/86	44.52	-	94	44.52	-	86	9.4	-	52.5	7.89	-	45.7	15.93	-	114

1 - Duty
2 - Subsidy
3 - Retail Price

Table I.85 PETROLEUM PRODUCT PRICE MECHANISM IN MALAYSIA

(Unit: M$/Litre : LPG : M$/kg)

		F.O.B.	Freight Port Charges Insurance & Losses	c.i.f.	Duty (Excise Tax)
					Msen
LPG		0.3698	0.0742	0.4440	15.93/kg
PMG		0.3866	0.0147	0.4013	44.52
RMG		0.3092	0.0142	0.3234	44.52
JET A-1		0.2566	0.0176	0.2742	
Kerosene		0.2349	0.0149	0.2498	9.40
Diesel	ADO	0.2560	0.0157	0.2717	7.89
	MGO	0.2560	0.0157	0.2717	7.89
	MOD	0.2385	0.0156	0.2541	7.89
					Excise Tax
Fuel Oil	180 cst[1/]	0.1466	0.0169	0.1635	M$16.73/MT
	120 cst	0.1532	0.0170	0.1702	"
	80 cst	0.1630	0.0170	0.1800	"
	MFO	0.1466	0.0169	0.1635	"

1/ cst : viscosity

Table I.86 LPG SALES AND PURCHASE PRICE BY RETICULATION

1) LPG SALES PRICE BY RETICULATION

Date	LPG Sales Price $M\$/m^3$
December, 1985	2.85
March, 1986	2.85
April, 1986	2.64
May, 1986	2.58

2) LPG PURCHASE PRICE

Item	Price and Cost M$/kg
Ex-Depot Cost at Kertel	0.4168
Government Duty	0.1593
Transportation cost from Kertel to Kuala Lumpur	0.1000
Sales Tax on LPG Reticulation	0.000
Sales Tax	0.000
Insurance	-
Total Delivered Cost	0.6761

Table I.87 LIST OF BULK LPG CUSTOMERS IN KLANG VALLEY

	NAME AND ADDRESS	SALES VOLUME (MT)	PRICE (M$/MT) May,1986	PRICE (M$/MT) Sep,1986	INDUSTRY
1.	M.A.S Flights Kitchen Subang Airport Subang, Selangor	4.71	0.7800	0.7400	Catering
2.	Petaling Jaya Hilton 2 Jalan Barat Petaling Jaya 46200 Selangor	5.48	0.7570	0.7686	Hotel
3.	Fima Airtel Lapangan Terbang Antarabangsa Subang, Selangor	7.63	0.7525	0.7641	Hotel
4.	Fima Metal Box Malaysia Bhd No. 1 Jalan 221 Federal Highway P.O. Box 6 Petaling Jaya, Selangor	29.69	0.7375	0.7491	Can Manufacturing
5.	Perusahaan Outomobil Nasional Kawasan Perusahaan HICOM Batu 3 Locked Bag No. 12 Post Office 40990 Shah Alam, Selangor	72.11	0.7009	0.7009	Car Manufacturing
6.	Goh Ban Huat 238 Jalan Segambut P.O. Box 290 51200 Kuala Lumpur	183.64	0.7083	0.6816	Ceramic
7.	Shangrila Hotel 11 Jalan Sultan Ismail 50250 Kuala Lumpur	70.46	0.6994	0.6634	Hotel
8.	Malaysian Sheet Glass 13th Mile Sungai Buloh Selangor	35.63	0.6995	0.7631	Glass
9.	Federal Malay Supplier 39-A Jalan Dariki Islamic City Off Jalan Pahang, Kuala Lumpur	1.95	0.7511	0.7363	Catering
10.	Rahim & Co Chartered Suveyours Sdn Bhd P.O. Box 11214 50738 Kuala Lumpur	2.24	0.7088	0.6877	Catering
11.	Saujana Golf & Country club Batu 3 Jalan Lapangan Terbang Peti Surat 610, 47200 Subang	-	0.7301	0.7085	Recreational
12.	Watta Battery Industries Sdn Bhd Lot 6 Jalan Satu Kawasan Perusahaan Balakong Cheras Jaya Batu 9, 43200 Cheras	-	0.7301	0.7085	Battery
13.	Century Batteries (M) Bhd 7 Jalan Kemajuan P.O. Box 1059 Jalan Semangat 46860 Petaling Jaya	-	0.7301	0.7085	Battery

Table I.88 LPG PRICE (PRESENT) AT KUALA LUMPUR

	Import		Reticulation 2/		Cylinder	Bulk
	1986,5.1 1/ M. Sen/kg	1986,6.1 2/ M. Sen/kg	Purchase Price (Delivered) M. Sen/kg	Sales Price 1986. 5 M$/m^3	1986,6.1 M. Sen/kg	1986,6.1 M. Sen/kg
F.O.B.	81.27 3/	36.98			36.98	36.98
PRO. Cost	43.85		41.68 4/			
Dis/Trans. Cost Freight/Insurance/Loss	9.25	7.42	10.00 5/		9.25	9.25
Marketing Cost	14.38				14.38	
Dealer's Com.	21.42				21.42	
Company Profit	9.00				9.00	9.00
Duty	15.93	15.93	15.93		15.93	15.93
Delivered Price	113.83		57.16	2.58 5/6/	106.96	71.16
C.I.F.		44.40				
US$/MMBTU 7/	9.27	3.62	4.66		8.71	5.80

Source: 1/ Automatic Pricing Mechanism (APM) W.E.F. Jun. 1, '86
2/ PETRONAS

Notes: 3/ 0.360 US$/AG x 2.6 M$/US$ x 42 USG/Barrel/ 158.99 liter/barrel/0.552 = 0.448 M$/kg
4/ Ex. depot cost at Kerteh
5/ Transportation from Kerteh to K.Lumpur
6/ 2.58 M$/m^3 / 0.552 = 4.674 M$/T
7/ LPG (C_3 : 30%, C_4 : 70%) 47.23 MMBTU/TON 2.6 M$ = US$

Table I.89 FUEL OIL (180 CST) PRICE (PRESENT)

	1986, 6.1 [1]			1986, 8 [2]
	M$/liter	M$/T [3]	US$/T [4]	US$/T
F.O.B.	0.1466	154.32	59.35	54.0952
Insurance/Freight/Loss	0.0169	17.79	6.84	4.1767 [5]
C.I.F.	0.1635	172.11	66.19	58.2719
Gross Margin		21.15	8.14	5.8272
Duty		16.74	6.44	6.44
Delivered Price				
excl. Duty		193.26	74.33	64.10
incl. Duty		210.00	80.77	70.54
US$/MMBTU [6]			1.97	1.72

Source: 1/ PETRONAS
2/ PETRONAS by Telex

Notes: 3/ S.g of Fuel Oil = 0.95
4/ US$ = 2.6 M$
5/ 3.8000(Freight) + 0.0868(Insurance) + 0.2899(Ocean loss)
= 4.1767
6/ M. Fuel Oil High Heating Value 41.03 MMBTU/TON

Table I.90 RETAIL PRICE OF SELECTED PETROLEUM PRODUCTS AND LPG IN KUALA LUMPUR, 1986

Products	Unit	FOB Singapore (A)	Ocean Freight	Distribt'n/ Transpot'n (B) *2	Marketing (C)	(D)= (B+C)	Dealer's Commission (E)	Company's Profit (F)	(G)= (E+F)	(H)= (D+G)	Duty (I)	Retail Price (A+H+I)
June 1, 1986												
Fuel Oil	MSen/lit.	14.66	1.69						2.01	3.70	1.59 *3	19.95
	US$/kl	56.38	6.50						7.73	14.23	6.11	76.72
LPG/Cylinder	MSen/kg	36.98	7.42	9.25	14.38	23.63	21.42	9.0	30.42	54.05	15.93	106.96
	US$/ton	142.23	28.54	35.58	55.31	90.88	82.38	34.62	117.00	207.88	61.27	411.38
LPG/Bulk	MSen/kg	36.98	7.42	9.25		9.25		9.0	9.00	18.25	15.93	71.16
	US$/ton	142.23	28.54	35.58		35.58		34.62	34.62	70.19	61.27	273.69
May 1, 1986												
Kerosene	MSen/lit.	32.94	1.49 *1	2.13	3.17	5.30	3.73	1.11	4.84	10.14	9.40 *1	52.48
	US$/kl	126.69	5.73	8.19	12.19	20.38	14.35	4.27	18.62	39.00	36.15	201.84
Diesel Oil	MSen/lit.	28.90	1.57 *1	2.13	3.17	5.30	2.24	1.30	3.54	8.84	7.89 *1	45.63
	US$/kl	111.15	6.04	8.19	12.19	20.38	8.62	5.00	13.62	34.00	30.35	175.50

Source: PETRONAS

Notes: 1. Exchange rate: M$2.6/US$
*1 Effective date: June 1, 1986
*2 "Distribution/Transportation (B)" includes "Ocean Freight"
*3 Duty: 16.73 M$/ton (s.g.=0.95)

Table I.91 PROJECTED PRICE STRUCTURE OF PETRO-PRODUCTS, KUALA LUMPUR
(1) FUEL OIL

(Unit: US$/kl)

Year	FOB Singapore		Dealer's Commission & Company's Profit	Sub-total (Price excl. Duty)		Duty	Retail Price		
	US$/kl	MSen/lit		US$/kl	US$/MMBtu		US$/kl	MSen/lit	US$/MMBtu
1985	182.39								
1986*1	56.38	14.66	14.23	70.61	1.81	6.11	76.72	19.95	1.97
1990	152.18	40.33	15.25	167.43	4.30	6.55	173.98	46.10	4.46
1991	166.33	44.08	15.79	182.12	4.67	6.78	188.90	50.06	4.85
1992	182.41	48.34	16.34	198.75	5.10	7.02	205.77	54.53	5.28
1993	199.62	52.90	16.91	216.53	5.56	7.26	223.79	59.30	5.74
1994	218.15	57.81	17.50	235.65	6.05	7.52	243.17	64.44	6.24
1995	238.97	63.33	18.12	257.09	6.60	7.78	264.87	70.19	6.80
1996	255.53	67.72	18.75	274.28	7.04	8.05	282.33	74.82	7.24
1997	273.11	72.37	19.41	292.52	7.50	8.33	300.85	79.73	7.72
1998	291.82	77.33	20.09	311.91	8.00	8.62	320.53	84.94	8.22
1999	312.87	82.91	20.79	333.66	8.56	8.93	342.59	90.79	8.79
2000	334.17	88.56	21.52	355.69	9.13	9.24	364.93	96.71	9.36
2001	357.98	94.86	22.27	380.25	9.76	9.56	389.81	103.30	10.00
2002	382.16	101.27	23.05	405.21	10.40	9.90	415.11	110.00	10.65
2003	409.21	108.44	23.86	433.07	11.11	10.24	443.31	117.48	11.37
2004	438.00	116.07	24.69	462.69	11.87	10.60	473.29	125.42	12.14
2005	468.65	124.19	25.56	494.21	12.68	10.97	505.18	133.87	12.96
2006	501.34	132.86	26.45	527.79	13.54	11.36	539.15	142.87	13.83
2007	536.14	142.08	27.38	563.52	14.46	11.76	575.28	152.45	14.76
2008	574.89	152.35	28.33	603.22	15.48	12.17	615.39	163.08	15.79
2009	614.35	162.80	29.33	643.68	16.51	12.59	656.27	173.91	16.84
2010	657.31	174.19	30.35	687.66	17.64	13.03	700.69	185.68	17.98
2011	703.07	186.31	31.42	734.49	18.84	13.49	747.98	198.21	19.19
2012	752.87	199.51	32.52	785.39	20.15	13.96	799.35	211.83	20.51
2013	805.89	213.56	33.65	839.54	21.54	14.45	853.99	226.31	21.91
2014	862.27	228.50	34.83	897.10	23.02	14.96	912.06	241.70	23.40
2015	922.38	244.43	36.05	958.43	24.59	15.48	973.91	258.09	24.99
2016	988.90	262.06	37.31	1026.21	26.33	16.02	1042.23	276.19	26.74
2017	1057.10	280.13	38.62	1095.72	28.11	16.58	1112.30	294.76	28.54
2018	1132.51	300.12	39.97	1172.48	30.08	17.16	1189.64	315.25	30.52
2019	1212.83	321.40	41.37	1254.20	32.18	17.76	1271.96	337.07	32.63
2020	1298.36	344.07	42.82	1341.18	34.41	18.38	1359.56	360.28	34.88
2021	1389.42	368.20	44.32	1433.74	36.78	19.03	1452.77	384.98	37.27
2022	1486.35	393.88	45.87	1532.22	39.31	19.69	1551.91	411.26	39.81
2023	1589.53	421.23	47.47	1637.00	42.00	20.38	1657.38	439.21	42.52
2024	1703.20	451.35	49.13	1752.33	44.96	21.10	1773.43	469.96	45.50
2025	1824.25	483.43	50.85	1875.10	48.11	21.83	1896.93	502.69	48.67
2026	1953.09	517.57	52.63	2005.72	51.46	22.60	2028.32	537.50	52.04
2027	2090.34	553.94	54.47	2144.81	55.03	23.39	2168.20	574.57	55.63
2028	2236.46	592.66	56.38	2292.84	58.82	24.21	2317.05	614.02	59.44

Sources: Tables I.77 and I.90
Notes: 1. Exchange rates in 1990 through 2028: M$2.65/US$
2. Heat value: 41.03 MMBtu/ton = 38.9785 MMBtu/kl (s.g.=0.95)
*1 On June 1, 1986

Table I.91 PROJECTED PRICE STRUCTURE OF PETRO-PRODUCTS, KUALA LUMPUR
(2) LPG/CYLINDER

(Unit: US$/ton)

Year	FOB Singapore		Distribut'n Transport'n & Marketing	Sub-total	Dealer's Commision & Company's Profit	Sub-total	Duty	Retail Price		
	US$/ton	MSen/kg						US$/ton	MSen/kg	US$/MMBtu
1985	312.59									
1986*1	142.23	36.98	90.88	233.11	117.00	350.11	61.27	411.38	106.96	8.71
1990	314.21	83.27	97.42	411.63	125.42	537.05	65.68	602.73	159.72	12.76
1991	338.80	89.78	100.83	439.63	129.81	569.44	67.98	637.42	168.92	13.50
1992	366.73	97.18	104.36	471.09	134.35	605.44	70.36	675.80	179.09	14.31
1993	396.64	105.11	108.01	504.65	139.05	643.70	72.82	716.52	189.88	15.17
1994	428.83	113.64	111.79	540.62	143.92	684.54	75.37	759.91	201.38	16.09
1995	465.00	123.23	115.71	580.71	148.96	729.67	78.01	807.68	214.04	17.10
1996	493.76	130.85	119.75	613.51	154.17	767.68	80.74	848.42	224.83	17.96
1997	524.30	138.94	123.95	648.25	159.58	807.83	83.57	891.40	236.22	18.87
1998	556.81	147.55	128.29	685.10	165.16	850.26	86.49	936.75	248.24	19.83
1999	593.39	157.25	132.78	726.17	170.94	897.11	89.52	986.63	261.46	20.89
2000	630.39	167.05	137.42	767.81	176.92	944.73	92.65	1037.38	274.91	21.96
2001	671.76	178.02	142.24	814.00	183.12	997.12	95.89	1093.01	289.65	23.14
2002	713.76	189.15	147.21	860.97	189.52	1050.49	99.25	1149.74	304.68	24.34
2003	760.75	201.60	152.36	913.11	196.15	1109.26	102.72	1211.98	321.17	25.66
2004	810.77	214.85	157.69	968.46	203.02	1171.48	106.32	1277.80	338.62	27.05
2005	864.02	228.97	163.22	1027.24	210.13	1237.37	110.04	1347.41	357.06	28.53
2006	920.82	244.02	168.93	1089.75	217.48	1307.23	113.89	1421.12	376.60	30.09
2007	981.28	260.04	174.84	1156.12	225.10	1381.22	117.88	1499.10	397.26	31.74
2008	1048.59	277.88	180.96	1229.55	232.97	1462.52	122.00	1584.52	419.90	33.55
2009	1117.15	296.04	187.29	1304.44	241.13	1545.57	126.27	1671.84	443.04	35.40
2010	1191.78	315.82	193.85	1385.63	249.56	1635.19	130.69	1765.88	467.96	37.39
2011	1271.29	336.89	200.64	1471.93	258.30	1730.23	135.27	1865.50	494.36	39.50
2012	1357.80	359.82	207.66	1565.46	267.35	1832.81	140.00	1972.81	522.79	41.77
2013	1449.92	384.23	214.92	1664.84	276.69	1941.53	144.90	2086.43	552.90	44.18
2014	1547.87	410.19	222.45	1770.32	286.38	2056.70	149.97	2206.67	584.77	46.72
2015	1652.30	437.86	230.24	1882.54	296.41	2178.95	155.22	2334.17	618.56	49.42
2016	1767.87	468.49	238.29	2006.16	306.77	2312.93	160.65	2473.58	655.50	52.37
2017	1886.35	499.88	246.63	2132.98	317.51	2450.49	166.27	2616.76	693.44	55.40
2018	2017.35	534.60	255.26	2272.61	328.63	2601.24	172.10	2773.34	734.94	58.72
2019	2156.89	571.58	264.20	2421.09	340.13	2761.22	178.12	2939.34	778.93	62.23
2020	2305.50	610.96	273.44	2578.94	352.03	2930.97	184.35	3115.32	825.56	65.96
2021	2463.69	652.88	283.02	2746.71	364.36	3111.07	190.81	3301.88	875.00	69.91
2022	2632.10	697.51	292.92	2925.02	377.11	3302.13	197.49	3499.62	927.40	74.10
2023	2811.35	745.01	303.18	3114.53	390.31	3504.84	204.40	3709.24	982.95	78.54
2024	3008.83	797.34	313.78	3322.61	403.97	3726.58	211.55	3938.13	1043.60	83.38
2025	3219.13	853.07	324.77	3543.90	418.11	3962.01	218.95	4180.96	1107.95	88.52
2026	3442.97	912.39	336.13	3779.10	432.74	4211.84	226.61	4438.45	1176.19	93.98
2027	3681.41	975.57	347.90	4029.31	447.89	4477.20	234.55	4711.75	1248.61	99.76
2028	3935.27	1042.85	360.08	4295.35	463.57	4758.92	242.76	5001.68	1325.45	105.90

Sources: Tables I.77 and I.90
Notes: 1. Exchange rates in 1990 through 2028: M$2.65/US$
2. Heat value: 47.23 MMBtu/ton
*1 On June 1, 1986

Table I.91 PROJECTED PRICE STRUCTURE OF PETRO-PRODUCTS, KUALA LUMPUR
(3) LPG/BULK

(Unit: US$/ton)

Year	FOB Singapore		Handling Cost & Dealer's Commission	Sub-total	Duty	Retail Price		
	US$/ton	MSen/kg				US$/ton	MSen/kg	US$/MMBtu
1985	312.59							
1986*1	142.23	36.98	70.19	212.42	61.27	273.69	71.16	5.80
1990	314.21	83.27	75.24	389.45	65.68	455.13	120.61	9.64
1991	338.80	89.78	77.88	416.68	67.98	484.66	128.43	10.26
1992	366.73	97.18	80.60	447.33	70.36	517.69	137.19	10.96
1993	396.64	105.11	83.42	480.06	72.82	552.88	146.51	11.71
1994	428.83	113.64	86.34	515.17	75.37	590.54	156.49	12.50
1995	465.00	123.23	89.37	554.37	78.01	632.38	167.58	13.39
1996	493.76	130.85	92.49	586.25	80.74	666.99	176.75	14.12
1997	524.30	138.94	95.73	620.03	83.57	703.60	186.45	14.90
1998	556.81	147.55	99.08	655.89	86.49	742.38	196.73	15.72
1999	593.39	157.25	102.55	695.94	89.52	785.46	208.15	16.63
2000	630.39	167.05	106.13	736.52	92.65	829.17	219.73	17.56
2001	671.76	178.02	109.85	781.61	95.89	877.50	232.54	18.58
2002	713.76	189.15	113.69	827.45	99.25	926.70	245.58	19.62
2003	760.75	201.60	117.67	878.42	102.72	981.14	260.00	20.77
2004	810.77	214.85	121.79	932.56	106.32	1038.88	275.30	22.00
2005	864.02	228.97	126.06	990.08	110.04	1100.12	291.53	23.29
2006	920.82	244.02	130.47	1051.29	113.89	1165.18	308.77	24.67
2007	981.28	260.04	135.04	1116.32	117.88	1234.20	327.06	26.13
2008	1048.59	277.88	139.76	1188.35	122.00	1310.35	347.24	27.74
2009	1117.15	296.04	144.65	1261.80	126.27	1388.07	367.84	29.39
2010	1191.78	315.82	149.72	1341.50	130.69	1472.19	390.13	31.17
2011	1271.29	336.89	154.96	1426.25	135.27	1561.52	413.80	33.06
2012	1357.80	359.82	160.38	1518.18	140.00	1658.18	439.42	35.11
2013	1449.92	384.23	165.99	1615.91	144.90	1760.81	466.61	37.28
2014	1547.87	410.19	171.80	1719.67	149.97	1869.64	495.45	39.59
2015	1652.30	437.86	177.82	1830.12	155.22	1985.34	526.12	42.04
2016	1767.87	468.49	184.04	1951.91	160.65	2112.56	559.83	44.73
2017	1886.35	499.88	190.48	2076.83	166.27	2243.10	594.42	47.49
2018	2017.35	534.60	197.15	2214.50	172.10	2386.60	632.45	50.53
2019	2156.89	571.58	204.05	2360.94	178.12	2539.06	672.85	53.76
2020	2305.50	610.96	211.19	2516.69	184.35	2701.04	715.78	57.19
2021	2463.69	652.88	218.59	2682.28	190.81	2873.09	761.37	60.83
2022	2632.10	697.51	226.24	2858.34	197.49	3055.83	809.79	64.70
2023	2811.35	745.01	234.15	3045.50	204.40	3249.90	861.22	68.81
2024	3008.83	797.34	242.35	3251.18	211.55	3462.73	917.62	73.32
2025	3219.13	853.07	250.83	3469.96	218.95	3688.91	977.56	78.11
2026	3442.97	912.39	259.60	3702.57	226.61	3929.18	1041.23	83.19
2027	3681.41	975.57	268.69	3950.10	234.55	4184.65	1108.93	88.60
2028	3935.27	1042.85	278.10	4213.37	242.76	4456.13	1180.87	94.35

Sources: Tables I.77 and I.90
Notes: 1. Exchange rates in 1990 through 2028: M$2.65/US$
2. Heat value: 47.23 MMBtu/ton
*1 On June 1, 1986

Table 1.91 PROJECTED PRICE STRUCTURE OF PETRO-PRODUCTS, KUALA LUMPUR
(4) KEROSENE

(Unit: US$/kl)

Year	FOB Singapore		Distribut'n Transport'n & Marketing	Sub-total	Dealer's Commision & Company's Profit	Sub-total	Duty	Retail Price		
	US$/kl	MSen/lit						US$/kl	MSen/lit	US$/MMBtu
1985	217.23									
1986*1	126.69	32.94	20.38	147.07	18.62	165.69	36.15	201.84	52.48	5.48
1990	198.08	52.49	21.85	219.93	19.96	239.89	38.75	278.64	73.84	7.57
1991	216.30	57.32	22.61	238.91	20.66	259.57	40.11	299.68	79.42	8.14
1992	236.99	62.80	23.40	260.39	21.38	281.77	41.51	323.28	85.67	8.78
1993	259.15	68.67	24.22	283.37	22.13	305.50	42.96	348.46	92.34	9.46
1994	283.00	75.00	25.07	308.07	22.90	330.97	44.47	375.44	99.49	10.20
1995	309.79	82.09	25.95	335.74	23.71	359.45	46.03	405.48	107.45	11.01
1996	331.10	87.74	26.85	357.95	24.54	382.49	47.63	430.12	113.98	11.68
1997	353.72	93.74	27.80	381.52	25.40	406.92	49.30	456.22	120.90	12.39
1998	377.80	100.12	28.77	406.57	26.28	432.85	51.03	483.88	128.23	13.14
1999	404.90	107.30	29.78	434.68	27.20	461.88	52.82	514.70	136.40	13.98
2000	432.31	114.56	30.82	463.13	28.16	491.29	54.66	545.95	144.68	14.83
2001	462.96	122.68	31.90	494.86	29.14	524.00	56.58	580.58	153.85	15.77
2002	494.08	130.93	33.01	527.09	30.16	557.25	58.56	615.81	163.19	16.72
2003	528.89	140.16	34.17	563.06	31.22	594.28	60.61	654.89	173.55	17.78
2004	565.94	149.97	35.36	601.30	32.31	633.61	62.73	696.34	184.53	18.91
2005	605.39	160.43	36.60	641.99	33.44	675.43	64.93	740.36	196.20	20.10
2006	647.47	171.58	37.88	685.35	34.61	719.96	67.20	787.16	208.60	21.38
2007	692.26	183.45	39.21	731.47	35.82	767.29	69.55	836.84	221.76	22.72
2008	742.13	196.66	40.58	782.71	37.08	819.79	71.98	891.77	236.32	24.22
2009	792.92	210.12	42.00	834.92	38.37	873.29	74.50	947.79	251.16	25.74
2010	848.20	224.77	43.47	891.67	39.72	931.39	77.11	1008.50	267.25	27.39
2011	907.11	240.38	44.99	952.10	41.11	993.21	79.81	1073.02	284.35	29.14
2012	971.19	257.37	46.57	1017.76	42.55	1060.31	82.60	1142.91	302.87	31.04
2013	1039.44	275.45	48.20	1087.64	44.03	1131.67	85.49	1217.16	322.55	33.05
2014	1112.00	294.68	49.88	1161.88	45.58	1207.46	88.48	1295.94	343.42	35.19
2015	1189.37	315.18	51.63	1241.00	47.17	1288.17	91.58	1379.75	365.63	37.47
2016	1274.98	337.87	53.44	1328.42	48.82	1377.24	94.79	1472.03	390.09	39.97
2017	1362.75	361.13	55.31	1418.06	50.53	1468.59	98.10	1566.69	415.17	42.54
2018	1459.81	386.85	57.24	1517.05	52.30	1569.35	101.54	1670.89	442.79	45.37
2019	1563.18	414.24	59.25	1622.43	54.13	1676.56	105.09	1781.65	472.14	48.38
2020	1673.27	443.42	61.32	1734.59	56.02	1790.61	108.77	1899.38	503.34	51.58
2021	1790.46	474.47	63.47	1853.93	57.99	1911.92	112.58	2024.50	536.49	54.98
2022	1915.22	507.53	65.69	1980.91	60.02	2040.93	116.52	2157.45	571.72	58.59
2023	2048.01	542.72	67.99	2116.00	62.12	2178.12	120.60	2298.72	609.16	62.42
2024	2194.31	581.49	70.37	2264.68	64.29	2328.97	124.82	2453.79	650.25	66.63
2025	2350.11	622.78	72.83	2422.94	66.54	2489.48	129.19	2618.67	693.95	71.11
2026	2515.94	666.72	75.38	2591.32	68.87	2660.19	133.70	2793.89	740.38	75.87
2027	2692.58	713.53	78.02	2770.60	71.28	2841.88	138.39	2980.27	789.77	80.93
2028	2880.64	763.37	80.75	2961.39	73.77	3035.16	143.23	3178.39	842.27	86.31

Sources: Tables 1.77 and 1.90
Notes: 1. Exchange rates in 1990 through 2028: M$2.65/US$
2. Heat value: 9,280 kcal/lit. = 36.825 MMBtu/kl
*1 On May 1, 1986

Table 1.91 PROJECTED PRICE STRUCTURE OF PETRO-PRODUCTS, KUALA LUMPUR
(5) DIESEL OIL

(Unit: US$/kl)

Year	FOB Singapore		Distribut'n Transport'n & Marketing	Sub-total	Dealer's Commision & Company's Profit	Sub-total	Duty	Retail Price		
	US$/kl	MSen/lit						US$/kl	MSen/lit	US$/MMBtu
1985	208.39									
1986*1	111.15	28.90	20.38	131.53	13.62	145.15	30.35	175.50	45.63	4.72
1990	189.87	50.32	21.85	211.72	14.60	226.32	32.54	258.86	68.60	6.96
1991	207.36	54.95	22.61	229.97	15.11	245.08	33.67	278.75	73.87	7.50
1992	227.23	60.22	23.40	250.63	15.64	266.27	34.85	301.12	79.80	8.10
1993	248.50	65.85	24.22	272.72	16.19	288.91	36.07	324.98	86.12	8.74
1994	271.40	71.92	25.07	296.47	16.75	313.22	37.33	350.55	92.90	9.43
1995	297.12	78.74	25.95	323.07	17.34	340.41	38.64	379.05	100.45	10.19
1996	317.58	84.16	26.85	344.43	17.95	362.38	39.99	402.37	106.63	10.82
1997	339.30	89.91	27.80	367.10	18.58	385.68	41.39	427.07	113.17	11.48
1998	362.42	96.04	28.77	391.19	19.23	410.42	42.84	453.26	120.11	12.19
1999	388.44	102.94	29.78	418.22	19.90	438.12	44.34	482.46	127.85	12.97
2000	414.75	109.91	30.82	445.57	20.59	466.16	45.89	512.05	135.69	13.77
2001	444.18	117.71	31.90	476.08	21.32	497.40	47.50	544.90	144.40	14.65
2002	474.05	125.62	33.01	507.06	22.06	529.12	49.16	578.28	153.24	15.55
2003	507.47	134.48	34.17	541.64	22.83	564.47	50.88	615.35	163.07	16.55
2004	543.05	143.91	35.36	578.41	23.63	602.04	52.66	654.70	173.50	17.61
2005	580.92	153.94	36.60	617.52	24.46	641.98	54.51	696.49	184.57	18.73
2006	621.32	164.65	37.88	659.20	25.32	684.52	56.41	740.93	196.35	19.92
2007	664.32	176.04	39.21	703.53	26.20	729.73	58.39	788.12	208.85	21.19
2008	712.20	188.73	40.58	752.78	27.12	779.90	60.43	840.33	222.69	22.60
2009	760.97	201.66	42.00	802.97	28.07	831.04	62.55	893.59	236.80	24.03
2010	814.04	215.72	43.47	857.51	29.05	886.56	64.74	951.30	252.09	25.58
2011	870.59	230.71	44.99	915.58	30.07	945.65	67.00	1012.65	268.35	27.23
2012	932.12	247.01	46.57	978.69	31.12	1009.81	69.35	1079.16	285.98	29.02
2013	997.64	264.37	48.20	1045.84	32.21	1078.05	71.77	1149.82	304.70	30.92
2014	1067.31	282.84	49.88	1117.19	33.34	1150.53	74.29	1224.82	324.58	32.94
2015	1141.59	302.52	51.63	1193.22	34.50	1227.72	76.89	1304.61	345.72	35.08
2016	1223.78	324.30	53.44	1277.22	35.71	1312.93	79.58	1392.51	369.02	37.45
2017	1308.05	346.63	55.31	1363.36	36.96	1400.32	82.36	1482.68	392.91	39.87
2018	1401.23	371.33	57.24	1458.47	38.26	1496.73	85.25	1581.98	419.22	42.54
2019	1500.48	397.63	59.25	1559.73	39.59	1599.32	88.23	1687.55	447.20	45.38
2020	1606.17	425.64	61.32	1667.49	40.98	1708.47	91.32	1799.79	476.94	48.40
2021	1718.69	455.45	63.47	1782.16	42.42	1824.58	94.52	1919.10	508.56	51.61
2022	1838.46	487.19	65.69	1904.15	43.90	1948.05	97.82	2045.87	542.16	55.02
2023	1965.96	520.98	67.99	2033.95	45.44	2079.39	101.25	2180.64	577.87	58.64
2024	2106.41	558.20	70.37	2176.78	47.03	2223.81	104.79	2328.60	617.08	62.62
2025	2255.99	597.84	72.83	2328.82	48.67	2377.49	108.46	2485.95	658.78	66.85
2026	2415.20	640.03	75.38	2490.58	50.37	2540.95	112.25	2653.20	703.10	71.35
2027	2584.79	684.97	78.02	2662.81	52.14	2714.95	116.18	2831.13	750.25	76.13
2028	2765.35	732.82	80.75	2846.10	53.96	2900.06	120.25	3020.31	800.38	81.22

Sources: Tables I.77 and I.90
Notes: 1. Exchange rates in 1990 through 2028: M$2.65/US$
2. Heat value: 9,371 kcal/lit. = 37.187 MMBtu/kl
*1 On May 1, 1986

Table I.92 MAIN PURPOSE OF NATURAL GAS
BY PENINSULA GAS PIPELINE

Project	Capacity	Estimated gas demand
(1) Terengganu Area		
Paka Power Plant	900 MW	140 mm scfd
Perwaja Steel Mill	600,000 TPY	20 mm scfd
Industrial Estate		92 mm scfd
Ethylene Plant	105,000 TPY	
Propylene Plant	50,000 TPY	
MTBE	300,000 TPY	
(methanol for MTBE will be delivered from Labuan)		
(2) East Side of Peninsula		
Port Dikson Power Plant	500 MW	110 mm scfd
Connaught Power Plant	180 MW	35 mm scfd
Port Klang Power Plant I	600 MW	113 mm scfd
Port Klang Power Plant II	600 MW	113 mm scfd
Port Klang Industry use		30 mm scfd
(3) Southern Area		
Singapore (export)		150 mm scfd
Johor Bahru Industry use		61 mm scfd
Pasir Gudang Power Plant		55 mm scfd

Table I.93 DISTRIBUTION PLAN OF NATURAL GAS

1st stage:	Utilization in Terengganu state consists of a) gas processing plant (Nominal Cap. 7 million Nm3/d) b) Methane and ethane components are delivered to Paka power station (900 MW), Perwaja steel mill and Kerteh city gas net works c) LPG separated in gas processing plant is delivered to port for export.
2nd stage:	Peninsular cross pipeline plan 240 km pipeline from Kerteh to Segamat with 36 inch diameter and 200 km blanched pipeline from Segamat to Johor Bahru (South) with 30 inch pipeline and another 230 km blanched pipeline to Port klang (North)
3rd stage:	Pipeline from Port Klang to Prai is under studying.

Table I.94 CAPITAL AND DEMAND OF PENINSULA GAS PIPILINE

Natural Gas Reserve	:	28 TCF
Expected max. volume of N.G. per year	:	733 MMSCFD
Expected demand in East Coast	:	167
Expected demand in West Coast	:	416
Expected demand to Singapore	:	150
Pipe capacity	:	1,000

Table I.95 SALES GAS COMPOSITION FROM PENINSULAR GAS PIPELINE

(1) Sales Gas composition (Mol. %)

Nitrogen	0.49
Methane	83.46
Ethane	7.86
Propane	2.63
i Butane	0.43
n Butane	0.37
i Pentane	0.07
n Pentane	0.03
Carbon Dioxide	4.66
Hydrogen Sulphide	4 ppmv
Mol. ut.	19.6

(2) Calorific Value:

1050 BTU/SCF $\pm$ 10%

(3) Gas Pressure (Subang Jaya)

YEAR	FLOW	PRESSURE
1989 - 1990	200 MMSCF/D	470 PSIG
1990 - 2005	332 MMSCF/D	700 PSIG

Table I.96 PROJECTED NATURAL GAS PRICE IN 1986 PRICES/LOW FUEL SCENARIO (1990-2028)

	Real-term *1	Annual Ave. Escalation Rate	Real-term *1		Escalation Factor	Current-term	
	M$/MMBtu	of Crude Price	US$/MMBtu	US$/Ncu.m-NG	*3	US$/MMBtu	US$/Ncu.m-NG
1985					1.0000		
1986					1.0000		
1987					1.0500		
1988					1.1025		
1989					1.1576		
1990	3.50*2		1.32	0.0517	1.2155	1.60	0.0627
1991	3.58		1.35	0.0529	1.2763	1.72	0.0674
1992	3.65		1.38	0.0541	1.3401	1.85	0.0725
1993	3.73		1.41	0.0553	1.4071	1.98	0.0776
1994	3.82	(1990-1995)	1.44	0.0564	1.4775	2.13	0.0835
1995	3.90*2	2.188%	1.47	0.0576	1.5513	2.28	0.0893
1996	4.00		1.51	0.0592	1.6289	2.46	0.0964
1997	4.09		1.54	0.0603	1.7103	2.63	0.1031
1998	4.19		1.58	0.0619	1.7959	2.84	0.1113
1999	4.30	(1995-2000)	1.62	0.0635	1.8856	3.05	0.1195
2000	4.40*2	2.442%	1.66	0.0651	1.9799	3.29	0.1289
2001	4.55		1.72	0.0674	2.0789	3.58	0.1403
2002	4.70		1.77	0.0694	2.1829	3.86	0.1513
2003	4.86		1.83	0.0717	2.2920	4.19	0.1642
2004	5.03	(2000-2005)	1.90	0.0745	2.4066	4.57	0.1791
2005	5.20*2	3.398%	1.96	0.0768	2.5270	4.95	0.1940
2006	5.42		2.05	0.0803	2.6533	5.44	0.2132
2007	5.65		2.13	0.0835	2.7860	5.93	0.2324
2008	5.89		2.22	0.0870	2.9253	6.49	0.2543
2009	6.14	(2005-2010)	2.32	0.0909	3.0715	7.13	0.2794
2010	6.40*2	4.240%	2.42	0.0948	3.2251	7.80	0.3057
2011	6.55		2.47	0.0968	3.3864	8.36	0.3276
2012	6.71		2.53	0.0991	3.5557	9.00	0.3527
2013	6.87		2.59	0.1015	3.7335	9.67	0.3789
2014	7.03	(2010-2028)	2.65	0.1038	3.9201	10.39	0.4072
2015	7.20*2	2.384%	2.72	0.1066	4.1161	11.20	0.4389
2016	7.37		2.78	0.1089	4.3219	12.01	0.4706
2017	7.55		2.85	0.1117	4.5380	12.93	0.5067
2018	7.73		2.92	0.1144	4.7649	13.91	0.5451
2019	7.91		2.98	0.1168	5.0032	14.91	0.5843
2020	8.10		3.06	0.1199	5.2533	16.08	0.6301
2021	8.29		3.13	0.1227	5.5160	17.27	0.6768
2022	8.49		3.20	0.1254	5.7918	18.53	0.7262
2023	8.69		3.28	0.1285	6.0814	19.95	0.7818
2024	8.90		3.36	0.1317	6.3855	21.46	0.8410
2025	9.11		3.44	0.1348	6.7048	23.06	0.9037
2026	9.33		3.52	0.1379	7.0400	24.78	0.9711
2027	9.55		3.60	0.1411	7.3920	26.61	1.0428
2028	9.78		3.69	0.1446	7.7616	28.64	1.1223

Notes: *1 In 1986 prices
*2 Prices given by EPU/Low scenario
*3 Inflaction factor: 1985/1986 0.0 %
After 1986 5.0% p.a.

Table 1.97 PROJECTED SELLING PRICES OF LPG (1990-2028) (1) CURRENT-TERM

(Unit: US$/ton)

Year	FOB Kerteh *1		Local Transportation	Sub-total (for Reticulation) *2	Company's Profit	Sub-total (Price for LPG/Bulk)			Marketing Cost	Dealer's Commission	Dealer's Selling Price (Price for LPG/Cylinder)			
	US$/ton	MSen/kg		(US$/cu.m)		US$/ton	US$/MMBtu	*2 US$/cu.m			US$/ton	MSen/kg	US$/MMBtu	*2 US$/cu.m
1986	139.5	36.97	37.74	0.147	33.96	211.20	4.47	0.175	54.26	80.83	346.29	91.77	7.33	0.287
1990	181.5	48.10	40.5	0.184	36.4	258.4	5.47	0.214	58.2	86.6	403.2	106.85	8.54	0.335
1991	194.7	51.60	41.9	0.196	37.7	274.3	5.81	0.228	60.2	89.7	424.2	112.41	8.98	0.352
1992	208.8	55.12	43.3	0.209	39.0	290.3	6.15	0.241	62.3	92.8	445.4	118.03	9.43	0.370
1993	223.4	59.20	44.9	0.223	40.4	308.7	6.54	0.256	64.5	96.1	469.3	124.36	9.94	0.390
1994	238.9	63.31	46.4	0.237	41.8	327.1	6.93	0.272	66.7	99.4	493.2	130.70	10.44	0.409
1995	256.6	68.00	48.1	0.253	43.2	347.9	7.37	0.289	69.1	102.9	519.9	137.77	11.01	0.431
1996	274.1	72.64	49.7	0.269	44.7	368.5	7.80	0.306	71.5	106.5	546.5	144.82	11.57	0.453
1997	293.6	77.80	51.5	0.286	46.3	391.4	8.29	0.325	74.0	110.2	575.6	152.53	12.19	0.478
1998	314.2	83.26	53.3	0.305	47.9	415.4	8.80	0.345	76.6	114.1	606.1	160.62	12.83	0.503
1999	336.9	89.28	55.1	0.325	49.6	441.6	9.35	0.366	79.3	118.1	639.0	169.34	13.53	0.530
2000	360.8	95.61	57.1	0.347	51.4	469.3	9.94	0.390	82.0	122.2	673.5	178.48	14.26	0.559
2001	386.7	102.48	59.1	0.370	53.2	499.0	10.57	0.414	84.9	126.5	710.4	188.26	15.04	0.589
2002	415.9	110.21	61.1	0.396	55.0	532.0	11.26	0.441	87.9	130.9	750.8	198.96	15.90	0.623
2003	446.1	118.22	63.3	0.423	56.9	566.3	11.99	0.470	91.0	135.5	792.8	210.09	16.79	0.658
2004	478.5	126.80	65.5	0.451	58.9	602.9	12.77	0.500	94.2	140.3	837.4	221.91	17.73	0.695
2005	513.0	135.95	67.8	0.482	61.0	641.8	13.59	0.533	97.5	145.2	884.5	234.39	18.73	0.734
2006	549.8	145.70	70.2	0.514	63.1	683.1	14.46	0.567	100.9	150.2	934.2	247.56	19.78	0.775
2007	588.5	155.95	72.6	0.549	65.3	726.4	15.38	0.603	104.4	155.5	986.3	261.37	20.88	0.818
2008	630.7	167.14	75.1	0.586	67.6	773.4	16.38	0.642	108.0	160.9	1042.3	276.21	22.07	0.865
2009	678.9	179.91	77.8	0.628	70.0	826.7	17.50	0.686	111.8	166.6	1105.1	292.85	23.40	0.917
2010	726.5	192.52	80.5	0.670	72.4	879.4	18.62	0.730	115.7	172.4	1167.5	309.39	24.72	0.969
2011	777.2	205.96	83.3	0.714	75.0	935.5	19.81	0.776	119.8	178.4	1233.7	326.93	26.12	1.024
2012	834.0	221.01	86.2	0.764	77.6	997.8	21.13	0.828	124.0	184.7	1306.5	346.22	27.66	1.084
2013	895.2	237.23	89.3	0.817	80.3	1064.8	22.54	0.883	128.3	191.2	1384.3	366.84	29.31	1.149
2014	956.6	253.50	92.4	0.870	83.1	1132.1	23.97	0.939	132.8	197.8	1462.7	387.62	30.97	1.214
2015	1026.4	272.00	95.6	0.931	86.0	1208.0	25.58	1.002	137.5	204.8	1550.3	410.83	32.82	1.286
2016	1100.6	291.66	99.0	0.995	89.0	1288.6	27.28	1.069	142.3	211.9	1642.8	435.34	34.78	1.363
2017	1178.9	312.41	102.4	1.063	92.2	1373.5	29.08	1.140	147.3	219.4	1740.2	461.15	36.85	1.444
2018	1267.8	335.97	106.0	1.140	95.4	1469.2	31.11	1.219	152.4	227.0	1848.6	489.88	39.14	1.534
2019	1357.9	359.84	109.7	1.218	98.7	1566.3	33.16	1.299	157.7	235.0	1959.0	519.14	41.48	1.626
2020	1453.5	385.18	113.6	1.300	102.2	1669.3	35.34	1.385	163.3	243.2	2075.8	550.09	43.95	1.722
2021	1560.5	413.53	117.5	1.392	105.8	1783.8	37.77	1.480	169.0	251.7	2204.5	584.19	46.68	1.829
2022	1674.8	443.82	121.6	1.491	109.5	1905.9	40.35	1.581	174.9	260.5	2341.3	620.44	49.57	1.943
2023	1790.7	474.54	125.9	1.590	113.3	2029.9	42.98	1.684	181.0	269.6	2480.5	657.33	52.52	2.058
2024	1921.2	509.12	130.3	1.702	117.3	2168.8	45.92	1.800	187.3	279.1	2635.2	698.33	55.80	2.187
2025	2059.3	545.71	134.9	1.821	121.4	2315.6	49.03	1.921	193.9	288.9	2798.4	741.58	59.25	2.322
2026	2206.8	584.80	139.6	1.947	125.6	2472.0	52.34	2.051	200.7	299.0	2971.7	787.50	62.92	2.466
2027	2371.8	628.32	144.5	2.087	130.0	2645.5	56.01	2.195	207.7	309.4	3162.6	838.09	66.96	2.624
2028	2538.9	672.81	149.5	2.231	134.6	2823.0	59.77	2.342	215.0	320.3	3358.3	889.95	71.11	2.787

Notes: 1. Exchange rates in 1990 through 2028: M$2.65/US$
2. Heat value: 47.23 MMBtu/ton
*1 "FOB Middle East" + "Freight Rate from Saudi Arabia to Japan" - "Freight Rate from Malaysia to Japan"
*2 Cubic meter of natural gas equivalent. (Heat value of natural gas: 9,876 kcal/normal cubic meter)

Table I.97 PROJECTED SELLING PRICES OF LPG (1990-2028) (2) IN 1985 PRICES

(Unit: US$/ton)

Year	FOB Kerteh *1		Local Transportation	Sub-total (for Reticulation) *2	Company's Profit	Sub-total (Price for LPG/Bulk)			Marketing Cost	Dealer's Commission	Selling Price (Price for LPG/Cylinder)			
	US$/ton	MSen/kg		(US$/cu.m)		US$/ton	US$/MMBtu	US$/cu.m *2			US$/ton	MSen/kg	US$/MMBtu	US$/cu.m *2
1986	139.5	36.97	37.74	0.147	33.96	211.20	4.47	0.175	54.26	80.83	346.29	91.77	7.33	0.287
1990	150.3	39.83	37.74	0.156	34.0	222.0	4.70	0.184	54.3	80.8	357.1	94.63	7.56	0.296
1991	153.6	40.70	37.74	0.159	34.0	225.3	4.77	0.187	54.3	80.8	360.4	95.51	7.63	0.299
1992	155.9	41.31	37.74	0.161	34.0	227.6	4.82	0.189	54.3	80.8	362.7	96.12	7.68	0.301
1993	159.3	42.21	37.74	0.163	34.0	231.0	4.89	0.192	54.3	80.8	366.1	97.02	7.75	0.304
1994	162.7	43.12	37.74	0.166	34.0	234.4	4.96	0.194	54.3	80.8	369.5	97.92	7.82	0.306
1995	166.0	43.99	37.74	0.169	34.0	237.7	5.03	0.197	54.3	80.8	372.8	98.79	7.89	0.309
1996	169.2	44.84	37.74	0.172	34.0	240.9	5.10	0.200	54.3	80.8	376.0	99.64	7.96	0.312
1997	172.4	45.69	37.74	0.174	34.0	244.1	5.17	0.203	54.3	80.8	379.2	100.49	8.03	0.315
1998	175.6	46.53	37.74	0.177	34.0	247.3	5.24	0.205	54.3	80.8	382.4	101.34	8.10	0.317
1999	179.8	47.65	37.74	0.180	34.0	251.5	5.33	0.209	54.3	80.8	386.6	102.45	8.19	0.321
2000	183.0	48.50	37.74	0.183	34.0	254.7	5.39	0.211	54.3	80.8	389.8	103.30	8.25	0.323
2001	187.2	49.61	37.74	0.187	34.0	258.9	5.48	0.215	54.3	80.8	394.0	104.41	8.34	0.327
2002	191.4	50.72	37.74	0.190	34.0	263.1	5.57	0.218	54.3	80.8	398.2	105.52	8.43	0.330
2003	195.6	51.83	37.74	0.194	34.0	267.3	5.66	0.222	54.3	80.8	402.4	106.64	8.52	0.334
2004	199.8	52.95	37.74	0.197	34.0	271.5	5.75	0.225	54.3	80.8	406.6	107.75	8.61	0.337
2005	204.0	54.06	37.74	0.201	34.0	275.7	5.84	0.229	54.3	80.8	410.8	108.86	8.70	0.341
2006	208.2	55.17	37.74	0.204	34.0	279.9	5.93	0.232	54.3	80.8	415.0	109.98	8.79	0.344
2007	212.4	56.29	37.74	0.208	34.0	284.1	6.02	0.236	54.3	80.8	419.2	111.09	8.88	0.348
2008	216.7	57.43	37.74	0.211	34.0	288.4	6.11	0.239	54.3	80.8	423.5	112.23	8.97	0.352
2009	221.9	58.80	37.74	0.215	34.0	293.6	6.22	0.244	54.3	80.8	428.7	113.61	9.08	0.356
2010	226.1	59.92	37.74	0.219	34.0	297.8	6.31	0.247	54.3	80.8	432.9	114.72	9.17	0.359
2011	230.3	61.03	37.74	0.222	34.0	302.0	6.39	0.250	54.3	80.8	437.1	115.83	9.25	0.362
2012	235.5	62.41	37.74	0.227	34.0	307.2	6.50	0.255	54.3	80.8	442.3	117.21	9.36	0.367
2013	240.8	63.81	37.74	0.231	34.0	312.5	6.62	0.259	54.3	80.8	447.6	118.61	9.48	0.372
2014	245.1	64.95	37.74	0.235	34.0	316.8	6.71	0.263	54.3	80.8	451.9	119.75	9.57	0.375
2015	250.3	66.33	37.74	0.239	34.0	322.0	6.82	0.267	54.3	80.8	457.1	121.13	9.68	0.379
2016	255.6	67.73	37.74	0.243	34.0	327.3	6.93	0.272	54.3	80.8	462.4	122.54	9.79	0.384
2017	260.8	69.11	37.74	0.248	34.0	332.5	7.04	0.276	54.3	80.8	467.6	123.91	9.90	0.388
2018	267.1	70.78	37.74	0.253	34.0	338.8	7.17	0.281	54.3	80.8	473.9	125.58	10.03	0.393
2019	272.4	72.19	37.74	0.257	34.0	344.1	7.29	0.286	54.3	80.8	479.2	126.99	10.15	0.398
2020	277.6	73.56	37.74	0.262	34.0	349.3	7.40	0.290	54.3	80.8	484.4	128.37	10.26	0.402
2021	284.0	75.26	37.74	0.267	34.0	355.7	7.53	0.295	54.3	80.8	490.8	130.06	10.39	0.407
2022	290.2	76.90	37.74	0.272	34.0	361.9	7.66	0.300	54.3	80.8	497.0	131.71	10.52	0.412
2023	295.5	78.31	37.74	0.276	34.0	367.2	7.77	0.304	54.3	80.8	502.3	133.11	10.64	0.417
2024	301.8	79.98	37.74	0.282	34.0	373.5	7.91	0.310	54.3	80.8	508.6	134.78	10.77	0.422
2025	308.2	81.67	37.74	0.287	34.0	379.9	8.04	0.315	54.3	80.8	515.0	136.48	10.90	0.427
2026	314.5	83.34	37.74	0.292	34.0	386.2	8.18	0.321	54.3	80.8	521.3	138.14	11.04	0.433
2027	321.8	85.28	37.74	0.298	34.0	393.5	8.33	0.326	54.3	80.8	528.6	140.08	11.19	0.439
2028	328.1	86.95	37.74	0.304	34.0	399.8	8.46	0.332	54.3	80.8	534.9	141.75	11.33	0.444

Notes: 1. Exchange rates in 1990 through 2028: M$2.65/US$
2. Heat value: 47.23 MMBtu/ton
*1 "FOB Middle East" + "Freight Rate from Saudi Arabia to Japan" - "Freight Rate from Malaysia to Japan"
*2 Cubic meter of natural gas equivalent. (Heat value of natural gas: 9,876 kcal/normal cubic meter)

Reference to Table 1.97 PROJECTED LPG PRICE/FOB KERTEH (1990-2028)

(Unit: US$/ton)

	LPG/FOB Middle East (Real) *1	Annual Ave. Escalation Rate/Crude Oil Price (% p.a.)	Escalation Factor *3	LPG/FOB Middle East (Current)	Freight/Saudi-Japan (Real)			Freight/Malaysia-Japan (Real)			Freight/Saudi-Japan (Current)			Freight/Malaysia-Japan (Current)			LPG/FOB Kerteh (Real-term)	LPG/FOB Kerteh (Current-term)
					Fixed Cost	Fuel Cost	Total	Fixed Cost	Fuel Cost	Total	Fixed Cost	Fuel Cost	Total	Fixed Cost	Fuel Cost	Total		
1985	213*2		1.0000	213														
1986	127*2		1.0000	127	24.1	10.9	35.0	17.2	5.3	22.5	24.1	10.9	35.0	17.2	5.3	22.5	139.5	139.5
1987	129		1.0500	135														
1988	131		1.1025	144														
1989	134	(1986-1990)	1.1576	155														
1990	136*2	1.726	1.2155	165	24.1	14.3	38.4	17.2	6.9	24.1	26.3	17.3	43.6	18.7	8.4	27.1	150.3	181.5
1991	139		1.2763	177	24.1	14.9	39.0	17.2	7.2	24.4	27.6	18.9	46.5	19.7	9.1	28.8	153.6	194.7
1992	141		1.3401	189	24.1	15.6	39.7	17.2	7.6	24.8	29.0	20.7	49.7	20.7	10.0	30.7	155.9	208.0
1993	144		1.4071	203	24.1	16.3	40.4	17.2	7.9	25.1	30.4	22.7	53.1	21.7	11.0	32.7	159.3	223.4
1994	147	(1990-1995)	1.4775	217	24.1	17.0	41.1	17.2	8.2	25.4	31.9	24.8	56.7	22.8	12.0	34.8	162.7	238.9
1995	150*2	1.979	1.5513	233	24.1	17.7	41.8	17.2	8.6	25.8	33.5	27.1	60.6	23.9	13.1	37.0	166.0	256.6
1996	153		1.6289	249	24.1	18.1	42.2	17.2	8.8	26.0	35.2	29.0	64.2	25.1	14.0	39.1	169.2	274.1
1997	156		1.7103	267	24.1	18.4	42.5	17.2	8.9	26.1	37.0	31.0	68.0	26.4	15.0	41.4	172.4	293.6
1998	159		1.7959	286	24.1	18.8	42.9	17.2	9.1	26.3	38.8	33.1	71.9	27.7	16.0	43.7	175.6	314.2
1999	163	(1995-2000)	1.8856	307	24.1	19.2	43.3	17.2	9.3	26.5	40.7	35.5	76.2	29.1	17.2	46.3	179.8	336.9
2000	166*2	2.048	1.9799	329	24.1	19.5	43.6	17.2	9.4	26.6	42.8	37.9	80.7	30.5	18.4	48.9	183.0	360.8
2001	170		2.0788	353	24.1	19.9	44.0	17.2	9.6	26.8	44.9	40.6	85.5	32.1	19.7	51.8	187.2	386.7
2002	174		2.1829	380	24.1	20.3	44.4	17.2	9.8	27.0	47.2	43.4	90.6	33.7	21.0	54.7	191.4	415.9
2003	178		2.2920	408	24.1	20.7	44.8	17.2	10.0	27.2	49.5	46.4	95.9	35.3	22.5	57.8	195.6	446.1
2004	182	(2000-2005)	2.4066	438	24.1	21.1	45.2	17.2	10.2	27.4	52.0	49.7	101.7	37.1	24.1	61.2	199.8	478.5
2005	186*2	2.301	2.5270	470	24.1	21.5	45.6	17.2	10.4	27.6	54.6	53.2	107.8	39.0	25.8	64.8	204.0	513.0
2006	190		2.6533	504	24.1	21.9	46.0	17.2	10.6	27.8	57.3	56.9	114.2	40.9	27.5	68.4	208.2	549.8
2007	194		2.7860	540	24.1	22.3	46.4	17.2	10.8	28.0	60.2	60.8	121.0	43.0	29.5	72.5	212.4	588.5
2008	198		2.9253	579	24.1	22.8	46.9	17.2	11.0	28.2	63.2	65.2	128.4	45.1	31.6	76.7	216.7	630.7
2009	203	(2005-2028)	3.0715	624	24.1	23.2	47.3	17.2	11.2	28.4	66.4	69.7	136.1	47.4	33.8	81.2	221.9	678.9
2010	207*2	2.162	3.2251	668	24.1	23.6	47.7	17.2	11.4	28.6	69.7	74.6	144.3	49.7	36.1	85.8	226.1	726.5
2011	211		3.3864	715	24.1	24.1	48.2	17.2	11.7	28.9	73.2	79.8	153.0	52.2	38.6	90.8	230.3	777.2
2012	216		3.5557	768	24.1	24.5	48.6	17.2	11.9	29.1	76.8	85.4	162.2	54.8	41.4	96.2	235.5	834.0
2013	221		3.7335	825	24.1	25.0	49.1	17.2	12.1	29.3	80.7	91.4	172.1	57.6	44.3	101.9	240.8	895.2
2014	225		3.9201	882	24.1	25.5	49.6	17.2	12.3	29.5	84.7	97.8	182.5	60.5	47.4	107.9	245.1	956.6
2015	230		4.1161	947	24.1	26.0	50.1	17.2	12.6	29.8	88.9	104.7	193.6	63.5	50.7	114.2	250.3	1026.4
2016	235		4.3219	1016	24.1	26.5	50.6	17.2	12.8	30.0	93.4	112.2	205.6	66.7	54.3	121.0	255.6	1108.6
2017	240		4.5380	1089	24.1	27.0	51.1	17.2	13.1	30.3	98.1	119.9	218.0	70.0	58.1	128.1	260.8	1178.9
2018	246		4.7649	1172	24.1	27.5	51.6	17.2	13.3	30.5	103.0	128.5	231.5	73.5	62.2	135.7	267.1	1267.8
2019	251		5.0032	1256	24.1	28.1	52.2	17.2	13.6	30.8	108.1	137.6	245.7	77.2	66.6	143.8	272.4	1357.9
2020	256		5.2533	1345	24.1	28.6	52.7	17.2	13.9	31.1	113.5	147.3	260.8	81.0	71.3	152.3	277.6	1453.5
2021	262		5.5160	1445	24.1	29.2	53.3	17.2	14.1	31.3	119.2	157.7	276.9	85.1	76.3	161.4	284.0	1560.5
2022	268		5.7918	1552	24.1	29.7	53.8	17.2	14.4	31.6	125.1	168.7	293.8	89.3	81.7	171.0	290.2	1674.8
2023	273		6.0814	1660	24.1	30.3	54.4	17.2	14.7	31.9	131.4	180.4	311.8	93.8	87.3	181.1	295.5	1790.7
2024	279		6.3855	1782	24.1	30.9	55.0	17.2	15.0	32.2	138.0	193.3	331.3	98.5	93.6	192.1	301.8	1921.2
2025	285		6.7048	1911	24.1	31.5	55.6	17.2	15.2	32.4	144.9	207.0	351.9	103.4	100.2	203.6	308.2	2059.3
2026	291		7.0400	2049	24.1	32.1	56.2	17.2	15.5	32.7	152.1	221.6	373.7	108.6	107.3	215.9	314.5	2206.8
2027	298		7.3920	2203	24.1	32.7	56.8	17.2	15.8	33.0	159.7	237.2	396.9	114.0	114.9	228.9	321.8	2371.0
2028	304		7.7616	2360	24.1	33.3	57.4	17.2	16.1	33.3	167.7	253.8	421.5	119.7	122.9	242.6	328.1	2538.9

Assumptions: Fuel oil price in 1986 (FOB Singapore): US$101.4/ton
Fuel oil price in 1990 through 2028: y = 6.35137 + 0.953683 x (See Table 1.82.)
Where, y = Fuel oil price (US$/kl)
x = Projected curde oil price (US$/kl) (See Table 1.77.)
Fuel consumption per voyage: Saudi Arabia-Japan 795 ton
Malaysia-Japan 385 ton
Grain capacity: 12,500 cubic meter
(LPG 7,375 ton, s.g.=0.59)
Escalation factor of fixed cost = Projected inflation rate of foreign currency for the project

Notes: *1 In 1985 prices
*2 Prices given by EPU/Low Scenario (GPS)
*3 Inflation factor: 1985/86 0.0% p.a., 1986-2028 5.0% p.a.

Figure I.1 STUDY AREA-KLANG VALLEY REGION

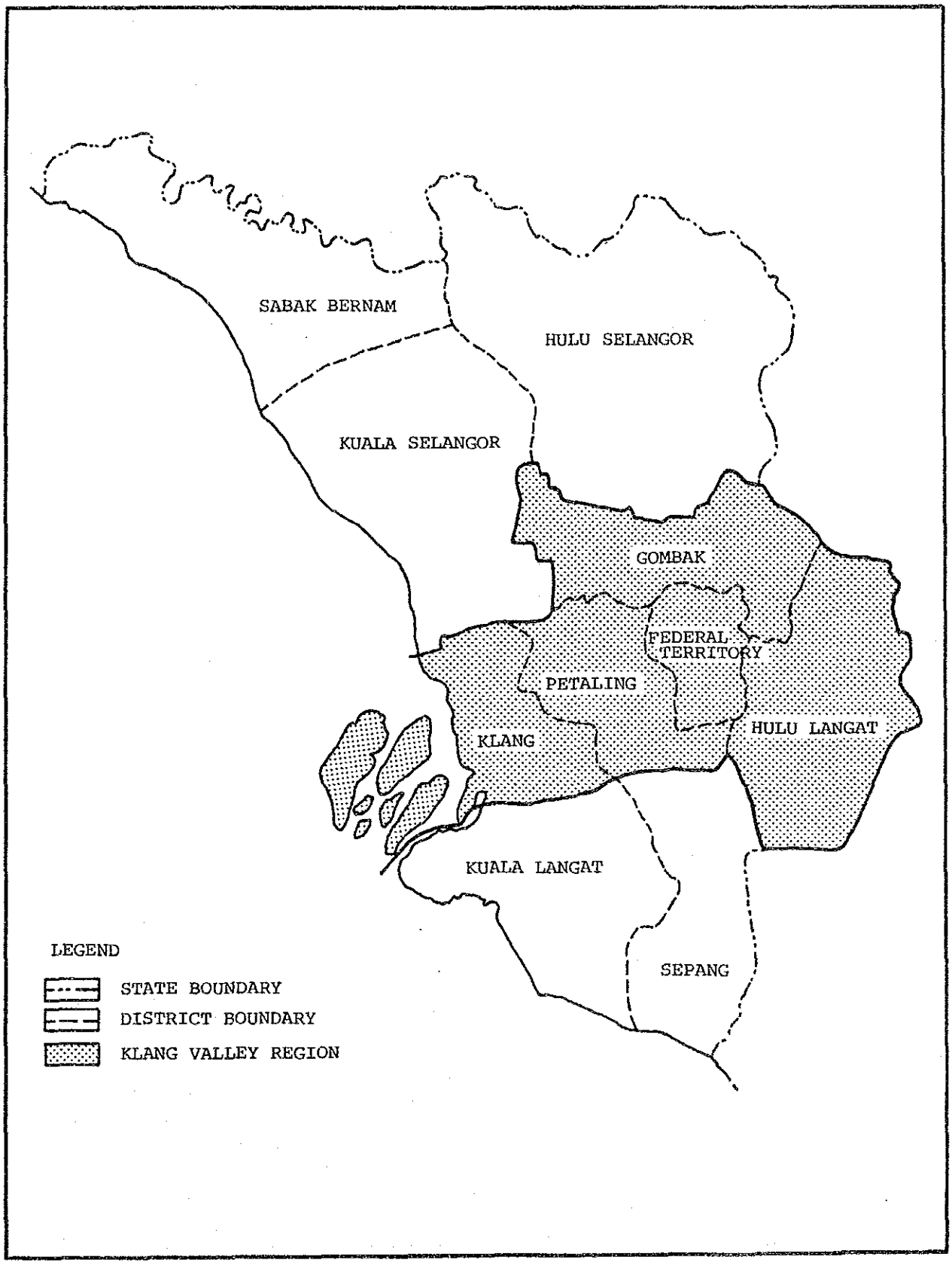
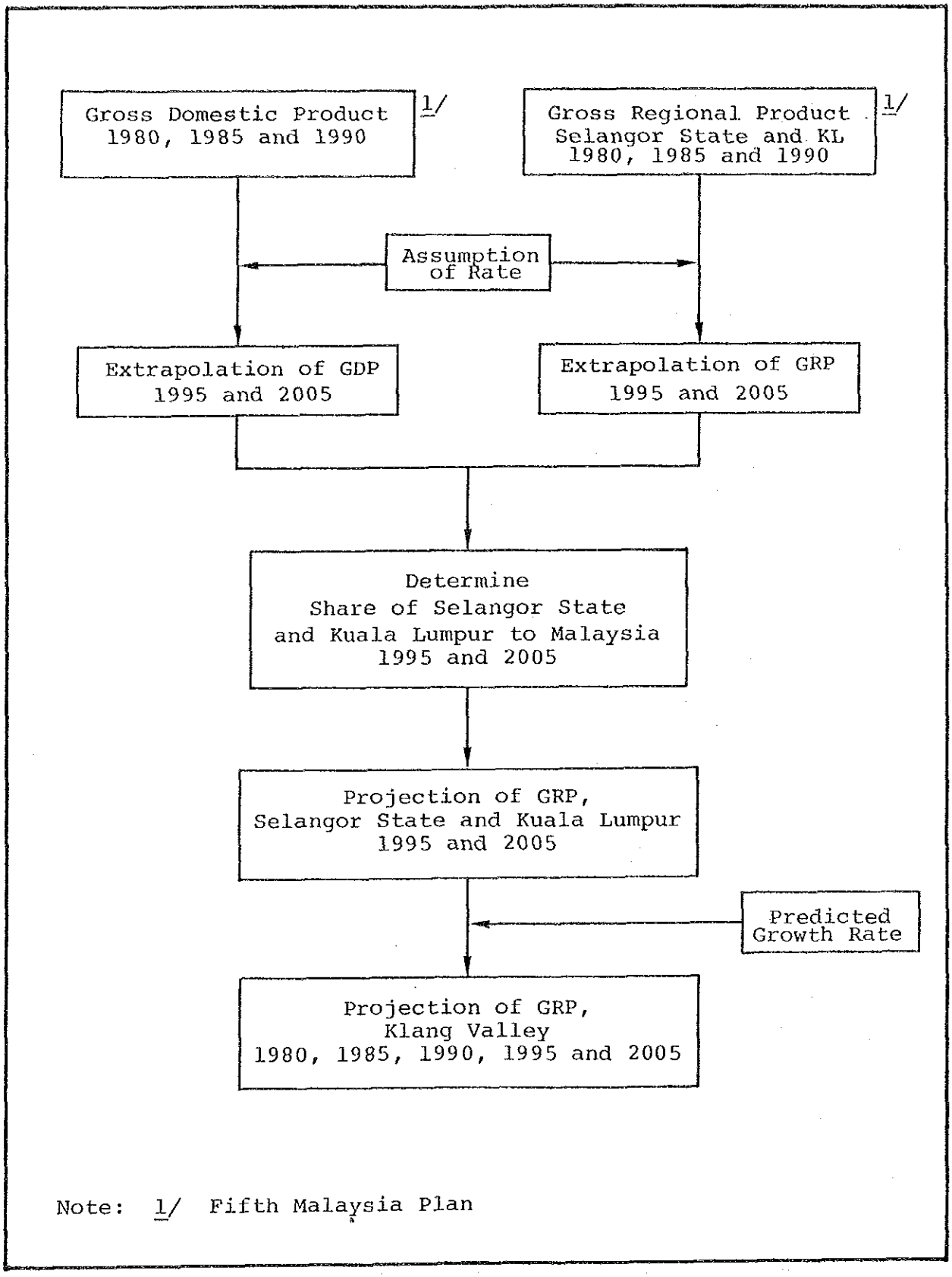


Figure I.2 SUMMARY SHEET OF GRP PROJECTION IN KLANG VALLEY



Note: 1/ Fifth Malaysia Plan

Figure I.3 SUMMARY CHART OF FUTURE POPULATION BY DISTRICT

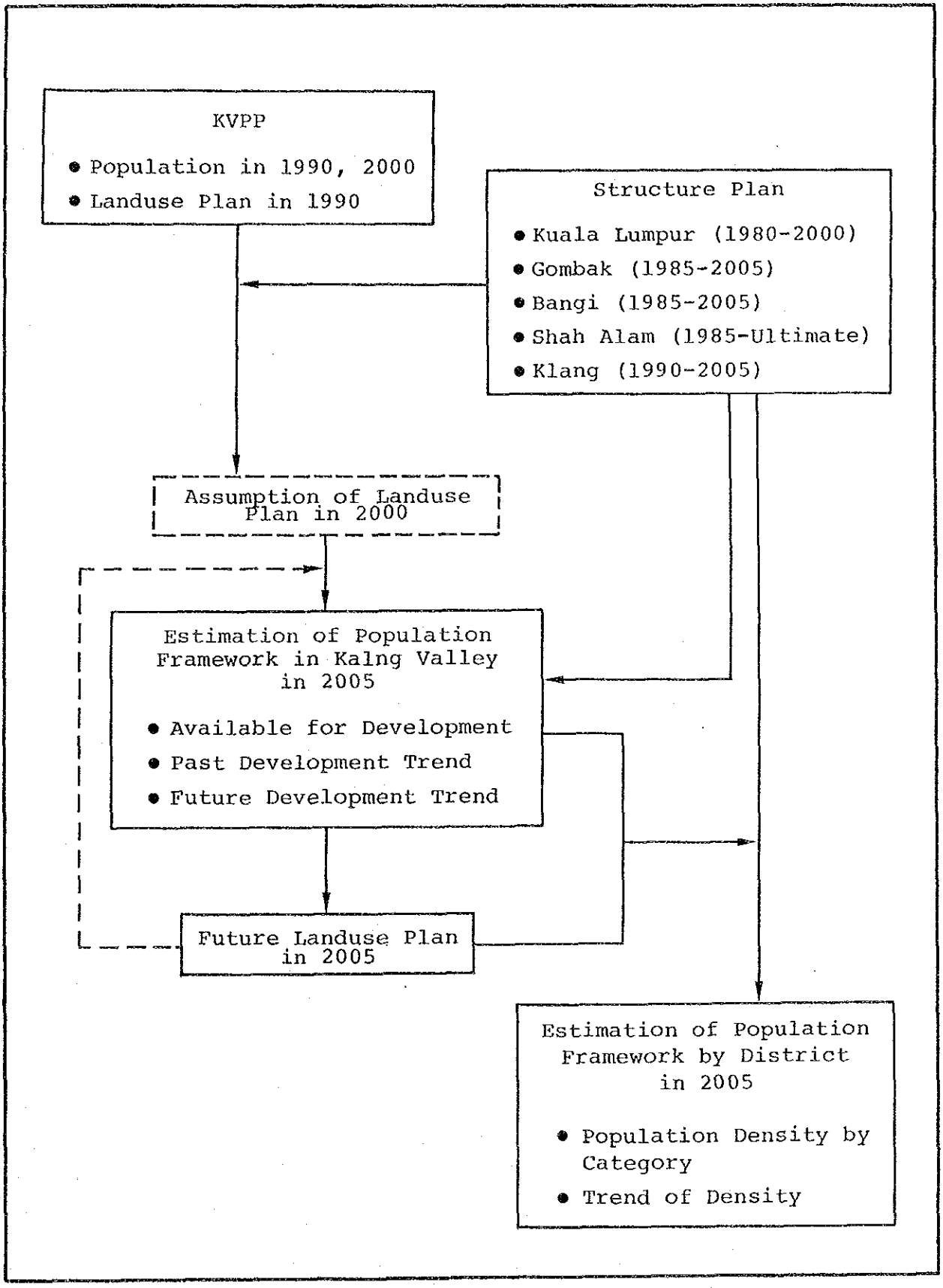


Figure I.4 SUMMARY CHART OF EMPLOYMENT PROJECTION BY DISTRICT

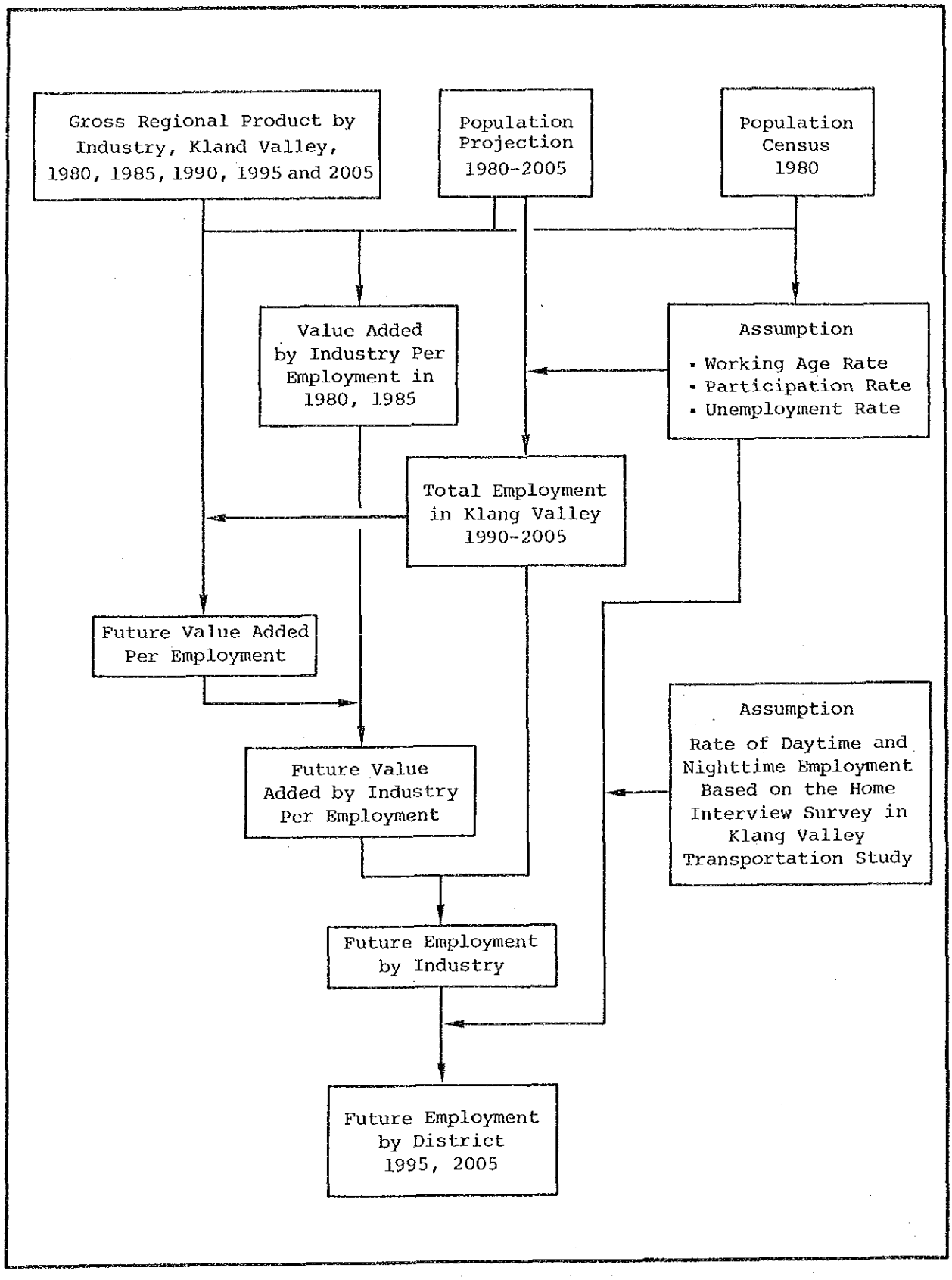


Figure I.5 EXISTING LAND USE IN URBAN AREA IN 1985

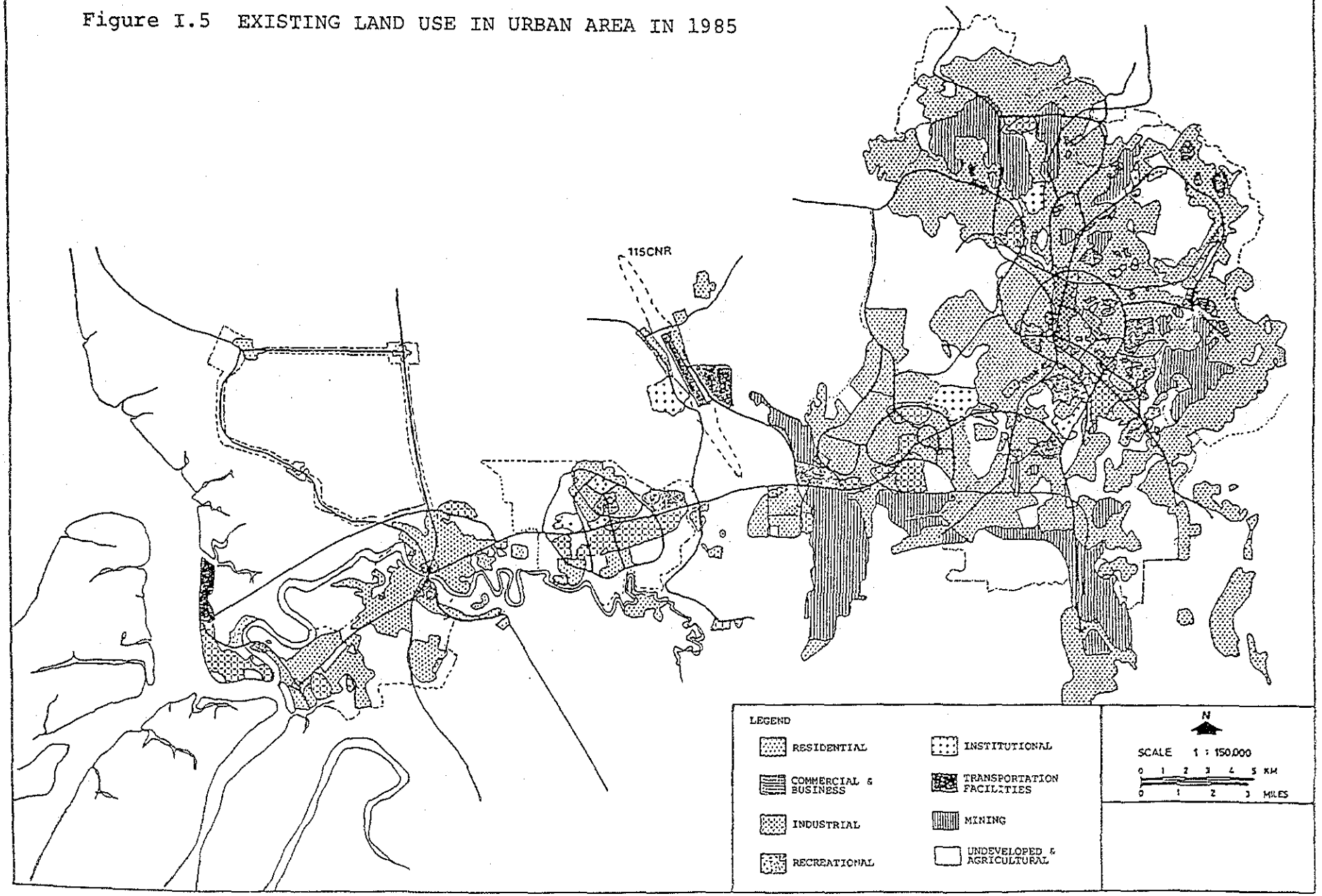


Figure I.6 LAND USE IN URBAN AREA IN 1990

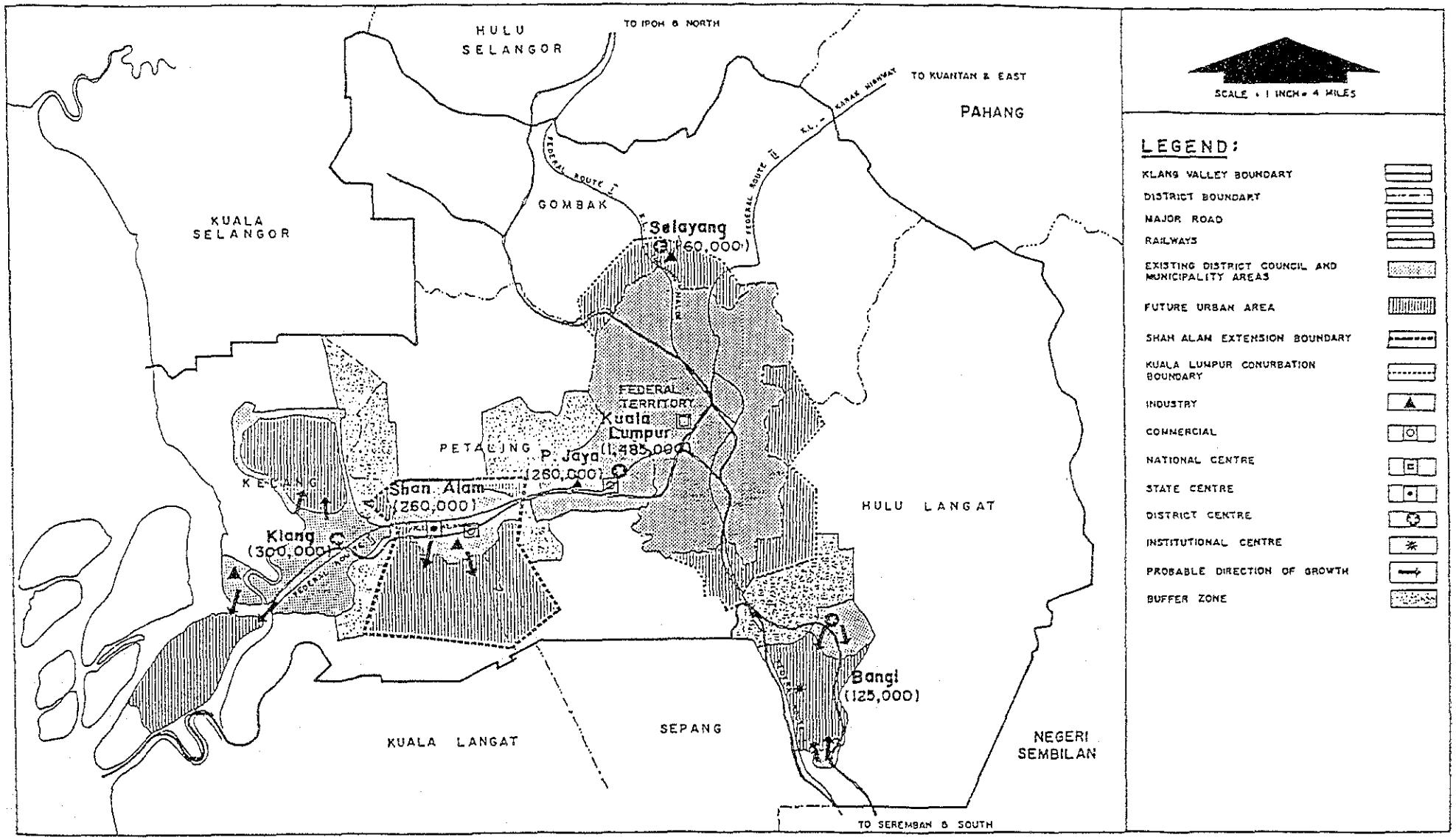


Figure I.7 LAND USE IN URBAN AREA IN 2005

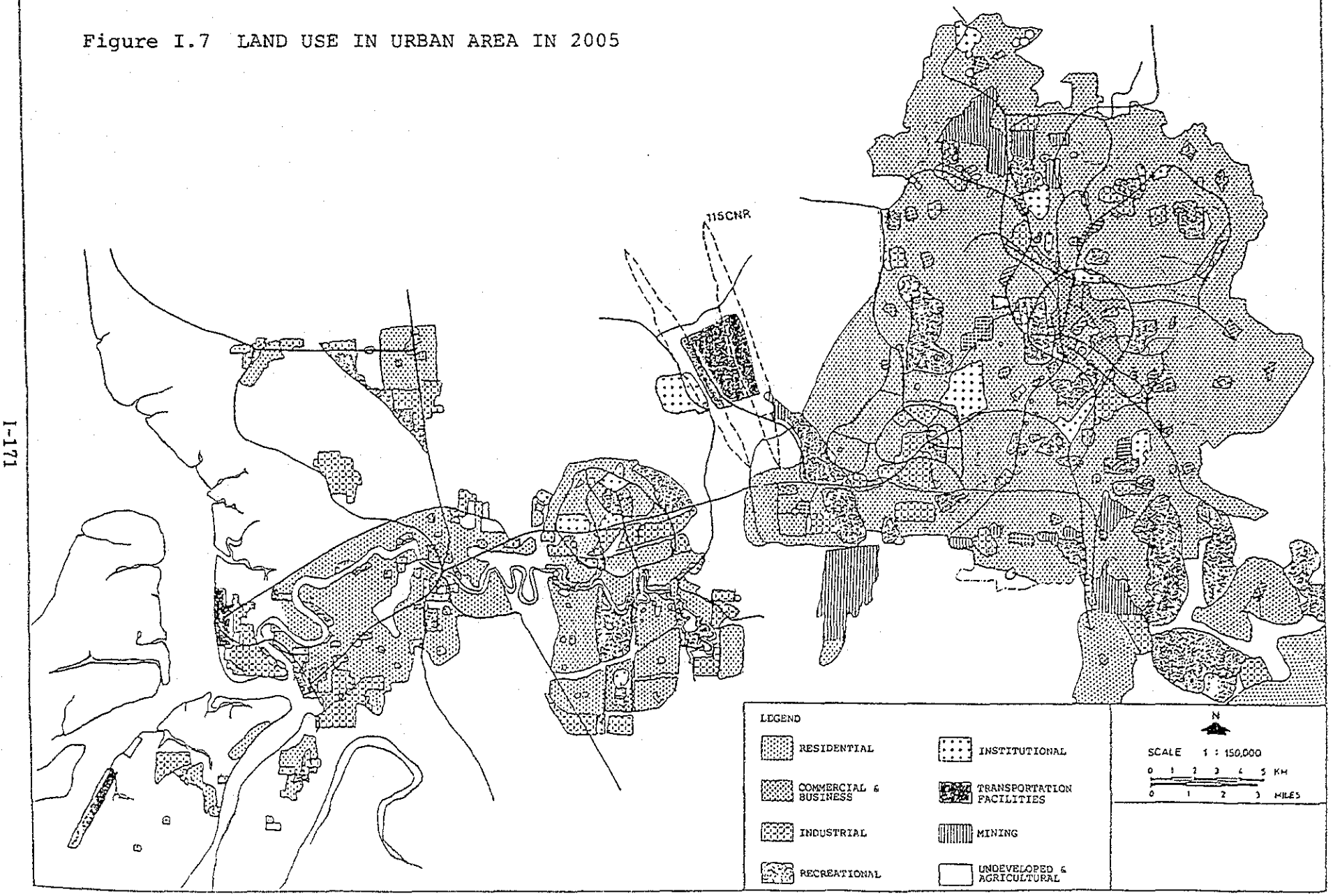


Figure I.8 SHAH ALAM EXTENTION PLAN OF INDUSTRY

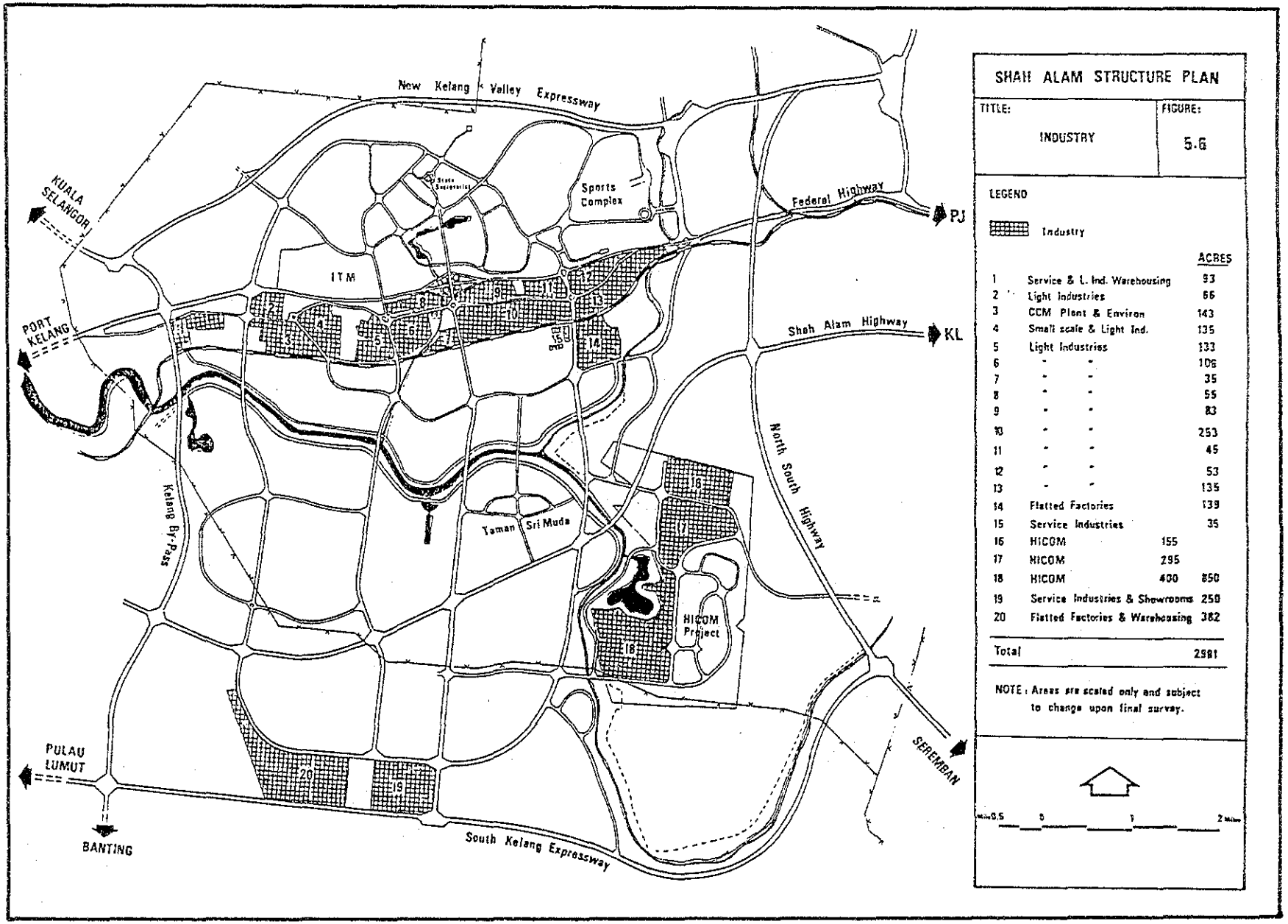
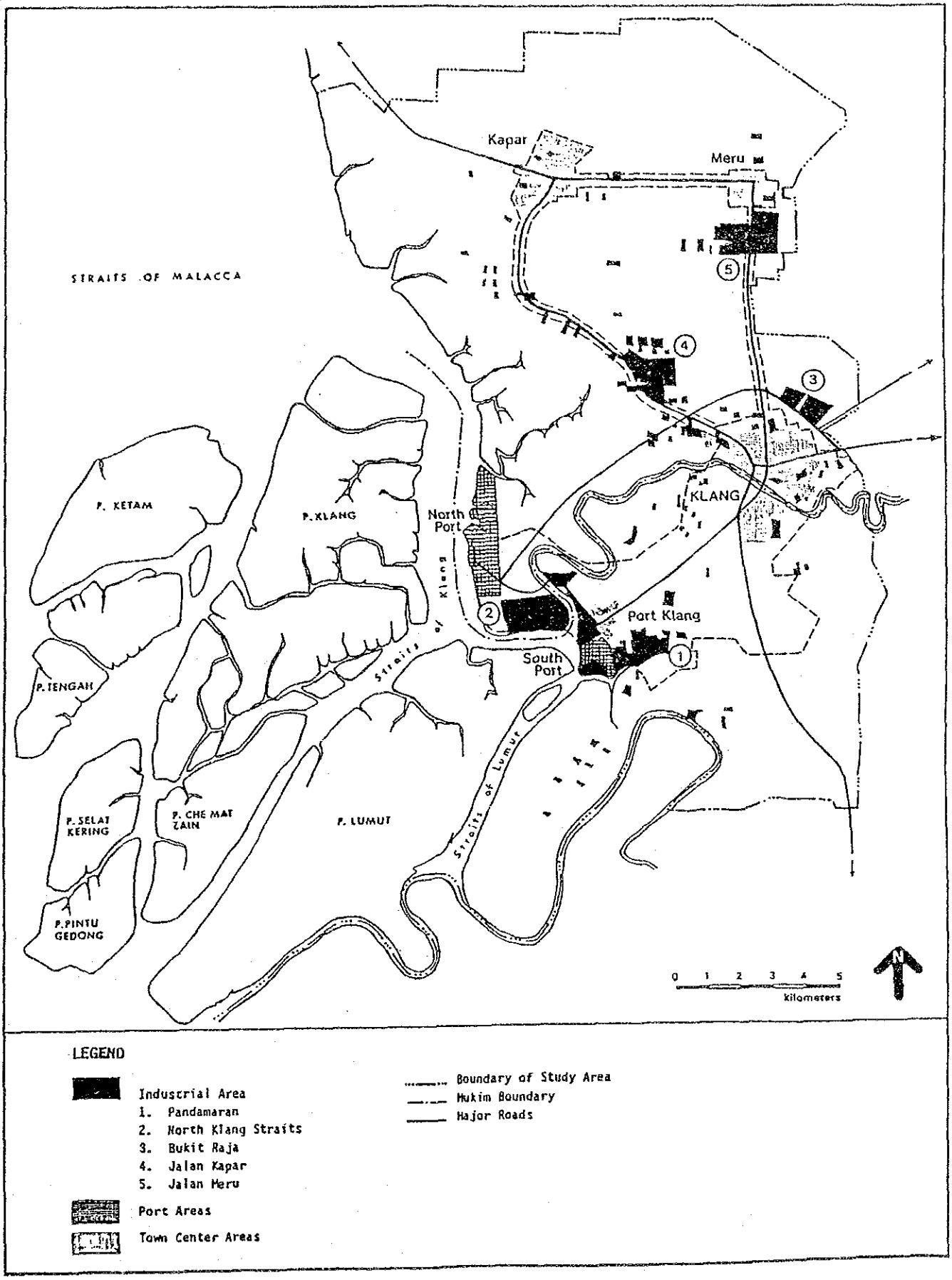


Figure I.9 LOCATION OF INDUSTRIES, LPAA, 1984



Source : Klang Structure Plan, 1984

Figure I.10 SUMMARY CHART OF PROCESS OF ZONING

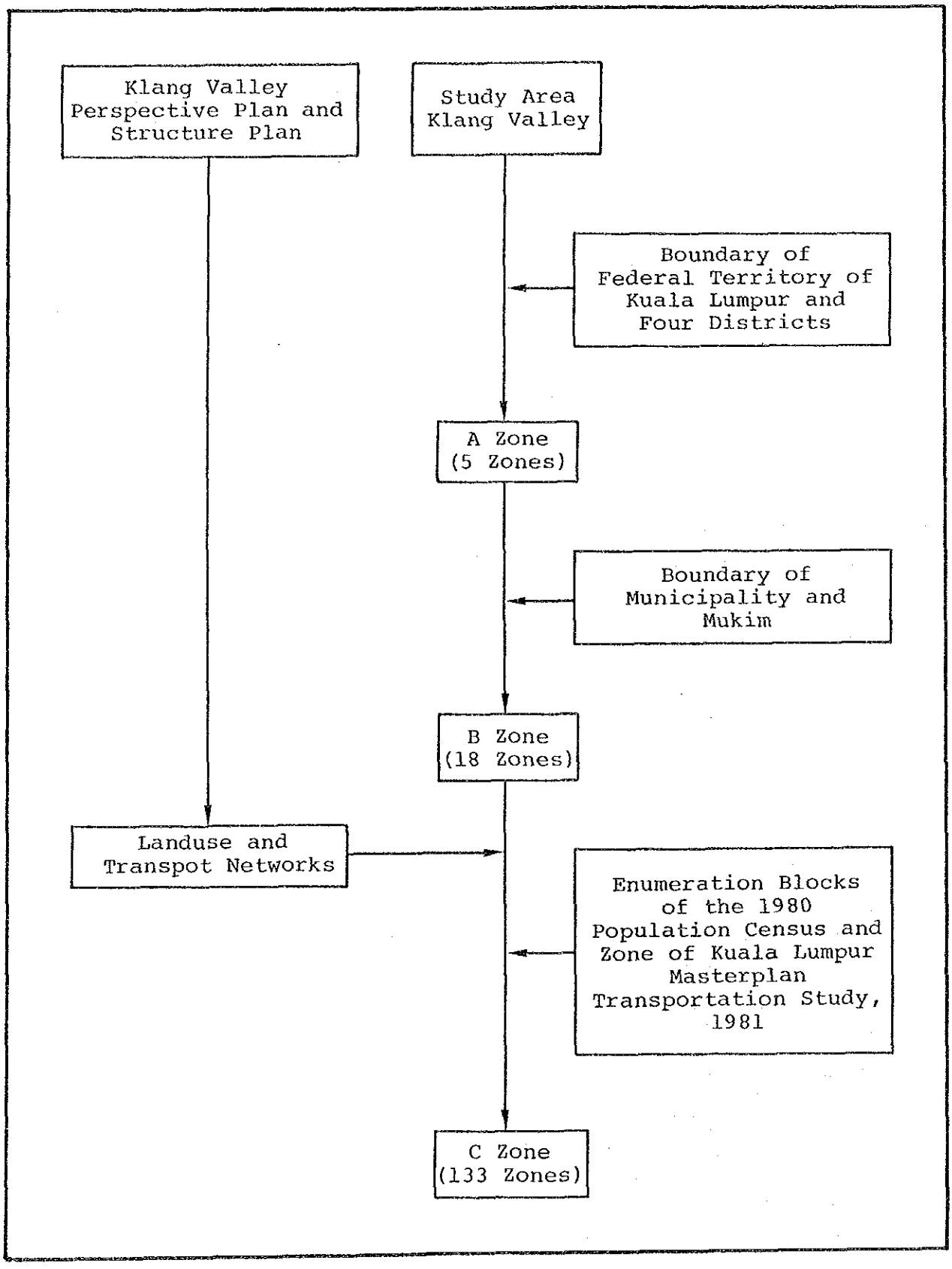


Figure I.11 KLANG VALLEY PLANNING ZONE (A ZONE)

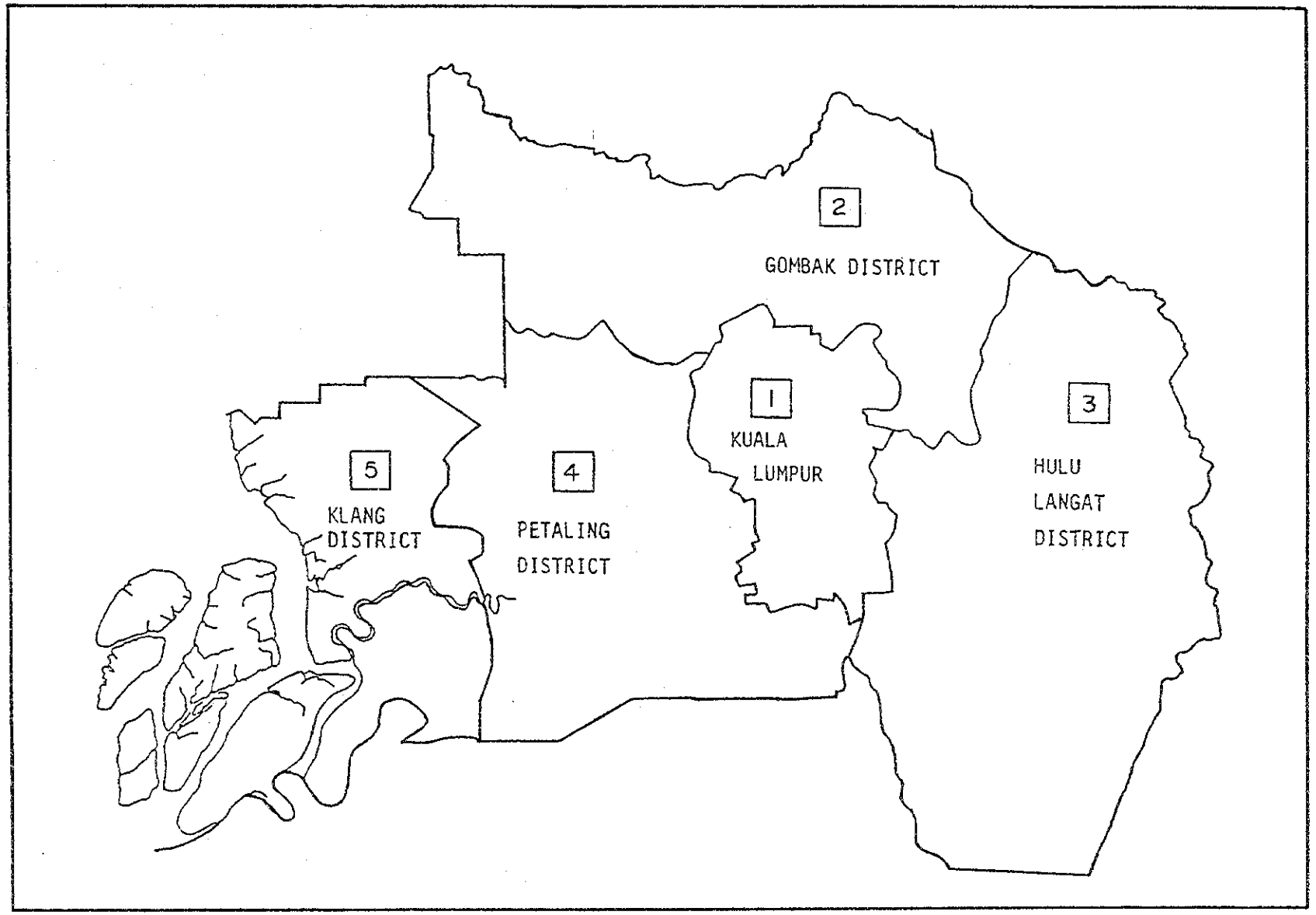


Figure I.12 KLANG VALLEY PLANNING ZONE (B & C ZONE)

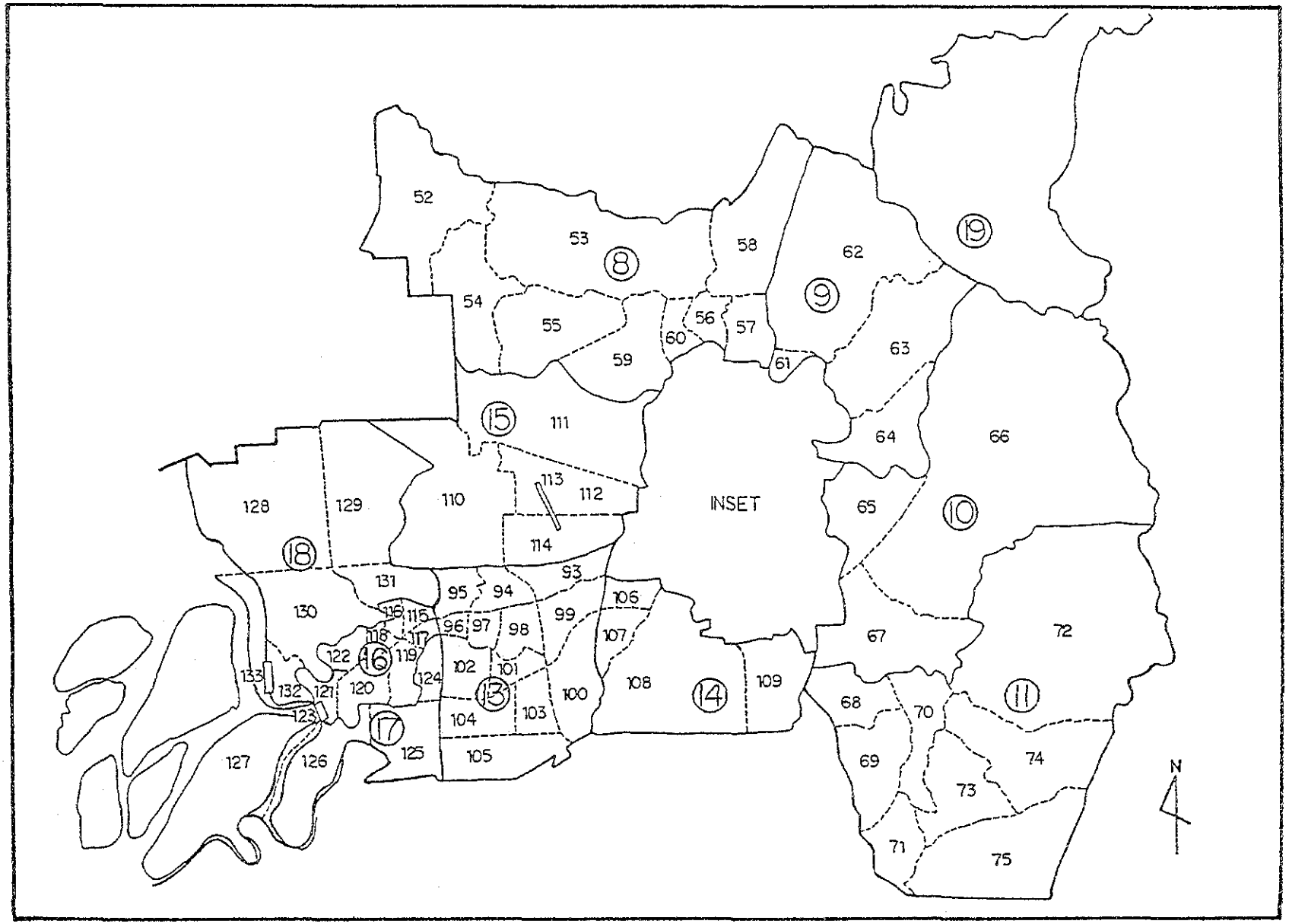


Figure I.13 KUALA LUMPUR CONURBATION PLANNING ZONE
(B & C ZONE)

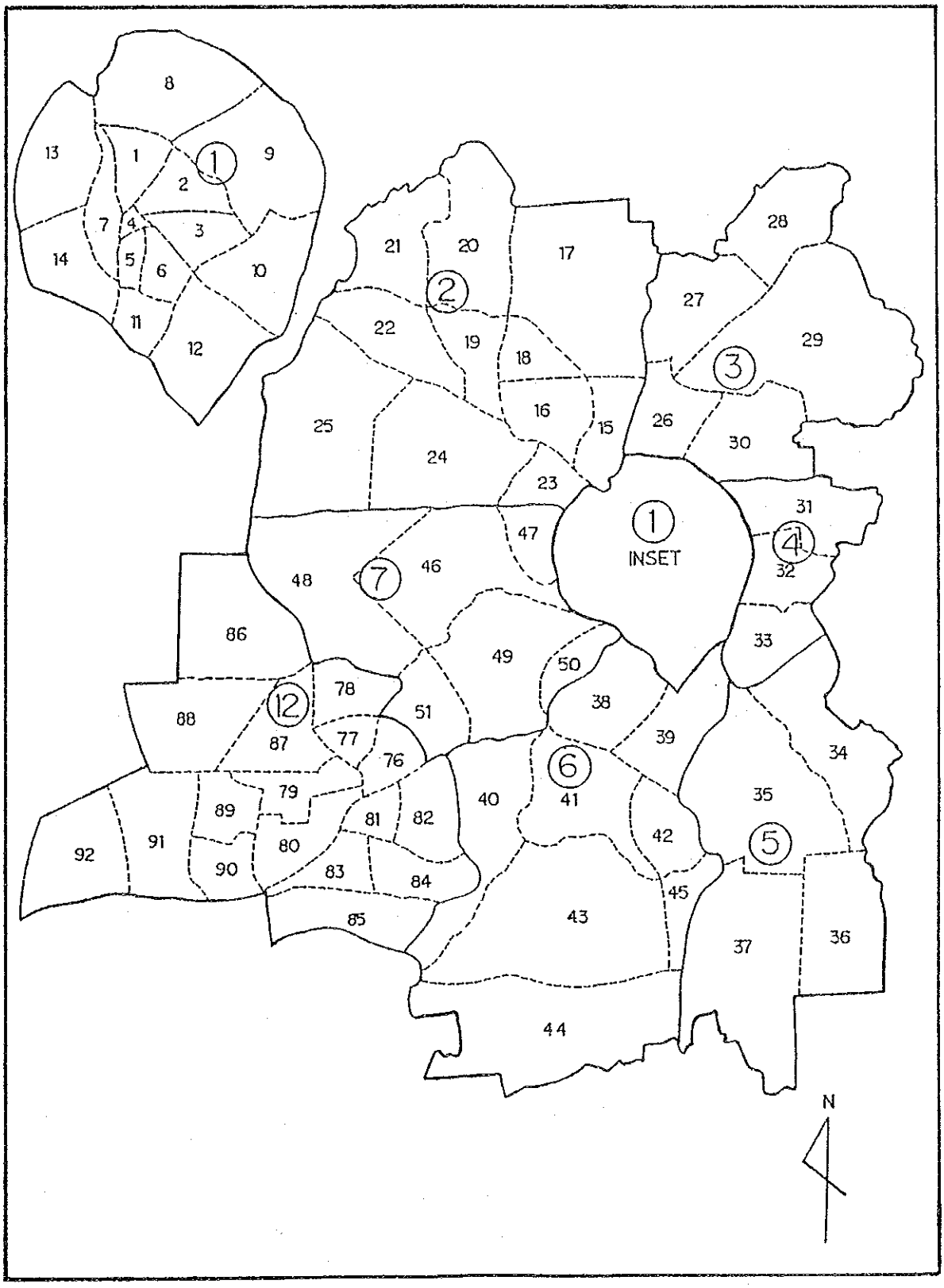
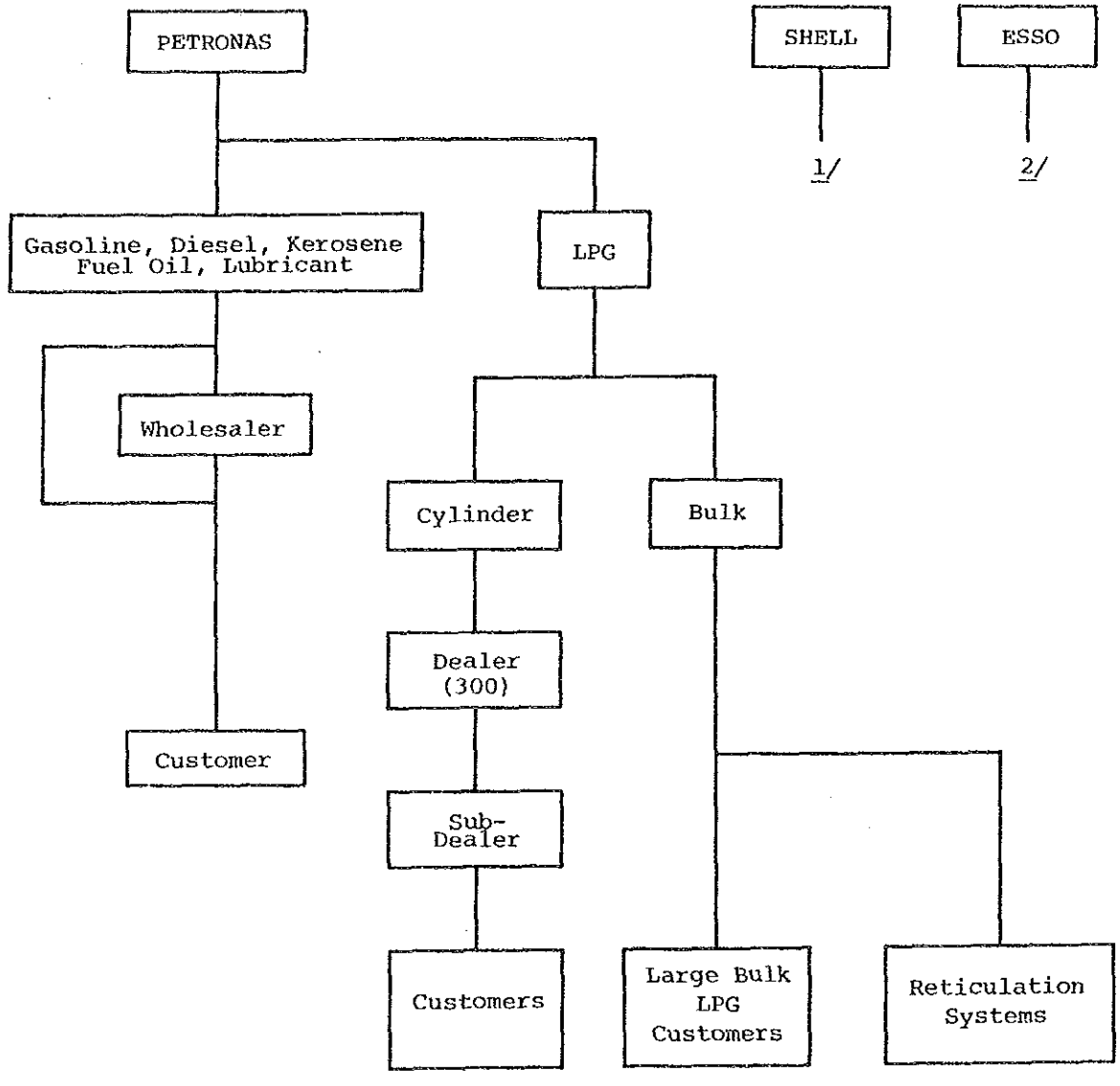


Figure I.14 THE PETROLEUM PRODUCTS DISTRIBUTION CHANNEL IN MALAYSIA



Notes: 1/ Shell appointed wholesaler who will supply LPG to dealers other petroleum products distribution channel is similar to PETRONAS's channel.

2/ Esso's channel is similar to PETRONAS's channel.

Figure I.15 PRICE OF ARABIAN LIGHT AND WHOLESALE PRICE INDEX

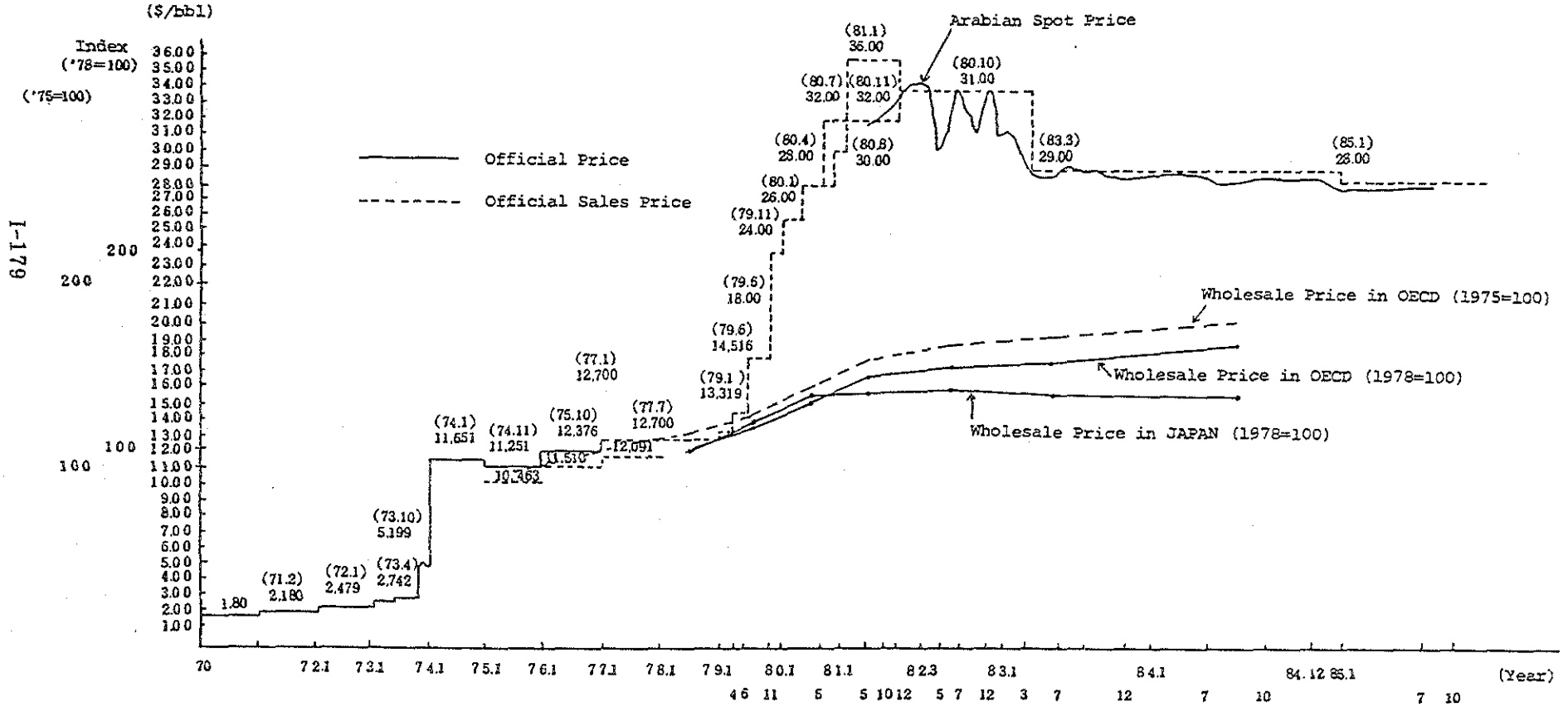
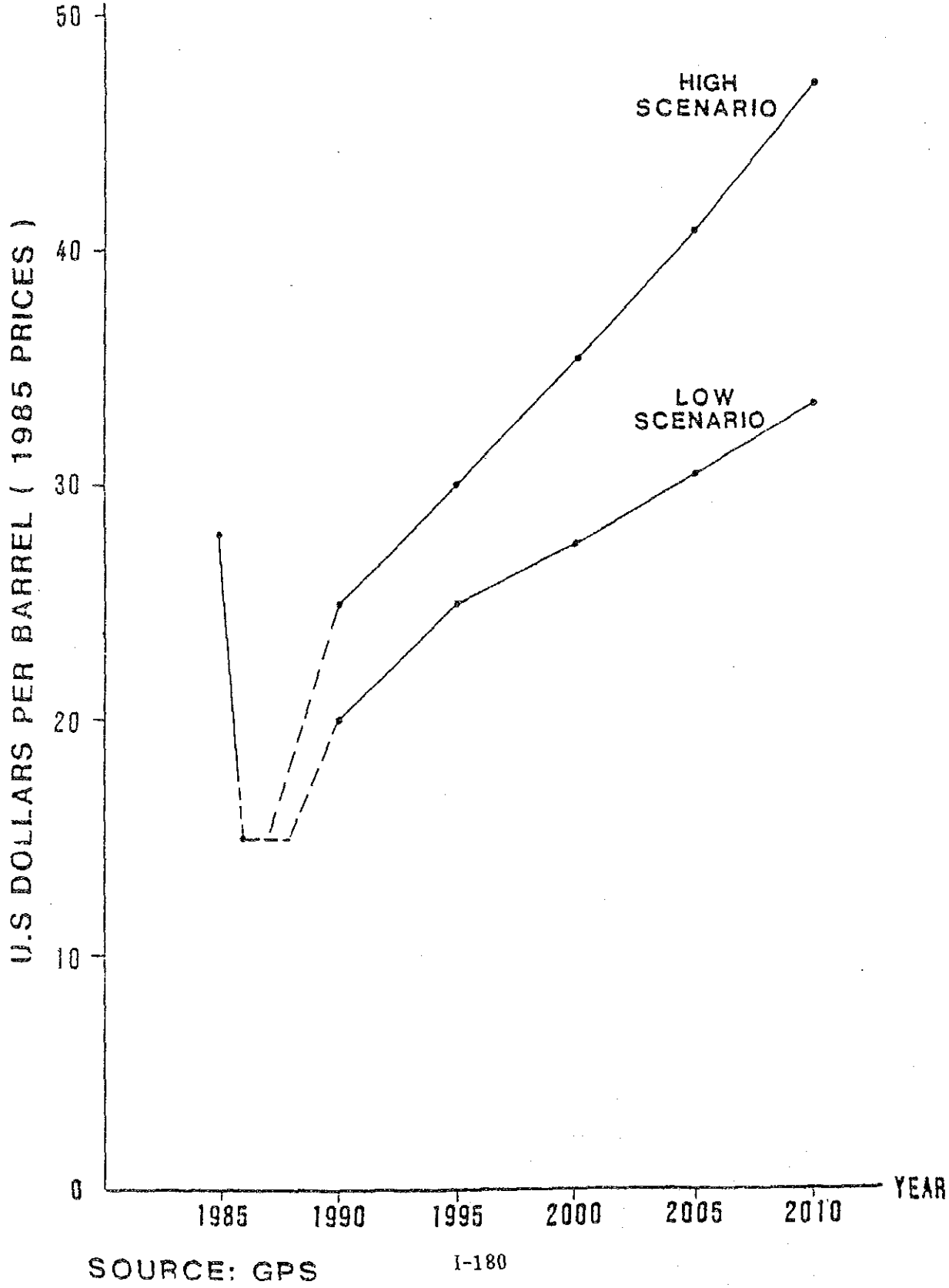
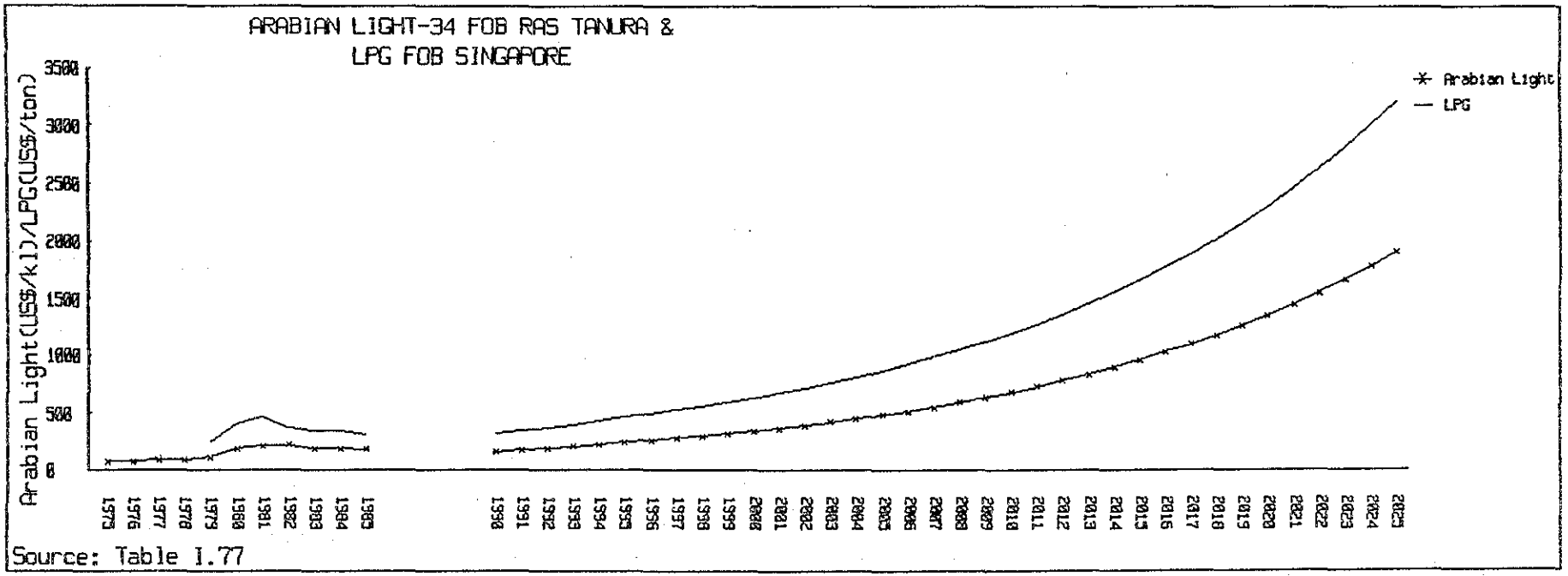


Figure I.16 CRUDE OIL PRICE FORECAST



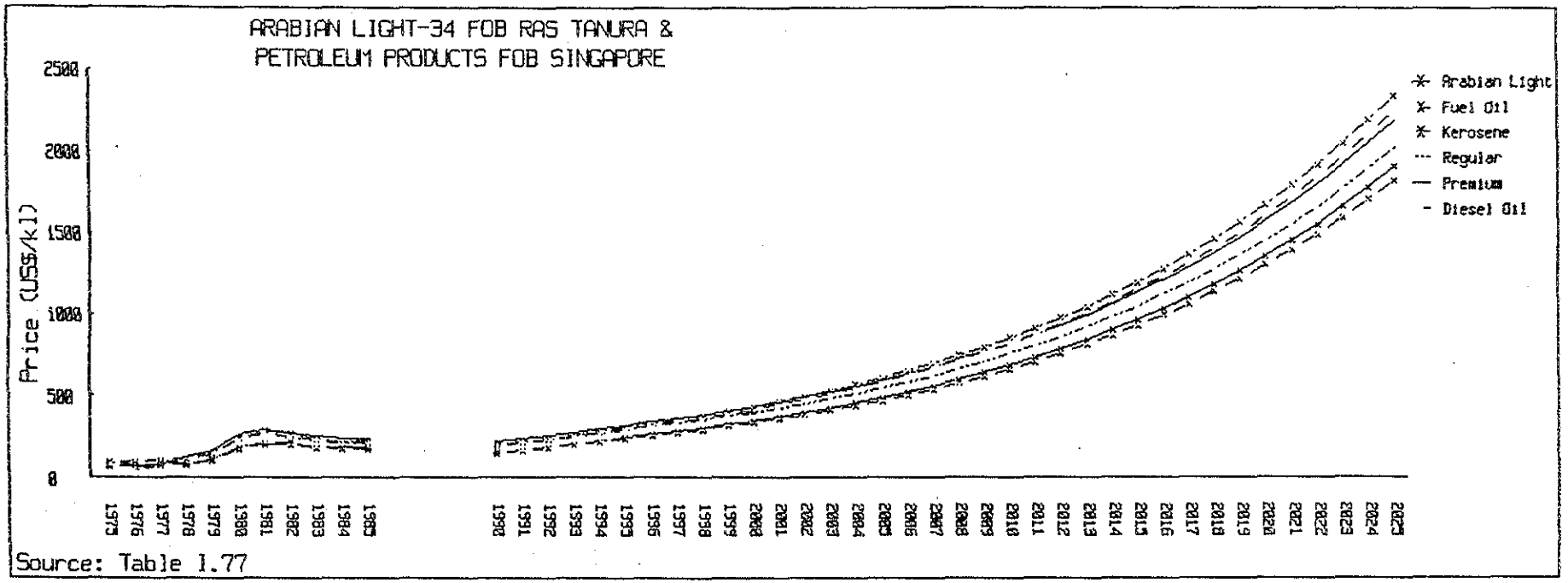
SOURCE: GPS

Figure I.17 ARABIAN LIGHT FOB RAS TANURA AND PET-PRODUCTS FOB SINGAPORE PRICES (1975-2025) (1)



Source: Table I.77

Figure I.17 ARABIAN LIGHT FOB RAS TANURA AND PET-PRODUCTS FOB SINGAPORE PRICES (1975-2025) (2)



Source: Table I.77

Figure I.18 SCHEMATIC DIAGRAM OF DUYONG GAS FACILITIES

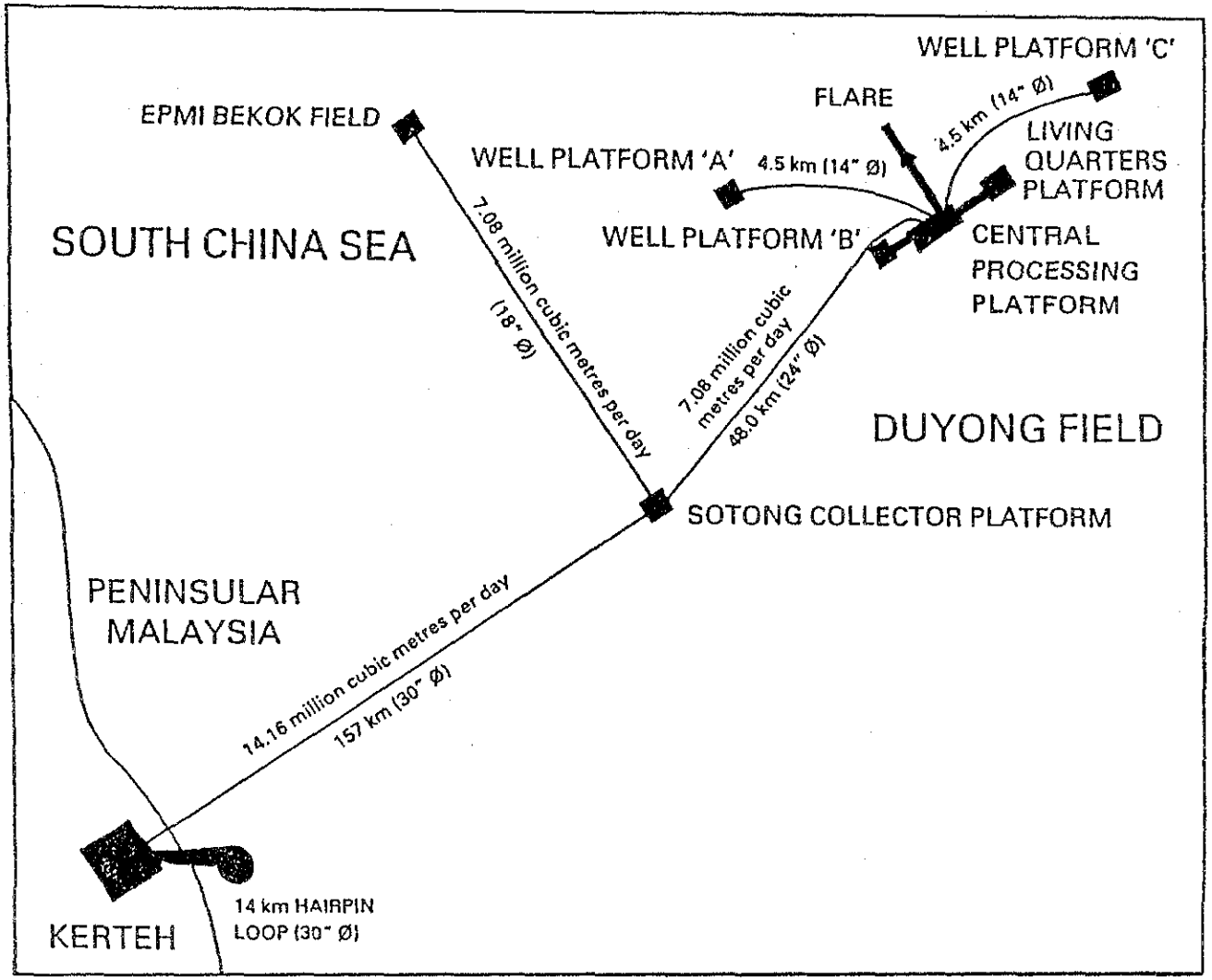
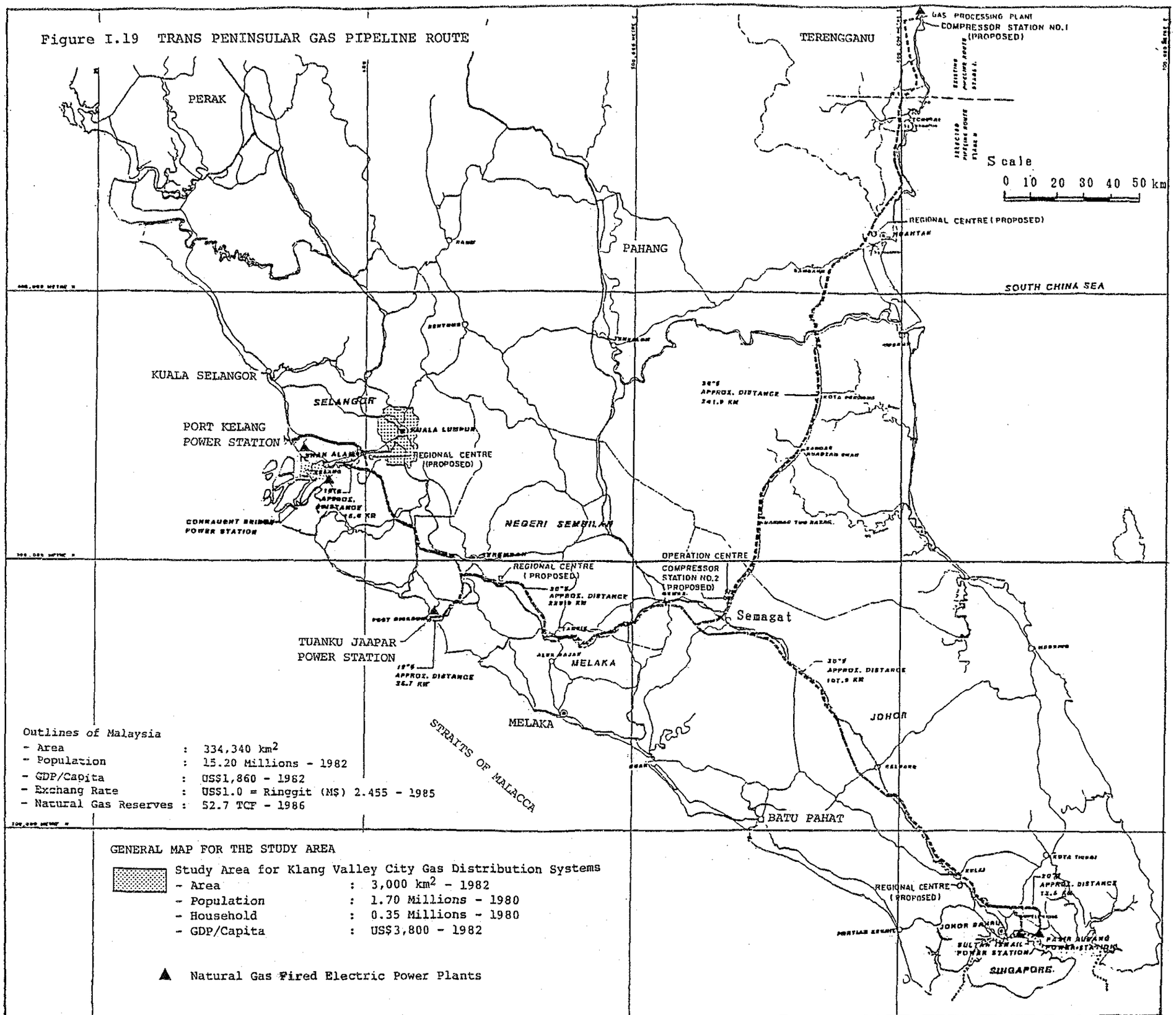


Figure I.19 TRANS PENINSULAR GAS PIPELINE ROUTE



Outlines of Malaysia

- Area	:	334,340 km^2
- Population	:	15.20 Millions - 1982
- GDP/Capita	:	US$1,860 - 1982
- Exchang Rate	:	US$1.0 = Ringgit (M$) 2.455 - 1985
- Natural Gas Reserves	:	52.7 TCF - 1986

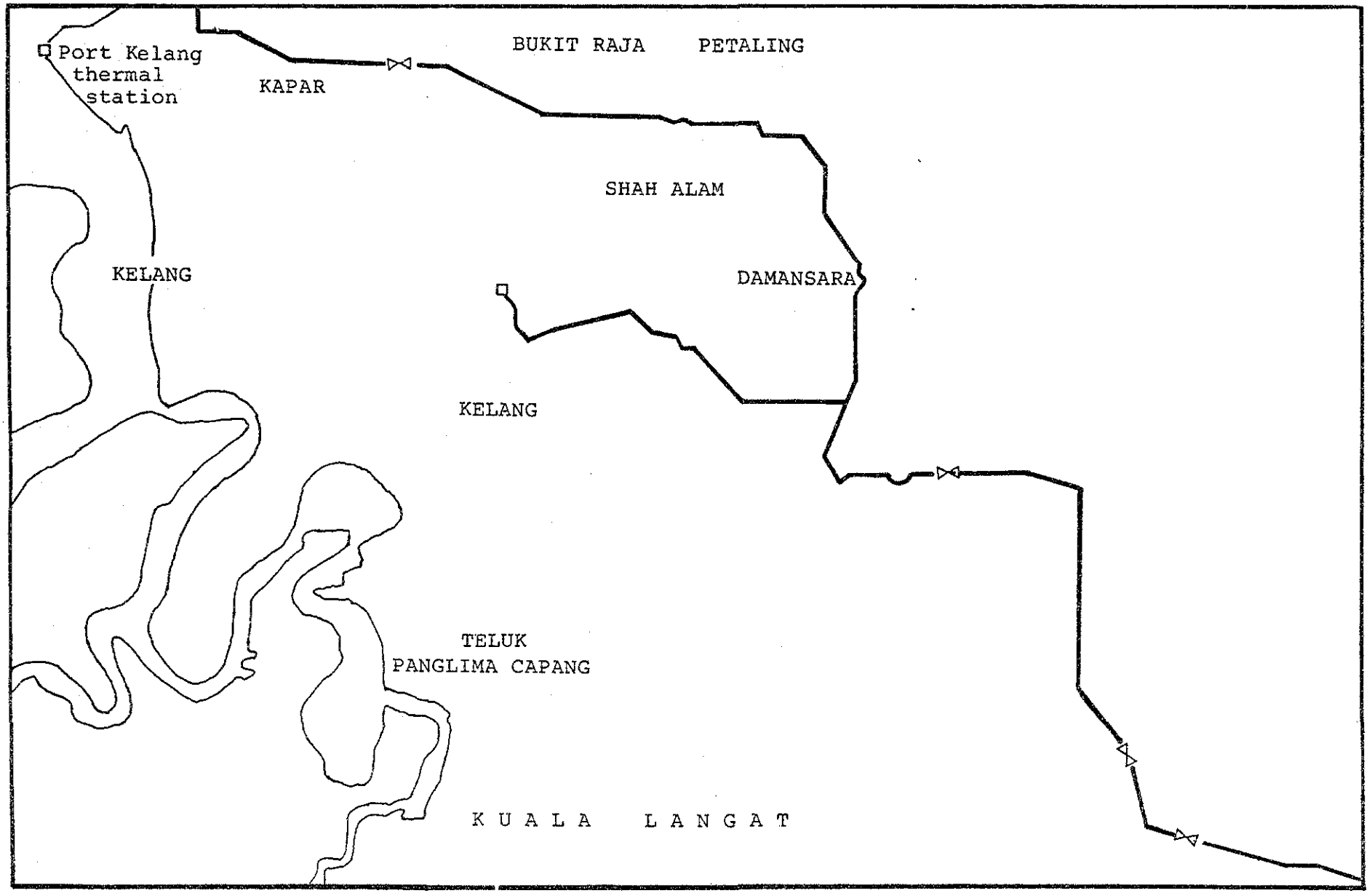
GENERAL MAP FOR THE STUDY AREA

Study Area for Klang Valley City Gas Distribution Systems

- Area	:	3,000 km^2 - 1982
- Population	:	1.70 Millions - 1980
- Household	:	0.35 Millions - 1980
- GDP/Capita	:	US$3,800 - 1982

▲ Natural Gas Fired Electric Power Plants

Figure I.20 ROUTE OF PIPELINE IN KLANG VALLEY AREA



PART II DEMAND FORECAST OF CITY GAS

Part II DEMAND FORECAST OF CITY GAS

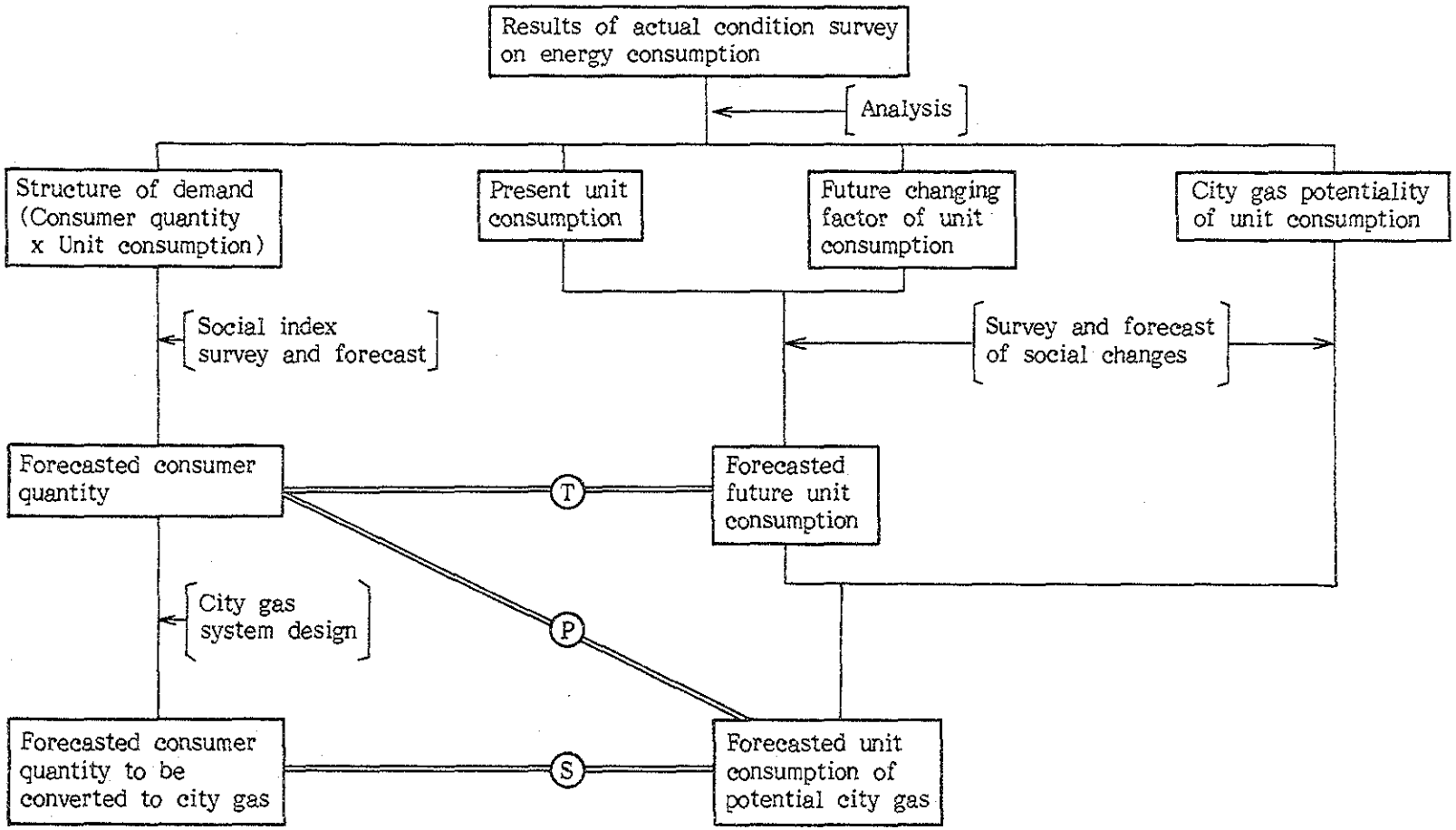
Chapter 1 METHOD OF DEMAND FORECAST

1.1 Demands to be Forecasted

All energy demands of all purposes in the Klang Valley area that can possibly be converted to city gas will be the subject of the forecast. They are shown in the following Table:

Sector	Subsector	Use
Household		Cooking
		Shower
Commercial	Restaurant	Cooking
	Hotel	Heating (except electricity)
Industrial	Manufacturing industry	Heating (except electricity)

1.2 Outline of Demand Forecast Method



T : Forecast of total energy demand
P : Forecast of potential demand for city gas
S : Forecast of sales volume of city gas

1) The energy consumption status will be investigated in respect of the types of demand shown in the Table of 1.1 above, and then the structure of the demand will be established on the basis of the results obtained. The establishment of the demand structure means breaking down the demand into the consumer quantity and the unit consumption, either of which can be investigated separately from the other, to enable an efficient estimation of the demand. The demand structure was established in that manner not because it was theoretically correct but because the adopted elements, namely the number of consumer units and the unit consumption could be actually obtained with sufficient accuracy within the limited time allowed for the survey. The number of consumer units for each type of demand is characterized as follows:

Use of city gas	No. of consumer units
Household	Population
Restaurant	No. of customer seats
Hotel	No. of guest rooms
Industrial	——
Building cooling	Floor area of commercial buildings
CNG for automobiles	——

Note: 1) In the case of Industrial use, the consumer unit could not be separated as it involved various and complicate consumption patterns.

2) In the case of CNG for automobiles, the forecast was obtained from PGSB.

2) The energy consumption amount of each consumer unit established, i.e. the unit consumption, was obtained from the results of the energy consumption status survey. At the same time, its composition by energy type and its interrelation with social indices were analysed and the models of its future changes and of its conversion to city gas were assumed.

3) Surveys and estimations of social changes such as changes in Gross Regional Product and income levels, which are necessary in making forecasts on the basis of the above-mentioned models, were conducted and the future unit consumption of total energy and the future unit consumption of potential city gas were estimated.

4) Then, the consumer quantities established in 1) above was estimated based on various social and economic plans including all the Klang Valley area until the year 2005. If the consumer quantity in all the Klang Valley area thus estimated is multiplied by the unit consumption of total energy, the product will be the total energy demand, which will be so referred hereinafter in this report. Likewise, the product of the total number of consumer units and the unit consumption of potential city gas will be the potential city gas demand. The forecast of the total energy demand and the potential city gas demand will be explained in Chapter 2 hereof.

5) The conceptional design of the Integrated Gas Distribution System was performed as described in Part 3, and based on the result thereof, the amount, out of the total number of consumer units, that will be incorporated into the said system was estimated by district and by year. This figure will be used as the number of city gas consumers. The product of this and the unit consumption of potential city gas is the city gas demand to be forecasted.

1.3 Potential Demand for City Gas

After closely examining the results of the surveys on the actual situations of energy consumption, we took the potential city gas demand in energy consumption in each sector as follows. Here we assumed that the price of city gas for household and restaurant would be equivalent to that of LPG sold in cylinder and that for hotel and industry to that of bulk supply LPG.

Use	Household	Restaurant	Hotel/Industry
City gas price	Cylinder LPG price	Cylinder LPG price	Bulk LPG price
Potential city gas portion in total energy demand	(1) LPG consumption (2) Part of kerosene consumption (As effect of city gas introduction) (3) Consumption by 1/2 of hot shower to be newly installed	LPG consumption	LPG consumption

1.4 Study on Additional Potential Demands for City Gas

In addition to the above potential city gas demand, we took into account the following demands which were regarded to have some possibility to be converted to city gas either in case that a city gas price vary favorable for them was realized or that special efforts were concentrated on marketing of city gas in those fields.

Sector	Use	Energy to be replaced
Industrial	Heating	Fuel oils
Commercial	Building cooling	Electricity
Transportation	CNG-powered automobile	Petrol

Chapter 2 DEMAND BY HOUSEHOLD

2.1 Survey on Energy Consumption

2.1.1 Survey Method

A survey on household energy consumption was made by interviewing over 450 random samples from the households in Klang Valley.

The inquiries on energy consumption showed the following:

1) Consumption of energy by kind.

2) Expenditure for energy by kind (For confirmation of 1.).

3) Use of hot showers at present and predicted future trends.

4) Use of air-conditioning equipment at present and predicted future trends.

5) Preference of type of fuels (Especially, views on using gaseous fuels).

In addition to the above, the respondents were also surveyed for type of housing and possession of durable consumer goods. (The questionnaire is shown in ANNEX.) The number of effective samples was 410, made up as shown in Table II.1.

2.1.2 Survey Results

(1) Total Consumption for Cooking

The results of the survey are summarized in Table II.2 through Table II.6. The energy consumption for cooking per capita was 36.3 x 10^3 kcal/month. However, when the consumption was broken down by ethnic group, distinct differences could be seen between them. Indians consume the largest volume, followed by Malay and then Chinese.

(Unit: 10^3 kcal/month)

Malay	Chinese	Indian
36.6	30.3	49.3

When the consumption was broken down by income level, a tendency was seen that the households with an income level of less than M$ 750 per month consumed larger volumes. However, as can be seen from Table II.3 through II.6, there is little difference of consumption among households of different income levels within the same ethnic group. Therefore, it was determined that the consumption differences by income level mentioned in the above were a reflection of ethnical characteristics.

(Unit: 10^3 kcal/month)

- M$ 750	M$ 751 - 1500	M$ 1501 -
43.2	33.9	33.1

Further, certain fluctuation in consumption volume was seen among households of different sizes. There was a tendency that as the household size exceeds a certain limit, the consumption per capita tends to decrease. However, the difference seen was not more than 10%, and therefore it was determined that it would not be a cause of a substantial error as long as the per capita energy consumption amount is used as an elemental unit of consumtion in the demand forecast.

(2) Consumption of Energy by Kind for Cooking

The per capita consumption of energy by kind for cooking on the average of all samples investigated was as follows:

(Unit: 10^3 kcal/month) (%)

LPG	Kerosene	Charcoal	Total
21.3	12.0	3.0	36.3
(59)	(33)	(8)	(100)

Of the above numbers, the LPG consumption, which occupies approximately 60% of the total consumption and is thought to be most easily converted to city gas, is broken down by income level and ethnic group as follows:

(Unit: 10^3 kcal/month)

- M$ 750	M$ 751 - 1500	M$ 1501 -	Total
15.6	21.1	27.8	21.3

(Unit: 10^3 kcal/month)

Malay	Chinese	Indian	Total
21.4	22.0	18.4	21.3

The influence of income is distinct. The class with an income of M$ 1,500 or more consumes almost twice as much energy as the class with an income of M$ 750 or less, and this difference certainly cannot be ignored. It was found that as far as the total energy for cooking was concerned, the differences by ethnic groups were conspicuous but they were levelled off as far as the LPG consumption was concerned.

(3) Hot Shower

The hot shower spread ratio is 15.6% on the average, however the following differences were found among households of different income levels.

(Unit: %)

- M$ 750	M$ 751 - 1500	M$ 1501 -
5.1	11.4	35.0

The details will be shown in Table II.7.

2.2 Total Energy Demand

2.2.1 Unit Consumption for Cooking

The consumptions by ethnic group shown in 2.1.2 were assumed to be the household unit consumptions for cooking. It was also assumed that these figures do not change from year to year. The average unit consumption by district was constructed on the basis of these unit consumptions and the ethnic group composition ratios by district (year 1900 and 2000) given in Table II.8. The results showed that the difference between the largest value and the smallest was about 2%.

However, when the whole area of Klang Valley was envisaged, the difference between the year 1900 and 2000 was not more than 0.1%, showing that the influence of the ethnic group composition ratios is very small.

It was therefore assumed that for the purpose of the demand forecast the error would be negligible even the same ethnic group composition ratio was used all over the area throughout the entire period. The household unit energy consumption for cooking in Klang Valley was calculated as follows (adopting the 1900 average ethnic group composition ratio):

$$36.6 \times 0.417 + 30.3 \times 0.441 + 49.3 \times 0.142 = 35.6$$

(10^3 kcal/capita/month)

2.2.2 Unit Consumption for Hot Shower

It is assumed that the hot shower spread ratios by income level described in 2.1.2 do not change. On the other hand, the income level composition is thought to change for the three cases of economical growth as shown in Table II.9. Accordingly, the average hot shower spread ratio may change as follows:

(Unit: %)

Case	1985	1990	1995	2000	2005
Base	16.3	17.6	18.9	20.2	21.6
Medium	16.3	16.8	17.3	18.9	20.6
Low	16.3	16.3	16.3	16.3	16.3

As the energy consumption per person per day can be assumed to be approximately 1,000 kcal, the energy consumption per capita in a household using a hot shower would be approximately 365 x 10^3 kcal/ capita/year.

$$\frac{2\ (\text{time/day}) \cdot 25(\ell/\text{time}) \cdot 15(°C) \cdot 1(\text{KCal}/\ell°C)}{0.75\ (\text{efficiency})} = 1{,}000\ (\text{KCal})$$

Therefore, the average energy consumption for hot shower will be given as follows:

(Unit: kcal/capita/year)

Case	1985	1990	1995	2000	2005
Base	59.5	64.3	68.8	74.1	78.9
Medium	59.5	61.4	63.1	69.1	74.4
Low	59.5	59.5	59.5	59.5	59.5

2.2.3 Size of Demand in Klang Valley

The total household energy demand of Klang Valley will be given by the above unit consumption and by the population given in Table II.10 as follows:

(Unit: 10^9 kcal/year)

	Cooking	Shower			Total		
		Base	Medium	Low	Base	Medium	Low
1985	1084	151	151	151	1235	1235	1235
1990	1404	211	201	195	1615	1605	1599
1995	1685	271	249	234	1956	1934	1919
2000	2036	353	329	283	2388	2364	2319
2005	2331	430	405	324	2761	2737	2655

The detail values are summarized in Table II.13 through II.15.

These figures can be converted to natural gas volumes (9876 kcal/Nm^3) as follows.

(Unit: 10^6 Nm^3/year)

	Cooking	Shower			Total		
		Base	Medium	Low	Base	Medium	Low
1985	109.7	15.3	15.3	15.3	125.0	125.0	125.0
1990	142.2	21.4	20.4	19.8	163.5	162.6	161.9
1995	170.6	27.4	25.2	23.7	198.0	195.8	194.3
2000	206.1	35.7	33.3	28.7	241.8	239.4	234.8
2005	236.0	43.5	41.1	32.8	279.5	277.1	268.8

2.3 Potential Demand for City Gas

2.3.1 Unit Consumption for Cooking

It was assumed that the LPG consumption would entirely be converted to city gas. The LPG consumptions by ethnic group and income level obtained by the energy consumption survey are as follows:

(Unit: 10^3 kcal/capita/month)

	- M$ 750	M$ 751 - 1500	M$ 1501 -
Malay	16.4	22.8	25.0
Chinese	18.3	18.9	29.2
Indian	13.0	23.4	29.2

The following distributions by ethnic group and by income level were also assumed:

	- M$ 750	M$ 751 - 1500	M$ 1501 -	Total
Malay	0.1626	0.1382	0.1162	0.4170
Chinese	0.1087	0.1708	0.1615	0.4410
Indian	0.0867	0.0306	0.0247	0.1420
Total	0.3580	0.3396	0.3024	1.0000

Based on the above assumptions, the following values were constructed as the average LPG consumptions by income level:

- M$ 750	M$ 751 - 1500	M$ 1501 -	
16.17	20.88	27.56	(10^3 kcal/capita/month)
194.1	250.6	330.7	(10^3 kcal/capita/year)

Assuming that these values will be retained over years, the average LPG consumption, the income rank distribution of Table II.9 being taken into account, may change as follows:

(Unit: 10^3 kcal/capita/year)

Case / Year	1985	1990	1995	2000	2005
Base	254.6	260.7	266.6	273.3	279.6
Medium	254.6	257.0	259.2	267.0	273.9
Low	254.6	254.6	254.6	254.0	254.6

As the LPG consumption increases according to the income increase, a part of kerosene consumption (135.1 kcal/capita/year) shifts to city gas. However, its percentage at maximum (for Base Case) is not more than 18% (75 kcal/capita/year). The assumption that the remaining kerosene consumption share will continue to exist for a long time after city gas introduction to the Klang Valley area, underestimates the advantage of city gas.

Supposing that, after introduction of city gas, the kerosene consumption will be replaced by city gas at the rate of 3% every year, the kerosene replacement ratios up to the year 2005 by predicted economical growth case will be as follows:

(Unit: 10^3 kcal/capita/year)

Case	City gas introduction	Conversion due to income increase	Conversion due to city gas effect	Total kerosene replacement	
Base	1992	25.0	59.7	84.7	(62%)
Medium	1995	19.3	46.0	65.3	(48%)
Low	1995	0	46.0	46.0	(34%)

The final city gas conversion ratios of the energy for cooking obtained by incorporating the above values into the 2005 LPG consumption forecast values are as follows:

(Unit: 10^3 kcal/capita/year)

Case	Energy for cooking	City gas conversion amount	(Ratio)
Base	427.6	339.3	(79%)
Medium	427.6	319.9	(75%)
Low	427.6	300.6	(70%)

The above city gas conversion ratios fall well short of the present LPG consumption household ratios found as a result of the survey (the ratio of the number of houses using LPG only plus the number of houses using LPG and other fuels against the total number of houses ... See Table II.11), so they can be considered to be reasonable assumptions.

Therefore, the assumption of 3% conversion per year from kerosene to city gas will be adopted in the forecast of the potential city gas demand by households for cooking. The unit potential city gas demand for cooking, the above assumption being taken into account, will be as follows:

(Unit: 10^3 kcal/capita/year)

Case / Year	1985	1990	1995	2000	2005
Base	254.6	260.7	280.4	310.1	339.3
Medium	254.6	257.0	259.2	290.0	319.9
Low	254.6	254.6	254.6	277.6	300.6

2.3.2 Unit Consumption for Hot Shower

It is assumed that 50% of the hot shower heaters to be newly installed will use city gas. Therefore, in the case of new demand to be generated in areas where city gas has already been introduced, 50% of the entire energy demand by hot showers will be a potential demand for city gas as follows:

(Unit: 10^3 kcal/capita/year)

Case / Year	1985	1990	1995	2000	2005
Base	29.8	32.1	34.4	37.0	39.4
Medium	29.8	30.7	31.6	34.5	37.2
Low	29.8	29.8	29.8	29.8	29.8

In the case of demand existing before introduction of city gas (existing demand), the potential demand for city gas will be obtained by reducing the above value by the corresponding value at the time of gas introduction into that area. Please refer to Table II.12 for details.

2.3.3 Size of Demand in Klang Valley

The potential city gas demand by households in Klang Valley will be calculated on the basis of the above unit consumption values and the populations given in Table II.10 as follows:

(Unit: 10^9 kcal/year)

Kind /	Cooking			Shower			Total		
Year/ Case	Base	Medium	Low	Base	Medium	Low	Base	Medium	Low
1985	645	645	645	75	75	75	720	720	720
1990	856	844	836	106	101	98	961	944	934
1995	1105	1021	1003	135	124	117	1240	1145	1120
2000	1476	1380	1321	176	164	142	1652	1545	1463
2005	1849	1743	1638	215	203	162	2064	1946	1800

The above figures can be converted to natural gas volumes (9876 kcal/Nm^3) as follows:

The detail values are summarized in Table II.16 through II.18.

(Unit: 10^6 Nm^3/year)

Kind /	Cooking			Shower			Total		
Year/ Case	Base	Medium	Low	Base	Medium	Low	Base	Medium	Low
1985	65.3	65.3	65.3	7.6	7.6	7.6	72.9	72.9	72.9
1990	86.7	85.4	84.6	10.7	10.2	9.9	97.3	95.6	94.5
1995	111.9	103.4	101.5	13.7	12.6	11.9	125.6	116.0	113.4
2000	149.5	139.7	133.8	17.9	16.6	14.3	167.3	156.4	148.1
2005	187.2	176.5	165.9	21.8	20.5	16.4	209.0	197.0	182.3

Chapter 3 DEMAND BY RESTAURANT

3.1 Survey on Energy Consumption

3.1.1 Survey Method

A survey was conducted by interviewing 200 restaurants taken at random from the lists of restaurants in five major commercial areas - Federal Territory, Petaling Jaya, Shah Alam, Klang Municipality and the Gombak Conurbation Area. The main inquiry items in the survey are as follows. (The questionnaire is attached in ANNEX.)

a. Consumption of LPG
b. Consumption of other kinds of energy, if applicable
c. Number of customer seats
d. Number of employees

Emphasis was placed on the exact amount of LPG consumption, questioning both the weight of LPG used and the monthly expense for it.

The composition of the restaurants surveyed is shown in the table below.

COMPOSITION OF RESTAURANTS SURVEYED

Kind of restaurant / Area	Malay	Chinese	Indian	Others	Total
Federal Territory	4	28	7	1	40
Petaling Jaya	5	25	6	4	40
Shah Alam	26	9	4	0	39
Klang	16	23	2	0	41
Gombak	20	16	4	0	40
Total	71	101	23	5	200

3.1.2 Survey Result

The results of the survey are shown in Table II.19 and Table II.20. The average energy consumptions in equivalent natural gas volume per shop, per customer seat and per employee were calculated as follows respectively. The share of LPG in these energy consumption was 76.9%.

i) 5,282 Nm^3/shop
ii) 82.73 Nm^3/seat
iii) 852 Nm^3/employee

The figures ii) and iii) for different districts show relatively small fluctuation and can be regarded as specific values for energy consumption in restaurants. Since figure ii) shows more stability, we adopted it as the unit consumption to use in this study.

This unit consumption changes by ethnic type to some extent. It is higher for Chinese and Indian restaurants and lower for Malay. By district, that for Petaling Jaya are relatively higher than the others. This may be reflecting the existing ratio of ethnic type of restaurants.

However, since it was difficult for us to obtain more information as to the number of restaurants by ethnic type in various areas in Klang Valley, we took the average total of these figures as the unit consumption of energy in restaurants and applied it to all the districts in Klang Valley. Namely,

Total energy consumption in restaurants in natural gas volume(Nm^3)
= 82.73 x Number of customer seats in restaurants.

We assumed this unit consumption will stay constant until 2005, since we could not predict any changes in the type of food to be served in these restaurants, nor in the cooking methods.

3.2 Total Energy Demand

3.2.1 Unit Consumption

From the results of the survey, the unit consumption has been decided to 82.73 Nm^3/seat.

3.2.2 Number of Seats in Restaurant

(1) Restaurants excluding hawkers

Inquiries were made with the administrative authorities covering the Klang Valley area. For Kuala Lumpur the following data were obtained, but regrettably, no data corresponding to these could be obtained for other areas.

Old city	New city	Total
10,138	3,190	13,328

The number of employees working for restaurants is estimated by the Kuala Lampur Structure Plan as 24,844. With this figure, the number of employees per restaurant is calculated as 1.86. Accordingly, it is assumed that the numbers of restaurants for Kuala Lumpur include not only the restaurants of such size as covered by the interview survey (with their employees numbering 6.2 persons per shop on the average) but also smaller restaurants such as canteens. Their percentages are estimated as follows:

	Large scale restaurants	Small scale restaurants	Total
Number of restaurants	2,291	11,037	13,328
Number of employees	14,204 (6.2)	10,640 (1.0)	24,844 (1.86)

Note: Large scale restaurants are the restaurants whose scale is the same as that of restaurants covered by the interview survey. Figures in parentheses are the number of employees per restaurant.

On the other hand, from the results of the interview survey, we can see a proportional relationship between the number of employees and the number of customer seats available in the restaurants. With this relationship the number of customer seats in these restaurants are calculated as follows:

	Large scale restaurants	Small scale restaurants	Total
Number of restaurants	2,291	11,037	13,328
Number of seats available	146,280 (63.85)	109,564 (9.927)	255,844 (19.20)

Note: Figures in parentheses show the number of customer seats available per restaurant.

The numbers of restaurants in two separate areas in Kuala Lumpur areas listed below, showing a good proportional relationship with the size of employment in the respective areas:

Item / Area	(a) No. of restaurants	(b) Employment (10^3)	(c) = (a)/(b)	(d) Population (10^3)	(e) = (a)/(d)
Old city	10,138	421.1	24.1	677.7	15.0
New city	3,190	120.3	26.5	537.3	5.9
Total	13,328	541.4	24.62	1,215.0	10.97

A survey was conducted on the correlation between the number of restaurants and the size of employment in the Tokyo area to confirm this relationship, and the following data was obtained;

The interrelated coefficient between the number of restaurants and the size of employment is 0.85, whereas that between the number of restaurants and the population is 0.64.

From this, it is considered reasonable enough to assume that the number of restaurants and the size of employment are in direct proportion to each other.

The number of customer seats in restaurants (by district and year) can be obtained by multiplying the size of employment (by district and year) by the following coefficient:

472.6 seats/10^3 employment
(= 19.20 seats/restaurant x 24.62 restaurants/10^3 employment).

The respective coefficients for large and small restaurants are as follows:

270.2 seats/10^3 employment,
202.4 seats/10^3 employment.

(2) Hawkers

From Kuala Lumpur City Hall we obtained the number of licensed hawkers shown in Table II.21. Hawkers serving food are assumed to include all of the locked-stall hawkers and the hawkers inside commercial buildings and a quarter of the stationary hawkers. In total, they account for 20% of the licensed hawkers, and their number totals 2,687 units.

From the Klang Valley Structure Plan, we can see that the number of employees per hawker shop is 1.55. If we apply the figure of 10.3 seats covered by each employee, which was obtained in the interview survey, we can find out the number of customer seats per hawker shop is 15.96. Additionally, the number of hawkers is considered relevant to the size of employment in that area. By dividing the number of hawkers in Kuala Lumpur (2,687) by the size of total employment in the same area (541.4×10^3), we found that there are 4.96 hawkers per 10^3 employment.

From these findings, we calculated the coefficient for multiplying the size of employment to obtain the number of customer seats in hawkers as follows.

79.2 seats/10^3 employment
(= 15.96 seats/shop x 4.96 shops/10^3 employment).

(3) Size of employment

Based on the employment framework developed in the Klang Valley Transportation Study, the size of employment in Klang Valley by category, district and year were forecasted for the three cases of economical growth as shown in Table II.23 and II.24.

For the base and medium cases the same unemployment rate was assumed as shown below, resulting in the same employment forecast. Employment smaller than this by 5% was forecast for the low case with a higher unemployment rate assumed for the years after 1990. (See Table II.22)

Assumed unemployment rates (%)

	1980	1985	1990	1995	2000	2005
Base/Medium	5.7	7.0	6.5	6.0	5.5	5.0
Low	5.7	7.0	12.0	10.0	10.0	10.0

(4) Total number of seats in restaurants

Total number of seats calculated with the coefficients detailed in (1) and (2) in the above and for the employments forecast in (3) are given in the following. For the detail see Table II.25 and II.26.

Number of seats in restaurant

(Unit: 10^3 seats)

Year / Case	1985	1990	1995	2000	2005
Base/Medium	524	687	835	1,023	1,208
Low	524	647	800	980	1,145

3.2.3 Size of Demand in Klang Valley

By multiplying the number of seats in restaurants calculated in the above by the unit consumption, 82.73 Nm^3/seat, obtained through the interview survey, the following total energy demands are estimated for Klang Valley.

For details see Table II.27 and Table II.28.

Total Energy Demand

(Unit: 10^3 Nm^3/Year)

Case \ Year	1985	1990	1995	2000	2005
Base/Medium	43,366	56,832	69,112	84,631	99,970
Low	43,366	53,450	66,144	81,071	94,720

These total energy demands by restaurant are approximately 40% of the energy demand for cooking in household. The corresponding rate in Tokyo is 43%.

3.3 Potential Demand for City Gas

3.3.1 Unit Consumption

As to the potential demand for city gas, only the LPG consumption out of the total energy consumed by restaurants is considered to be converted to city gas. This amount of LPG occupies 76.9% of the total energy and the value per seat is 63.64 Nm^3/year.

3.3.2 Size of Demand in Klang Valley

Table II.29 and Table II.30 show the potential demand by restaurants. It is summarized as follows:

Potential Demand for City Gas

(Unit: 10^3 Nm^3/Year)

Year / Case	1985	1990	1995	2000	2005
Base	33,360	43,718	53,165	65,102	76,902
Low	33,360	41,154	50,882	62,364	72,863

Chapter 4 DEMAND BY HOTEL

4.1 Survey on Energy Consumption

4.1.1 Survey Method

The consumption of energy other than electricity in hotels was investigated with regard to hotels that had over 100 rooms.

The number of hotels investigated was six. The questionnaire is attached in ANNEX.

Hotels which have less than 100 rooms are omitted because their consumption is only expected to be equivalent to that of a large restaurant.

4.1.2 Survey Result

The results of the survey are shown in Table II.31.

Fuel consumption per room has a tendency to increase in accordance with the scale of the hotel. However, the average number of rooms in the hotels investigated (420) is comparable to that of the average number (about 300) of rooms of the existing hotels with 100 rooms and over. It seems reasonable to take the average fuel consumption per room in this survey as the standard unit of consumption of energy other than electricity in hotels. 1,138 Nm^3/room is consumed in a year.

The LPG share in total fuel consumption is 21.7% on average, excepting sample No. 1 (Direct bulk supply by PDSB).

The LPG consumption is 247 Nm^3 in equivalent natural gas volume per room in a year.

It is not expected that this unit consumption will change in the near future.

4.2 Total Energy Demand

4.2.1 Unit Consumption

Based on the survey result, 1,138 Nm^3/room is assumed to be the unit consumption of total energy except electricity in hotels.

4.2.2 Number of Rooms in Hotels

The existing number of rooms of hotels was obtained from the data supplied by Tourist Development Corporation. The number of guest rooms in future was predicted by using the growth rate of hotels given in the Kuala Lumpur Structure Plan.

Present number of guest rooms (Hotel list from Tourist Development Corporation)

District	Number of Rooms	Notes
Federal Territory	5,852	Located in City Center
Petaling Jaya	712	Located in City Center and Suban Airport
Total	6,564	

Growth rate of the number of guest rooms (Kuala Lumpur Structure Plan)

Year	1985	1990	2000
Growth Rate	1	1.27	2.12

4.2.3 Size of Demand in Klang Valley

The numbers of guest rooms in hotels with more than 100 rooms are predicted as follows.
These hotels are likely to be constructed in future also in the town centers where many hotels are concentrated at present.

(Unit: Rooms)

Year / District	1985	1990	1995	2000	2005
Federal Territory	5,852	7,455	9,930	12,401	14,876
Petaling Jaya	712	907	1,208	1,508	1,809
Total	6,564	8,362	11,138	13,909	16,685

By multiplying the figures in the above by 1,138 Nm^3/room/year, the total energy demand are calculated as follows.

(Unit: 10^3 Nm^3/year)

Year / District	1985	1990	1995	2000	2005
Federal Territory	6,660	8,484	11,300	14,112	16,929
Petaling Jaya	810	1,032	1,375	1,716	2,059
Total	7,470	9,516	12,675	15,828	18,988

4.3 Potential Demand for City Gas

4.3.1 Unit Consumption

The LPG consumption, 247 Nm^3/room/year, can be regarded as the consumption of city gas in all the energy consumption in hotels.

4.3.2 Size of Demand in Klang Valley

Potential demand for city gas is listed below.

(Unit: 10^3 Nm^3/year)

Year / District	1985	1990	1995	2000	2005
Federal Territory	1,445	1,841	2,453	3,063	3,674
Petaling Jaya	176	224	298	372	447
Total	1,621	2,065	2,751	3,435	4,121

Chapter 5 DEMAND BY MANUFACTURING INDUSTRY

5.1 Survey on Energy Consumption

5.1.1 Survey Method

421 manufacturing industries were picked out in the Klang Valley area from the lists of companies shown below. The actual conditions of energy consumption was investigated by questioning by telephone and in-depth survey by interviews.

a. Federation of Malaysian Manufacturers Directory: 346 factories were chosen from this list.

b. Industrial Estates in Peninsular Malaysia: 75 factories of over 0.1 MMCF/D of energy consumption were chosen.

The main questions of the investigation are as follows, and are also shown in ANNEX.

a. Product, production amount and number of employees
b. Consumption of each kind of energy
c. Use of energy
d. Specifications of main equipments

A total of 270 cases were investigated, including 50 cases by personal visits and 220 cases by telephoning.

The following data were obtained from PGSB. These data brought additional information about the actual conditions of energy consumption in about 200 companies.

Name of data: Study of fuel consumption by manufacturing industries along the gas pipeline route in Peninsular Malaysia

5.1.2 Survey Result

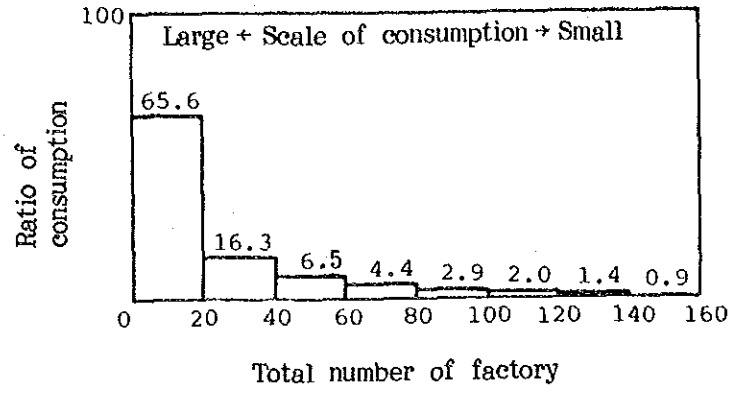
The information obtained from the telephoning survey, the interview survey and the data supplied by PGSB, covered 470 factories in Klang Valley. From them 159 factories with total energy demands (except electricity) equivalent to 100,000 Nm^3 of natural gas per year or larger were picked up and studied.

The energy equivalent to 242 million Nm^3 of natural gas is being consumed by these factories except for electric power. Only 6% of it is LPG, 22% is diesel oil and the rest is fuel oil as shown in the table below.

Energy consumed by manufacturing industry

Kind of energy		LPG	Diesel Oil	Fuel Oil	Total
Energy Consumption	10^3 Nm^3/year	14,980	53,152	174,217	242,349
	(%)	(6.18)	(21.93)	(71.89)	(100)

The following figure shows the scale comparison of the 159 factories. The factories are placed in order of the amount of energy consumed. The largest 20 factories are consuming 65.6% of the whole consumption, the next 20 factories 16.3% and the smallest 19 factories consume only 0.9%. We can see that, if a larger number of small factories was investigated, the total amount of energy used would only be a few percent more. This justifies the 159 factories with consumption of 100,000 Nm^3/year or larger picked up as the significant samples for our study.



More analysis are given in Table II.32 and II.33. Table II.33 contains the breakdown of energy consumption by the type of industries.

5.2 Total Demand Prediction

5.2.1 Method of prediction

If it is possible to predict the growth of each type of manufacturing industry in the Klang Valley area then it is possible to predict the future consumption of energy based on the present consumption rates by the type of industries in Table II.33. However such growth prediction by type of industry was not available, so our predictions of future consumption was made on the following assumptions.

a. The consumption of energy in manufacturing industry will increase in all the Klang Valley area in proportion to the GRP of manufacturing (GRPM).

b. The new consumption grows in 45 zones which have industrial estates authorized by the land use plans in the Klang Valley Perspective Plan and in other structure plans.

c. The increase of consumption in a certain district is in proportion to the increase in the employment in secondary industry in the zones with the industrial estates in that district.
Six districts, Federal Territory, Gombak, Hulu Langat, Petaling Jaya, Shah Alam and Klang were distinguished as having different coefficients of proportion, which are shown in Table II.34.

5.2.2 Results of Prediction

(1) GRPM is projected as follows for the three cases of economical growth, based on the Klang Valley Transportation Study.

GRP of manufacturing

(Unit: M$ million)

Case / Year	1985	1990	1995	2005
Base	4,082	5,511	7,561	13,129
Medium	4,082	4,980	6,872	11,916
Low	4,082	4,486	5,667	8,066

(2) For the employment in secondary industries, the figures projected in Table II.23 and Table II.24 are used.

(3) The following results whose details are shown in Table II.35 are obtained.

Prediction of total energy demand

(Unit: 10^3 Nm^3/Year)

Case / Year	1985	1990	1995	2000	2005
Base	242,349	327,189	448,898	614,185	779,471
Medium	242,349	295,664	407,992	557,724	707,455
Low	242,349	266,335	336,452	407,696	478,881

5.3 Potential Demand for City Gas

The potential demand for city gas will be sought by assuming that only the LPG, which occupies 6.18% out of the total energy demand, will be converted. Here the city gas sales price is assumed to be on the LPG bulk price level. The results as to different economical growth cases will be shown in the table below. The details thereof will be shown in Table II.36.

Potential demand for city gas

(Unit: 10^3 Nm^3/Year)

Case / Year	1985	1990	1995	2000	2005
Base	14,980	20,224	27,747	37,965	48,180
Medium	14,980	18,276	25,219	34,474	43,729
Low	14,980	16,463	20,797	25,200	29,601

Further, as additional demands, the following two cases will be assumed within the Base Case of economical growth:

a. High estimate — It is assumed that the total amount of Diesel Oil and Fuel Oil, which occupies 93.8% of the total energy demand, will be converted to city gas with the city gas sales price being on the fuel oil price level.

b. Low estimate — It is assumed that one-half of Diesel Oil and Fuel Oil, namely 46.9% of the total energy demand, will be converted to city gas with the city gas sales price being on the fuel oil price level.

The potential demand for city gas in these cases will be shown in the following Table. The details thereof will be shown in Table II.37 and II.38.

Additional demand for city gas in manufacturing industry

(Unit: 10^3 Nm^3/year)

Case / Year	1985	1990	1995	2000	2005
High	227,372	306,969	421,156	576,228	731,300
Low	113,686	153,484	210,578	288,113	365,650

Chapter 6 DEMAND BY COOLING OF BUILDINGS

6.1 Total Energy Demand

6.1.1 Unit Consumption

The unit consumption for building cooling demand will be given by the following equation.

$$U = L \times H \div \alpha$$

U is the unit consumption kcal/m^2 · year and means the annual energy consumption per unit floor area of the building. L is the cooling load (kcal/m^2 · h), used frequently in air-conditioning design. H is the annual cooling hour (h/year) and expressed in terms of equivalent peak load operation hour. And α is the efficiency ratio of the cooling machines and equipment and also called coefficient of performance (C.O.P.).

The cooling load L was assumed to be 100 kcal/m^2 · h based on the air-conditioning design experience of two or three buildings in the Klang Valley area. This value is the same as the value used in Tokyo. The factors that may increase this value in the Klang Valley area in comparison with that in Tokyo are:

a. The average outdoor air temperature during the air-conditioning season is a little higher. (K.V. 33°C, Tokyo 32°C)
b. The room temperature setting is lower. (K.V. 25°C, Tokyo 28°C)

Onthe contrary, the factors that may decrease the value of the Klang Valley area are:

a. The sunlight amount is less. (The sun is higher than in Tokyo, hence a shorter hour of the sunlight penetration through windows.)

b. Buildings can be so designed as to suit cooling only.
(Use of heat ray absorptive glass)

Weighing the above positive and negative factors, the adoption of the design cooling load value equal to the Tokyo value must be a reasonable choice.

The annual cooling hour (H) expressed in terms of equivalent peak load operation hour was assumed to be 1,500 hours. It was thought that the Klang Valley value would be at least 3 times the corresponding value of in Tokyo, which is 500.

The efficiency of the cooling equipment (α) was assumed to be 1.0 based on the experience with gas absorption type chillers.

Therefore, the unit consumption will be:

$100\ kcal/m^2 \cdot h \times 1,500\ h/year \div 1 = 150,000\ kcal/m^2 \cdot year$

If converted to city gas, $15.19\ Nm^3/m^2 \cdot year$.

6.1.2 Floor Area

As the total floor areas the commercial and office floor space, which is shown below, were taken from the Klang Valley Perspective Plan.

Commercial and Office Floor Space (Unit: $10^3 m^2$)

	1980	1990
Commercial Floor	7,436	14,030
Office Floor	6,582	10,453
Total	14,018	24,483

The areal and annual progression of the total floor areas shown in the table below intimates an interrelation between the total floor area and the employment in tertiary industry. Therefore, the total floor area was sought by multiplying the employment in tertiary industry by the average correlation factor between the floor area and the employment, which was 28.45 m^2/person.

Interrelation between Floor Area and Employment in Tertiary Industry

Year	District	Total floor area*2 (10^3m^2)	Employment III (10^3 person)	Floor area per employment III (m^2/P)
1985*1	K.V.	18,526	634.4	29.2
1990	K.L.	14,623	528.9	27.7
	P.J.	3,945	130.0	30.3
	S.A.	1,657	48.0	34.5
	Others	4,258	153.7	27.7
1990	Total	24,483	860.6	28.45

*1 Interpolated with the use of a fixed rate based on the values of 1980 and 1990.

*2 From the Klang Valley Perspective Plan

*3 From the Klang Valley Transportation Study

6.1.3 Size of Demand in Klang Valley

The energy demand in Klang Valley is shown in the table below. In addition, the estimation of floor areas in Klang Valley will be shown in detail in Table II.39 and the estimation of energy demand in Klang Valley in detail in Table II.40.

Floor Area and Energy Demand for Cooling

Year	1985	1990	1995	2000	2005
Total floor area ($10^3 m^2$)	18,049	24,484	30,393	37,884	45,540
Energy demand (10^3 Nm^3/Y)	274,159	371,913	461,672	575,458	691,751

6.2 Potential Demand for City Gas

6.2.1 Potentiality of Cooling by City Gas

At the present time, only electric power is used for cooling in the Klang Valley area. Cooling by city gas is compared with cooling by electricity both in Klang Valley as follows:

a. The overall energy efficiency is approximately the same in both cases.

City gas	Cooling equipment efficiency = 1
Electricity	Power generation efficiency 0.33 x Cooling equipment efficiency 3 = 1

b. The energy cost depends on the energy sales prices.
In order to equalize the costs of gas and electricity, it is necessary to eliminate or offset the difference of the cooling equipment efficiencies (1 : 3). This difference can be eliminated if the sales price of 1 KHW of electricity is equal to that of 2,580 kcal of city gas (0.26 Nm^3).

1 KWH = 860 kcal
3 x 860 kcal = 2,580 kcal

c. The installation cost depends on the equipment annual sales quantity and the sales promotion policies including subsidies. It is thought that in Tokyo the gas cooling equipment, which serve about a half of the total large-scale cooling there, are about on the same price level with the electric cooling equipment. However, the modification of existing installations will require an additional cost for additional cooling tower capacity and installation of a smoke stack.

d. Cooling by city gas is advantageous when the scale of cooling exceeds 50 RT (1,500 m^2 of floor area). In the case of small-scale cooling, especially of residences, electrical cooling is still advantageous in respect of efficiency and installation cost, though such cooling by gas is now in the stage of development and field testing.

e. The Klang Valley area will eventually have the same original source of energy for both gas cooling and electrical cooling when the electric power plants convert fuel to natural gas. Since the overall efficiencies of both cooling systems are the same, gas and electricity will be even in energy saving. A difference is that in case of electricity, natural gas will be spent at power plants only while in case of city gas, its consumption will be dispersed over the Klang Valley area.

The above comparison between city gas cooling and electrical cooling concludes that the competitive power of city gas in this field when it is left to take its own course, may not be so strong as to drive out electricity. Nevertheless, replacing the cooling electricity is a very tempting market to city gas companies and they are expected to make special business efforts for realizing this market. The efforts should be aimed at favorable gas pricing for cooling, reduction of equipment cost and technical assistance for building owners and construction designers. If these efforts work, there will be a demand for city gas in this enormous building cooling sector.

6.2.2 Size of Demand in Klang Valley

The potential demand from building cooling in the Klang Valley area was assumed as follows.

1) The period before 1996 will be the preparatory period for selling city gas cooling.

2) City gas cooling will be applied only to the commercial and office floor to be newly built after 1996.

3) The following ratio of the objective floor area will be obtained by city gas
   High case ..... 50% constant
   Low case ..... 4% for 1996, increasing by 4% annually and attaining to 40% at 2005

4) City gas cooling will be concentrated to 30 highly commercial zones, where large-scale buildings are expected to be constructed.

The estimates on this assumption are shown in the table below, and the details thereof are shown in Table II.41 and II.42.

Potential Demand for Cooling (Unit: 10^3 Nm^3/Year)

Case / Year	1985	1990	1995	2000	2005
High	0	0	0	31,429	66,206
Low	0	0	0	6,971	27,810

Chapter 7 DEMAND BY C.N.G.

C.N.G. is an abbreviation of Compressed Natural Gas, which is made by compressing natural gas under a high pressure (normally 150 - 200 kg/cm^2) and filling it into cylinders to be used by automobiles as fuel.

PGSB has furnished the data on potential demand of C.N.G. as shown in Table II.43. Their figure are converted to city gas as follows:

Potential Demand for C.N.G. (Unit: 10^3 Nm^3/Year)

Year	1985	1990	1995	2000	2005
Demand	0	0	19,621	93,446	154,661

Assuming that the size of this potential demand will be in proportion to the total of the population and the employment of the area in each year, the zonal distribution as shown in Table II.44 was obtained.

Chapter 8 RESULT OF DEMAND FORECAST

8.1 Total Energy Demands

The resulted energy consumption in all sectors is 418 million Nm^3 in equivalent natural gas volume for 1985 and for 2005 it is 1,178, 1,104 and 861 million Nm^3 for Base, Medium and Low cases respectively. (See Table II.45 through II.47 for details.)

(Unit: 1,000 Nm^3/year)

	1985 (A)	2005 (B)			2005/1985 (A)/(B)		
		Base	Medium	Low	Base	Medium	Low
Household	125.0	279.5	277.1	268.8	2.24	2.21	2.15
Commercial	43.4	100.0	100.0	94.7	2.31	2.31	2.18
Hotel	7.5	19.0	19.0	19.0	2.54	2.54	2.54
Industrial	242.3	779.4	707.4	478.9	3.22	2.92	1.98
Total	418.2	1,177.9	1,103.5	861.4	2.82	2.64	2.06

8.2 Potential Demands for City Gas

The amount of potential city gas demand in 1985 is estimated as 123 million Nm^3 and that in 2005 is estimated as 338, 322 and 289 million Nm^3 for Base, Medium and Low cases respectively. (See Table II.48 through II.50 for details.) These amounts are all approximately 30% of the total energy demands in the corresponding years and cases. This potential city gas demand is brought to city gas only on condition that city gas is transported to the location of the demand and that the equipments are prepared for city gas combustion.

	Potential city gas demand (10^6 Nm^3/year)				Potential/Total ratio (%)			
	1985	2005			1985	2005		
	Common	Base	Medium	Low	Common	Base	Medium	Low
Household	73.0	209.0	197.1	182.3	58.4	75.0	71.1	67.8
Restaurant	33.3	76.9	76.9	72.9	76.9	76.9	76.9	76.9
Hotel	1.6	4.1	4.1	4.1	21.7	21.7	21.7	21.7
Industry	15.0	48.2	43.7	29.6	6.2	6.2	6.2	6.2
Total	122.9	338.2	321.8	288.9	29.4	28.7	29.2	33.5

8.3 Additional Demands for City Gas

The following results were obtained from the study on additional demands for city gas.

Details are shown in Table II.51.

Sector	Use	Energy to be replaced	Additional potential demand for city gas estimated for 2005 (10^6 Nm^3/year)	
Industrial	Heating	Fuel oils	High estimate (100%)	731
			Low estimate (50%)	366
Commercial	Building cooling	Electricity	High estimate	66
			Low estimate	28
Transportation	CNG-powered automobile	Petrol		155

Table II.1 COMPOSITION OF EFFECTIVE SAMPLES IN HOUSEHOLD DEMAND SURVEY

Classification	Ethnic Group	Malay	Chinese	Indian	Others	Total
Income*	- M$750	56	25	42	0	123
	M$751 - 1500	72	72	20	3	167
	M$1501 -	45	51	12	8	116
	No Answer	1	1	1	1	4
District	Federal Territory	69	91	33	8	201
	Petaling Jaya	41	36	8	3	88
	Klang	12	17	29	1	59
	Gombak	37	0	3	0	40
	Hulu Langat	15	5	2	0	22
Total		174	149	75	12	410

* Monthly income per household

Table II.2 MONTHLY FUEL CONSUMPTION FOR COOKING IN HOUSEHOLD
(TOTAL)

	Income*	-M$750	M$751-1500	M$1501-	No Answer	Total
No. of dwellings		123	167	116	4	410
No. of persons		706	1,065	666	22	2,459
Total amount						
LPG	(kg)	962.9	1,887.4	1,554.4	38.9	4,407.6
Kerosene	(ℓ)	1,956.0	1,124.8	240.5	0	3,321.2
Charcoal	(kg)	306.2	521.0	202.2	13.3	1,042.7
Total amount in 10^3 kcal						
LPG	(10^3 kcal)	11,030	22,460	18,497	462	52,450
Kerosene	(10^3 kcal)	17,338	9,970	2,132	0	29,439
Charcoal	(10^3 kcal)	2,143	3,647	1,415	93	7,299
Total	(10^3 kcal)	30,511	36,077	22,044	556	89,188
Consumption/dwelling						
LPG	(10^3 kcal/dwg)	89.7	134.5	159.5	115.6	127.9
Kerosene	(10^3 kcal/dwg)	141.0	59.7	18.4	0	71.8
Charcoal	(10^3 kcal/dwg)	17.4	21.8	12.2	23.3	17.8
Total	(10^3 kcal/dwg)	248.1	216.0	190.0	138.9	217.5
Consumption/person						
LPG	(10^3 kcal/psn)	15.62	21.09	27.77	21.01	21.33
Kerosene	(10^3 kcal/psn)	24.56	9.36	3.20	0	11.97
Charcoal	(10^3 kcal/psn)	3.04	3.42	2.13	4.24	2.97
Total	(10^3 kcal/psn)	43.22	33.88	33.10	25.26	36.27

* Monthly income per household

Table II.3 MONTHLY FUEL CONSUMPTION FOR COOKING IN HOUSEHOLD (MALAY)

	Income*	-M$750	M$751-1500	M$1501-	No Answer	Total
No. of dwellings		56	72	45	1	174
No. of persons		302	433	256	5	996
Total amount						
LPG	(kg)	416.3	828.7	537.3	7.7	1,790.0
Kerosene	(ℓ)	831.8	661.1	126.0	0	1,618.8
Charcoal	(kg)	5.7	55.8	55.0	0	116.5
Total amount in 10^3 kcal						
LPG	(10^3 kcal)	4,954	9,861	6,394	92	21,301
Kerosene	(10^3 kcal)	7,373	5,860	1,117	0	14,349
Charcoal	(10^3 kcal)	40	391	385	0	816
Total	(10^3 kcal)	12,367	16,112	7,896	92	36,465
Consumption/dwelling						
LPG	(10^3 kcal/dwg)	88.5	137.0	142.1	91.5	122.4
Kerosene	(10^3 kcal/dwg)	131.7	81.4	24.8	0	82.5
Charcoal	(10^3 kcal/dwg)	7.1	54.3	85.6	0	46.9
Total	(10^3 kcal/dwg)	220.8	223.8	175.5	91.5	209.6
Consumption/person						
LPG	(10^3 kcal/psn)	16.40	22.77	24.98	18.30	21.39
Kerosene	(10^3 kcal/psn)	24.41	13.53	4.36	0	14.41
Charcoal	(10^3 kcal/psn)	0.13	0.90	1.50	0	0.82
Total	(10^3 kcal/psn)	40.95	37.21	30.84	18.30	36.61

* Monthly income per household

Table II.4 MONTHLY FUEL CONSUMPTION FOR COOKING IN HOUSEHOLD (CHINESE)

	Income*	-M$750	M$751-1500	M$1501-	No Answer	Total
No. of dwellings		25	72	51	1	149
No. of persons		153	504	301	4	962
Total amount						
LPG	(kg)	235.9	800.8	738.0	5.8	1,780.5
Kerosene	(ℓ)	121.0	187.1	11.3	0	319.4
Charcoal	(kg)	209.7	460.2	63.8	0	733.7
Total amount in 10^3 kcal						
LPG	(10^3 kcal)	2,807	9,530	8,782	69	21,188
Kerosene	(10^3 kcal)	1,072	1,658	100	0	2,831
Charcoal	(10^3 kcal)	1,468	3,221	447	0	5,136
Total	(10^3 kcal)	5,347	14,410	9,329	69	29,155
Consumption/dwelling						
LPG	(10^3 kcal/dwg)	112.3	132.4	172.2	68.7	142.2
Kerosene	(10^3 kcal/dwg)	42.9	23.0	2.0	0	19.0
Charcoal	(10^3 kcal/dwg)	58.7	44.7	8.8	0	34.5
Total	(10^3 kcal/dwg)	213.9	200.1	182.9	68.7	195.7
Consumption/person						
LPG	(10^3 kcal/psn)	18.35	18.91	29.18	17.17	22.03
Kerosene	(10^3 kcal/psn)	7.00	3.29	0.33	0	2.94
Charcoal	(10^3 kcal/psn)	9.59	6.39	1.48	0	5.34
Total	(10^3 kcal/psn)	34.95	28.59	30.99	17.17	30.31

* Monthly income per household

Table II.5 MONTHLY FUEL CONSUMPTION FOR COOKING IN HOUSEHOLD
(INDIAN)

Income*	-M$750	M$751-1500	M$1501-	No Answer	Total
No. of dwellings	42	20	12	1	75
No. of persons	251	105	76	8	440
Total amount					
LPG (kg)	274.7	206.2	186.3	13.1	680.2
Kerosene (ℓ)	1,003.2	276.6	103.2	0.0	1,383.1
Charcoal (kg)	90.8	5.0	83.3	13.3	192.5
Total amount in 10^3 kcal					
LPG (10^3 kcal)	3,269	2,453	2,217	156	8,095
Kerosene (10^3 kcal)	8,893	2,452	915	0	12,260
Charcoal (10^3 kcal)	636	35	583	93	1,347
Total (10^3 kcal)	12,797	4,940	3,715	249	21,702
Consumption/dwelling					
LPG (10^3 kcal/dwg)	77.8	122.7	184.8	155.7	107.9
Kerosene (10^3 kcal/dwg)	211.7	122.6	76.3	0	163.5
Charcoal (10^3 kcal/dwg)	15.1	1.8	48.6	93.3	18.0
Total (10^3 kcal/dwg)	304.7	247.0	309.6	249.0	289.4
Consumption/person					
LPG (10^3 kcal/psn)	13.02	23.36	29.17	19.46	18.40
Kerosene (10^3 kcal/psn)	35.43	23.35	12.04	0	27.86
Charcoal (10^3 kcal/psn)	2.53	0.33	7.68	11.66	3.06
Total (10^3 kcal/psn)	50.99	47.05	48.89	31.12	49.32

* Monthly income per household

Table II.6 MONTHLY FUEL CONSUMPTION FOR COOKING IN HOUSEHOLD
(OTHERS)

	Income*	-M$750	M$751-1500	M$1501-	No Answer	Total
No. of dwellings		0	3	8	1	12
No. of persons		0	23	33	5	61
Total amount						
LPG	(kg)	0	51.7	92.8	12.3	156.8
Kerosene	(ℓ)	0	0	0	0	0
Charcoal	(kg)	0	0	0	0	0
Total amount in 10^3 kcal						
LPG	(10^3 kcal)	0	616	1,104	146	1,866
Kerosene	(10^3 kcal)	0	0	0	0	0
Charcoal	(10^3 kcal)	0	0	0	0	0
Total	(10^3 kcal)	0	616	1,104	146	1,866
Consumption/dwelling						
LPG	(10^3 kcal/dwg)	0	205.2	138.0	146.5	155.5
Kerosene	(10^3 kcal/dwg)	0	0	0	0	0
Charcoal	(10^3 kcal/dwg)	0	0	0	0	0
Total	(10^3 kcal/dwg)	0	205.2	138.0	146.5	155.5
Consumption/person						
LPG	(10^3 kcal/psn)	0	26.76	33.45	29.30	30.59
Kerosene	(10^3 kcal/psn)	0	0	0	0	0
Charcoal	(10^3 kcal/psn)	0	0	0	0	0
Total	(10^3 kcal/psn)	0	26.76	33.45	29.30	30.59

* Monthly income per household

Table II.7 SHOWER DISTRIBUTION RATIO

Income*	Ethnic Group	Malay	Chinese	Indian	Others	Total
- M$750	A*	68	33	55	0	156
	B*	0	5	3	0	8
	B/A	0	0.1515	0.0545	-	0.0513
M$751 - 1500	A*	73	79	20	3	175
	B*	4	15	1	0	20
	B/A	0.0548	0.1899	0.0500	0	0.1143
M$1501 -	A*	46	54	12	8	120
	B*	9	23	5	5	42
	B/A	0.1957	0.4259	0.4167	0.6250	0.3500
No answer	A*	1	1	1	1	4
	B*	0	1	0	0	1
	B/A	0	1.0000	0	0	0.2500
Total	A*	188	167	88	12	455
	B*	13	44	9	5	71
	B/A	0.0691	0.2635	0.1023	0.4167	0.1560

* : Monthly income per household

A* : Number of household surveyed

B* : Number of household in possession of hot shower

Table II.8 KLANG VALLEY, SCENARIO OF POPULATION TARGETS, 1980-2000 BY DISTRICT

District	Population						Annual rate of growth	
	1980		1990		1980		1980-1990	1990-2000
	Total	%	Total	%	Total	%		
1. Federal Territory	977,102	100.0	1,489,550	100.0	2,150,000	100.0		
Malay	324,398	33.2	521,343	35.0	774,000	36.0		
Chinese	509,070	52.1	759,671	51.0	1,096,500	50.0	4.3	3.7
Indian	143,634	14.7	208,536	14.0	279,500	14.0		
2. 4 District in Selangor								
i. PETALING	382,335	100.0	711,991	100.0	1,011,380	100.0		
Malay	126,990	33.2	307,190	43.1	451,725	44.3		
Chinese	180,818	47.3	297,825	41.8	408,252	40.6	6.4	3.6
Indian	74,527	19.5	106,976	15.1	151,403	15.1		
ii. KLANG	296,125	100.0	417,491	100.0	576,055	100.0		
Malay	111,724	37.7	166,602	39.9	247,553	43.0		
Chinese	126,186	42.6	172,536	41.3	226,182	39.3	3.5	3.3
Indian	58,215	19.7	78,353	15.8	102,320	17.7		
iii. GOMBAK	175,867	100.0	342,428	100.0	575,414	100.0		
Malay	95,509	54.3	197,045	57.5	330,281	57.4		
Chinese	53,164	30.2	103,447	30.2	162,070	28.2		
Indian	27,194	15.5	41,936	12.2	83,063	14.4	6.9	5.3
iv. HULU LANGAT	188,370	100.0	321,566	100.0	447,151	100.0		
Malay	94,564	50.2	177,249	55.1	238,222	53.3		
Chinese	72,167	38.3	113,350	35.2	160,627	35.9	5.5	3.4
Indian	21,639	11.5	30,967	9.7	48,302	10.8		
3. TOTAL KLANG VALLEY	2,019,799	100.0	3,283,026	100.0	4,760,000	100.0		
Malay	753,185	37.3	1,369,429	41.7	2,041,781	42.9		
Chinese	941,405	46.6	1,446,829	44.1	2,053,631	43.1		
Indian	325,209	16.1	466,768	14.2	664,588	14.0	5.0	3.8

Source: Klang Valley Perspective Plan

Table II.9 INCOME DISTRIBUTION

Case		Base			Medium			Low		
Income		-M$ 750	MS$751-1,500	M$1,501 -	-M$ 750	M$ 751-1,500	M$ 1,501-	-M$ 750	M$ 751-1,500	M$ 1,501-
1985		0.3580	0.3396	0.3024	0.3580	0.3396	0.3024	0.3580	0.3396	0.3024
6		0.3486	0.3401	0.3113	0.3544	0.3398	0.3058	〃	〃	〃
7		0.3392	0.3407	0.3201	0.3508	0.3400	0.3092	〃	〃	〃
8		0.3302	0.3422	0.3276	0.3473	0.3403	0.3124	〃	〃	〃
9		0.3210	0.3418	0.3372	0.3437	0.3405	0.3158	〃	〃	〃
1990		0.3115	0.3431	0.3454	0.3403	0.3405	0.3192	〃	〃	〃
1		0.3040	0.3424	0.3536	0.3368	0.3409	0.3223	〃	〃	〃
2		0.2916	0.3469	0.3615	0.3334	0.3411	0.3255	〃	〃	〃
3		0.2816	0.3454	0.3730	0.3298	0.3415	0.3287	〃	〃	〃
4		0.2721	0.3506	0.3773	0.3266	0.3415	0.3319	〃	〃	〃
1995		0.2627	0.3523	0.3850	0.3231	0.3418	0.3351	〃	〃	〃
6		0.2507	0.3544	0.3949	0.3105	0.3435	0.3460	〃	〃	〃
7		0.2387	0.3566	0.4047	0.2974	0.3460	0.3566	〃	〃	〃
8		0.2271	0.3589	0.4140	0.2846	0.3482	0.3672	〃	〃	〃
9		0.2198	0.3570	0.4232	0.2721	0.3504	0.3775	〃	〃	〃
2000		0.2108	0.3568	0.4324	0.2597	0.3529	0.3874	〃	〃	〃
1		0.2005	0.3583	0.4412	0.2477	0.3551	0.3972	〃	〃	〃
2		0.1903	0.3597	0.4500	0.2359	0.3572	0.4069	〃	〃	〃
3		0.1804	0.3611	0.4585	0.2244	0.3593	0.4163	〃	〃	〃
4		0.1710	0.3621	0.4669	0.2134	0.3611	0.4255	〃	〃	〃
2005		0.1613	0.3636	0.4751	0.2032	0.3623	0.4345	〃	〃	〃

growth rate 1.6% (1985–1995)
growth rate 2.1% (1995–2005)
growth rate 0.6% (1985–1995)
growth rate 2.1% (1995–2005)
growth rate ±0% (1985–2005)

Table II.10 POPULATION

(Unit: 1,000)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	1215.0	1490.0	1770.0	2150.0	2240.0
Gombak	243.0	342.0	444.0	576.0	746.0
Hulu Langat	240.0	322.0	386.0	447.0	630.0
Petaling Jaya	443.0	452.0	570.8	641.0	727.0
Shah Alam	48.0	260.0	279.2	370.0	430.0
Klang	345.0	417.0	490.0	576.0	677.0
Total	2534.0	3283.0	3940.0	4760.0	5450.0

Table II.11 MALAYSIAN HOUSEHOLD LPG CONSUMPTION STATUS (BY ETHNIC GROUP)

Ethnic / Fuel	Malay	Chinese	Indian	Others	Total
LPG	84 (20.5%)	77 (18.8%)	23 (5.6%)	12 (2.9%)	196 (47.8%)
LPG & charcoal	7 (1.7%)	38 (9.3%)	2 (0.5%)	0 (0.0%)	47 (11.5%)
LPG & kerosene	46 (11.2%)	6 (1.5%)	17 (4.1%)	0 (0.0%)	69 (16.8%)
LPG, charcoal & kerosene	6 (1.5%)	17 (4.1%)	4 (1.0%)	0 (0.0%)	27 (6.6%)
Unused	31 (7.6%)	11 (2.7%)	29 (7.1%)	0 (0.0%)	71 (17.3%)
Total	174 (42.4%)	149 (36.3%)	75 (18.3%)	12 (2.9%)	410 (100.0%)

Table II.12 UNIT CONSUMPTION IN HOUSEHOLD

UNIT DEMAND(HOUSEUSE)(B/KCAL)

NO.	NAME	1 #1985	2 #1986	3 #1987	4 #1988	5 #1989	6 #1990	7 #1991	8 #1992	9 #1993	10 #1994	11 #1995
1	TDC	427.632	427.632	427.632	427.632	427.632	427.632	427.632	427.632	427.632	427.632	427.632
2	TDS	59.503	60.485	61.458	62.310	63.348	64.272	65.149	66.114	67.333	67.922	68.800
3	TDT	487.135	488.117	489.090	489.942	490.980	491.904	492.781	493.746	494.965	495.554	496.432
4		-	-	-	-	-	-	-	-	-	-	-
5	PDL	254.614	255.858	257.094	258.204	259.493	260.687	261.768	263.101	264.588	265.469	266.617
6	PDK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.594	9.188	13.783
7	PDCT	254.614	255.858	257.094	258.204	259.493	260.687	261.768	263.101	269.182	274.657	280.400
8	PDSN	29.752	30.243	30.729	31.155	31.674	32.136	32.575	33.057	33.667	33.961	34.400
9	PDSE1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.610	0.904	1.343
10	PDSE2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.295	0.734
11	PDSE3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.439
12	PDSE4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	PDSE5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	NAME	#1996	#1997	#1998	#1999	#2000	#2001	#2002	#2003	#2004	#2005
1	TDC	427.632	427.632	427.632	427.632	427.632	427.632	427.632	427.632	427.632	427.632
2	TDS	69.928	71.047	72.114	73.073	74.072	75.066	76.057	77.016	77.955	78.884
3	TDT	497.560	498.679	499.746	500.705	501.704	502.698	503.689	504.648	505.587	506.516
4		-	-	-	-	-	-	-	-	-	-
5	PDL	268.089	269.552	270.952	272.102	273.348	274.635	275.917	277.157	278.361	279.566
6	PDK	18.377	22.971	27.565	32.160	36.754	41.348	45.942	50.537	55.131	59.725
7	PDCT	286.466	292.523	298.517	304.262	310.102	315.983	321.859	327.694	333.492	339.291
8	PDSN	34.964	35.524	36.057	36.537	37.036	37.533	38.029	38.508	38.978	39.442
9	PDSE1	1.907	2.467	3.000	3.480	3.979	4.476	4.972	5.451	5.921	6.385
10	PDSE2	1.298	1.857	2.391	2.870	3.370	3.867	4.362	4.842	5.311	5.776
11	PDSE3	1.003	1.563	2.096	2.576	3.075	3.572	4.068	4.547	5.017	5.481
12	PDSE4	0.564	1.124	1.657	2.137	2.636	3.133	3.629	4.108	4.578	5.042
13	PDSE5	0.0	0.560	1.093	1.573	2.072	2.569	3.065	3.544	4.014	4.478

(Explanation)

1 I.D. FOR COOKING
2 FOR SHOWER
3 TOTAL
4
5 P.D. FOR COOKING REP. LPG
6 REP. KEROSINE
7 TOTAL
8 FOR SHOWER FOR NEW
9 FOR EX. (ST.1)
10 (ST.2)
11 (ST.3)
12 (ST.4)
13 (ST.5)

Table II.13 TOTAL DEMAND IN HOUSEHOLD (BASE CASE)

(Unit: 10^3 Nm^3/Year)

Kind	Year / District	1985	1990	1995	2000	2005
Cooking	Federal Territory	52,610	64,518	76,641	93,095	96,993
	Gombak	10,522	14,808	19,225	24,941	32,302
	Hulu Langat	10,392	13,943	16,714	19,355	27,279
	Petaling Jaya	19,182	19,572	24,716	27,756	31,479
	Shah Alam	2,078	11,258	12,090	16,021	18,619
	Klang	14,939	18,056	21,217	24,941	29,314
	Total	109,723	142,155	170,603	206,109	235,986
Shower	Federal Territory	7,321	9,697	12,330	16,126	17,892
	Gombak	1,464	2,226	3,093	4,320	5,959
	Hulu Langat	1,446	2,096	2,689	3,353	5,032
	Petaling Jaya	2,669	2,942	3,977	4,808	5,807
	Shah Alam	289	1,692	1,945	2,775	3,435
	Klang	2,079	2,714	3,414	4,321	5,408
	Total	15,268	21,366	27,448	35,703	43,531
Total	Federal Territory	59,930	74,215	88,972	109,222	114,884
	Gombak	11,986	17,034	22,318	29,261	38,260
	Hulu Langat	11,838	16,038	19,403	22,708	32,311
	Petaling Jaya	21,851	22,513	28,692	32,564	37,286
	Shah Alam	2,368	12,950	14,035	18,796	22,054
	Klang	17,017	20,770	24,631	29,261	34,722
	Total	124,990	163,520	198,051	241,812	279,517

Table II.14 TOTAL DEMAND IN HOUSEHOLD (MEDIUM CASE)

(Unit: 10^3 Nm^3/Year)

Kind	District \ Year	1985	1990	1995	2000	2005
Cooking	Federal Territory	52,610	64,518	76,641	93,095	96,993
	Gombak	10,522	14,808	19,225	24,941	32,302
	Hulu Langat	10,392	13,943	16,714	19,355	27,279
	Petaling Jaya	19,182	19,572	24,716	27,756	31,479
	Shah Alam	2,078	11,258	12,090	16,021	18,619
	Klang	14,939	18,056	21,217	24,941	29,314
	Total	109,723	142,155	170,603	206,109	235,986
Shower	Federal Territory	7,321	9,257	11,313	15,038	16,881
	Gombak	1,464	2,125	2,838	4,029	5,622
	Hulu Langat	1,446	2,001	2,467	3,127	4,748
	Petaling Jaya	2,669	2,808	3,648	4,483	5,479
	Shah Alam	289	1,615	1,785	2,588	3,240
	Klang	2,079	2,591	3,131	4,029	5,102
	Total	15,268	20,396	25,182	33,294	41,072
Total	Federal Territory	59,930	73,774	87,954	108,133	113,873
	Gombak	11,986	16,933	22,063	28,970	37,924
	Hulu Langat	11,838	15,943	19,181	22,482	32,027
	Petaling Jaya	21,851	22,380	28,364	32,239	36,958
	Shah Alam	2,368	12,873	13,874	18,609	21,859
	Klang	17,017	20,647	24,349	28,970	34,416
	Total	124,990	162,550	195,785	239,403	277,057

Table II.15 TOTAL DEMAND IN HOUSEHOLD (LOW CASE)

(Unit: 10^3 Nm^3/Year)

Kind	District \ Year	1985	1990	1995	2000	2005
Cooking	Federal Territory	52,610	64,518	76,641	93,095	96,993
	Gombak	10,522	14,808	19,225	24,941	32,302
	Hulu Langat	10,392	13,943	16,714	19,355	27,279
	Petaling Jaya	19,182	19,572	24,716	27,756	31,479
	Shah Alam	2,078	11,258	12,090	16,021	18,619
	Klang	14,939	18,056	21,217	24,941	29,314
	Total	109,723	142,155	170,603	206,109	235,986
Shower	Federal Territory	7,321	8,977	10,664	12,954	13,496
	Gombak	1,464	2,061	2,675	3,471	4,495
	Hulu Langat	1,446	1,940	2,326	2,693	3,796
	Petaling Jaya	2,669	2,723	3,439	3,862	4,380
	Shah Alam	289	1,566	1,682	2,229	2,591
	Klang	2,079	2,513	2,953	3,470	4,079
	Total	15,268	19,780	23,739	28,679	32,837
Total	Federal Territory	59,930	73,495	87,305	106,049	110,489
	Gombak	11,986	16,869	21,901	28,411	36,796
	Hulu Langat	11,838	15,883	19,040	22,048	31,075
	Petaling Jaya	21,851	22,295	28,155	31,618	35,860
	Shah Alam	2,368	12,824	13,772	18,250	21,210
	Klang	17,017	20,569	24,169	28,412	33,393
	Total	124,990	161,935	194,342	234,788	268,823

Table II.16 POTENTIAL DEMAND IN HOUSEHOLD (BASE CASE)

(Unit: 10^3 Nm^3/Year)

Kind	District \ Year	1985	1990	1995	2000	2005
Cooking	Federal Territory	31,324	39,330	50,254	67,509	76,956
	Gombak	6,265	9,028	12,606	18,086	25,629
	Hulu Langat	6,188	8,499	10,960	14,036	21,644
	Petaling Jaya	11,421	11,931	16,207	20,127	24,976
	Shah Alam	1,237	6,863	7,927	11,618	14,773
	Klang	8,895	11,007	13,912	18,086	23,258
	Total	65,330	86,658	111,866	149,462	187,236
Shower	Federal Territory	3,660	4,848	6,165	8,063	2,946
	Gombak	732	1,113	1,547	2,160	2,979
	Hulu Langat	723	1,048	1,345	1,676	2,516
	Petaling Jaya	1,335	1,471	1,988	2,404	2,904
	Shah Alam	145	846	972	1,388	1,717
	Klang	1,039	1,357	1,707	2,160	2,704
	Total	7,634	10,683	13,724	17,852	21,766
Total	Federal Territory	34,984	44,178	56,419	75,572	85,902
	Gombak	6,997	10,140	14,153	20,246	28,608
	Hulu Langat	6,911	9,547	12,304	15,712	24,160
	Petaling Jaya	12,755	13,402	18,195	22,531	27,880
	Shah Alam	1,382	7,709	8,900	13,006	16,490
	Klang	9,934	12,364	15,619	26,247	25,962
	Total	72,963	97,340	125,590	167,314	209,002

Table II.17 POTENTIAL DEMAND IN HOUSEHOLD (MEDIUM CASE)

(Unit: 10^3 Nm^3/Year)

Kind	District \ Year	1985	1990	1995	2000	2005
Cooking	Federal Territory	31,324	38,768	46,455	63,122	72,556
	Gombak	6,265	8,898	11,653	16,911	24,163
	Hulu Langat	6,188	8,378	10,131	13,123	20,406
	Petaling Jaya	11,421	11,760	14,982	18,819	23,548
	Shah Alam	1,237	6,765	7,328	10,863	13,928
	Klang	8,895	10,850	12,861	16,911	21,928
	Total	65,330	85,419	103,410	139,749	176,529
Shower	Federal Territory	3,660	4,628	5,656	7,519	8,441
	Gombak	732	1,062	1,419	2,015	2,811
	Hulu Langat	723	1,000	1,233	1,563	2,374
	Petaling Jaya	1,335	1,404	1,824	2,242	2,740
	Shah Alam	145	808	892	1,294	1,620
	Klang	1,039	1,296	1,566	2,014	2,551
	Total	7,634	10,198	12,590	16,647	20,537
Total	Federal Territory	34,984	43,396	52,112	70,641	80,997
	Gombak	6,997	9,961	13,072	18,925	26,975
	Hulu Langat	6,911	9,378	11,364	14,687	22,780
	Petaling Jaya	12,755	13,165	16,805	21,061	26,287
	Shah Alam	1,382	7,573	8,220	12,157	15,548
	Klang	9,934	12,145	14,427	18,925	24,479
	Total	72,963	95,617	116,000	156,396	197,066

Table II.18 POTENTIAL DEMAND IN HOUSEHOLD (LOW CASE)

(Unit: 10^3 Nm^3/Year)

Kind	District \ Year	1985	1990	1995	2000	2005
Cooking	Federal Territory	31,324	38,414	45,633	60,430	68,171
	Gombak	6,265	8,817	11,447	16,190	22,703
	Hulu Langat	6,188	8,302	9,952	12,564	29,173
	Petaling Jaya	11,421	11,653	14,716	18,017	22,125
	Shah Alam	1,237	6,703	7,198	10,400	13,086
	Klang	8,895	10,751	12,633	16,189	20,603
	Total	65,330	84,640	101,578	133,790	165,861
Shower	Federal Territory	3,660	4,489	5,332	6,477	6,748
	Gombak	732	1,031	1,338	1,735	2,247
	Hulu Langat	723	970	1,163	1,347	1,898
	Petaling Jaya	1,335	1,362	1,720	1,931	2,190
	Shah Alam	145	783	841	1,114	1,296
	Klang	1,039	1,256	1,476	1,735	2,040
	Total	7,634	9,891	11,870	14,339	16,419
Total	Federal Territory	34,984	42,902	50,965	66,907	74,919
	Gombak	6,997	9,848	12,784	17,925	24,950
	Hulu Langat	6,911	9,272	11,114	13,910	21,071
	Petaling Jaya	12,755	13,015	16,436	19,948	24,315
	Shah Alam	1,382	7,487	8,040	11,514	14,382
	Klang	9,934	12,007	14,109	17,925	22,643
	Total	72,963	94,531	113,448	148,129	182,280

Table II.19 SURVEY RESULT ON RESTAURANTS (1)

Items	Size of Restaurant			Monthly Consumption by Kind of Energy					Size Comparison		
District	Shop	Seat	Employee	LPG(kg)	Kerosene(l)	Wood(kg)	Coal(kg)	Charcoal(kg)	Seat/Shop	Emp./Shop	Seat/Emp.
F.T.	40	3471	337	10771.2	3233	5400	90	3241	86.8	8.4	10.3
Petaling Jaya	40	3181	320	21476.3	2261	0	0	4347	79.5	8.0	9.9
Shah Alam	39	1630	187	5980.2	1043	0	0	854	41.8	4.8	8.7
Klang	41	2913	230	11506.8	1362	0	0	3327	71.0	5.6	12.7
Gombak	40	1575	166	6458.9	1117	544	144	2722	39.4	4.2	9.5
Ethnic Group											
Malay	71	2732	326	12172.2	632	0	0	2160	38.5	4.6	8.4
Chinese	101	8410	682	32485.3	7730	5694	234	11833	83.3	6.8	12.3
Indian	23	1168	140	7964.9	654	250	0	480	50.8	6.1	8.3
Others	5	460	92	3571.0	0	0	0	18	92.0	18.4	5.0
Total	200	12770	1240	56193.4	9016	5944	234	14491	63.9	6.2	10.3

F.T. : Federal Territory

Table II.20 SURVEY RESULT ON RESTAURANTS (2)

Items / District	Total Consumption					LPG Consumption					
	10^6Kcal	Eq. N.G. Volume [Nm^3]	Nm^3/ Shop	Nm^3/ Seat	Nm^3/ Emp.	10^6 Kcal	Nm^3	% in Total	Nm^3/ Shop	Nm^3/ Seat	Nm^3/ Emp.
F.T.	2355	238509	5963	68.71	708	1538	155770	65.3	3894	44.88	462
Petaling Jaya	3673	371909	9298	116.92	1162	3067	310584	83.5	7765	97.64	971
Shah Alam	1037	104981	2692	64.41	561	854	86484	82.4	2218	53.06	462
Klang	2068	209375	5107	71.88	910	1644	166408	79.5	4059	57.13	724
Gombak	1300	131641	3291	83.58	793	923	93407	71.0	2335	59.31	563
Ethnic Group											
Malay	1987	201210	2834	73.65	617	1738	176031	87.5	2479	64.43	540
Chinese	6678	676187	6695	80.40	991	4640	469793	69.5	4651	55.86	689
Indian	1256	127224	5531	108.92	909	1138	115186	90.5	5008	98.62	823
Others	512	51796	10359	112.60	563	510	51643	99.8	10329	12.27	561
Total	10443	1056416	5282	82.73	852	8026	812654	76.9	4063	63.64	655

F.T. : Federal Territory

Table II.21 FEDERAL TERRITORY HAWKER STATISTICS AS OF MAY 1986

BIL.	No. of licensed hawkers			Total
	Malay	Chinese	Indian	
1. Stationary hawkers	961	4570	512	6043
(Percentage)	(15.9)	(75.6)	(8.5)	(100)
2. Mobile hawkers	7	186	201	394
(Percentage)	(1.8)	(47.2)	(51.0)	(100)
3. Outside market hawkers	267	1847	38	2152
(Percentage)	(12.4)	(85.8)	(1.8)	(100)
4. Market hawkers	632	2811	184	3627
(Percentage)	(17.4)	(77.5)	(5.1)	(100)
5. Locked stall hawkers	841	283	40	1164
(Percentage)	(72.3)	(24.3)	(3.4)	(100)
6. Hawkers inside commercial buildings	22	5	1	28
(Percentage)	(78.6)	(17.9)	(3.5)	(100)
7. Bus station kiosks	23	2	2	27
(Percentage)	(85.2)	(7.4)	(7.4)	(100)
Total	2755	9704	978	13435
(Percentage)	(20.5)	(72.2)	(7.3)	(100)

Source: Kuala Lumpur City Hall

Table II.22 ESTIMATED EMPLOYMENT, 1985 - 2005, KLANG VALLEY

(Unit: 1,000)

Year		1980[3]	1985[4]	1990[5]	1995	2000	2005
Population		2,020	2,534	3,283	3,940	4,760	5,550
Working Age Population (15 - 64)		1,300	1,632	2,114	2,537	3,065	3,574
Participation Rate (%)[1]		62.0	62.5	63.0	63.5	64.0	64.5
Labour Force		806	1,020	1,332	1,610	1,962	2,305
Unemployment rate (%)	Base Case	5.7	7.0	6.5	6.0	5.5	5.0
	Medium Case	5.7	7.0	6.5	6.0	5.5	5.0
	Low Case	5.7	7.0	12.0	10.0	10.0	10.0
Unemployment[2]	Base Case	46	70	87	96	108	115
	Medium Case	46	70	87	96	108	115
	Low Case	46	70	160	161	196	230
Employment	Base Case	760	950	1,245	1,514	1,854	2,190
	Medium Case	760	950	1,245	1,514	1,854	2,190
	Low Case	760	950	1,172	1,449	1,776	2,075

Notes: 1) Participation rate is defined as labour force per working age population
2) Unemployment is defined as the status of employment as not at work, actively unemployed and inactively unemployed and out of labour force

Source: 3) Department of Statistics
4) Modified from HIS Data by Klang Valley Transportation Study Team
5) Klang Valley Transportation Study

Table II.23 EMPLOYMENT (BASE/MEDIUM CASES)

(Unit: 1,000)

Sector	District \ Year	1985	1990	1995	2000	2005
I	Federal Territory	9.6	9.5	9.4	9.4	8.0
	Gombak	7.0	6.9	6.8	6.6	6.0
	Hulu Langat	7.1	7.0	6.9	6.8	5.9
	Petaling Jaya	10.9	10.7	10.6	10.4	9.4
	Shah Alam	2.5	2.5	2.5	2.3	1.8
	Klang	9.2	9.0	9.0	8.7	7.7
	Total	46.3	45.6	45.2	44.2	38.8
II	Federal Territory	102.5	129.9	154.1	168.9	182.3
	Gombak	28.6	41.7	53.4	77.7	101.0
	Hulu Langat	13.6	22.0	29.2	44.1	58.4
	Petaling Jaya	74.6	76.8	78.8	81.8	83.7
	Shah Alam	22.2	32.6	41.9	54.0	65.6
	Klang	27.8	35.8	43.1	51.7	59.5
	Total	269.3	338.8	400.5	478.2	550.5
III	Federal Territory	429.3	528.9	620.9	731.7	843.7
	Gombak	21.7	38.9	54.9	84.0	113.7
	Hulu Langat	17.8	37.9	56.4	87.8	120.0
	Petaling Jaya	94.6	130.0	162.0	198.5	236.4
	Shah Alam	18.0	48.0	75.5	107.5	139.7
	Klang	53.0	76.9	98.6	122.1	147.2
	Total	634.4	860.6	1068.3	1331.6	1600.7
Total	Federal Territory	541.4	668.3	784.4	910.0	1034.0
	Gombak	57.3	87.5	115.1	168.3	220.7
	Hulu Langat	38.5	66.9	92.5	138.7	184.3
	Petaling Jaya	180.1	217.5	251.4	290.7	329.5
	Shah Alam	42.7	83.1	119.9	163.8	207.1
	Klang	90.0	121.7	150.7	182.5	214.4
	Total	950.0	1245.0	1514.0	1854.0	2190.0

Table II.24 EMPLOYMENT (LOW CASE)

(Unit: 1,000)

Sector	District \ Year	1985	1990	1995	2000	2005
I	Federal Territory	9.6	9.5	9.4	8.0	8.0
	Gombak	7.0	6.9	6.7	6.1	5.8
	Hulu Langat	7.1	6.9	6.8	5.9	5.8
	Petaling Jaya	10.9	10.7	10.3	9.5	9.1
	Shah Alam	2.5	2.5	2.5	2.0	1.8
	Klang	9.2	9.0	8.7	7.7	7.3
	Total	46.3	45.5	44.4	39.2	37.8
II	Federal Territory	102.5	122.3	147.9	160.8	173.0
	Gombak	28.6	38.5	51.2	74.2	95.8
	Hulu Langat	13.6	20.1	27.9	42.3	55.2
	Petaling Jaya	74.6	75.1	75.7	77.5	79.6
	Shah Alam	22.2	30.1	40.1	51.5	62.2
	Klang	27.8	33.8	41.3	49.0	56.5
	Total	269.3	319.9	384.1	455.3	522.3
III	Federal Territory	429.3	502.5	593.4	701.3	798.5
	Gombak	21.7	35.4	52.1	81.5	107.5
	Hulu Langat	17.8	33.8	53.8	85.5	113.5
	Petaling Jaya	94.6	121.5	154.8	191.0	223.7
	Shah Alam	18.0	42.2	72.1	103.7	132.3
	Klang	53.0	71.2	94.3	118.5	139.4
	Total	634.4	806.6	1020.5	1281.5	1514.9
Total	Federal Territory	541.4	634.3	750.7	870.1	979.5
	Gombak	57.3	80.8	110.0	161.8	209.1
	Hulu Langat	38.5	60.8	88.5	133.7	174.5
	Petaling Jaya	180.1	207.3	240.8	278.0	312.4
	Shah Alam	42.7	74.8	114.7	157.2	196.3
	Klang	90.0	114.0	144.3	175.2	203.2
	Total	950.0	1172.0	1449.0	1776.0	2075.0

Table II.25 NUMBER OF SEATS IN RESTAURANTS (BASE/MEDIUM CASES)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	298,727	368,747	432,809	502,111	570,531
Gombak	31,616	48,280	63,511	92,861	121,776
Hulu Langat	21,245	36,912	51,039	76,532	101,691
Petaling Jaya	99,376	120,013	138,718	160,398	181,808
Shah Alam	23,561	45,851	66,158	90,378	114,274
Klang	49,661	67,150	83,152	100,699	118,300
Total	524,186	686,953	835,387	1,022,979	1,208,380

Table II.26 NUMBER OF SEATS IN RESTAURANT (LOW CASE)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	298,727	349,985	414,216	480,095	540,464
Gombak	31,616	44,584	60,694	89,274	115,376
Hulu Langat	21,245	33,547	48,831	73,773	96,284
Petaling Jaya	99,376	114,381	132,868	153,394	172,371
Shah Alam	23,561	41,273	63,287	86,737	108,312
Klang	49,661	62,902	79,619	96,671	112,119
Total	524,186	646,672	799,515	979,944	1,144,926

Table II.27 TOTAL ENERGY DEMAND IN RESTAURANT (BASE/MEDIUM CASES)

(Unit: 10^3 Nm^3/Year)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	24,714	30,507	35,806	41,540	47,200
Gombak	2,615	3,994	5,254	7,682	10,075
Hulu Langat	1,758	3,054	4,223	6,331	8,413
Petaling Jaya	8,222	9,929	11,476	13,270	15,041
Shah Alam	1,949	3,793	5,474	7,477	9,454
Klang	4,108	5,555	6,879	8,331	9,787
Total	43,366	56,832	69,112	84,631	99,970

Table II.28 TOTAL ENERGY DEMAND IN RESTAURANT (LOW CASE)

(Unit: 10^3 Nm^3/Year)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	24,714	28,954	34,268	39,718	44,712
Gombak	2,615	3,689	5,021	7,386	9,545
Hulu Langat	1,758	2,775	4,040	6,103	7,966
Petaling Jaya	8,222	9,463	10,992	12,690	14,260
Shah Alam	1,949	3,415	5,236	7,176	8,961
Klang	4,108	5,204	6,587	7,998	9,276
Total	43,366	53,450	66,144	81,071	94,720

Table II.29 POTENTIAL DEMAND IN RESTAURANT (BASE/MEDIUM CASES)

(Unit: 10^3 Nm^3/Year)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	19,011	23,467	27,544	31,954	36,308
Gombak	2,012	3,073	4,042	5,910	7,750
Hulu Langat	1,352	2,349	3,248	4,871	6,472
Petaling Jaya	6,325	7,638	8,828	10,208	11,570
Shah Alam	1,500	2,918	4,211	5,751	7,273
Klang	3,160	4,273	5,292	6,408	7,529
Total	33,360	43,718	53,165	65,102	76,902

Table II.30 POTENTIAL DEMAND IN RESTAURANT (LOW CASE)

(Unit: 10^3 Nm^3/Year)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	19,011	22,273	26,361	30,553	34,395
Gombak	2,012	2,837	3,863	5,682	7,343
Hulu Langat	1,352	2,135	3,108	4,695	6,128
Petaling Jaya	6,325	7,279	8,456	9,762	10,969
Shah Alam	1,500	2,627	4,027	5,520	6,893
Klang	3,160	4,003	5,067	6,152	7,135
Total	33,360	41,154	50,882	62,364	72,863

Table II.31 FUEL CONSUMPTION IN HOTELS

Hotel No.	Number of Rooms	LPG Consumption (t)	LPG Consumption Eq. NG Volume (10^3 Nm^3/Y)	Other Fuel Consumption (kl)	Other Fuel Consumption Eq. NG Volume (10^3 Nm^3/Y)	Total Fuel Consumption (10^6Kcal)	Total Fuel Consumption Eq. NG Volume (10^3 Nm^3/Y)	Unit (Nm^3/Room)	LPG Share (%)
1	722	974.1	1,173.9	-	-	11,594	1173.9	1,626	-
2	500	57.6	69.4	518.4	515.6	5,778	585.0	1,170	12
3	450	132.0	159.1	348.0	346.1	4,989	505.2	1,123	31
4	398	84.0	101.2	300.0	298.4	3,947	399.6	1,004	25
5	250	24.0	28.9	108.0	107.4	1,347	136.3	545	21
6	208	9.0	10.8	65.4	65.0	750	75.9	365	17
Total	2528	1,280.7	1,543.4	1,339.8	1,332.6	28,403	2,876.0	1,138	21.7

Table II.32 TOTAL ENERGY CONSUMPTION IN MANUFACTURING INDUSTRY

Kind of energy / District	Number of Factories	LPG Consumption 10^3 Nm^3/Year	Diesel Oil Consumption 10^3 Nm^3/Year	Fuel Oil Consumption 10^3 Nm^3/Year	Total 10^3 Nm^3/Year
Federal Territory	24	2,029	6,029	13,356	21,414
Gombak	13	620	3,639	9,641	13,900
Hulu Langat	10	0	3,559	4,655	8,214
Petaling Jaya	54	5,353	24,878	70,925	101,156
Shah Alam	35	1,308	3,373	36,370	41,051
Klang	23	5,670	11,674	39,270	56,614
Total	159	14,980	53,152	174,217	242,349

Table II.33 ENERGY CONSUMPTION BY TYPE OF INDUSTRY

(Unit: 10^3 Nm^3/Year)

District / Type of Industry	Food	Textile	Wood	Paper	Chemical	Non Metal	Base Metal	Fabri-cation	Other	Total
Federal Territory	12,785	745	3,810	779	271	2,036	0	428	560	21,414
Gombak	508	0	0	0	1,627	10,433	366	614	352	13,900
Hulu Langat	968	1,127	3,040	2,156	739	0	0	184	0	8,214
Petaling Jaya	16,407	3,212	0	557	28,003	34,632	9,568	8,650	127	101,156
Shah Alam	21,104	119	0	0	12,866	287	1,036	5,639	0	41,051
Klang	17,854	592	820	185	7,004	12,347	16,915	897	0	56,614
Total	69,626	5,795	7,670	3,677	50,510	59,735	27,885	16,412	1,039	242,349
Percentage (%)	28.7	2.4	3.2	1.5	20.8	24.6	11.5	6.8	6.4	100

Table II.34 ENERGY CONSUMPTION PER EMPLOYMENT IN SECONDARY INDUSTRY

Items / District	Energy Consumption [10^3 Nm^3/Year]	Employment in II Industry* in 1985 [10^3]	Energy/Employment coefficient [10^3 Nm^3/Year 10^3P]
Federal Territory	21,414	54.2	395
Gombak	13,900	19.0	732
Hulu Langat	8,214	4.5	1,825
Petaling Jaya	101,156	42.8	2,363
Shah Alam	41,051	16.2	2,534
Klang	56,614	13.5	4,194
Total	242,349	150.9	1,614

* in the zones with industrial estates

Table II.35 PREDICTION OF TOTAL ENERGY DEMAND IN MANUFACTURING INDUSTRY

(Unit: 10^3 Nm^3/Year)

Case	Year / District	1985	1990	1995	2000	2005
Base	Federal Territory	21,415	27,211	35,992	42,753	48,847
	Gombak	13,900	20,437	29,403	46,830	64,753
	Hulu Langat	8,213	19,297	32,128	58,622	86,548
	Petaling Jaya	101,158	108,211	128,326	152,495	174,770
	Shah Alam	41,048	66,607	99,418	143,436	187,650
	Klang	56,615	85,426	123,631	170,049	216,903
	Total	242,349	327,189	448,898	614,185	779,471
Medium	Federal Territory	21,415	24,590	32,712	38,831	44,362
	Gombak	13,900	18,468	26,723	42,533	58,807
	Hulu Langat	8,213	17,438	29,200	53,244	78,602
	Petaling Jaya	101,158	97,784	11,632	138,393	158,277
	Shah Alam	41,048	60,189	90,359	130,276	170,420
	Klang	56,615	77,195	112,366	154,446	196,987
	Total	242,349	295,664	407,992	557,723	707,455
Low	Federal Territory	21,415	22,261	26,995	28,217	30,060
	Gombak	13,900	16,438	22,019	31,174	39,748
	Hulu Langat	8,213	14,800	24,062	39,174	53,112
	Petaling Jaya	101,158	91,036	96,506	101,308	107,576
	Shah Alam	41,048	53,079	74,374	94,975	115,310
	Klang	56,615	68,721	92,495	112,847	133,074
	Total	242,349	266,335	336,451	407,695	478,880

Table II.36 POTENTIAL CITY GAS DEMAND IN MANUFACTURING INDUSTRY

(Unit: 10^3 Nm^3/Year)

Case	District \ Year	1985	1990	1995	2000	2005
Base	Federal Territory	1,324	1,682	2,225	2,643	3,019
	Gombak	859	1,263	1,817	2,895	4,002
	Hulu Langat	508	1,193	1,986	3,624	5,350
	Petaling Jaya	6,253	6,689	7,932	9,426	10,803
	Shah Alam	2,537	4,117	6,145	8,866	11,599
	Klang	3,499	5,280	7,642	10,511	13,407
	Total	14,980	20,224	27,747	37,965	48,180
Medium	Federal Territory	1,324	1,520	2,022	2,400	2,742
	Gombak	859	1,142	1,652	2,629	3,635
	Hulu Langat	508	1,078	1,805	3,291	4,859
	Petaling Jaya	6,253	6,044	7,209	8,554	9,783
	Shah Alam	2,537	3,720	5,585	8,053	10,534
	Klang	3,499	4,772	6,946	9,547	12,176
	Total	14,980	18,276	25,219	34,474	43,729
Low	Federal Territory	1,324	1,372	1,669	1,744	1,858
	Gombak	859	1,016	1,361	1,927	2,457
	Hulu Langat	508	915	1,487	2,421	3,283
	Petaling Jaya	6,253	5,627	5,965	6,262	6,649
	Shah Alam	2,537	3,281	4,597	5,871	7,128
	Klang	3,499	4,248	5,717	6,975	8,226
	Total	14,980	16,463	20,797	25,200	29,601

Table II.37 ADDITIONAL DEMAND FOR CITY GAS IN MANUFACTURING INDUSTRY (HIGH CASE)

(Unit: 10^3 Nm^3/Year)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	20,092	25,530	33,767	40,111	45,829
Gombak	13,041	19,174	27,586	53,936	60,751
Hulu Langat	7,706	18,104	30,143	55,000	81,200
Petaling Jaya	94,906	101,523	120,395	143,070	163,969
Shah Alam	28,511	62,491	93,274	134,572	176,053
Klang	53,116	80,147	115,991	159,539	203,498
Total	227,372	306,969	421,156	576,228	731,300

Table II.38 ADDITIONAL DEMAND FOR CITY GAS IN MANUFACTURING INDUSTRY (LOW CASE)

(Unit: 10^3 Nm^3/Year)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	10,046	12,765	16,884	20,055	22,914
Gombak	6,521	9,587	13,793	21,968	30,375
Hulu Langat	3,853	9,052	15,071	27,500	40,600
Petaling Jaya	47,453	50,762	60,197	71,535	81,985
Shah Alam	19,255	31,245	46,637	67,286	88,027
Klang	26,558	40,073	57,996	79,769	101,749
Total	113,686	153,484	210,578	288,113	365,650

Table II.39 FORECAST OF FLOOR AREA

(Unit: 10^3m^2)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	12,213	15,047	17,665	20,817	24,003
Gombak	617	1,107	1,562	2,390	3,235
Hulu Langat	506	1,078	1,604	2,498	3,414
Petaling Jaya	2,691	3,698	4,609	5,647	6,726
Shah Alam	512	1,366	2,148	3,058	3,974
Klang	1,508	2,188	2,805	3,474	4,188
Total	18,049	24,484	30,393	37,844	45,540

Table II.40 TOTAL ENERGY DEMAND FOR COOLING

(Unit: 10^3 Nm^3/Year)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	185,524	228,567	268,325	316,208	364,610
Gombak	9,378	16,811	23,725	36,301	49,136
Hulu Langat	7,692	16,378	24,374	37,943	51,858
Petaling Jaya	40,882	56,180	70,009	85,783	102,162
Shah Alam	7,779	20,744	32,628	46,457	60,372
Klang	22,904	33,233	42,611	52,766	63,613
Total	274,159	371,913	461,672	575,458	691,751

Table II.41 POTENTIAL DEMAND FOR COOLING (HIGH CASE)

(Unit: 10^3 Nm^3)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	0	0	0	15,320	32,304
Gombak	0	0	0	2,280	4,764
Hulu Langat	0	0	0	3,695	7,768
Petaling Jaya	0	0	0	2,496	5,272
Shah Alam	0	0	0	5,402	11,398
Klang	0	0	0	2,236	4,700
Total	0	0	0	31,429	66,206

Table II.42 POTENTIAL DEMAND FOR COOLING (LOW CASE)

(Unit: 10^3 Nm^3/Year)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	0	0	0	3,395	13,561
Gombak	0	0	0	509	2,002
Hulu Langat	0	0	0	820	3,260
Petaling Jaya	0	0	0	552	2,220
Shah Alam	0	0	0	1,198	4,793
Klang	0	0	0	497	1,974
Total	0	0	0	6,971	27,810

Table II.43 FORECAST NO. OF VEHICLES SUITABLE FOR CNG CONVERSION

Year	Target No. of vehicles for Peninsular Malaysia	Proportion of CNG vehicles in FT/Selangor	No. of CNG vehicles in FT/Selangor
1990	1,600	0.45	720
1995	57,000	0.46	26,220
2000	228,500	0.48	109,680
2010	330,000	0.50	165,000

Source: Welgas CNG Study

Notes:
Assuming - Average vehicle travels 20,000 km/year,
- Percentage distance travelled on CNG 60%
(The remaining 40% on petrol)
- CNG car consumption 250 km/mmbtu
The average CNG consumption = 48 mmbtu/year/vehicle

Estimated natural gas demand for CNG vehicles in FT/Selangor

Year	No. of CNG vehicles	CNG consumption	
		mmbtu/year	mmsef/year
1990	720	34,560	32.91
1995	26,220	1,258,560	1,198.63
2000	109,680	5,264,640	5,013.94
2010	165,000	7,920,000	7,542.86

Table II.44 POTENTIAL DEMAND FOR CNG

(10^3 Nm^3/Year)

District \ Year	1985	1990	1995	2000	2005
Federal Territory	0	0	10,406	45,572	70,895
Gombak	0	0	1,888	8,477	15,153
Hulu Langat	0	0	1,632	7,447	14,980
Petaling Jaya	0	0	2,925	13,689	22,358
Shah Alam	0	0	907	7,878	13,663
Klang	0	0	1,863	10,393	17,612
Total	0	0	19,621	93,446	154,661

Table II.45 TOTAL ENERGY DEMAND (BASE CASE)

(Unit: 1,000 Nm^3/Year)

Use / Year		1985	1990	1995	2000	2005
Household	Cooking	109,723	142,155	170,603	206,109	235,986
	Hot shower	15,268	21,366	27,448	35,703	43,531
	Subtotal	124,990	163,520	198,051	241,812	279,517
Restaurant		43,366	56,832	69,112	84,631	99,970
Hotel		7,470	9,516	12,675	15,828	18,988
Manufacturing industry		242,349	327,189	448,898	614,185	779,471
Total		418,175	557,057	728,736	956,456	1,177,946

Table II.46 TOTAL ENERGY DEMAND (MEDIUM CASE)

(Unit: 1,000 Nm^3/Year)

Use / Year		1985	1990	1995	2000	2005
Household	Cooking	109,723	142,155	170,603	206,109	235,986
	Hot shower	15,268	20,396	25,182	33,294	41,072
	Subtotal	124,990	162,550	195,785	239,403	277,057
Restaurant		43,366	56,832	69,112	84,631	99,970
Hotel		7,470	9,516	12,675	15,825	18,988
Manufacturing industry		242,349	295,664	407,992	557,723	707,455
Total		418,175	524,562	685,563	897,585	1,103,470

Table II.47 TOTAL ENERGY DEMAND (LOW CASE)

(Unit: 1,000 Nm^3/Year)

Use / Year		1985	1990	1995	2000	2005
Household	Cooking	109,723	142,155	170,603	206,109	235,986
	Hot shower	15,268	19,780	23,739	28,679	32,837
	Subtotal	124,990	161,935	194,342	234,788	268,823
Restaurant		43,366	53,500	66,144	81,071	94,720
Hotel		7,470	9,516	12,675	15,825	18,989
Manufacturing industry		242,349	266,334	336,451	407,695	478,880
Total		418,175	491,285	609,612	739,383	861,410

Table II.48 POTENTIAL DEMAND FOR CITY GAS (BASE CASE)

(Unit: 1,000 Nm^3/Year)

Use / Year		1985	1990	1995	2000	2005
Household	Cooking	65,330	86,658	111,866	149,462	187,236
	Hot shower	7,634	10,683	13,724	17,852	21,766
	Subtotal	72,963	97,340	125,590	167,314	209,003
Restaurant		33,360	43,718	53,165	65,102	76,902
Hotel		1,621	2,065	2,751	3,435	4,121
Manufacturing industry		14,977	20,221	27,742	37,957	48,171
Total		122,922	163,344	209,247	273,808	338,196

Table II.49 POTENTIAL DEMAND FOR CITY GAS (MEDIUM CASE)

(Unit: 1,000 Nm^3/Year)

Use / Year		1985	1990	1995	2000	2005
Household	Cooking	65,330	85,419	103,410	139,749	176,529
	Hot shower	7,634	10,198	12,590	16,647	20,537
	Subtotal	72,963	95,617	116,000	156,396	197,066
Restaurant		33,360	43,718	53,165	65,102	76,902
Hotel		1,621	2,065	2,751	3,435	4,121
Manufacturing industry		14,977	18,272	25,214	34,467	43,721
Total		122,922	159,673	197,130	259,401	321,809

Table II.50 POTENTIAL DEMAND FOR CITY GAS (LOW CASE)

(Unit: 1,000 Nm^3/Year)

Use / Year		1985	1990	1995	2000	2005
Household	Cooking	65,330	84,640	101,578	133,790	165,861
	Hot shower	7,634	9,891	11,870	14,339	16,419
	Subtotal	72,963	94,531	113,448	148,129	182,280
Restaurant		33,360	41,154	50,882	62,364	72,863
Hotel		1,621	2,065	2,751	3,435	4,121
Manufacturing industry		14,977	16,460	20,793	25,196	29,595
Total		122,922	154,210	187,873	239,124	288,859

Table II.51 ADDITIONAL DEMAND

(Unit: 1,000 Nm^3/Year)

Case / Year		1985	1990	1995	2000	2005
Industry	High	227,372	306,969	421,156	576,228	731,300
	Low	113,686	153,848	210,578	288,113	365,650
Cooling	High	0	0	0	31,429	66,206
	Low	0	0	0	6,971	27,810
C.N.G.		0	0	19,621	93,446	154,661