

SOUTHEAST ASIA
ENERGY BALANCE TABLES

2002										Mtoe
	Coal	Oil	Gas	Hydro	Nuclear	NRE	Electricity	Heat	Total	
Production	91.2	134.6	147.8	4.3		98.7				476.6
Net Imports	- 46.8	32.8	- 52.2				0.2			- 66.0
TPED	43.7	168.7	92.4	4.3		98.7	0.2			408.0
Electricity and Heat Generation	- 23.0	- 12.0	- 43.1	- 4.3		- 16.4	31.0			- 67.8
Petroleum Refineries		- 25.6	- 1.1				- 0.2			- 26.9
Others	- 4.0	- 0.6	- 30.4			- 0.7				- 35.8
TFED	16.5	129.9	17.5			81.6	30.7			276.1
Industry	15.5	36.0	17.3			10.0	13.7			92.4
Transport		74.9	0.1				0.1			75.0
Residential	0.8	14.6	0.1			71.4	9.0			95.8
Commercial	0.3	4.4				0.2	7.9			12.9

2010										Mtoe
	Coal	Oil	Gas	Hydro	Nuclear	NRE	Electricity	Heat	Total	
Production	155.2	144.2	221.8	6.1		109.0				636.3
Net Imports	- 65.0	78.1	- 74.7				0.7			- 60.9
TPED	90.2	222.3	147.1	6.1		109.0	0.7			575.4
Electricity and Heat Generation	- 51.1	- 7.0	- 70.3	- 6.1		- 20.6	51.1			- 103.9
Petroleum Refineries		- 30.3	- 1.4				- 0.2			- 32.0
Others	- 10.5	- 0.6	- 46.0			- 0.7				- 57.7
TFED	28.7	184.4	29.4			87.6	51.5			381.7
Industry	27.1	54.2	28.8			12.4	23.3			145.7
Transport		108.7	0.5				0.1			109.3
Residential	1.1	15.7	0.1			75.0	15.7			107.6
Commercial	0.5	5.9	0.1			0.2	12.4			19.1

2020										Mtoe
	Coal	Oil	Gas	Hydro	Nuclear	NRE	Electricity	Heat	Total	
Production	176.2	138.4	226.2	8.8	3.6	121.0				674.2
Net Imports	- 26.2	174.4	- 23.3				2.6			127.5
TPED	150.0	312.8	202.9	8.8	3.6	121.0	2.6			801.8
Electricity and Heat Generation	- 92.9	- 4.6	- 108.4	- 8.8	- 3.6	- 23.0	86.4			- 155.0
Petroleum Refineries		- 36.5	- 2.0				- 0.2			- 38.7
Others	- 11.7	- 0.5	- 43.6			- 0.7				- 56.5
TFED	45.4	271.3	48.9			97.3	88.7			551.6
Industry	43.0	79.8	47.9			17.0	40.7			228.3
Transport		166.6	0.6				0.1			167.2
Residential	1.6	17.1	0.3			80.0	27.0			125.9
Commercial	0.9	7.9	0.2			0.3	20.9			30.1

2030										Mtoe
	Coal	Oil	Gas	Hydro	Nuclear	NRE	Electricity	Heat	Total	
Production	199.1	130.9	201.7	11.0	10.8	137.1				690.6
Net Imports	32.7	287.8	49.9				4.7			375.0
TPED	231.8	418.7	251.6	11.0	10.8	137.1	4.7			1 065.6
Electricity and Heat Generation	- 156.1	- 4.7	- 138.4	- 11.0	- 10.8	- 29.0	130.4			- 219.6
Petroleum Refineries		- 45.5	- 2.7				- 0.3			- 48.5
Others	- 12.4	- 0.4	- 38.5			- 0.7				- 52.0
TFED	63.3	368.1	72.0			107.4	134.8			745.5
Industry	59.9	102.8	70.4			22.9	61.8			317.9
Transport		236.6	0.7				0.1			237.4
Residential	2.1	18.6	0.5			84.2	41.0			146.4
Commercial	1.2	10.1	0.4			0.3	31.8			43.8

SOUTHEAST ASIA

MACRO ASSUMPTIONS

	1980	2002	2010	2020	2030	Growth Rate (% per annum)				
						80-02	02-10	10-20	20-30	02-30
GDP (2000 PPP US\$ billion)	699	2 018	3 032	4 878	7 452	4.9	5.2	4.9	4.3	4.8
Population (million)	313	464	513	570	616	1.8	1.3	1.1	0.8	1.0
GDP per capita (2000 PPP US\$)	2 231	4 349	5 911	8 555	12 088	3.1	3.9	3.8	3.5	3.7
GDP in Services (2000 PPP US\$ billion)	271	874	1 369	2 279	3 580	5.5	5.8	5.2	4.6	5.2
GDP in Industry (2000 PPP US\$ billion)	201	717	1 152	1 913	2 917	6.0	6.1	5.2	4.3	5.1
Urbanisation level (%)	26	43	50	57	63	2.3	1.8	1.3	1.0	1.4

ENERGY PROJECTIONS

	Mtoe					Growth rate (% per annum)				
	1980	2002	2010	2020	2030	80-02	02-10	10-20	20-30	02-30
Production	203.7	476.6	636.3	674.2	690.6	3.9	3.7	0.6	0.2	1.3
Coal	3.7 (2%)	91.2 (19%)	155.2 (24%)	176.2 (26%)	199.1 (29%)	15.7	6.9	1.3	1.2	2.8
Oil	107.2 (53%)	134.6 (28%)	144.2 (23%)	138.4 (21%)	130.9 (19%)	1.0	0.9	-0.4	-0.6	-0.1
Gas	25.9 (13%)	147.8 (31%)	221.8 (35%)	226.2 (34%)	201.7 (29%)	8.2	5.2	0.2	-1.1	1.1
Hydro	0.9 (0%)	4.3 (1%)	6.1 (1%)	8.8 (1%)	11.0 (2%)	7.7	4.3	3.8	2.2	3.4
NRE	66.0 (32%)	98.7 (21%)	109.0 (17%)	121.0 (18%)	137.1 (20%)	1.8	1.3	1.1	1.3	1.2
Nuclear				3.6 (1%)	10.8 (2%)				11.6	
Net Imports	- 58.5	- 66.0	- 60.9	127.5	375.0	0.5	- 1.0		11.4	
Coal	-0.1	-46.8	-65.0	-26.2	32.7		4.2	-8.7		
Oil	-42.0	32.8	78.1	174.4	287.8		11.4	8.4	5.1	8.1
Gas	-16.5	-52.2	-74.7	-23.3	49.9	5.4	4.6	-11.0		
Electricity	0.1	0.2	0.7	2.6	4.7	6.2	13.5	14.5	6.1	11.2
Total Primary Energy Demand	139.6	408.0	575.4	801.8	1 065.6	5.0	4.4	3.4	2.9	3.5
Coal	3.3 (2%)	43.7 (11%)	90.2 (16%)	150.0 (19%)	231.8 (22%)	12.4	9.5	5.2	4.4	6.1
Oil	59.9 (43%)	168.7 (41%)	222.3 (39%)	312.8 (39%)	418.7 (39%)	4.8	3.5	3.5	3.0	3.3
Gas	9.4 (7%)	92.4 (23%)	147.1 (26%)	202.9 (25%)	251.6 (24%)	10.9	6.0	3.3	2.2	3.6
Hydro	0.9 (1%)	4.3 (1%)	6.1 (1%)	8.8 (1%)	11.0 (1%)	7.7	4.3	3.8	2.2	3.4
NRE	66.0 (47%)	98.7 (24%)	109.0 (19%)	121.0 (15%)	137.1 (13%)	1.8	1.3	1.1	1.3	1.2
Nuclear				3.6 (0%)	10.8 (1%)				11.6	
Input for Electricity and Heat Generation	- 16.7	- 98.8	- 155.0	- 241.4	- 350.0	8.4	5.8	4.5	3.8	4.6
Coal	-1.2 (7%)	-23.0 (23%)	-51.1 (33%)	-92.9 (38%)	-156.1 (45%)	14.5	10.5	6.2	5.3	7.1
Oil	-12.7 (76%)	-12.0 (12%)	-7.0 (5%)	-4.6 (2%)	-4.7 (1%)	-0.3	-6.5	-4.1	0.2	-3.3
Gas	-0.2 (1%)	-43.1 (44%)	-70.3 (45%)	-108.4 (45%)	-138.4 (40%)		6.3	4.4	2.5	4.3
Hydro	-0.9 (5%)	-4.3 (4%)	-6.1 (4%)	-8.8 (4%)	-11.0 (3%)	7.7	4.3	3.8	2.2	3.4
NRE	-1.8 (11%)	-16.4 (17%)	-20.6 (13%)	-23.0 (10%)	-29.0 (8%)	10.6	2.9	1.1	2.3	2.1
Nuclear				-3.6 (1%)	-10.8 (3%)				11.6	
Other Transformation	- 7.2	- 62.6	- 89.8	- 95.1	- 100.5	10.3	4.6	0.6	0.5	1.7
Coal		-4.0 (6%)	-10.5 (12%)	-11.7 (12%)	-12.4 (12%)	23.6	12.6	1.1	0.5	4.1
Oil	-5.1 (72%)	-26.2 (42%)	-30.9 (34%)	-36.9 (39%)	-45.9 (46%)	7.7	2.1	1.8	2.2	2.0
Gas	-1.9 (27%)	-31.5 (50%)	-47.4 (53%)	-45.5 (48%)	-41.3 (41%)	13.5	5.3	-0.4	-1.0	1.0
NRE		-0.7 (1%)	-0.7 (1%)	-0.7 (1%)	-0.7 (1%)					
Electricity	-0.1 (1%)	-0.2 (0%)	-0.2 (0%)	-0.2 (0%)	-0.3 (0%)	5.7	1.3	0.2	0.2	0.5
Heat										

SOUTHEAST ASIA

	Mtoe					Growth rate (% per annum)				
	1980	2002	2010	2020	2030	80-02	02-10	10-20	20-30	02-30
Total Final Energy Demand	102.0	276.1	381.7	551.6	745.5	4.6	4.1	3.8	3.1	3.6
Coal	1.8 (2%)	16.5 (6%)	28.7 (8%)	45.4 (8%)	63.3 (8%)	10.5	7.1	4.7	3.4	4.9
Oil	40.0 (39%)	129.9 (47%)	184.4 (48%)	271.3 (49%)	368.1 (49%)	5.5	4.5	3.9	3.1	3.8
Gas	2.4 (2%)	17.5 (6%)	29.4 (8%)	48.9 (9%)	72.0 (10%)	9.4	6.7	5.2	3.9	5.2
NRE	53.6 (53%)	81.6 (30%)	87.6 (23%)	97.3 (18%)	107.4 (14%)	1.9	0.9	1.1	1.0	1.0
Electricity	4.2 (4%)	30.7 (11%)	51.5 (13%)	88.7 (16%)	134.8 (18%)	9.5	6.7	5.6	4.3	5.4
Heat										
Industry	23.3	92.4	145.7	228.3	317.9	6.5	5.9	4.6	3.4	4.5
Coal	1.4 (6%)	15.5 (17%)	27.1 (19%)	43.0 (19%)	59.9 (19%)	11.5	7.2	4.7	3.4	5.0
Oil	15.2 (65%)	36.0 (39%)	54.2 (37%)	79.8 (35%)	102.8 (32%)	4.0	5.3	3.9	2.6	3.8
Gas	2.4 (10%)	17.3 (19%)	28.8 (20%)	47.9 (21%)	70.4 (22%)	9.4	6.5	5.2	3.9	5.1
NRE	2.2 (9%)	10.0 (11%)	12.4 (8%)	17.0 (7%)	22.9 (7%)	7.2	2.7	3.2	3.0	3.0
Electricity	2.2 (9%)	13.7 (15%)	23.3 (16%)	40.7 (18%)	61.8 (19%)	8.8	6.9	5.7	4.3	5.5
Heat										
Transport	17.2	75.0	109.3	167.2	237.4	6.9	4.8	4.3	3.6	4.2
Coal	0.1 (0%)									
Oil	17.2 (100%)	74.9 (100%)	108.7 (100%)	166.6 (100%)	236.6 (100%)	6.9	4.8	4.4	3.6	4.2
Gas		0.1 (0%)	0.5 (0%)	0.6 (0%)	0.7 (0%)		28.6	2.3	2.0	9.1
NRE										
Electricity		0.1 (0%)	0.1 (0%)	0.1 (0%)	0.1 (0%)		2.0	1.3	1.1	1.4
Residential	59.9	95.8	107.6	125.9	146.4	2.2	1.5	1.6	1.5	1.5
Coal	0.3 (1%)	0.8 (1%)	1.1 (1%)	1.6 (1%)	2.1 (1%)	3.7	4.5	3.7	3.1	3.7
Oil	7.2 (12%)	14.6 (15%)	15.7 (15%)	17.1 (14%)	18.6 (13%)	3.3	0.9	0.9	0.9	0.9
Gas	0.1 (0%)	0.1 (0%)	0.1 (0%)	0.3 (0%)	0.5 (0%)	1.4	5.8	8.4	6.5	6.9
NRE	51.4 (86%)	71.4 (74%)	75.0 (70%)	80.0 (64%)	84.2 (57%)	1.5	0.6	0.7	0.5	0.6
Electricity	0.9 (1%)	9.0 (9%)	15.7 (15%)	27.0 (21%)	41.0 (28%)	11.1	7.2	5.6	4.3	5.6
Heat										
Commercial	1.5	12.9	19.1	30.1	43.8	10.1	5.0	4.7	3.8	4.5
Coal		0.3 (2%)	0.5 (3%)	0.9 (3%)	1.2 (3%)		7.1	5.4	3.7	5.3
Oil	0.4 (28%)	4.4 (34%)	5.9 (31%)	7.9 (26%)	10.1 (23%)	11.1	3.7	3.0	2.5	3.0
Gas		0.04 (0%)	0.1 (0%)	0.2 (1%)	0.4 (1%)		9.4	10.0	6.8	8.7
NRE		0.2 (2%)	0.2 (1%)	0.3 (1%)	0.3 (1%)		1.3	1.0	1.0	1.1
Electricity	1.1 (72%)	7.9 (62%)	12.4 (65%)	20.9 (69%)	31.8 (73%)	9.3	5.7	5.4	4.3	5.1
Heat										

Note: Net imports include intraregional trade

ENERGY SECURITY

	1980	2002	2010	2020	2030
Diversity of Primary Energy Demand (Rated between 1 and 100)	64	82	85	86	86
Net Energy Import Ratio (%)	-40	-16	-11	16	35
Net Oil Import Dependency (%)	-70	19	35	56	69

SOUTHEAST ASIA
ELECTRICITY GENERATION

	1980	2002	2010	2020	2030	Growth rate (% per annum)				
						80-02	02-10	10-20	20-30	02-30
Total Electricity Generation (TWh)	61	409	673	1 117	1 668	9.0	6.4	5.2	4.1	5.1
Coal	3 (5%)	79 (19%)	189 (28%)	376 (34%)	683 (41%)	16.0	11.5	7.1	6.2	8.0
Oil	46 (75%)	50 (12%)	32 (5%)	21 (2%)	22 (1%)	0.4	- 5.3	- 4.1	0.3	- 2.9
Gas	0.4 (1%)	209 (51%)	354 (53%)	565 (51%)	743 (45%)		6.8	4.8	2.8	4.6
Hydro	10 (16%)	50 (12%)	71 (10%)	103 (9%)	127 (8%)	7.7	4.3	3.8	2.2	3.4
NRE	2 (3%)	21 (5%)	28 (4%)	39 (3%)	51 (3%)	11.0	3.8	3.2	2.8	3.3
Nuclear				14 (1%)	42 (2%)				11.6	
Total Installed Generation Capacity (GW)	16	99	154	259	367	8.6	5.7	5.3	3.6	4.8
Thermal	12 (74%)	81 (81%)	127 (82%)	214 (83%)	312 (85%)	9.0	5.9	5.3	3.8	5.0
Coal		17 (17%)	41 (26%)	83 (32%)	137 (37%)		11.6	7.4	5.1	7.7
Oil		19 (19%)	16 (11%)	13 (5%)	13 (3%)		- 1.6	- 2.2	- 0.4	- 1.4
Gas		45 (45%)	70 (45%)	118 (45%)	162 (44%)		5.7	5.3	3.3	4.7
Hydro	3 (21%)	15 (15%)	21 (14%)	33 (13%)	36 (10%)	7.1	4.3	4.4	1.0	3.1
NRE	1 (5%)	3 (3%)	6 (4%)	10 (4%)	13 (4%)	6.6	6.8	5.5	2.9	4.9
Nuclear				2 (1%)	6 (2%)				11.6	

ENERGY INTENSITY & CO₂ EMISSIONS

	1980	2002	2010	2020	2030	Growth Rates (% per annum)				
						80-02	02-10	10-20	20-30	02-30
Energy Intensity (toe per US\$ million GDP)	200	202	190	164	143	0.1	- 0.8	- 1.4	- 1.4	- 1.2
Industry (toe per US\$ million GDP in Industry)	116	129	127	119	109	0.5	- 0.2	- 0.6	- 0.9	- 0.6
Commercial (toe per US\$ million GDP in Services)	6	15	14	13	12	4.4	- 0.7	- 0.5	- 0.8	- 0.7
Energy Intensity (kgoe per capita)	445	879	1 122	1 406	1 729	3.1	3.1	2.3	2.1	2.4
Industry	74	199	284	400	516	4.6	4.5	3.5	2.6	3.5
Transport	55	162	213	293	385	5.0	3.5	3.3	2.8	3.1
Residential	191	206	210	221	237	0.4	0.2	0.5	0.7	0.5
Commercial	5	28	37	53	71	8.2	3.7	3.6	3.0	3.4
CO₂ Emissions (million tonnes)	192	810	1 227	1 849	2 582	6.8	5.3	4.2	3.4	4.2
Electricity Generation	43	226	383	628	943	7.8	6.8	5.1	4.2	5.2
Transformation other than Electricity Generation	14	92	120	134	144	8.9	3.5	1.1	0.8	1.6
Industry	59	207	327	504	685	5.9	5.9	4.4	3.1	4.4
Transport	51	223	325	498	707	6.9	4.8	4.4	3.6	4.2
Residential	23	48	52	58	65	3.4	1.2	1.2	1.1	1.1
Commercial	2	15	20	28	36	10.4	4.0	3.3	2.7	3.3
CO₂ Emissions Intensity										
CO ₂ emissions per GDP (tonnes per US\$ million)	274	401	405	379	346	1.8	0.1	- 0.7	- 0.9	- 0.5
CO ₂ emissions per capita (tonnes per capita)	0.6	1.7	2.4	3.2	4.2	4.9	4.0	3.1	2.6	3.2

ENERGY INVESTMENT REQUIREMENTS

(Cumulative from 2003 -)	2010	2020	2030
Total (2000 US\$ billion)	189 - 242	451 - 572	732 - 927
Coal Production & Transportation	8 - 10	12 - 16	16 - 21
Oil & Gas Production & Processing	49 - 73	97 - 142	144 - 210
Oil & Gas International Trade	30 - 33	51 - 58	67 - 76
Oil & Gas Domestic Pipeline	6 - 9	12 - 17	17 - 25
Electricity Generation & Transmission	96 - 117	279 - 339	488 - 595