Attachment Set D to:

Synthesis Report for the Pacific Asia Regional Energy Security (PARES) Project, Phase 1

A Framework for Energy Security Analysis and Application to a Case Study of Japan

Selected Detailed Results, Background Data, and Workpapers: Energy Paths Analysis for Japan

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Business as Usual Path

ENERGY DEMAND: FUEL BY YEAR, ALL SECTORS (BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	2.71	3.12	3.55	4.30	4.96
NATURAL GAS	0.03	0.02	0.02	0.02	0.02
GASOLINE	1.49	1.76	1.93	2.15	2.23
JET FUEL	0.15	0.18	0.21	0.28	0.32
KEROSENE	0.95	1.03	1.11	1.23	1.31
DIESEL/GAS OIL	1.51	1.85	2.15	2.54	2.85
HEAVY OIL A	0.71	1.01	1.06	1.16	1.27
HEAVY OIL B	0.03	0.00	0.00	0.00	0.00
HEAVY OIL C	0.83	0.73	0.68	0.63	0.58
LPG/BOTTLED GAS	0.75	0.83	0.91	1.08	1.25
OTHER PETRO PROD	0.26	0.24	0.26	0.27	0.30
LUBRICATING OIL	0.09	0.09	0.10	0.11	0.14
CRUDE OIL	0.00	0.00	0.00	0.00	0.00
COAL BITUMINOUS	0.32	0.30	0.28	0.26	0.24
COAL, COKING	0.20	0.31	0.18	0.12	0.08
COAL ANTHRACITE	0.02	0.04	0.04	0.04	0.05
HARDCOAL BRIQUET	0.00	0.00	0.00	0.00	0.00
COKE (from Coal)	0.79	0.64	0.57	0.51	0.43
Coke Oven Gas	0.16	0.14	0.13	0.12	0.11
Biomass/Wood/Wst	0.12	0.10	0.10	0.11	0.11
SOLAR	0.05	0.04	0.04	0.05	0.05
HEAT (DISTRICT)	0.01	0.02	0.03	0.05	0.08
NAPTHA	1.03	1.34	1.40	1.48	1.48
BLAST FURN. GAS	0.16	0.15	0.13	0.10	0.08
MUNICIPAL GAS	0.60	0.79	0.98	1.32	1.87
PETROLEUM COKE	0.09	0.11	0.11	0.12	0.14
LNG	0.00	0.00	0.00	0.00	0.00
TOTAL	13.05	14.84	15.96	18.04	19.95

ENERGY DEMAND: BALANCE CATEGORY BY YEAR, ALL SECTORS (BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	0.00	0.00	0.00	0.00	0.00
PETRO PROD	7.88	9.17	9.91	11.04	11.87
COAL/COKE	1.33	1.30	1.07	0.94	0.80
FUEL GASES	0.95	1.09	1.25	1.55	2.09
ELECTRICITY	2.71	3.12	3.55	4.30	4.96
WIND/SOLAR	0.05	0.04	0.04	0.05	0.05
HEAT	0.01	0.02	0.03	0.05	0.08
BIOMASS FUELS	0.12	0.10	0.10	0.11	0.11
TOTAL	13.05	14.84	15.96	18.04	19.95

Business as Usual Path

ENERGY DEMAND: SECTOR BY YEAR, ALL FUELS
(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
INDUSTRY	6.16	6.46	6.52	6.96	7.37
TRANSPORT	3.31	3.97	4.43	5.07	5.49
AGRIC/FOR/FISH	0.22	0.26	0.27	0.27	0.27
HOUSEHOLD	1.81	2.07	2.25	2.41	2.51
COMMERCIAL	1.20	1.75	2.14	2.95	3.88
NON-ENERGY	0.35	0.33	0.35	0.38	0.44
TOTAL	13.05	14.84	15.96	18.04	19.95

ENERGY DEMAND: SECTOR BY YEAR, ELECTRICITY
(MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
INDUSTRY	1357.84	1424.35	1536.38	1721.18	1888.15
TRANSPORT	62.31	67.65	67.84	74.09	80.38
AGRIC/FOR/FISH	8.38	9.40	9.64	9.64	9.64
HOUSEHOLD	684.48	852.83	971.45	1120.18	1148.15
COMMERCIAL	598.75	766.24	965.18	1376.10	1832.94
NON-ENERGY	0.00	0.00	0.00	0.00	0.00
TOTAL	2711.77	3120.47	3550.48	4301.18	4959.27

ENERGY DEMAND: SECTOR BY YEAR, PETRO PROD
(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
INDUSTRY	2.89	3.12	3.22	3.43	3.53
TRANSPORT	3.25	3.91	4.37	5.00	5.41
AGRIC/FOR/FISH	0.22	0.25	0.26	0.26	0.26
HOUSEHOLD	0.75	0.82	0.85	0.86	0.84
COMMERCIAL	0.42	0.74	0.87	1.11	1.39
NON-ENERGY	0.35	0.33	0.35	0.38	0.44
TOTAL	7.88	9.17	9.91	11.04	11.87

Business as Usual Path

ENERGY DEMAND: SECTOR BY YEAR, FUEL GASES
(MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
INDUSTRY	496.95	569.64	641.19	823.79	1122.09
TRANSPORT	0.00	0.00	0.00	0.00	0.00
AGRIC/FOR/FISH	0.00	0.00	0.00	0.00	0.00
HOUSEHOLD	316.87	344.60	381.11	378.69	469.19
COMMERCIAL	137.14	178.76	231.38	349.23	493.79
NON-ENERGY	0.00	0.00	0.00	0.00	0.00
TOTAL	950.96	1093.00	1253.68	1551.71	2085.08

ENERGY DEMAND: SECTOR BY YEAR, ALL BALANCE CATEGORIES
PERCENT SHARE

	1990	1995	2000	2010	2020
INDUSTRY	47.18%	43.56%	40.83%	38.58%	36.94%
TRANSPORT	25.36%	26.78%	27.77%	28.11%	27.52%
AGRIC/FOR/FISH	1.72%	1.76%	1.68%	1.48%	1.34%
HOUSEHOLD	13.88%	13.92%	14.10%	13.37%	12.57%
COMMERCIAL	9.18%	11.77%	13.40%	16.35%	19.44%
NON-ENERGY	2.68%	2.21%	2.22%	2.12%	2.20%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%

ENERGY DEMAND: SECTOR BY YEAR, ALL BALANCE CATEGORIES
(BILLION GIGAJOULES)

		-- Average Annual Growth Rates --		
	1990	1990-2020	1990-2004	2004-2020
INDUSTRY	6.16	0.60%	0.60%	0.60%
TRANSPORT	3.31	1.70%	2.51%	1.00%
AGRIC/FOR/FISH	0.22	0.57%	1.23%	-0.01%
HOUSEHOLD	1.81	1.09%	1.77%	0.50%
COMMERCIAL	1.20	3.99%	5.24%	2.91%
NON-ENERGY	0.35	0.76%	0.35%	1.12%
TOTAL	13.05	1.42%	1.81%	1.09%

Business as Usual Path

ENERGY DEMAND: BALANCE CATEGORY BY SECTOR, 1990
(BILLION GIGAJOULES)

	INDUSTRY	TRANSPORT	AGRIC/FOR	HOUSEHOLD	COMMERCIA	NON-ENERG	TOTAL
CRUDE OIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PETRO PROD	2.89	3.25	0.22	0.75	0.42	0.35	7.88
COAL/COKE	1.30	0.00	0.00	0.00	0.03	0.00	1.33
FUEL GASES	0.50	0.00	0.00	0.32	0.14	0.00	0.95
ELECTRICITY	1.36	0.06	0.01	0.68	0.60	0.00	2.71
WIND/SOLAR	0.00	0.00	0.00	0.05	0.00	0.00	0.05
HEAT	0.00	0.00	0.00	0.00	0.01	0.00	0.01
BIOMASS FUELS	0.11	0.00	0.00	0.00	0.00	0.00	0.12
TOTAL	6.16	3.31	0.22	1.81	1.20	0.35	13.05

ENERGY DEMAND: BALANCE CATEGORY BY SECTOR, 1995
(BILLION GIGAJOULES)

	INDUSTRY	TRANSPORT	AGRIC/FOR	HOUSEHOLD	COMMERCIA	NON-ENERG	TOTAL
CRUDE OIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PETRO PROD	3.12	3.91	0.25	0.82	0.74	0.33	9.17
COAL/COKE	1.25	0.00	0.00	0.00	0.04	0.00	1.30
FUEL GASES	0.57	0.00	0.00	0.34	0.18	0.00	1.09
ELECTRICITY	1.42	0.07	0.01	0.85	0.77	0.00	3.12
WIND/SOLAR	0.00	0.00	0.00	0.04	0.00	0.00	0.04
HEAT	0.00	0.00	0.00	0.00	0.01	0.00	0.02
BIOMASS FUELS	0.10	0.00	0.00	0.00	0.00	0.00	0.10
TOTAL	6.46	3.97	0.26	2.07	1.75	0.33	14.84

ENERGY DEMAND: BALANCE CATEGORY BY SECTOR, 2000
(BILLION GIGAJOULES)

	INDUSTRY	TRANSPORT	AGRIC/FOR	HOUSEHOLD	COMMERCIA	NON-ENERG	TOTAL
PETRO PROD	3.22	4.37	0.26	0.85	0.87	0.35	9.91
COAL/COKE	1.02	0.00	0.00	0.00	0.05	0.00	1.07
FUEL GASES	0.64	0.00	0.00	0.38	0.23	0.00	1.25
ELECTRICITY	1.54	0.07	0.01	0.97	0.97	0.00	3.55
WIND/SOLAR	0.00	0.00	0.00	0.04	0.00	0.00	0.04
HEAT	0.00	0.00	0.00	0.00	0.02	0.00	0.03
BIOMASS FUELS	0.10	0.00	0.00	0.00	0.00	0.00	0.10
TOTAL	6.52	4.43	0.27	2.25	2.14	0.35	15.96

ENERGY DEMAND: BALANCE CATEGORY BY SECTOR, 2010
(BILLION GIGAJOULES)

	INDUSTRY	TRANSPORT	AGRIC/FOR	HOUSEHOLD	COMMERCIA	NON-ENERG	TOTAL
PETRO PROD	3.43	5.00	0.26	0.86	1.11	0.38	11.04
COAL/COKE	0.88	0.00	0.00	0.00	0.06	0.00	0.94
FUEL GASES	0.82	0.00	0.00	0.38	0.35	0.00	1.55
ELECTRICITY	1.72	0.07	0.01	1.12	1.38	0.00	4.30
WIND/SOLAR	0.00	0.00	0.00	0.05	0.00	0.00	0.05
HEAT	0.00	0.00	0.00	0.00	0.05	0.00	0.05
BIOMASS FUELS	0.11	0.00	0.00	0.00	0.00	0.00	0.11
TOTAL	6.96	5.07	0.27	2.41	2.95	0.38	18.04

Business as Usual Path

ENERGY DEMAND: BALANCE CATEGORY BY SECTOR, 2020
(BILLION GIGAJOULES)

	INDUSTRY	TRANSPORT	AGRIC/FOR	HOUSEHOLD	COMMERCIA	NON-ENERG	TOTAL
PETRO PROD	3.53	5.41	0.26	0.84	1.39	0.44	11.87
COAL/COKE	0.72	0.00	0.00	0.00	0.07	0.00	0.80
FUEL GASES	1.12	0.00	0.00	0.47	0.49	0.00	2.09
ELECTRICITY	1.89	0.08	0.01	1.15	1.83	0.00	4.96
WIND/SOLAR	0.00	0.00	0.00	0.05	0.00	0.00	0.05
HEAT	0.00	0.00	0.00	0.00	0.08	0.00	0.08
BIOMASS FUELS	0.11	0.00	0.00	0.00	0.00	0.00	0.11
TOTAL	7.37	5.49	0.27	2.51	3.88	0.44	19.95

ENERGY DEMAND: BALANCE CATEGORY BY YEAR
INDUSTRY
(MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	0.72	0.04	0.00	0.00	0.00
PETRO PROD	2888.93	3119.97	3219.49	3431.01	3533.48
COAL/COKE	1300.07	1252.67	1018.93	877.60	720.28
FUEL GASES	496.95	569.64	641.19	823.79	1122.09
ELECTRICITY	1357.84	1424.35	1536.38	1721.18	1888.15
BIOMASS FUELS	113.55	96.84	101.44	106.16	106.16
TOTAL	6158.06	6463.51	6517.43	6959.74	7370.17

ENERGY DEMAND: BALANCE CATEGORY BY YEAR
TRANSPORT
(MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
PETRO PROD	3248.23	3907.09	4365.20	4997.55	5408.93
ELECTRICITY	62.31	67.65	67.84	74.09	80.38
TOTAL	3310.55	3974.74	4433.04	5071.63	5489.31

ENERGY DEMAND: BALANCE CATEGORY BY YEAR
HOUSEHOLD
(MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
PETRO PROD	753.58	820.65	848.12	861.35	837.50
COAL/COKE	3.52	1.93	1.56	0.93	0.93
FUEL GASES	316.87	344.60	381.11	378.69	469.19
ELECTRICITY	684.48	852.83	971.45	1120.18	1148.15
WIND/SOLAR	47.04	40.69	43.38	46.68	46.82
HEAT	1.27	1.37	1.44	1.52	1.52
BIOMASS FUELS	4.31	3.02	3.18	3.42	3.43
TOTAL	1811.08	2065.08	2250.24	2412.77	2507.55

Business as Usual Path

ENERGY DEMAND: BALANCE CATEGORY BY YEAR
COMMERCIAL (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
PETRO PROD	424.94	744.30	868.87	1114.34	1393.21
COAL/COKE	29.70	43.18	49.47	61.29	74.71
FUEL GASES	137.14	178.76	231.38	349.23	493.79
ELECTRICITY	598.75	766.24	965.18	1376.10	1832.94
HEAT	7.16	14.44	23.81	48.21	82.89
TOTAL	1197.69	1746.92	2138.71	2949.16	3877.54

Alternative Path

ENERGY DEMAND: FUEL BY YEAR, ALL SECTORS
(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	2.71	3.12	3.49	3.60	3.58
NATURAL GAS	0.03	0.02	0.02	0.02	0.02
GASOLINE	1.49	1.76	1.92	0.87	0.67
JET FUEL	0.15	0.18	0.21	0.25	0.26
KEROSENE	0.95	1.03	1.08	0.96	0.80
DIESEL/GAS OIL	1.51	1.85	2.11	2.09	1.74
HEAVY OIL A	0.71	1.05	1.08	0.93	0.74
HEAVY OIL B	0.03	0.00	0.00	0.00	0.00
HEAVY OIL C	0.83	0.73	0.67	0.54	0.48
LPG/BOTTLED GAS	0.75	0.83	0.90	0.87	0.80
OTHER PETRO PROD	0.26	0.24	0.26	0.27	0.30
LUBRICATING OIL	0.09	0.09	0.10	0.11	0.14
CRUDE OIL	0.00	0.00	0.00	0.00	0.00
COAL BITUMINOUS	0.32	0.30	0.25	0.17	0.11
COAL, COKING	0.20	0.31	0.18	0.07	0.03
COAL ANTHRACITE	0.02	0.04	0.04	0.04	0.04
HARDCOAL BRIQUET	0.00	0.00	0.00	0.00	0.00
COKE (from Coal)	0.79	0.64	0.56	0.45	0.33
Coke Oven Gas	0.16	0.14	0.12	0.10	0.09
Biomass/Wood/Wst	0.12	0.10	0.10	0.09	0.08
SOLAR	0.05	0.04	0.05	0.06	0.08
HEAT (DISTRICT)	0.01	0.02	0.03	0.05	0.08
HEAT (COGEN)	0.00	0.00	0.04	0.30	0.44
HYDROGEN	0.00	0.00	0.00	0.00	0.01
NAPTHA	1.03	1.34	1.39	1.33	1.18
BLAST FURN. GAS	0.16	0.15	0.12	0.09	0.06
MUNICIPAL GAS	0.60	0.79	0.99	1.62	2.41
PETROLEUM COKE	0.09	0.11	0.11	0.10	0.08
LNG	0.00	0.00	0.00	0.00	0.00
TOTAL	13.05	14.90	15.80	14.97	14.53

ENERGY DEMAND: BALANCE CATEGORY BY YEAR, ALL SECTORS
(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	0.00	0.00	0.00	0.00	0.00
PETRO PROD	7.88	9.22	9.81	8.31	7.20
COAL/COKE	1.33	1.30	1.04	0.73	0.50
FUEL GASES	0.95	1.10	1.25	1.83	2.58
ELECTRICITY	2.71	3.12	3.49	3.60	3.58
WIND/SOLAR	0.05	0.04	0.05	0.06	0.08
HEAT	0.01	0.02	0.06	0.35	0.52
BIOMASS FUELS	0.12	0.10	0.10	0.09	0.08
TOTAL	13.05	14.90	15.80	14.97	14.53

Alternative Path

ENERGY DEMAND: SECTOR BY YEAR, ALL FUELS (BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
INDUSTRY	6.16	6.51	6.48	6.37	6.12
TRANSPORT	3.31	3.97	4.39	3.34	2.84
AGRIC/FOR/FISH	0.22	0.26	0.27	0.27	0.26
HOUSEHOLD	1.81	2.08	2.20	2.07	1.85
COMMERCIAL	1.20	1.75	2.11	2.54	3.02
NON-ENERGY	0.35	0.33	0.35	0.38	0.44
TOTAL	13.05	14.90	15.80	14.97	14.53

ENERGY DEMAND: SECTOR BY YEAR, ELECTRICITY (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
INDUSTRY	1357.84	1423.79	1520.24	1548.66	1510.29
TRANSPORT	62.31	67.65	69.46	73.65	80.50
AGRIC/FOR/FISH	8.38	9.40	9.54	8.67	7.71
HOUSEHOLD	684.48	855.78	943.27	832.64	688.71
COMMERCIAL	598.75	766.46	948.45	1136.53	1297.35
NON-ENERGY	0.00	0.00	0.00	0.00	0.00
TOTAL	2711.77	3123.07	3490.96	3600.15	3584.57

ENERGY DEMAND: SECTOR BY YEAR, PETRO PROD (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
INDUSTRY	2888.93	3162.35	3214.34	2974.72	2691.27
TRANSPORT	3248.23	3907.09	4320.35	3221.65	2651.85
AGRIC/FOR/FISH	216.59	252.17	257.75	256.78	256.78
HOUSEHOLD	753.58	825.00	826.57	665.55	451.23
COMMERCIAL	424.94	744.30	840.62	807.36	706.22
NON-ENERGY	349.85	328.02	354.90	381.61	438.96
TOTAL	7882.12	9218.91	9814.53	8307.66	7196.30

ENERGY DEMAND: SECTOR BY YEAR, FUEL GASES (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
INDUSTRY	496.95	569.64	634.63	896.46	1120.01
TRANSPORT	0.00	0.00	2.14	44.40	99.50
AGRIC/FOR/FISH	0.00	0.00	0.00	0.00	0.00
HOUSEHOLD	316.87	349.79	380.97	508.79	629.66
COMMERCIAL	137.14	180.36	235.71	379.88	728.45
NON-ENERGY	0.00	0.00	0.00	0.00	0.00
TOTAL	950.96	1099.79	1253.44	1829.54	2577.62

Alternative Path

ENERGY DEMAND: SECTOR BY YEAR, ALL BALANCE CATEGORIES
PERCENT SHARE

	1990	1995	2000	2010	2020
INDUSTRY	47.18%	43.67%	40.99%	42.58%	42.08%
TRANSPORT	25.36%	26.68%	27.79%	22.31%	19.52%
AGRIC/FOR/FISH	1.72%	1.76%	1.69%	1.77%	1.82%
HOUSEHOLD	13.88%	13.95%	13.94%	13.85%	12.75%
COMMERCIAL	9.18%	11.74%	13.34%	16.94%	20.81%
NON-ENERGY	2.68%	2.20%	2.25%	2.55%	3.02%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%

ENERGY DEMAND: SECTOR BY YEAR, ALL BALANCE CATEGORIES
(BILLION GIGAJOULES)

		-- Average Annual Growth Rates --		
	1990	1990-2020	1990-2004	2004-2020
INDUSTRY	6.16	-0.02%	0.32%	-0.33%
TRANSPORT	3.31	-0.51%	1.47%	-2.22%
AGRIC/FOR/FISH	0.22	0.54%	1.22%	-0.05%
HOUSEHOLD	1.81	0.08%	1.24%	-0.93%
COMMERCIAL	1.20	3.14%	4.71%	1.78%
NON-ENERGY	0.35	0.76%	0.35%	1.12%
TOTAL	13.05	0.36%	1.27%	-0.43%

ENERGY DEMAND: BALANCE CATEGORY BY SECTOR, 1995
(BILLION GIGAJOULES)

	INDUSTRY	TRANSPORT	AGRIC/FOR	HOUSEHOLD	COMMERCIA	NON-ENERG	TOTAL
CRUDE OIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PETRO PROD	3.16	3.91	0.25	0.82	0.74	0.33	9.22
COAL/COKE	1.25	0.00	0.00	0.00	0.04	0.00	1.30
FUEL GASES	0.57	0.00	0.00	0.35	0.18	0.00	1.10
ELECTRICITY	1.42	0.07	0.01	0.86	0.77	0.00	3.12
WIND/SOLAR	0.00	0.00	0.00	0.04	0.00	0.00	0.04
HEAT	0.00	0.00	0.00	0.00	0.01	0.00	0.02
BIOMASS FUELS	0.10	0.00	0.00	0.00	0.00	0.00	0.10
TOTAL	6.51	3.97	0.26	2.08	1.75	0.33	14.90

ENERGY DEMAND: BALANCE CATEGORY BY SECTOR, 2000
(BILLION GIGAJOULES)

	INDUSTRY	TRANSPORT	AGRIC/FOR	HOUSEHOLD	COMMERCIA	NON-ENERG	TOTAL
PETRO PROD	3.21	4.32	0.26	0.83	0.84	0.35	9.81
COAL/COKE	0.99	0.00	0.00	0.00	0.05	0.00	1.04
FUEL GASES	0.63	0.00	0.00	0.38	0.24	0.00	1.25
ELECTRICITY	1.52	0.07	0.01	0.94	0.95	0.00	3.49
WIND/SOLAR	0.00	0.00	0.00	0.05	0.00	0.00	0.05
HEAT	0.02	0.00	0.00	0.00	0.04	0.00	0.06
BIOMASS FUELS	0.10	0.00	0.00	0.00	0.00	0.00	0.10
TOTAL	6.48	4.39	0.27	2.20	2.11	0.35	15.80

Alternative Path

ENERGY DEMAND: BALANCE CATEGORY BY SECTOR, 2010
(BILLION GIGAJOULES)

	INDUSTRY	TRANSPORT	AGRIC/FOR	HOUSEHOLD	COMMERCIA	NON-ENERG	TOTAL
PETRO PROD	2.97	3.22	0.26	0.67	0.81	0.38	8.31
COAL/COKE	0.69	0.00	0.00	0.00	0.04	0.00	0.73
FUEL GASES	0.90	0.04	0.00	0.51	0.38	0.00	1.83
ELECTRICITY	1.55	0.07	0.01	0.83	1.14	0.00	3.60
WIND/SOLAR	0.00	0.00	0.00	0.06	0.00	0.00	0.06
HEAT	0.18	0.00	0.00	0.00	0.17	0.00	0.35
BIOMASS FUELS	0.09	0.00	0.00	0.00	0.00	0.00	0.09
TOTAL	6.37	3.34	0.27	2.07	2.54	0.38	14.97

ENERGY DEMAND: BALANCE CATEGORY BY SECTOR, 2020
(BILLION GIGAJOULES)

	INDUSTRY	TRANSPORT	AGRIC/FOR	HOUSEHOLD	COMMERCIA	NON-ENERG	TOTAL
PETRO PROD	2.69	2.65	0.26	0.45	0.71	0.44	7.20
COAL/COKE	0.45	0.00	0.00	0.00	0.05	0.00	0.50
FUEL GASES	1.12	0.10	0.00	0.63	0.73	0.00	2.58
ELECTRICITY	1.51	0.08	0.01	0.69	1.30	0.00	3.58
WIND/SOLAR	0.00	0.01	0.00	0.08	0.00	0.00	0.08
HEAT	0.27	0.00	0.00	0.00	0.25	0.00	0.52
BIOMASS FUELS	0.07	0.00	0.00	0.00	0.00	0.00	0.08
TOTAL	6.12	2.84	0.26	1.85	3.02	0.44	14.53

ENERGY DEMAND: BALANCE CATEGORY BY YEAR INDUSTRY (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	0.72	0.04	0.00	0.00	0.00
PETRO PROD	2888.93	3162.35	3214.34	2974.72	2691.27
COAL/COKE	1300.07	1252.67	987.22	685.98	453.96
FUEL GASES	496.95	569.64	634.63	896.46	1120.01
ELECTRICITY	1357.84	1423.79	1520.24	1548.66	1510.29
HEAT	0.00	0.00	23.52	180.84	267.49
BIOMASS FUELS	113.55	96.84	99.16	86.64	73.31
TOTAL	6158.06	6505.32	6479.11	6373.31	6116.33

ENERGY DEMAND: BALANCE CATEGORY BY YEAR TRANSPORT (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
PETRO PROD	3248.23	3907.09	4320.35	3221.65	2651.85
FUEL GASES	0.00	0.00	2.14	44.40	99.50
ELECTRICITY	62.31	67.65	69.46	73.65	80.50
WIND/SOLAR	0.00	0.00	0.00	0.00	5.56
TOTAL	3310.55	3974.74	4391.95	3339.70	2837.40

Alternative Path

ENERGY DEMAND: BALANCE CATEGORY BY YEAR HOUSEHOLD (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
PETRO PROD	753.58	825.00	826.57	665.55	451.23
COAL/COKE	3.52	1.93	1.56	0.93	0.93
FUEL GASES	316.87	349.79	380.97	508.79	629.66
ELECTRICITY	684.48	855.78	943.27	832.64	688.71
WIND/SOLAR	47.04	40.69	45.85	60.07	77.46
HEAT	1.27	1.37	1.44	1.52	1.52
BIOMASS FUELS	4.31	3.02	3.18	3.42	3.43
TOTAL	1811.08	2077.57	2202.84	2072.91	1852.94

ENERGY DEMAND: BALANCE CATEGORY BY YEAR COMMERCIAL (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
PETRO PROD	424.94	744.30	840.62	807.36	706.22
COAL/COKE	29.70	43.18	48.10	44.68	45.80
FUEL GASES	137.14	180.36	235.71	379.88	728.45
ELECTRICITY	598.75	766.46	948.45	1136.53	1297.35
HEAT	7.16	14.44	35.89	167.86	246.46
TOTAL	1197.69	1748.73	2108.76	2536.31	3024.28

D2. DETAILED LEAP RESULTS: TRANSFORMATION

Business as Usual Path

ENERGY BALANCE: 1990 (BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.31	0.08	0.38	0.00	0.05	0.00	0.00	0.26	1.08
EXPORTS	0.00	-1.47	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.52
IMPORTS	8.89	3.23	2.86	1.80	0.00	0.00	0.00	2.18	0.00	0.00	18.96
STOCK CHANGES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRIMARY SUPPLIES	8.90	1.76	3.13	1.88	0.38	0.00	0.05	2.18	0.00	0.26	18.52
BITUM. COAL PROD	0.00	0.00	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
COKING COAL PROD	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
GAS PRODUCTION	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
COKE PRODUCTION	0.00	-0.03	-0.58	0.31	0.00	0.00	0.00	0.00	0.00	0.00	-0.28
PIPELINE GAS IMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-8.14	7.76	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	-0.40
REFINING--NON-EN	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.46	0.38	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
MUNIC GAS INPUT	0.00	-0.12	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MUNICIPAL GAS PR	0.00	-0.02	-0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	-0.76	-1.46	-0.69	-1.66	-0.38	2.92	0.00	-2.18	0.00	-0.14	-4.35
DISTRICT HEAT	0.00	-0.00	-0.00	-0.01	0.00	-0.00	0.00	0.00	0.01	0.00	-0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.00	0.00	-0.18	0.00	0.00	0.00	0.00	-0.18
FINAL CONSUMPTION	0.00	7.88	1.33	1.00	0.00	2.71	0.05	0.00	0.01	0.12	13.10
STATISTICAL DIFF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INDUSTRY	0.00	2.89	1.30	0.50	0.00	1.36	0.00	0.00	0.00	0.11	6.16
TRANSPORT	0.00	3.25	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	3.31
AGRIC/FOR/FISH	0.00	0.22	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.22
HOUSEHOLD	0.00	0.75	0.00	0.32	0.00	0.68	0.05	0.00	0.00	0.00	1.81
COMMERCIAL	0.00	0.42	0.03	0.14	0.00	0.60	0.00	0.00	0.01	0.00	1.20
NON-ENERGY	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35
TOTAL DEMANDS	0.00	7.88	1.33	0.95	0.00	2.71	0.05	0.00	0.01	0.12	13.05
SHORTFALL	-0.00	-0.00	-0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	-0.05

Business as Usual Path

ENERGY BALANCE: 1995 (BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.20	0.09	0.44	0.00	0.04	0.00	0.00	0.28	1.05
EXPORTS	0.00	-2.11	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-2.19
IMPORTS	10.97	2.80	3.29	2.22	0.00	0.00	0.00	3.18	0.00	0.00	22.45
PRIMARY SUPPLIES	10.98	0.69	3.41	2.30	0.44	0.00	0.04	3.18	0.00	0.28	21.32
BITUM. COAL PROD	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
COKING COAL PROD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
GAS PRODUCTION	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
COKE PRODUCTION	0.00	-0.02	-0.53	0.31	0.00	0.00	0.00	0.00	0.00	0.00	-0.25
PIPELINE GAS IMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-10.38	9.87	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00	-0.54
REFINING--NON-EN	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.48	0.42	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
MUNIC GAS INPUT	0.00	-0.12	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MUNICIPAL GAS PR	0.00	-0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
ELECTRICITY GEN.	-0.58	-1.21	-1.04	-1.92	-0.44	3.35	0.00	-3.18	0.00	-0.18	-5.22
DISTRICT HEAT	0.00	-0.00	-0.00	-0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.00	0.00	-0.20	0.00	0.00	0.00	0.00	-0.21
FINAL CONSUMPTION	0.00	9.17	1.30	1.16	0.00	3.12	0.04	0.00	0.02	0.10	14.91
INDUSTRY	0.00	3.12	1.25	0.57	0.00	1.42	0.00	0.00	0.00	0.10	6.46
TRANSPORT	0.00	3.91	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	3.97
AGRIC/FOR/FISH	0.00	0.25	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.26
HOUSEHOLD	0.00	0.82	0.00	0.34	0.00	0.85	0.04	0.00	0.00	0.00	2.07
COMMERCIAL	0.00	0.74	0.04	0.18	0.00	0.77	0.00	0.00	0.01	0.00	1.75
NON-ENERGY	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
TOTAL DEMANDS	0.00	9.17	1.30	1.09	0.00	3.12	0.04	0.00	0.02	0.10	14.84
SHORTFALL	-0.00	0.00	0.00	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	-0.07

Business as Usual Path

ENERGY BALANCE: 2000

(BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.20	0.09	0.44	0.00	0.04	0.00	0.00	0.28	1.06
EXPORTS	0.00	-1.10	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.18
IMPORTS	11.21	2.82	3.11	2.62	0.00	0.00	0.00	3.48	0.00	0.00	23.23
PRIMARY SUPPLIES	11.21	1.71	3.24	2.70	0.44	0.00	0.04	3.48	0.00	0.28	23.11
BITUM. COAL PROD	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
COKING COAL PROD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
GAS PRODUCTION	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
COKE PRODUCTION	0.00	-0.02	-0.49	0.28	0.00	0.00	0.00	0.00	0.00	0.00	-0.23
PIPELINE GAS IMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-10.41	9.90	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00	-0.54
REFINING--NON-EN	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.47	0.39	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
MUNIC GAS INPUT	0.00	-0.14	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MUNICIPAL GAS PR	0.00	-0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	-0.80	-1.48	-1.16	-2.14	-0.44	3.80	0.00	-3.48	0.00	-0.18	-5.89
DISTRICT HEAT	0.00	-0.00	-0.00	-0.02	0.00	0.00	0.00	0.00	0.03	0.00	-0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.00	0.00	-0.22	0.00	0.00	0.00	0.00	-0.23
FINAL CONSUMPTION	0.00	9.91	1.07	1.31	0.00	3.55	0.04	0.00	0.03	0.10	16.02
INDUSTRY	0.00	3.22	1.02	0.64	0.00	1.54	0.00	0.00	0.00	0.10	6.52
TRANSPORT	0.00	4.37	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	4.43
AGRIC/FOR/FISH	0.00	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.27
HOUSEHOLD	0.00	0.85	0.00	0.38	0.00	0.97	0.04	0.00	0.00	0.00	2.25
COMMERCIAL	0.00	0.87	0.05	0.23	0.00	0.97	0.00	0.00	0.02	0.00	2.14
NON-ENERGY	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35
TOTAL DEMANDS	0.00	9.91	1.07	1.25	0.00	3.55	0.04	0.00	0.03	0.10	15.96
SHORTFALL	0.00	-0.00	-0.00	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	-0.06

Business as Usual Path

ENERGY BALANCE: 2010

(BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.20	0.09	0.44	0.00	0.05	0.00	0.00	0.29	1.07
EXPORTS	0.00	-0.45	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.53
IMPORTS	11.29	3.66	3.30	3.61	0.00	0.00	0.00	3.88	0.00	0.00	25.73
PRIMARY SUPPLIES	11.29	3.20	3.42	3.70	0.44	0.00	0.05	3.88	0.00	0.29	26.27
BITUM. COAL PROD	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
COKING COAL PROD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.09	0.00	0.00	0.00	0.00	0.00	0.00	-0.09
GAS PRODUCTION	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
COKE PRODUCTION	0.00	-0.02	-0.45	0.26	0.00	0.00	0.00	0.00	0.00	0.00	-0.21
PIPELINE GAS IMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-10.41	9.90	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00	-0.54
REFINING--NON-EN	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.44	0.37	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
MUNIC GAS INPUT	0.00	-0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
MUNICIPAL GAS PR	0.00	-0.04	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	-0.88	-1.82	-1.55	-2.79	-0.44	4.57	0.00	-3.88	0.00	-0.18	-6.97
DISTRICT HEAT	0.00	-0.01	-0.00	-0.04	0.00	0.00	0.00	0.00	0.05	0.00	0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.00	0.00	-0.24	0.00	0.00	0.00	0.00	-0.25
FINAL CONSUMPTION	0.00	11.04	0.94	1.59	0.00	4.30	0.05	0.00	0.05	0.11	18.08
INDUSTRY	0.00	3.43	0.88	0.82	0.00	1.72	0.00	0.00	0.00	0.11	6.96
TRANSPORT	0.00	5.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	5.07
AGRIC/FOR/FISH	0.00	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.27
HOUSEHOLD	0.00	0.86	0.00	0.38	0.00	1.12	0.05	0.00	0.00	0.00	2.41
COMMERCIAL	0.00	1.11	0.06	0.35	0.00	1.38	0.00	0.00	0.05	0.00	2.95
NON-ENERGY	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38
TOTAL DEMANDS	0.00	11.04	0.94	1.55	0.00	4.30	0.05	0.00	0.05	0.11	18.04
SHORTFALL	0.00	0.00	-0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	-0.04

Business as Usual Path

ENERGY BALANCE: 2020

(BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.20	0.09	0.44	0.00	0.05	0.00	0.00	0.29	1.07
EXPORTS	0.00	-0.46	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.54
IMPORTS	11.33	5.01	3.66	5.15	0.00	0.00	0.00	3.06	0.00	0.00	28.20
PRIMARY SUPPLIES	11.33	4.54	3.78	5.24	0.44	0.00	0.05	3.06	0.00	0.29	28.73
BITUM. COAL PROD	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
COKING COAL PROD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.13	0.00	0.00	0.00	0.00	0.00	0.00	-0.13
GAS PRODUCTION	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
COKE PRODUCTION	0.00	-0.02	-0.41	0.23	0.00	0.00	0.00	0.00	0.00	0.00	-0.19
PIPELINE GAS IMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-10.41	9.90	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00	-0.54
REFINING--NON-EN	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.42	0.35	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
MUNIC GAS INPUT	0.00	-0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MUNICIPAL GAS PR	0.00	-0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	-0.92	-2.29	-2.12	-3.76	-0.44	5.24	0.00	-3.06	0.00	-0.18	-7.53
DISTRICT HEAT	0.00	-0.01	-0.00	-0.07	0.00	0.00	0.00	0.00	0.08	0.00	0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.01	0.00	-0.25	0.00	0.00	0.00	0.00	-0.25
FINAL CONSUMPTION	0.00	11.87	0.80	2.10	0.00	4.96	0.05	0.00	0.08	0.11	19.97
INDUSTRY	0.00	3.53	0.72	1.12	0.00	1.89	0.00	0.00	0.00	0.11	7.37
TRANSPORT	0.00	5.41	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	5.49
AGRIC/FOR/FISH	0.00	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.27
HOUSEHOLD	0.00	0.84	0.00	0.47	0.00	1.15	0.05	0.00	0.00	0.00	2.51
COMMERCIAL	0.00	1.39	0.07	0.49	0.00	1.83	0.00	0.00	0.08	0.00	3.88
NON-ENERGY	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44
TOTAL DEMANDS	0.00	11.87	0.80	2.09	0.00	4.96	0.05	0.00	0.08	0.11	19.95
SHORTFALL	0.00	-0.00	-0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02

Alternative Path

ENERGY BALANCE: 1990

(BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.31	0.08	0.38	0.00	0.05	0.00	0.00	0.26	1.08
EXPORTS	0.00	-1.47	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.52
IMPORTS	8.89	3.23	2.86	1.82	0.00	0.00	0.00	2.18	0.00	0.00	18.98
STOCK CHANGES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRIMARY SUPPLIES	8.90	1.76	3.13	1.90	0.38	0.00	0.05	2.18	0.00	0.26	18.54
BITUM. COAL PROD	0.00	0.00	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
COKING COAL PROD	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
GAS PRODUCTION	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
COKE PRODUCTION	0.00	-0.03	-0.58	0.31	0.00	0.00	0.00	0.00	0.00	0.00	-0.28
PIPELINE GAS IMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-8.14	7.76	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	-0.40
REFINING--NON-EN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.46	0.38	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
MUNIC GAS INPUT	0.00	-0.12	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MUNICIPAL GAS PR	0.00	-0.02	-0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
ELECTRICITY GEN.	-0.76	-1.46	-0.69	-1.66	-0.38	2.92	0.00	-2.18	0.00	-0.14	-4.34
DISTRICT HEAT	0.00	-0.00	-0.00	-0.01	0.00	-0.00	0.00	0.00	0.01	0.00	-0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.00	0.00	-0.18	0.00	0.00	0.00	0.00	-0.18
FINAL CONSUMPTION	0.00	7.88	1.33	1.02	0.00	2.71	0.05	0.00	0.01	0.12	13.12
STATISTICAL DIFF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INDUSTRY	0.00	2.89	1.30	0.50	0.00	1.36	0.00	0.00	0.00	0.11	6.16
TRANSPORT	0.00	3.25	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	3.31
AGRIC/FOR/FISH	0.00	0.22	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.22
HOUSEHOLD	0.00	0.75	0.00	0.32	0.00	0.68	0.05	0.00	0.00	0.00	1.81
COMMERCIAL	0.00	0.42	0.03	0.14	0.00	0.60	0.00	0.00	0.01	0.00	1.20
NON-ENERGY	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35
TOTAL DEMANDS	0.00	7.88	1.33	0.95	0.00	2.71	0.05	0.00	0.01	0.12	13.05
SHORTFALL	0.00	-0.00	-0.00	-0.07	0.00	0.00	0.00	0.00	0.00	-0.00	-0.07

Alternative Path

ENERGY BALANCE: 1995

(BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.20	0.09	0.44	0.00	0.04	0.00	0.00	0.28	1.05
EXPORTS	0.00	-2.09	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-2.17
IMPORTS	10.95	2.79	3.29	2.23	0.00	0.00	0.00	3.24	0.00	0.00	22.51
PRIMARY SUPPLIES	10.96	0.71	3.41	2.32	0.44	0.00	0.04	3.24	0.00	0.28	21.39
BITUM. COAL PROD	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
COKING COAL PROD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
GAS PRODUCTION	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
COKE PRODUCTION	0.00	-0.02	-0.53	0.31	0.00	0.00	0.00	0.00	0.00	0.00	-0.25
PIPELINE GAS IMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-10.38	9.87	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00	-0.54
REFINING--NON-EN	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.48	0.42	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
MUNIC GAS INPUT	0.00	-0.11	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
MUNICIPAL GAS PR	0.00	-0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	-0.58	-1.19	-1.04	-1.92	-0.44	3.36	0.00	-3.24	0.00	-0.18	-5.23
DISTRICT HEAT	0.00	-0.00	-0.00	-0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.00	0.00	-0.20	0.00	0.00	0.00	0.00	-0.21
FINAL CONSUMPTION	0.00	9.22	1.30	1.17	0.00	3.12	0.04	0.00	0.02	0.10	14.97
INDUSTRY	0.00	3.16	1.25	0.57	0.00	1.42	0.00	0.00	0.00	0.10	6.51
TRANSPORT	0.00	3.91	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	3.97
AGRIC/FOR/FISH	0.00	0.25	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.26
HOUSEHOLD	0.00	0.82	0.00	0.35	0.00	0.86	0.04	0.00	0.00	0.00	2.08
COMMERCIAL	0.00	0.74	0.04	0.18	0.00	0.77	0.00	0.00	0.01	0.00	1.75
NON-ENERGY	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
TOTAL DEMANDS	0.00	9.22	1.30	1.10	0.00	3.12	0.04	0.00	0.02	0.10	14.90
SHORTFALL	0.00	0.00	0.00	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	-0.07

Alternative Path

ENERGY BALANCE: 2000

(BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.20	0.09	0.44	0.00	0.05	0.00	0.00	0.28	1.07
EXPORTS	0.00	-1.22	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.28
IMPORTS	11.14	2.74	3.01	2.66	0.00	0.00	0.00	3.53	0.00	0.00	23.09
PRIMARY SUPPLIES	11.15	1.53	3.13	2.75	0.44	0.00	0.05	3.53	0.00	0.28	22.86
BITUM. COAL PROD	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
COKING COAL PROD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
GAS PRODUCTION	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
COKE PRODUCTION	0.00	-0.02	-0.49	0.28	0.00	0.00	0.00	0.00	0.00	0.00	-0.23
PIPELINE GAS IMP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-10.41	9.90	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00	-0.54
REFINING--NON-EN	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.47	0.39	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
MUNIC GAS INPUT	0.00	-0.13	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MUNICIPAL GAS PR	0.00	-0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	-0.74	-1.42	-1.08	-2.17	-0.44	3.74	-0.00	-3.53	0.03	-0.18	-5.81
DISTRICT HEAT	0.00	-0.00	-0.00	-0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.00	0.00	-0.22	0.00	0.00	0.00	0.00	-0.22
FINAL CONSUMPTION	0.00	9.81	1.04	1.31	0.00	3.49	0.05	0.00	0.06	0.10	15.86
INDUSTRY	0.00	3.21	0.99	0.63	0.00	1.52	0.00	0.00	0.02	0.10	6.48
TRANSPORT	0.00	4.32	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	4.39
AGRIC/FOR/FISH	0.00	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.27
HOUSEHOLD	0.00	0.83	0.00	0.38	0.00	0.94	0.05	0.00	0.00	0.00	2.20
COMMERCIAL	0.00	0.84	0.05	0.24	0.00	0.95	0.00	0.00	0.04	0.00	2.11
NON-ENERGY	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35
TOTAL DEMANDS	0.00	9.81	1.04	1.25	0.00	3.49	0.05	0.00	0.06	0.10	15.80
SHORTFALL	0.00	-0.00	0.00	-0.06	0.00	0.00	0.00	0.00	0.01	0.00	-0.05

Alternative Path

ENERGY BALANCE: 2010

(BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.20	0.09	0.44	0.00	0.60	0.00	0.00	0.35	1.69
EXPORTS	0.00	-2.56	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-2.64
IMPORTS	10.88	2.41	2.31	3.88	0.00	0.00	0.00	3.55	0.00	0.00	23.03
PRIMARY SUPPLIES	10.89	-0.16	2.43	3.97	0.44	0.00	0.60	3.55	0.00	0.35	22.07
BITUM. COAL PROD	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
COKING COAL PROD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
GAS PRODUCTION	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
COKE PRODUCTION	0.00	-0.02	-0.38	0.22	0.00	0.00	0.00	0.00	0.00	0.00	-0.18
PIPELINE GAS IMP	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-10.41	9.90	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00	-0.54
REFINING--NON-EN	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.35	0.29	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
MUNIC GAS INPUT	0.00	-0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MUNICIPAL GAS PR	0.00	-0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	-0.48	-1.18	-0.93	-2.69	-0.44	3.83	-0.54	-3.55	0.30	-0.26	-5.94
DISTRICT HEAT	0.00	-0.01	-0.00	-0.04	0.00	0.00	0.00	0.00	0.05	0.00	0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.00	0.00	-0.20	0.00	0.00	0.00	0.00	-0.21
FINAL CONSUMPTION	0.00	8.31	0.73	1.86	0.00	3.60	0.06	0.00	0.35	0.09	15.00
INDUSTRY	0.00	2.97	0.69	0.90	0.00	1.55	0.00	0.00	0.18	0.09	6.37
TRANSPORT	0.00	3.22	0.00	0.04	0.00	0.07	0.00	0.00	0.00	0.00	3.34
AGRIC/FOR/FISH	0.00	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.27
HOUSEHOLD	0.00	0.67	0.00	0.51	0.00	0.83	0.06	0.00	0.00	0.00	2.07
COMMERCIAL	0.00	0.81	0.04	0.38	0.00	1.14	0.00	0.00	0.17	0.00	2.54
NON-ENERGY	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38
TOTAL DEMANDS	0.00	8.31	0.73	1.83	0.00	3.60	0.06	0.00	0.35	0.09	14.97
SHORTFALL	0.00	-0.00	-0.00	-0.03	0.00	0.00	-0.00	0.00	-0.00	0.00	-0.03

Alternative Path

ENERGY BALANCE: 2020

(BILLION GIGAJOULES)

	CRUDE OIL	PETRO PROD	COAL/ COKE	FUEL GASES	HYDRO/ GEOTHERM	ELEC- TRICITY	WIND/ SOLAR	NUCLEAR	HEAT	BIOMASS FUELS	TOTAL
INDIGENOUS PRODN.	0.00	0.00	0.20	0.09	0.44	0.00	2.15	0.00	0.00	0.39	3.28
EXPORTS	0.00	-2.68	-0.08	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	-2.78
IMPORTS	9.65	2.40	1.83	4.89	0.00	0.00	0.01	2.53	0.00	0.00	21.31
PRIMARY SUPPLIES	9.66	-0.28	1.95	4.98	0.44	-0.00	2.16	2.53	0.00	0.39	21.81
BITUM. COAL PROD	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
COKING COAL PROD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
CRUDE OIL PRODN.	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LNG IMPORTS	0.00	0.00	0.00	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
GAS PRODUCTION	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
COKE PRODUCTION	0.00	-0.01	-0.29	0.16	0.00	0.00	0.00	0.00	0.00	0.00	-0.13
PIPELINE GAS IMP	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
COAL BRIQUETTE P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	-9.55	9.08	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00	-0.48
REFINING--NON-EN	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS P	0.00	0.00	-0.24	0.21	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
MUNIC GAS INPUT	0.00	-0.35	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MUNICIPAL GAS PR	0.00	-0.09	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	-0.11	-1.12	-0.88	-3.05	-0.44	3.79	-2.08	-2.53	0.44	-0.31	-6.27
DISTRICT HEAT	0.00	-0.01	-0.00	-0.06	0.00	0.00	0.00	0.00	0.08	0.00	-0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T&D LOSSES	0.00	0.00	0.00	-0.01	0.00	-0.18	0.00	0.00	0.00	0.00	-0.19
FINAL CONSUMPTION	0.00	7.20	0.50	2.57	0.00	3.58	0.08	0.00	0.52	0.08	14.53
INDUSTRY	0.00	2.69	0.45	1.12	0.00	1.51	0.00	0.00	0.27	0.07	6.12
TRANSPORT	0.00	2.65	0.00	0.10	0.00	0.08	0.01	0.00	0.00	0.00	2.84
AGRIC/FOR/FISH	0.00	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.26
HOUSEHOLD	0.00	0.45	0.00	0.63	0.00	0.69	0.08	0.00	0.00	0.00	1.85
COMMERCIAL	0.00	0.71	0.05	0.73	0.00	1.30	0.00	0.00	0.25	0.00	3.02
NON-ENERGY	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44
TOTAL DEMANDS	0.00	7.20	0.50	2.58	0.00	3.58	0.08	0.00	0.52	0.08	14.53
SHORTFALL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00

Business as Usual Path

PRIMARY SUPPLIES BY FUEL

(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	0.00	0.00	0.00	0.00	0.00
GASOLINE	-0.01	-0.18	-0.01	0.21	0.29
KEROSENE	0.07	-0.06	0.01	0.13	0.21
DIESEL/GAS OIL	0.23	-0.03	0.25	0.64	0.96
HEAVY OIL A	-0.28	-0.17	-0.12	-0.02	0.09
LPG/BOTTLED GAS	0.69	0.75	0.86	1.06	1.26
OTHER PETRO PROD	-0.19	0.08	0.08	0.08	0.08
LUBRICATING OIL	-0.07	-0.29	-0.33	-0.35	-0.41
CRUDE OIL	8.90	10.98	11.21	11.29	11.33
COAL BITUMINOUS	1.06	1.37	1.48	1.84	2.40
COAL, COKING	2.08	2.06	1.79	1.60	1.41
COAL ANTHRACITE	0.03	0.05	0.05	0.05	0.05
COKE (from Coal)	-0.05	-0.08	-0.08	-0.08	-0.08
Coke Oven Gas	-0.07	-0.07	-0.06	-0.04	-0.02
Biomass/Wood/Wst	0.24	0.25	0.26	0.26	0.26
SOLAR	0.05	0.04	0.04	0.05	0.05
HYDRO	0.31	0.36	0.36	0.36	0.36
GEOTHERMAL	0.06	0.07	0.07	0.07	0.07
NUCLEAR	2.18	3.18	3.48	3.88	3.06
MUN. SOLID WASTE	0.02	0.02	0.02	0.02	0.02
NAPTHA	0.52	0.68	0.74	0.82	0.83
NATURAL GAS LIQ.	0.25	0.20	0.20	0.20	0.20
PETROLEUM COKE	0.14	0.13	0.12	0.13	0.14
DOM. NAT GAS RES	0.08	0.09	0.09	0.09	0.09
HEAVY OIL B	-0.00	-0.00	-0.00	-0.00	-0.00
HEAVY OIL C	0.25	-0.39	-0.17	0.11	0.53
JET FUEL	-0.02	-0.12	-0.09	-0.03	0.02
LNG	1.80	2.22	2.62	3.61	5.15
Non-Energy Prod.	0.24	0.15	0.22	0.28	0.40
Refinery Gas	-0.03	-0.05	-0.05	-0.04	-0.04
TOTAL	18.45	21.25	23.05	26.23	28.71

PRIMARY SUPPLIES BY BALANCE CATEGORY

(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	8.90	10.98	11.21	11.29	11.33
PETRO PROD	1.76	0.69	1.71	3.20	4.54
COAL/COKE	3.13	3.41	3.24	3.42	3.78
FUEL GASES	1.81	2.23	2.65	3.66	5.22
HYDRO/GEOTHERM	0.38	0.44	0.44	0.44	0.44
ELECTRICITY	0.00	0.00	0.00	0.00	0.00
WIND/SOLAR	0.05	0.04	0.04	0.05	0.05
NUCLEAR	2.18	3.18	3.48	3.88	3.06
BIOMASS FUELS	0.26	0.28	0.28	0.29	0.29
TOTAL	18.45	21.25	23.05	26.23	28.71

Business as Usual Path

INDIGENOUS RESOURCE PRODUCTION BY BALANCE CATEGORY
(MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	2.41	3.21	3.21	3.21	3.21
COAL/COKE	312.07	202.47	202.47	202.47	202.47
FUEL GASES	79.42	89.23	89.23	89.23	89.23
HYDRO/GEOTHERM	375.94	439.56	439.56	439.56	439.56
WIND/SOLAR	47.04	40.69	43.38	46.68	46.82
BIOMASS FUELS	258.48	279.02	283.78	288.75	288.76
TOTAL	1075.35	1054.18	1061.63	1069.90	1070.04

IMPORTS BY FUEL
(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	0.00	0.00	0.00	0.00	0.00
GASOLINE	0.07	0.04	0.02	0.21	0.29
KEROSENE	0.13	0.12	0.06	0.13	0.21
DIESEL/GAS OIL	0.26	0.06	0.30	0.64	0.96
HEAVY OIL A	0.06	0.04	0.02	0.00	0.09
LPG/BOTTLED GAS	0.69	0.75	0.86	1.06	1.26
OTHER PETRO PROD	0.12	0.08	0.08	0.08	0.08
LUBRICATING OIL	0.01	0.00	0.00	0.00	0.00
CRUDE OIL	8.89	10.97	11.21	11.29	11.33
COAL BITUMINOUS	0.78	1.17	1.28	1.65	2.20
COAL, COKING	2.05	2.06	1.79	1.60	1.41
COAL ANTHRACITE	0.03	0.05	0.05	0.05	0.05
COKE (from Coal)	0.00	0.00	0.00	0.00	0.00
NUCLEAR	2.18	3.18	3.48	3.88	3.06
NAPTHA	0.67	0.87	0.75	0.82	0.83
NATURAL GAS LIQ.	0.25	0.20	0.20	0.20	0.20
PETROLEUM COKE	0.14	0.14	0.14	0.14	0.14
HEAVY OIL C	0.41	0.17	0.09	0.11	0.53
JET FUEL	0.16	0.12	0.06	0.00	0.02
LNG	1.80	2.22	2.62	3.61	5.15
Non-Energy Prod.	0.25	0.18	0.24	0.28	0.40
TOTAL	18.96	22.45	23.23	25.73	28.20

IMPORTS BY BALANCE CATEGORY
(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	8.89	10.97	11.21	11.29	11.33
PETRO PROD	3.23	2.80	2.82	3.66	5.01
COAL/COKE	2.86	3.29	3.11	3.30	3.66
FUEL GASES	1.80	2.22	2.62	3.61	5.15
ELECTRICITY	0.00	0.00	0.00	0.00	0.00
NUCLEAR	2.18	3.18	3.48	3.88	3.06
TOTAL	18.96	22.45	23.23	25.73	28.20

Business as Usual Path

EXPORTS BY FUEL (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
GASOLINE	83.64	220.49	32.66	0.00	0.00
KEROSENE	62.44	185.56	50.20	0.00	0.00
DIESEL/GAS OIL	24.64	97.17	48.59	0.00	0.00
HEAVY OIL A	361.13	211.31	142.46	17.23	0.00
LPG/BOTTLED GAS	0.08	0.32	0.16	0.00	0.00
OTHER PETRO PROD	307.44	1.59	1.59	1.59	1.59
LUBRICATING OIL	77.33	290.83	332.13	355.46	415.18
COKE (from Coal)	47.50	80.50	80.47	80.40	80.33
NAPTHA	156.36	197.63	4.95	0.00	0.00
PETROLEUM COKE	0.00	13.60	15.63	6.24	2.81
HEAVY OIL B	1.29	0.47	2.71	3.32	3.74
HEAVY OIL C	162.48	564.84	257.10	0.00	0.00
JET FUEL	187.20	241.80	150.44	26.11	0.00
Non-Energy Prod.	12.16	33.06	16.53	0.00	0.00
Refinery Gas	33.52	50.39	47.68	44.11	37.28
TOTAL	1517.20	2189.56	1183.29	534.45	540.93

EXPORTS BY BALANCE CATEGORY (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
PETRO PROD	1469.70	2109.06	1102.82	454.05	460.60
COAL/COKE	47.50	80.50	80.47	80.40	80.33
TOTAL	1517.20	2189.56	1183.29	534.45	540.93

RESERVES BY FUEL

(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	0.30	0.29	0.27	0.24	0.21
COAL BITUMINOUS	18.15	16.96	15.97	13.97	11.98
COAL, COKING	1.71	1.68	1.68	1.68	1.68
COAL ANTHRACITE	0.27	0.25	0.23	0.20	0.17
COKE (from Coal)	0.00	0.00	0.00	0.00	0.00
WIND	3.00	3.00	3.00	3.00	3.00
SOLAR	5.00	5.00	5.00	5.00	5.00
HYDRO	2.58	2.58	2.58	2.58	2.58
GEOTHERMAL	0.20	0.20	0.20	0.20	0.20
DOM. NAT GAS RES	1.26	0.84	1.06	0.84	0.62
TOTAL	32.46	30.79	29.99	27.71	25.43

Business as Usual Path

TOTAL FUEL REQUIREMENTS BY FUEL (BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	3.10	3.63	4.09	4.89	5.55
NATURAL GAS	1.95	2.29	2.69	3.68	5.23
GASOLINE	1.49	1.76	1.93	2.15	2.23
KEROSENE	0.95	1.04	1.11	1.23	1.31
DIESEL/GAS OIL	1.52	1.86	2.15	2.55	2.86
HEAVY OIL A	0.73	1.02	1.07	1.18	1.28
LPG/BOTTLED GAS	0.92	1.02	1.12	1.32	1.52
OTHER PETRO PROD	0.26	0.24	0.26	0.27	0.30
LUBRICATING OIL	0.09	0.09	0.10	0.11	0.14
CRUDE OIL	8.90	10.98	11.21	11.29	11.33
COAL BITUMINOUS	1.06	1.37	1.48	1.84	2.40
COAL, COKING	2.08	2.06	1.79	1.60	1.41
COAL ANTHRACITE	0.03	0.05	0.05	0.05	0.05
HARDCOAL BRIQUET	0.00	0.00	0.00	0.00	0.00
COKE (from Coal)	1.24	1.14	1.04	0.95	0.85
Coke Oven Gas	0.25	0.24	0.22	0.22	0.22
Biomass/Wood/Wst	0.24	0.25	0.26	0.26	0.26
SOLAR	0.05	0.04	0.04	0.05	0.05
HYDRO	0.31	0.36	0.36	0.36	0.36
GEOTHERMAL	0.06	0.07	0.07	0.07	0.07
NUCLEAR	2.18	3.18	3.48	3.88	3.06
HEAT (DISTRICT)	0.01	0.02	0.03	0.05	0.08
MUN. SOLID WASTE	0.02	0.02	0.02	0.02	0.02
NAPTHA	1.08	1.39	1.46	1.53	1.54
BLAST FURN. GAS	0.38	0.42	0.39	0.37	0.35
MUNICIPAL GAS	0.61	0.80	1.01	1.36	1.95
NATURAL GAS LIQ.	0.25	0.20	0.20	0.20	0.20
PETROLEUM COKE	0.19	0.18	0.19	0.20	0.21
DOM. NAT GAS RES	0.08	0.09	0.09	0.09	0.09
HEAVY OIL B	0.03	0.00	0.00	0.00	0.00
HEAVY OIL C	2.09	1.73	1.96	2.24	2.66
JET FUEL	0.15	0.18	0.21	0.28	0.32
LNG	1.80	2.22	2.62	3.61	5.15
Non-Energy Prod.	0.63	0.57	0.65	0.70	0.82
Refinery Gas	0.31	0.38	0.38	0.38	0.39
Input to Mun Gas	0.57	0.76	0.96	1.31	1.88

TOTAL FUEL REQUIREMENTS BY BALANCE CATEGORY (BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	8.90	10.98	11.21	11.29	11.33
PETRO PROD	10.68	11.66	12.79	14.33	15.79
COAL/COKE	4.42	4.63	4.36	4.45	4.71
FUEL GASES	5.64	6.81	7.98	10.64	14.86
HYDRO/GEOTHERM	0.38	0.44	0.44	0.44	0.44
ELECTRICITY	3.10	3.63	4.09	4.89	5.55
WIND/SOLAR	0.05	0.04	0.04	0.05	0.05
NUCLEAR	2.18	3.18	3.48	3.88	3.06
HEAT	0.01	0.02	0.03	0.05	0.08
BIOMASS FUELS	0.26	0.28	0.28	0.29	0.29

Business as Usual Path

ELECTRICITY GEN.: ENERGY INPUTS BY FUEL
(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	0.16	0.24	0.26	0.28	0.28
NATURAL GAS	1.37	1.57	1.78	2.44	3.40
DIESEL/GAS OIL	0.01	0.01	0.01	0.01	0.01
HEAVY OIL A	0.02	0.02	0.02	0.02	0.02
LPG/BOTTLED GAS	0.05	0.07	0.07	0.07	0.07
CRUDE OIL	0.76	0.60	0.80	0.88	0.92
COAL BITUMINOUS	0.69	1.03	1.16	1.54	2.11
COAL ANTHRACITE	0.00	0.01	0.01	0.01	0.01
Coke Oven Gas	0.07	0.08	0.08	0.08	0.08
Biomass/Wood/Wst	0.12	0.15	0.15	0.15	0.15
HYDRO	0.31	0.36	0.36	0.36	0.36
GEOTHERMAL	0.06	0.07	0.07	0.07	0.07
NUCLEAR	2.18	3.18	3.48	3.88	3.06
MUN. SOLID WASTE	0.02	0.02	0.02	0.02	0.02
NAPTHA	0.04	0.04	0.04	0.04	0.04
BLAST FURN. GAS	0.22	0.27	0.27	0.27	0.27
MUNICIPAL GAS	0.00	0.00	0.00	0.00	0.00
NATURAL GAS LIQ.	0.02	0.03	0.03	0.03	0.03
PETROLEUM COKE	0.04	0.03	0.03	0.03	0.03
HEAVY OIL B	0.00	0.00	0.00	0.00	0.00
HEAVY OIL C	1.26	1.00	1.28	1.60	2.07
Refinery Gas	0.02	0.02	0.02	0.02	0.02
TOTAL	7.42	8.81	9.95	11.82	13.04

Business as Usual Path

ELECTRICITY GEN.: ENERGY OUTPUTS BY PLANT
(THOUSAND GIGAWATT-HOURS)

	1990	1995	2000	2010	2020
Nucl.--Exist BWR	120.32	168.19	168.19	165.68	119.88
Nucl.--Exist PWR	77.22	119.32	119.32	119.32	72.04
Nucl.--Exist HWR	0.96	1.16	1.16	1.16	0.00
Nucl.--Exist GCR	1.03	1.16	1.16	0.00	0.00
Nucl.--New BWRs	0.00	0.00	19.01	45.87	45.87
Nucl.--New PWRs	0.00	0.00	8.27	8.27	8.27
Nucl. New ABWRs	0.00	0.00	0.00	13.85	32.64
Nucl., FBR	0.00	1.72	1.72	1.72	1.72
Hydro--Convent.	87.22	101.30	101.30	101.30	101.30
Pumped St. Hydro	7.10	19.65	19.65	23.13	24.88
Geothermal--Util	1.46	1.82	1.82	1.82	1.82
Geothermal--Auto	0.25	0.26	0.26	0.26	0.26
Gas Turbine-Util	8.74	12.26	12.26	12.26	12.26
Int. Comb--Util	8.97	13.60	13.60	13.60	13.60
Coal Steam--Util	71.62	104.92	104.92	104.92	104.92
Coal Steam--Auto	13.83	23.45	23.45	23.45	23.45
Coal/Ck Gas-Util	21.37	24.35	24.35	24.35	24.35
Coal/Ck Gas-Auto	14.76	19.47	19.47	19.47	19.47
Std. Coal, New	0.00	0.00	15.77	63.07	134.03
Stm Nat Gas-Util	151.42	168.90	168.90	168.90	168.90
Stm Nat Gas-Auto	0.17	0.10	0.13	0.14	0.15
Steam Gas--New	0.00	0.00	17.55	54.60	106.26
Gas Comb Cy, New	0.00	0.00	8.78	55.14	125.83
Steam Oil--Util	197.53	155.83	209.38	229.91	240.18
Stm Hvy Oil-Auto	51.55	41.19	41.19	41.19	41.19
Stm Lt Oil--Auto	10.08	8.05	8.05	8.05	8.05
Oil CC, New	0.00	0.00	5.85	35.33	89.48
MSW-Fired Plants	1.16	1.74	1.74	1.74	1.74
Biomass/Wst-Auto	8.60	10.71	10.71	10.71	10.71
TOTAL	855.36	999.14	1127.94	1349.21	1533.23

Business as Usual Path

ELECTRICITY GEN.: PLANT CAPACITIES
(THOUSAND MEGAWATTS)

	1990	1995	2000	2010	2020
Nucl.--Exist BWR	19.30	24.00	24.00	23.64	17.11
Nucl.--Exist PWR	12.60	17.03	17.03	17.03	10.28
Nucl.--Exist HWR	0.17	0.17	0.17	0.17	0.00
Nucl.--Exist GCR	0.17	0.17	0.17	0.00	0.00
Nucl.--New BWRs	0.00	0.00	2.71	6.55	6.55
Nucl.--New PWRs	0.00	0.00	1.18	1.18	1.18
Nucl. New ABWRs	0.00	0.00	0.00	1.98	4.66
Nucl., FBR	0.00	0.25	0.25	0.25	0.25
Hydro--Convent.	20.83	21.03	21.03	21.03	21.03
Pumped St. Hydro	17.00	22.43	22.43	26.40	28.40
Geothermal--Util	0.24	0.26	0.26	0.26	0.26
Geothermal--Auto	0.03	0.03	0.03	0.03	0.03
Gas Turbine-Util	2.37	2.55	2.55	2.55	2.55
Int. Comb--Util	2.82	2.82	2.82	2.82	2.82
Coal Steam--Util	12.42	15.97	15.97	15.97	15.97
Coal Steam--Auto	2.78	3.57	3.57	3.57	3.57
Coal/Ck Gas-Util	3.71	3.71	3.71	3.71	3.71
Coal/Ck Gas-Auto	2.96	2.96	2.96	2.96	2.96
Std. Coal, New	0.00	0.00	2.40	9.60	20.40
Stm Nat Gas-Util	35.41	38.18	38.18	38.18	38.18
Stm Nat Gas-Auto	0.03	0.03	0.03	0.03	0.03
Steam Gas--New	0.00	0.00	3.60	10.20	19.00
Gas Comb Cy, New	0.00	0.00	1.80	10.30	22.50
Steam Oil--Util	53.89	53.68	53.68	53.68	53.68
Stm Hvy Oil-Auto	10.35	7.84	7.84	7.84	7.84
Stm Lt Oil--Auto	2.02	1.53	1.53	1.53	1.53
Oil CC, New	0.00	0.00	1.20	6.60	16.00
MSW-Fired Plants	0.23	0.28	0.28	0.28	0.28
Biomass/Wst-Auto	1.73	1.75	1.75	1.75	1.75
TOTAL	201.05	220.22	233.11	270.07	302.50

Business as Usual Path

ELECTRICITY GEN.: ACTUAL CAPACITY FACTORS
(PERCENT)

	1990	1995	2000	2010	2020
Nucl.--Exist BWR	71.18	80.00	80.00	80.00	80.00
Nucl.--Exist PWR	69.98	80.00	80.00	80.00	80.00
Nucl.--Exist HWR	66.13	80.00	80.00	80.00	0.00
Nucl.--Exist GCR	70.62	80.00	80.00	0.00	0.00
Nucl.--New BWRs	0.00	0.00	80.00	80.00	80.00
Nucl.--New PWRs	0.00	0.00	80.00	80.00	80.00
Nucl. New ABWRs	0.00	0.00	0.00	80.00	80.00
Nucl., FBR	0.00	80.00	80.00	80.00	80.00
Hydro--Convent.	47.80	55.00	55.00	55.00	55.00
Pumped St. Hydro	4.77	10.00	10.00	10.00	10.00
Geothermal--Util	69.68	80.00	80.00	80.00	80.00
Geothermal--Auto	93.36	95.00	95.00	95.00	95.00
Gas Turbine-Util	42.17	55.00	55.00	55.00	55.00
Int. Comb--Util	36.29	55.00	55.00	55.00	55.00
Coal Steam--Util	65.82	75.00	75.00	75.00	75.00
Coal Steam--Auto	56.88	75.00	75.00	75.00	75.00
Coal/Ck Gas-Util	65.83	75.00	75.00	75.00	75.00
Coal/Ck Gas-Auto	56.86	75.00	75.00	75.00	75.00
Std. Coal, New	0.00	0.00	75.00	75.00	75.00
Stm Nat Gas-Util	48.82	50.50	50.50	50.50	50.50
Stm Nat Gas-Auto	56.81	33.14	44.52	48.89	51.07
Steam Gas--New	0.00	0.00	55.65	61.11	63.84
Gas Comb Cy, New	0.00	0.00	55.65	61.11	63.84
Steam Oil--Util	41.84	33.14	44.52	48.89	51.07
Stm Hvy Oil-Auto	56.87	60.00	60.00	60.00	60.00
Stm Lt Oil--Auto	56.87	60.00	60.00	60.00	60.00
Oil CC, New	0.00	0.00	55.65	61.11	63.84
MSW-Fired Plants	56.79	70.00	70.00	70.00	70.00
Biomass/Wst-Auto	56.87	70.00	70.00	70.00	70.00

ELECTRIC PEAK LOADS: ELECTRICITY GEN.

	1990	1995	2000	2010	2020
Load Factor (%)	68.88	68.88	68.88	68.88	68.88
Peak Output (THOUSAND MW)	141.75	165.58	186.92	223.59	254.09
Reserve Marg. (%)	41.83	33.00	24.71	20.79	19.05

Alternative Path

PRIMARY SUPPLIES BY FUEL

(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	0.00	0.00	0.00	0.00	-0.00
GASOLINE	-0.01	-0.18	-0.02	-1.07	-1.11
KEROSENE	0.07	-0.06	-0.02	-0.14	-0.21
DIESEL/GAS OIL	0.23	-0.03	0.22	0.19	0.00
HEAVY OIL A	-0.28	-0.12	-0.10	-0.25	-0.34
LPG/BOTTLED GAS	0.69	0.75	0.83	0.84	0.99
OTHER PETRO PROD	-0.19	0.08	0.08	0.08	0.08
LUBRICATING OIL	-0.07	-0.29	-0.33	-0.35	-0.41
CRUDE OIL	8.90	10.96	11.15	10.89	9.66
COAL BITUMINOUS	1.06	1.37	1.39	1.14	1.02
COAL, COKING	2.08	2.06	1.78	1.33	0.96
COAL ANTHRACITE	0.03	0.05	0.05	0.05	0.04
COKE (from Coal)	-0.05	-0.08	-0.08	-0.08	-0.08
Coke Oven Gas	-0.07	-0.07	-0.06	-0.03	0.00
Biomass/Wood/Wst	0.24	0.25	0.26	0.31	0.34
WIND	0.00	0.00	0.00	0.26	1.04
SOLAR	0.05	0.04	0.05	0.34	1.11
HYDRO	0.31	0.36	0.36	0.36	0.36
GEOTHERMAL	0.06	0.07	0.07	0.07	0.07
NUCLEAR	2.18	3.24	3.53	3.55	2.53
HEAT (COGEN)	0.00	0.00	0.00	-0.00	-0.00
HYDROGEN	0.00	0.00	0.00	0.00	0.01
MUN. SOLID WASTE	0.02	0.02	0.02	0.04	0.05
NAPTHA	0.52	0.68	0.73	0.69	0.61
NATURAL GAS LIQ.	0.25	0.20	0.20	0.20	0.19
PETROLEUM COKE	0.14	0.13	0.12	0.09	0.05
DOM. NAT GAS RES	0.08	0.09	0.09	0.09	0.09
HEAVY OIL B	-0.00	-0.00	-0.00	-0.00	-0.00
HEAVY OIL C	0.25	-0.42	-0.26	-0.61	-0.55
JET FUEL	-0.02	-0.12	-0.09	-0.06	-0.01
LNG	1.82	2.23	2.66	3.28	3.31
Non-Energy Prod.	0.24	0.15	0.22	0.28	0.43
Refinery Gas	-0.03	-0.05	-0.05	-0.03	-0.01
Pipeline Gas	0.00	0.00	0.00	0.59	1.58
TOTAL	18.47	21.32	22.80	22.04	21.81

PRIMARY SUPPLIES BY BALANCE CATEGORY

(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	8.90	10.96	11.15	10.89	9.66
PETRO PROD	1.76	0.71	1.53	-0.16	-0.28
COAL/COKE	3.13	3.41	3.13	2.43	1.95
FUEL GASES	1.84	2.25	2.69	3.94	4.98
HYDRO/GEOTHERM	0.38	0.44	0.44	0.44	0.44
ELECTRICITY	0.00	0.00	0.00	0.00	-0.00
WIND/SOLAR	0.05	0.04	0.05	0.60	2.16
NUCLEAR	2.18	3.24	3.53	3.55	2.53
HEAT	0.00	0.00	0.00	-0.00	-0.00
BIOMASS FUELS	0.26	0.28	0.28	0.35	0.39
TOTAL	18.47	21.32	22.80	22.04	21.81

Alternative Path

INDIGENOUS RESOURCE PRODUCTION BY BALANCE CATEGORY (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	2.41	3.21	3.21	3.21	3.21
COAL/COKE	312.07	202.47	202.47	202.47	202.47
FUEL GASES	79.42	89.23	89.23	89.23	89.23
HYDRO/GEOTHERM	375.86	439.56	439.56	439.56	439.56
WIND/SOLAR	47.04	40.69	49.24	603.21	2154.90
BIOMASS FUELS	258.45	279.02	281.50	347.60	387.09
TOTAL	1075.25	1054.18	1065.21	1685.28	3276.45

IMPORTS BY FUEL

(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	0.00	0.00	0.00	0.00	0.00
GASOLINE	0.07	0.04	0.02	0.00	0.00
KEROSENE	0.13	0.12	0.06	0.00	0.00
DIESEL/GAS OIL	0.26	0.06	0.27	0.19	0.00
HEAVY OIL A	0.06	0.04	0.02	0.00	0.00
LPG/BOTTLED GAS	0.69	0.75	0.83	0.84	0.99
OTHER PETRO PROD	0.12	0.08	0.08	0.08	0.08
LUBRICATING OIL	0.01	0.00	0.00	0.00	0.00
CRUDE OIL	8.89	10.95	11.14	10.88	9.65
COAL BITUMINOUS	0.78	1.17	1.19	0.94	0.82
COAL, COKING	2.05	2.06	1.78	1.33	0.96
COAL ANTHRACITE	0.03	0.05	0.05	0.04	0.04
COKE (from Coal)	0.00	0.00	0.00	0.00	0.00
NUCLEAR	2.18	3.24	3.53	3.55	2.53
HYDROGEN	0.00	0.00	0.00	0.00	0.01
NAPTHA	0.67	0.87	0.74	0.69	0.61
NATURAL GAS LIQ.	0.25	0.20	0.20	0.20	0.19
PETROLEUM COKE	0.14	0.14	0.14	0.14	0.10
HEAVY OIL C	0.41	0.17	0.09	0.00	0.00
JET FUEL	0.16	0.12	0.06	0.00	0.00
LNG	1.82	2.23	2.66	3.28	3.31
Non-Energy Prod.	0.25	0.18	0.24	0.28	0.43
Pipeline Gas	0.00	0.00	0.00	0.59	1.58
TOTAL	18.98	22.51	23.09	23.03	21.31

IMPORTS BY BALANCE CATEGORY

(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	8.89	10.95	11.14	10.88	9.65
PETRO PROD	3.23	2.79	2.74	2.41	2.40
COAL/COKE	2.86	3.29	3.01	2.31	1.83
FUEL GASES	1.82	2.23	2.66	3.88	4.89
ELECTRICITY	0.00	0.00	0.00	0.00	0.00
WIND/SOLAR	0.00	0.00	0.00	0.00	0.01
NUCLEAR	2.18	3.24	3.53	3.55	2.53
TOTAL	18.98	22.51	23.09	23.03	21.31

Alternative Path

EXPORTS BY FUEL

(MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	0.00	0.00	0.00	0.00	0.00
GASOLINE	83.64	220.49	42.70	1073.22	1106.77
KEROSENE	62.44	185.56	82.90	137.80	210.87
DIESEL/GAS OIL	24.64	97.17	48.59	0.00	0.00
HEAVY OIL A	361.13	167.45	122.73	252.95	338.96
LPG/BOTTLED GAS	0.08	0.32	0.16	0.00	0.00
OTHER PETRO PROD	306.70	1.59	1.59	1.59	1.59
LUBRICATING OIL	77.06	290.83	332.13	355.46	415.18
COKE (from Coal)	47.50	80.50	80.47	80.40	80.33
NAPTHA	156.36	197.52	4.95	0.00	0.00
PETROLEUM COKE	0.00	13.60	19.48	42.78	50.41
HEAVY OIL B	1.29	0.47	2.72	3.50	3.63
HEAVY OIL C	162.74	589.49	343.20	607.77	546.39
JET FUEL	187.20	241.80	153.49	56.72	13.73
Non-Energy Prod.	12.16	33.06	16.53	0.00	0.00
Refinery Gas	33.52	50.27	46.65	30.53	10.78
TOTAL	1516.46	2170.13	1298.28	2642.71	2778.66

EXPORTS BY BALANCE CATEGORY (MILLION GIGAJOULES)

	1990	1995	2000	2010	2020
PETRO PROD	1468.96	2089.62	1217.81	2562.32	2698.33
COAL/COKE	47.50	80.50	80.47	80.40	80.33
ELECTRICITY	0.00	0.00	0.00	0.00	0.00
TOTAL	1516.46	2170.13	1298.28	2642.71	2778.66

RESERVES BY FUEL (BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	0.30	0.29	0.27	0.24	0.21
COAL BITUMINOUS	18.15	16.96	15.97	13.97	11.98
COAL, COKING	1.71	1.68	1.68	1.68	1.68
COAL ANTHRACITE	0.27	0.25	0.23	0.20	0.17
COKE (from Coal)	0.00	0.00	0.00	0.00	0.00
WIND	3.00	3.00	3.00	3.00	3.00
SOLAR	5.00	5.00	5.00	5.00	5.00
HYDRO	2.58	2.58	2.58	2.58	2.58
GEOTHERMAL	0.20	0.20	0.20	0.20	0.20
DOM. NAT GAS RES	1.26	0.84	1.06	0.84	0.62
TOTAL	32.46	30.79	29.99	27.71	25.43

Alternative Path

TOTAL FUEL REQUIREMENTS BY FUEL (BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	3.10	3.63	4.02	4.11	4.02
NATURAL GAS	1.89	2.30	2.73	3.94	4.96
GASOLINE	1.49	1.76	1.92	0.87	0.67
KEROSENE	0.95	1.04	1.08	0.96	0.80
DIESEL/GAS OIL	1.52	1.86	2.12	2.10	1.75
HEAVY OIL A	0.73	1.07	1.09	0.94	0.76
LPG/BOTTLED GAS	0.92	1.01	1.10	1.10	1.23
OTHER PETRO PROD	0.26	0.24	0.26	0.27	0.30
LUBRICATING OIL	0.09	0.09	0.10	0.11	0.14
CRUDE OIL	8.90	10.96	11.15	10.89	9.66
COAL BITUMINOUS	1.06	1.37	1.39	1.14	1.02
COAL, COKING	2.08	2.06	1.78	1.33	0.96
COAL ANTHRACITE	0.03	0.05	0.05	0.05	0.04
HARDCOAL BRIQUET	0.00	0.00	0.00	0.00	0.00
COKE (from Coal)	1.24	1.14	1.03	0.79	0.57
Coke Oven Gas	0.25	0.24	0.22	0.19	0.17
Biomass/Wood/Wst	0.24	0.25	0.26	0.31	0.34
WIND	0.00	0.00	0.00	0.26	1.04
SOLAR	0.05	0.04	0.05	0.34	1.11
HYDRO	0.31	0.36	0.36	0.36	0.36
GEOTHERMAL	0.06	0.07	0.07	0.07	0.07
NUCLEAR	2.18	3.24	3.53	3.55	2.53
HEAT (DISTRICT)	0.01	0.02	0.03	0.05	0.08
HEAT (COGEN)	0.00	0.00	0.05	0.30	0.44
HYDROGEN	0.00	0.00	0.00	0.00	0.01
MUN. SOLID WASTE	0.02	0.02	0.02	0.04	0.05
NAPTHA	1.08	1.39	1.44	1.40	1.27
BLAST FURN. GAS	0.38	0.42	0.39	0.29	0.21
MUNICIPAL GAS	0.61	0.81	1.07	2.27	3.38
NATURAL GAS LIQ.	0.25	0.20	0.20	0.20	0.19
PETROLEUM COKE	0.19	0.18	0.18	0.15	0.11
DOM. NAT GAS RES	0.08	0.09	0.09	0.09	0.09
HEAVY OIL B	0.03	0.00	0.00	0.00	0.00
HEAVY OIL C	2.09	1.71	1.87	1.52	1.41
JET FUEL	0.15	0.18	0.21	0.25	0.26
LNG	1.82	2.23	2.66	3.28	3.31
Non-Energy Prod.	0.63	0.57	0.65	0.70	0.82
Refinery Gas	0.31	0.38	0.38	0.40	0.38
Input to Mun Gas	0.57	0.77	1.02	2.18	3.25
Pipeline Gas	0.00	0.00	0.00	0.59	1.58

TOTAL FUEL REQUIREMENTS BY BALANCE CATEGORY (BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
CRUDE OIL	8.90	10.96	11.15	10.89	9.66
PETRO PROD	10.68	11.68	12.60	10.97	10.10
COAL/COKE	4.42	4.63	4.25	3.31	2.60
FUEL GASES	5.60	6.85	8.19	12.84	16.96
HYDRO/GEOTHERM	0.38	0.44	0.44	0.44	0.44
ELECTRICITY	3.10	3.63	4.02	4.11	4.02
WIND/SOLAR	0.05	0.04	0.05	0.60	2.16
NUCLEAR	2.18	3.24	3.53	3.55	2.53
HEAT	0.01	0.02	0.07	0.35	0.52
BIOMASS FUELS	0.26	0.28	0.28	0.35	0.39

Alternative Path

ELECTRICITY GEN.: ENERGY INPUTS BY FUEL
(BILLION GIGAJOULES)

	1990	1995	2000	2010	2020
ELECTRICITY	0.16	0.24	0.26	0.24	0.20
NATURAL GAS	1.37	1.57	1.76	1.82	1.96
DIESEL/GAS OIL	0.01	0.01	0.01	0.01	0.01
HEAVY OIL A	0.02	0.02	0.02	0.02	0.02
LPG/BOTTLED GAS	0.05	0.07	0.07	0.07	0.07
CRUDE OIL	0.76	0.58	0.74	0.48	0.11
COAL BITUMINOUS	0.69	1.03	1.09	0.92	0.87
COAL ANTHRACITE	0.00	0.01	0.01	0.00	0.00
Coke Oven Gas	0.07	0.08	0.08	0.06	0.04
Biomass/Wood/Wst	0.12	0.15	0.15	0.22	0.26
WIND	0.00	0.00	0.00	0.26	1.04
SOLAR	0.00	0.00	0.00	0.28	1.04
HYDRO	0.31	0.36	0.36	0.36	0.36
GEOTHERMAL	0.06	0.07	0.07	0.07	0.07
NUCLEAR	2.18	3.24	3.53	3.55	2.53
MUN. SOLID WASTE	0.02	0.02	0.02	0.04	0.05
NAPTHA	0.04	0.04	0.04	0.04	0.04
BLAST FURN. GAS	0.22	0.27	0.27	0.20	0.14
MUNICIPAL GAS	0.00	0.00	0.06	0.61	0.90
NATURAL GAS LIQ.	0.02	0.03	0.03	0.03	0.03
PETROLEUM COKE	0.04	0.03	0.03	0.02	0.01
HEAVY OIL B	0.00	0.00	0.00	0.00	0.00
HEAVY OIL C	1.26	0.98	1.21	0.98	0.93
Refinery Gas	0.02	0.02	0.02	0.02	0.02
TOTAL	7.42	8.83	9.84	10.33	10.71

Alternative Path

ELECTRICITY GEN.: ENERGY OUTPUTS BY PLANT
(THOUSAND GIGAWATT-HOURS)

	1990	1995	2000	2010	2020
Nucl.--Exist BWR	120.32	168.19	168.19	165.68	119.88
Nucl.--Exist PWR	77.22	119.32	119.32	119.32	72.04
Nucl.--Exist HWR	0.96	1.16	1.16	1.16	0.00
Nucl.--Exist GCR	1.03	1.16	1.16	0.00	0.00
Nucl.--New BWRs	0.00	5.58	24.01	29.59	29.59
Nucl.--New PWRs	0.00	0.00	8.27	8.27	8.27
Nucl., FBR	0.00	1.72	1.72	1.72	1.72
Hydro--Convent.	87.22	101.30	101.30	101.30	101.30
Pumped St. Hydro	7.10	19.65	19.65	23.13	24.88
Geothermal--Util	1.46	1.82	1.82	1.82	1.82
Geothermal--Auto	0.25	0.26	0.26	0.26	0.26
Gas Turbine-Util	8.74	12.26	12.26	12.26	12.26
Int. Comb--Util	8.97	13.60	13.60	13.60	13.60
Coal Steam--Util	71.62	104.92	104.92	65.70	39.42
Coal Steam--Auto	13.83	23.45	23.45	19.71	16.43
Coal/Ck Gas-Util	21.37	24.35	24.35	16.43	13.14
Coal/Ck Gas-Auto	14.76	19.47	19.47	16.43	9.86
Std. Coal, New	0.00	0.00	7.88	29.57	52.56
Stm Nat Gas-Util	151.42	168.90	168.90	141.56	92.90
Stm Nat Gas-Auto	0.17	0.09	0.13	0.16	0.17
Steam Gas--New	0.00	0.00	17.32	24.98	26.88
Gas Comb Cy, New	0.00	0.00	5.77	41.64	108.78
Serv Cogen--Gas	0.00	0.00	1.84	17.22	21.85
Serv FC Cogen-Gs	0.00	0.00	0.02	4.30	14.57
Ind Cogen--Gas	0.00	0.00	2.73	26.06	33.07
Ind FC Cogen-Gas	0.00	0.00	0.03	6.51	22.05
Steam Oil--Util	197.53	150.91	192.45	130.87	30.72
Stm Hvy Oil-Auto	51.55	41.19	41.19	26.28	13.14
Stm Lt Oil--Auto	10.08	8.05	8.05	8.05	8.05
Oil CC, New	0.00	0.00	5.77	29.74	89.59
MSW-Fired Plants	1.16	1.74	1.74	3.07	4.29
Wind Power	0.00	0.00	0.03	14.45	57.82
Biomass/Wst-Auto	8.60	10.71	10.71	21.46	29.43
Solar PV--Resid.	0.00	0.00	0.01	2.93	8.15
Solar PV-Comml	0.00	0.00	0.01	2.29	6.79
Solar PV--Util.	0.00	0.00	0.09	5.26	24.53
TOTAL	855.36	999.79	1109.57	1132.78	1109.78

Alternative Path

ELECTRICITY GEN.: PLANT CAPACITIES
(THOUSAND MEGAWATTS)

	1990	1995	2000	2010	2020
Nucl.--Exist BWR	19.30	24.00	24.00	23.64	17.11
Nucl.--Exist PWR	12.60	17.03	17.03	17.03	10.28
Nucl.--Exist HWR	0.17	0.17	0.17	0.17	0.00
Nucl.--Exist GCR	0.17	0.17	0.17	0.00	0.00
Nucl.--New BWRs	0.00	0.80	3.43	4.22	4.22
Nucl.--New PWRs	0.00	0.00	1.18	1.18	1.18
Nucl., FBR	0.00	0.25	0.25	0.25	0.25
Hydro--Convent.	20.83	21.03	21.03	21.03	21.03
Pumped St. Hydro	17.00	22.43	22.43	26.40	28.40
Geothermal--Util	0.24	0.26	0.26	0.26	0.26
Geothermal--Auto	0.03	0.03	0.03	0.03	0.03
Gas Turbine-Util	2.37	2.55	2.55	2.55	2.55
Int. Comb--Util	2.82	2.82	2.82	2.82	2.82
Coal Steam--Util	12.42	15.97	15.97	10.00	6.00
Coal Steam--Auto	2.78	3.57	3.57	3.00	2.50
Coal/Ck Gas-Util	3.71	3.71	3.71	2.50	2.00
Coal/Ck Gas-Auto	2.96	2.96	2.96	2.50	1.50
Std. Coal, New	0.00	0.00	1.20	4.50	8.00
Stm Nat Gas-Util	35.41	38.18	38.18	32.00	21.00
Stm Nat Gas-Auto	0.03	0.03	0.03	0.03	0.03
Steam Gas--New	0.00	0.00	3.60	4.20	4.20
Gas Comb Cy, New	0.00	0.00	1.20	7.00	17.00
Serv Cogen--Gas	0.00	0.00	0.50	4.68	5.94
Serv FC Cogen-Gs	0.00	0.00	0.01	1.17	3.96
Ind Cogen--Gas	0.00	0.00	0.60	5.72	7.26
Ind FC Cogen-Gas	0.00	0.00	0.01	1.43	4.84
Steam Oil--Util	53.89	53.68	50.00	27.50	6.00
Stm Hvy Oil-Auto	10.35	7.84	7.84	5.00	2.50
Stm Lt Oil--Auto	2.02	1.53	1.53	1.53	1.53
Oil CC, New	0.00	0.00	1.20	5.00	14.00
MSW-Fired Plants	0.23	0.28	0.28	0.50	0.70
Wind Power	0.00	0.00	0.01	5.50	22.00
Biomass/Wst-Auto	1.73	1.75	1.75	3.50	4.80
Solar PV--Resid.	0.00	0.00	0.01	2.16	6.00
Solar PV-Comml	0.00	0.00	0.01	1.69	5.00
Solar PV--Util.	0.00	0.00	0.05	3.00	14.00
TOTAL	201.05	221.01	229.53	233.68	248.88

Alternative Path

ELECTRICITY GEN.: ACTUAL CAPACITY FACTORS
(PERCENT)

	1990	1995	2000	2010	2020
Nucl.--Exist BWR	71.18	80.00	80.00	80.00	80.00
Nucl.--Exist PWR	69.98	80.00	80.00	80.00	80.00
Nucl.--Exist HWR	66.13	80.00	80.00	80.00	0.00
Nucl.--Exist GCR	70.62	80.00	80.00	0.00	0.00
Nucl.--New BWRs	0.00	80.00	80.00	80.00	80.00
Nucl.--New PWRs	0.00	0.00	80.00	80.00	80.00
Nucl., FBR	0.00	80.00	80.00	80.00	80.00
Hydro--Convent.	47.80	55.00	55.00	55.00	55.00
Pumped St. Hydro	4.77	10.00	10.00	10.00	10.00
Geothermal--Util	69.68	80.00	80.00	80.00	80.00
Geothermal--Auto	93.36	95.00	95.00	95.00	95.00
Gas Turbine-Util	42.17	55.00	55.00	55.00	55.00
Int. Comb--Util	36.29	55.00	55.00	55.00	55.00
Coal Steam--Util	65.82	75.00	75.00	75.00	75.00
Coal Steam--Auto	56.88	75.00	75.00	75.00	75.00
Coal/Ck Gas-Util	65.83	75.00	75.00	75.00	75.00
Coal/Ck Gas-Auto	56.86	75.00	75.00	75.00	75.00
Std. Coal, New	0.00	0.00	75.00	75.00	75.00
Stm Nat Gas-Util	48.82	50.50	50.50	50.50	50.50
Stm Nat Gas-Auto	56.81	32.09	43.94	54.33	58.44
Steam Gas--New	0.00	0.00	54.92	67.91	73.05
Gas Comb Cy, New	0.00	0.00	54.92	67.91	73.05
Serv Cogen--Gas	0.00	0.00	42.00	42.00	42.00
Serv FC Cogen-Gs	0.00	0.00	42.00	42.00	42.00
Ind Cogen--Gas	0.00	0.00	52.00	52.00	52.00
Ind FC Cogen-Gas	0.00	0.00	52.00	52.00	52.00
Steam Oil--Util	41.84	32.09	43.94	54.33	58.44
Stm Hvy Oil-Auto	56.87	60.00	60.00	60.00	60.00
Stm Lt Oil--Auto	56.87	60.00	60.00	60.00	60.00
Oil CC, New	0.00	0.00	54.92	67.91	73.05
MSW-Fired Plants	56.79	70.00	70.00	70.00	70.00
Wind Power	0.00	0.00	30.00	30.00	30.00
Biomass/Wst-Auto	56.87	70.00	70.00	70.00	70.00
Solar PV--Resid.	0.00	0.00	15.50	15.50	15.50
Solar PV-Comml	0.00	0.00	15.50	15.50	15.50
Solar PV--Util.	0.00	0.00	20.00	20.00	20.00

ELECTRIC PEAK LOADS: ELECTRICITY GEN.

	1990	1995	2000	2010	2020
Load Factor (%)	68.88	68.88	68.88	68.88	68.88
Peak Output (THOUSAND MW)	141.75	165.69	183.88	187.73	183.91
Reserve Marg. (%)	41.83	33.39	24.83	24.48	35.32

Business-as-Usual Path with Loss of BWR Capacity in 2010

ELECTRICITY GEN.: MODULE BALANCE
(MILLION GIGAJOULES)

	1990	1995	2000	2010	2015	2020
Outputs						
ELECTRICITY	3079.31	3596.90	4060.57	4352.63	4713.05	5159.01
Total	3079.31	3596.90	4060.57	4352.63	4713.05	5159.01
Imports						
ELECTRICITY	0.00	0.00	0.00	487.03	446.65	344.31
Total	0.00	0.00	0.00	487.03	446.65	344.31
Module Supplies						
ELECTRICITY	3079.31	3596.90	4060.57	4839.66	5159.70	5503.32
Total	3079.31	3596.90	4060.57	4839.66	5159.70	5503.32
Requirements						
ELECTRICITY	3079.31	3596.90	4060.57	4839.66	5159.70	5503.32
Total	3079.31	3596.90	4060.57	4839.66	5159.70	5503.32

Alternative Path with Loss of BWR Capacity in 2010

ELECTRICITY GEN.: MODULE BALANCE
(MILLION GIGAJOULES)

	1990	**1995**	**2000**	**2010**	**2015**	**2020**
Outputs						
HEAT (COGEN)	**0.00**	**0.00**	**30.72**	**303.90**	**367.12**	**439.68**
ELECTRICITY	**3079.31**	**3599.25**	**3994.45**	**3460.52**	**3388.53**	**3481.77**
Total	**3079.31**	**3599.25**	**4025.17**	**3764.42**	**3755.65**	**3921.44**
Imports						
ELECTRICITY	**0.00**	**0.00**	**0.00**	**595.21**	**628.97**	**494.21**
Total	**0.00**	**0.00**	**0.00**	**595.21**	**628.97**	**494.21**
Module Supplies						
HEAT (COGEN)	**0.00**	**0.00**	**30.72**	**303.90**	**367.12**	**439.68**
ELECTRICITY	**3079.31**	**3599.25**	**3994.45**	**4055.74**	**4017.50**	**3975.98**
Total	**3079.31**	**3599.25**	**4025.17**	**4359.63**	**4384.61**	**4415.65**
Requirements						
HEAT (COGEN)	**0.00**	**0.00**	**45.75**	**302.91**	**373.21**	**439.24**
ELECTRICITY	**3079.31**	**3599.25**	**3994.45**	**4055.74**	**4017.50**	**3975.98**
Total	**3079.31**	**3599.25**	**4040.21**	**4358.65**	**4390.71**	**4415.22**
Wasted Outputs						
HEAT (COGEN)	**0.00**	**0.00**	**0.00**	**0.99**	**0.00**	**0.44**
Total	**0.00**	**0.00**	**0.00**	**0.99**	**0.00**	**0.44**

D3. DETAILED LEAP RESULTS: EVALUATION

Comparison of Alternative Path and BAU Path, No Environmental Costs

BENEFIT-COST SUMMARY: 1990-2020

TRILLION DISCOUNTED 1990 Y

(DISCOUNTED TO 1990 AT 2% REAL DISCOUNT RATE)

	BENEFITS	COSTS	NPV	B/C RATIO
DEMAND NON-FUEL COSTS				
INDUSTRY	0.57	0.54	0.04	--
TRANSPORT	0.00	0.00	0.00	--
AGRIC/FOR/FISH	0.00	0.00	0.00	--
HOUSEHOLD	1.97	4.36	-2.39	--
COMMERCIAL	0.15	2.37	-2.22	--
NON-ENERGY	0.00	0.00	0.00	--
TRANSFORMATION NON-FUEL COSTS				
T&D LOSSES	0.00	0.00	0.00	--
CHARCOAL PRODN	0.00	0.00	0.00	--
DISTRICT HEAT	0.00	0.00	0.00	--
ELECTRICITY GEN.	5.86	6.27	-0.41	--
MUNICIPAL GAS PR.	0.00	0.00	0.00	--
MUNIC GAS INPUT	0.00	0.00	0.00	--
BLAST FURN GAS PR	0.00	0.00	0.00	--
PETROCHEM. PROD.	0.00	0.00	0.00	--
REFINING--NON-EN.	0.00	0.00	0.00	--
OIL REFINING	0.00	0.00	0.00	--
COAL BRIQUETTE PR	0.00	0.00	0.00	--
PIPELINE GAS IMP.	0.00	1.07	-1.07	--
COKE PRODUCTION	0.00	0.00	0.00	--
GAS PRODUCTION	0.00	0.00	0.00	--
LNG IMPORTS	0.73	0.00	0.73	--
CRUDE OIL PRODN.	0.00	0.00	0.00	--
ANTHR. COAL PROD.	0.00	0.00	0.00	--
COKING COAL PROD.	0.00	0.00	0.00	--
BITUM. COAL PROD.	0.00	0.00	0.00	--
RESOURCE COSTS				
INDIGENOUS	0.00	0.00	-0.00	--
IMPORTS	20.01	1.66	18.35	--
EXPORTS	13.80	0.18	13.62	--
ENVIRONMENTAL COSTS	0.00	0.00	0.00	--
TOTAL ENERGY SYSTEM	43.09	16.44	26.64	2.62

Comparison of Alternative Path and BAU Path, No Environmental Costs

OVERVIEW OF COSTS

TRILLION REAL 1990 Y

	1990	1995	2000	2010	2020
DEMAND					
NON-FUEL COSTS					
INDUSTRY	0.00	-0.01	-0.00	-0.00	0.01
TRANSPORT	0.00	0.00	0.00	0.00	0.00
AGRIC/FOR/FISH	0.00	0.00	0.00	0.00	0.00
HOUSEHOLD	0.00	0.03	0.02	0.18	0.21
COMMERCIAL	0.00	0.00	0.01	0.16	0.35
NON-ENERGY	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	0.02	0.03	0.34	0.57
TRANSFORMATION					
NON-FUEL COSTS					
T&D LOSSES	0.00	0.00	0.00	0.00	0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00
DISTRICT HEAT	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	0.00	0.03	0.01	-0.03	0.32
MUNICIPAL GAS PR.	0.00	0.00	0.00	0.00	0.00
MUNIC GAS INPUT	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS PR	0.00	0.00	0.00	0.00	0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00
REFINING--NON-EN.	0.00	0.00	0.00	0.00	0.00
OIL REFINING	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE PR	0.00	0.00	0.00	0.00	0.00
PIPELINE GAS IMP.	0.00	0.00	0.00	0.08	0.20
COKE PRODUCTION	0.00	0.00	0.00	0.00	0.00
GAS PRODUCTION	0.00	0.00	0.00	0.00	0.00
LNG IMPORTS	0.00	0.00	0.00	-0.05	-0.15
CRUDE OIL PRODN.	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD.	0.00	0.00	0.00	0.00	0.00
COKING COAL PROD.	0.00	0.00	0.00	0.00	0.00
BITUM. COAL PROD.	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	0.03	0.01	0.00	0.37
RESOURCE COSTS					
INDIGENOUS	0.00	0.00	0.00	0.00	0.00
IMPORTS	0.00	-0.00	-0.07	-1.28	-3.51
EXPORTS	0.00	0.02	-0.05	-1.24	-1.36
TOTAL	0.00	0.02	-0.12	-2.52	-4.87
ENVIRONMENTAL COSTS					
TOTAL	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	0.07	-0.08	-2.17	-3.94

Comparison of Alternative Path and BAU Path, No Environmental Costs

TOTAL NON-FUEL DEMAND COSTS: ALL SECTORS

BILLION REAL 1990 Y

FUEL	1990	1995	2000	2010	2020
ELECTRICITY	0.00	8.97	31.97	326.29	556.78
NATURAL GAS	0.00	0.00	0.00	0.02	0.04
KEROSENE	0.00	0.00	-16.78	-104.25	-165.60
DIESEL/GAS OIL	0.00	0.00	0.00	0.04	0.11
HEAVY OIL A	0.00	-8.77	-6.22	25.57	74.78
HEAVY OIL B	0.00	0.00	0.00	0.00	0.00
HEAVY OIL C	0.00	0.30	0.97	11.29	13.41
LPG/BOTTLED GAS	0.00	7.99	4.94	19.67	2.94
COAL BITUMINOUS	0.00	0.00	4.03	11.60	15.88
COAL, COKING	0.00	0.00	0.00	7.29	6.17
COKE (from Coal)	0.00	0.00	0.15	2.13	4.71
SOLAR	0.00	0.00	11.65	26.06	63.14
MUNICIPAL GAS	0.00	9.99	-1.37	10.89	-7.13
PETROLEUM COKE	0.00	0.00	0.30	0.93	3.81
TOTAL	0.00	18.48	29.64	337.54	569.03

TOTAL RESOURCE COSTS

TRILLION REAL 1990 Y

	1990	1995	2000	2010	2020
GASOLINE	0.00	0.00	-0.01	-0.86	-0.94
KEROSENE	0.00	0.00	-0.02	-0.18	-0.29
DIESEL/GAS OIL	0.00	0.00	-0.02	-0.33	-0.69
HEAVY OIL A	0.00	0.03	0.01	-0.17	-0.31
LPG/BOTTLED GAS	0.00	-0.00	-0.02	-0.14	-0.17
CRUDE OIL	0.00	-0.01	-0.03	-0.19	-0.77
COAL BITUMINOUS	0.00	0.00	-0.02	-0.18	-0.38
COAL, COKING	0.00	0.00	-0.00	-0.06	-0.08
NUCLEAR	0.00	0.00	0.00	-0.00	-0.01
HEAVY OIL C	0.00	-0.01	-0.03	-0.29	-0.44
LNG	0.00	0.01	0.02	-0.18	-0.98
Pipeline Gas	0.00	0.00	0.00	0.08	0.21
TOTAL	0.00	0.02	-0.12	-2.52	-4.87

Comparison of Alternative Path and BAU Path, No Environmental Costs

TRANSFORMATION CAPITAL COSTS: ELECTRICITY GEN.
BILLION REAL 1990 Y

PROCESS	1990	1995	2000	2010	2020
Nucl.--New BWRs	0.00	17.93	16.08	-52.31	-52.31
Std. Coal, New	0.00	0.00	-12.96	-55.09	-133.95
Steam Gas--New	0.00	0.00	0.00	-39.88	-98.38
Gas Comb Cy, New	0.00	0.00	-2.24	-12.34	-20.57
Serv Cogen--Gas	0.00	0.00	4.64	43.45	50.51
Serv FC Cogen-Gs	0.00	0.00	0.06	14.48	48.96
Ind Cogen--Gas	0.00	0.00	3.71	35.41	41.23
Ind FC Cogen-Gas	0.00	0.00	0.05	11.80	39.90
Oil CC, New	0.00	0.00	0.00	-6.65	-8.31
MSW-Fired Plants	0.00	0.00	0.00	2.16	4.16
Wind Power	0.00	0.00	0.08	45.70	182.80
Biomass/Wst-Auto	0.00	0.00	0.00	17.49	30.45
Solar PV--Resid.	0.00	0.00	0.21	44.57	123.60
Solar PV-Comml	0.00	0.00	0.19	31.38	92.67
Solar PV--Util.	0.00	0.00	0.77	46.43	215.88
TOTAL	0.00	17.93	10.59	126.61	516.64

TRANSFORMATION OPERATING & MAINTENANCE COSTS: ELECTRICITY GEN.
BILLION REAL 1990 Y

PROCESS	1990	1995	2000	2010	2020
Nucl.--New BWRs	0.00	13.96	12.52	-40.74	-40.74
Nucl. New ABWRs	0.00	0.00	0.00	-34.67	-81.67
Coal Steam--Util	0.00	0.00	0.00	-55.38	-92.48
Coal Steam--Auto	0.00	0.00	0.00	-5.29	-9.93
Coal/Ck Gas-Util	0.00	0.00	0.00	-16.61	-23.48
Coal/Ck Gas-Auto	0.00	0.00	0.00	-1.38	-4.35
Std. Coal, New	0.00	0.00	-11.13	-47.31	-115.02
Stm Nat Gas-Util	0.00	0.00	0.00	-11.37	-31.58
Stm Nat Gas-Auto	0.00	-0.00	-0.00	0.00	0.00
Steam Gas--New	0.00	0.00	-0.03	-11.35	-28.87
Gas Comb Cy, New	0.00	0.00	-2.64	-13.48	-20.65
Serv Cogen--Gas	0.00	0.00	3.08	28.82	36.58
Serv FC Cogen-Gs	0.00	0.00	0.05	11.85	40.12
Ind Cogen--Gas	0.00	0.00	3.48	33.16	42.09
Ind FC Cogen-Gas	0.00	0.00	0.06	14.41	48.78
Steam Oil--Util	0.00	-0.69	-6.87	-45.81	-87.48
Stm Hvy Oil-Auto	0.00	0.00	0.00	-5.55	-10.44
Oil CC, New	0.00	0.00	-0.03	-6.22	-5.36
MSW-Fired Plants	0.00	0.00	0.00	1.36	2.61
Wind Power	0.00	0.00	0.05	29.20	116.79
Biomass/Wst-Auto	0.00	0.00	0.00	10.98	19.11
Solar PV--Resid.	0.00	0.00	0.03	5.83	16.20
Solar PV-Comml	0.00	0.00	0.02	3.41	10.10
Solar PV--Util.	0.00	0.00	0.07	4.05	18.90
TOTAL	0.00	13.27	-1.34	-152.07	-200.80

Comparison of Alternative Path and BAU Path, With 6750 Yen per Tonne CO_2 Environmental Costs

BENEFIT-COST SUMMARY: 1990-2020

TRILLION DISCOUNTED 1990 Y

(DISCOUNTED TO 1990 AT 2% REAL DISCOUNT RATE)

	BENEFITS	COSTS	NPV	B/C RATIO
DEMAND NON-FUEL COSTS				
INDUSTRY	0.57	0.54	0.04	--
TRANSPORT	0.00	0.00	0.00	--
AGRIC/FOR/FISH	0.00	0.00	0.00	--
HOUSEHOLD	1.97	4.36	-2.39	--
COMMERCIAL	0.15	2.37	-2.22	--
NON-ENERGY	0.00	0.00	0.00	--
TRANSFORMATION NON-FUEL COSTS				
T&D LOSSES	0.00	0.00	0.00	--
CHARCOAL PRODN	0.00	0.00	0.00	--
DISTRICT HEAT	0.00	0.00	0.00	--
ELECTRICITY GEN.	5.86	6.27	-0.41	--
MUNICIPAL GAS PR.	0.00	0.00	0.00	--
MUNIC GAS INPUT	0.00	0.00	0.00	--
BLAST FURN GAS PR	0.00	0.00	0.00	--
PETROCHEM. PROD.	0.00	0.00	0.00	--
REFINING--NON-EN.	0.00	0.00	0.00	--
OIL REFINING	0.00	0.00	0.00	--
COAL BRIQUETTE PR	0.00	0.00	0.00	--
PIPELINE GAS IMP.	0.00	1.07	-1.07	--
COKE PRODUCTION	0.00	0.00	0.00	--
GAS PRODUCTION	0.00	0.00	0.00	--
LNG IMPORTS	0.73	0.00	0.73	--
CRUDE OIL PRODN.	0.00	0.00	0.00	--
ANTHR. COAL PROD.	0.00	0.00	0.00	--
COKING COAL PROD.	0.00	0.00	0.00	--
BITUM. COAL PROD.	0.00	0.00	0.00	--
RESOURCE COSTS				
INDIGENOUS	0.00	0.00	-0.00	--
IMPORTS	20.01	1.66	18.35	--
EXPORTS	13.80	0.18	13.62	--
ENVIRONMENTAL COSTS	27.67	0.05	27.62	--
TOTAL ENERGY SYSTEM	70.76	16.49	54.27	4.29

Comparison of Alternative Path and BAU Path, With 6750 Yen per Tonne CO_2 Environmental Costs and Oil Price Shock in 2010

BENEFIT-COST SUMMARY: 1990-2020
TRILLION DISCOUNTED 1990 Y
(DISCOUNTED TO 1990 AT 2% REAL DISCOUNT RATE)

	BENEFITS	COSTS	NPV	B/C RATIO
DEMAND NON-FUEL COSTS				
INDUSTRY	0.57	0.54	0.04	--
TRANSPORT	0.00	0.00	0.00	--
AGRIC/FOR/FISH	0.00	0.00	0.00	--
HOUSEHOLD	1.97	4.36	-2.39	--
COMMERCIAL	0.15	2.37	-2.22	--
NON-ENERGY	0.00	0.00	0.00	--
TRANSFORMATION NON-FUEL COSTS				
T&D LOSSES	0.00	0.00	0.00	--
CHARCOAL PRODN	0.00	0.00	0.00	--
DISTRICT HEAT	0.00	0.00	0.00	--
ELECTRICITY GEN.	5.86	6.27	-0.41	--
MUNICIPAL GAS PR.	0.00	0.00	0.00	--
MUNIC GAS INPUT	0.00	0.00	0.00	--
BLAST FURN GAS PR	0.00	0.00	0.00	--
PETROCHEM. PROD.	0.00	0.00	0.00	--
REFINING--NON-EN.	0.00	0.00	0.00	--
OIL REFINING	0.00	0.00	0.00	--
COAL BRIQUETTE PR	0.00	0.00	0.00	--
PIPELINE GAS IMP.	0.00	1.07	-1.07	--
COKE PRODUCTION	0.00	0.00	0.00	--
GAS PRODUCTION	0.00	0.00	0.00	--
LNG IMPORTS	0.73	0.00	0.73	--
CRUDE OIL PRODN.	0.00	0.00	0.00	--
ANTHR. COAL PROD.	0.00	0.00	0.00	--
COKING COAL PROD.	0.00	0.00	0.00	--
BITUM. COAL PROD.	0.00	0.00	0.00	--
RESOURCE COSTS				
INDIGENOUS	0.00	0.00	-0.00	--
IMPORTS	32.55	1.80	30.75	--
EXPORTS	23.45	0.22	23.23	--
ENVIRONMENTAL COSTS	27.67	0.05	27.62	--
TOTAL ENERGY SYSTEM	92.94	16.66	76.28	5.58

Comparison of Alternative Path and BAU Path, With 6750 Yen per Tonne CO_2 Environmental Costs and Oil Price Shock in 2010

OVERVIEW OF COSTS

TRILLION REAL 1990 Y

	1990	1995	2000	2010	2015	2020
DEMAND						
NON-FUEL COSTS						
INDUSTRY	0.00	-0.01	-0.00	-0.00	0.00	0.01
TRANSPORT	0.00	0.00	0.00	0.00	0.00	0.00
AGRIC/FOR/FISH	0.00	0.00	0.00	0.00	0.00	0.00
HOUSEHOLD	0.00	0.03	0.02	0.18	0.10	0.21
COMMERCIAL	0.00	0.00	0.01	0.16	0.25	0.35
NON-ENERGY	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	0.02	0.03	0.34	0.35	0.57
TRANSFORMATION						
NON-FUEL COSTS						
T&D LOSSES	0.00	0.00	0.00	0.00	0.00	0.00
CHARCOAL PRODN	0.00	0.00	0.00	0.00	0.00	0.00
DISTRICT HEAT	0.00	0.00	0.00	0.00	0.00	0.00
ELECTRICITY GEN.	0.00	0.03	0.01	-0.03	0.13	0.32
MUNICIPAL GAS PR.	0.00	0.00	0.00	0.00	0.00	0.00
MUNIC GAS INPUT	0.00	0.00	0.00	0.00	0.00	0.00
BLAST FURN GAS PR	0.00	0.00	0.00	0.00	0.00	0.00
PETROCHEM. PROD.	0.00	0.00	0.00	0.00	0.00	0.00
REFINING--NON-EN.	0.00	0.00	0.00	0.00	0.00	0.00
OIL REFINING	0.00	0.00	0.00	0.00	0.00	0.00
COAL BRIQUETTE PR	0.00	0.00	0.00	0.00	0.00	0.00
PIPELINE GAS IMP.	0.00	0.00	0.00	0.08	0.20	0.20
COKE PRODUCTION	0.00	0.00	0.00	0.00	0.00	0.00
GAS PRODUCTION	0.00	0.00	0.00	0.00	0.00	0.00
LNG IMPORTS	0.00	0.00	0.00	-0.05	-0.08	-0.15
CRUDE OIL PRODN.	0.00	0.00	0.00	0.00	0.00	0.00
ANTHR. COAL PROD.	0.00	0.00	0.00	0.00	0.00	0.00
COKING COAL PROD.	0.00	0.00	0.00	0.00	0.00	0.00
BITUM. COAL PROD.	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	0.03	0.01	0.00	0.23	0.37
RESOURCE COSTS						
INDIGENOUS	0.00	0.00	0.00	0.00	0.00	0.00
IMPORTS	0.00	-0.00	-0.10	-2.18	-3.95	-5.94
EXPORTS	0.00	0.03	-0.07	-2.17	-2.60	-2.39
TOTAL	0.00	0.02	-0.17	-4.35	-6.55	-8.33
ENVIRONMENTAL COSTS						
TOTAL	0.00	0.02	-0.14	-2.10	-3.02	-3.94
TOTAL	0.00	0.09	-0.27	-6.11	-8.99	-11.33

D4. DETAILED LEAP RESULTS: ENVIRONMENT

Business as Usual Path Air Pollutant Emissions

ENVIRONMENTAL EFFECTS BY YEAR: PHYSICAL UNITS — TOTAL ENERGY SYSTEM: ALL FUELS

	1990	1995	2000	2010	2020	
AIR EMISSIONS						
CARBON DIOXIDE						
NON-BIOGENIC	1090.85	1199.71	1255.24	1407.03	1600.28	(BILLION KG)
BIOGENIC	29.94	33.00	33.47	33.96	33.96	(BILLION KG)
CARBON MONOXIDE						
TOTAL	2562.34	2839.55	3089.59	3484.05	3790.58	(MILLION KG)
HYDROCARBONS						
TOTAL	723.40	842.35	904.60	993.17	1053.59	(MILLION KG)
METHANE	276.79	229.85	240.04	264.25	301.30	(MILLION KG)
NITROGEN OXIDES						
TOTAL	4183.22	4394.77	4537.18	4853.88	5174.41	(MILLION KG)
NITROUS OXIDE	108.92	102.24	95.83	96.76	121.89	(MILLION KG)
SULFUR OXIDES						
TOTAL	2056.92	1936.74	1931.58	1946.63	1958.00	(MILLION KG)
PARTICULATES						
TOTAL	916.42	910.24	912.56	932.55	938.53	(MILLION KG)

ENVIRONMENTAL EFFECTS BY YEAR: PHYSICAL UNITS — DEMAND: ALL SECTORS: ALL FUELS

	1990	1995	2000	2010	2020	
AIR EMISSIONS						
CARBON DIOXIDE						
NON-BIOGENIC	652.39	722.22	748.26	813.07	870.83	(BILLION KG)
BIOGENIC	11.59	9.82	10.29	10.78	10.78	(BILLION KG)
CARBON MONOXIDE						
TOTAL	2028.55	2299.44	2570.40	2969.21	3266.32	(MILLION KG)
HYDROCARBONS						
TOTAL	536.30	604.57	664.11	746.10	795.67	(MILLION KG)
METHANE	22.69	23.48	24.63	28.25	31.47	(MILLION KG)
NITROGEN OXIDES						
TOTAL	2478.34	2616.58	2765.09	3041.75	3278.43	(MILLION KG)
NITROUS OXIDE	88.85	81.83	69.51	57.14	62.56	(MILLION KG)
SULFUR OXIDES						
TOTAL	1399.46	1323.94	1188.09	1118.34	1041.39	(MILLION KG)
PARTICULATES						
TOTAL	872.82	865.71	859.13	867.94	858.71	(MILLION KG)

Business as Usual Path Air Pollutant Emissions

ENVIRONMENTAL EFFECTS BY YEAR: PHYSICAL UNITS TRANSFORMATION: ALL PROCESSES: ALL FUELS

	1990	1995	2000	2010	2020	
AIR EMISSIONS						
CARBON DIOXIDE						
NON-BIOGENIC	438.46	477.50	506.97	593.97	729.45	(BILLION KG)
BIOGENIC	18.35	23.18	23.18	23.18	23.18	(BILLION KG)
CARBON MONOXIDE						
TOTAL	533.79	540.11	519.19	514.85	524.26	(MILLION KG)
HYDROCARBONS						
TOTAL	187.10	237.78	240.49	247.07	257.92	(MILLION KG)
METHANE	254.11	206.37	215.41	236.00	269.83	(MILLION KG)
NITROGEN OXIDES						
TOTAL	1704.87	1778.20	1772.10	1812.13	1895.98	(MILLION KG)
NITROUS OXIDE	20.07	20.40	26.32	39.62	59.33	(MILLION KG)
SULFUR OXIDES						
TOTAL	657.46	612.80	743.49	828.29	916.61	(MILLION KG)
PARTICULATES						
TOTAL	43.60	44.53	53.43	64.61	79.82	(MILLION KG)

ENVIRONMENTAL EFFECTS: DEMAND SOURCES BY YEAR
AIR EMISSIONS / CARBON DIOXIDE / NON-BIOGENIC
ALL FUELS
(BILLION KILOGRAMS)

	1990	1995	2000	2010	2020
INDUSTRY	308.66	299.47	280.59	283.68	288.53
TRANSPORT	223.51	269.38	301.15	344.33	372.50
AGRIC/FOR/FISH	15.72	18.32	18.72	18.65	18.65
HOUSEHOLD	68.19	74.17	77.94	78.69	81.79
COMMERCIAL	36.32	60.88	69.86	87.72	109.37
NON-ENERGY	0.00	0.00	0.00	0.00	0.00
TOTAL	652.39	722.22	748.26	813.07	870.83

Alternative Path Air Pollutant Emissions

ENVIRONMENTAL EFFECTS BY YEAR: PHYSICAL UNITS
TOTAL ENERGY SYSTEM: ALL FUELS

	1990	1995	2000	2010	2020	
AIR EMISSIONS						
CARBON DIOXIDE						
NON-BIOGENIC	1090.85	1202.20	1235.12	1095.71	1016.93	(BILLION KG)
BIOGENIC	29.94	33.00	33.24	42.11	47.55	(BILLION KG)
CARBON MONOXIDE						
TOTAL	2562.34	2838.81	3070.66	3106.49	2794.15	(MILLION KG)
HYDROCARBONS						
TOTAL	723.40	842.56	898.33	640.47	549.00	(MILLION KG)
METHANE	276.79	230.24	239.81	274.50	314.26	(MILLION KG)
NITROGEN OXIDES						
TOTAL	4183.22	4390.86	4476.32	3813.61	3230.63	(MILLION KG)
NITROUS OXIDE	108.92	102.07	95.12	79.00	82.17	(MILLION KG)
SULFUR OXIDES						
TOTAL	2056.92	1929.44	1867.07	1458.66	1074.09	(MILLION KG)
PARTICULATES						
TOTAL	916.42	910.11	892.12	706.47	537.32	(MILLION KG)

ENVIRONMENTAL EFFECTS BY YEAR: PHYSICAL UNITS
DEMAND: ALL SECTORS: ALL FUELS

	1990	1995	2000	2010	2020	
AIR EMISSIONS						
CARBON DIOXIDE						
NON-BIOGENIC	652.39	726.03	738.80	628.82	565.47	(BILLION KG)
BIOGENIC	11.59	9.82	10.06	8.84	7.52	(BILLION KG)
CARBON MONOXIDE						
TOTAL	2028.55	2299.00	2555.25	2660.52	2407.98	(MILLION KG)
HYDROCARBONS						
TOTAL	536.30	604.82	657.96	393.51	311.17	(MILLION KG)
METHANE	22.69	23.48	24.34	24.31	23.89	(MILLION KG)
NITROGEN OXIDES						
TOTAL	2478.34	2616.03	2725.64	2351.18	2054.01	(MILLION KG)
NITROUS OXIDE	88.85	81.83	70.32	49.82	49.28	(MILLION KG)
SULFUR OXIDES						
TOTAL	1399.46	1327.67	1164.36	892.70	697.45	(MILLION KG)
PARTICULATES						
TOTAL	872.82	866.19	840.98	656.17	489.17	(MILLION KG)

Alternative Path Air Pollutant Emissions

ENVIRONMENTAL EFFECTS BY YEAR: PHYSICAL UNITS
TRANSFORMATION: ALL PROCESSES: ALL FUELS

	1990	1995	2000	2010	2020	
AIR EMISSIONS						
CARBON DIOXIDE						
NON-BIOGENIC	438.46	476.17	496.32	466.89	451.46	(BILLION KG)
BIOGENIC	18.35	23.18	23.18	33.27	40.03	(BILLION KG)
CARBON MONOXIDE						
TOTAL	533.79	539.81	515.41	445.98	386.18	(MILLION KG)
HYDROCARBONS						
TOTAL	187.10	237.73	240.37	246.97	237.83	(MILLION KG)
METHANE	254.11	206.76	215.47	250.19	290.37	(MILLION KG)
NITROGEN OXIDES						
TOTAL	1704.87	1774.83	1750.68	1462.43	1176.61	(MILLION KG)
NITROUS OXIDE	20.07	20.24	24.80	29.18	32.89	(MILLION KG)
SULFUR OXIDES						
TOTAL	657.46	601.77	702.70	565.96	376.64	(MILLION KG)
PARTICULATES						
TOTAL	43.60	43.92	51.14	50.30	48.15	(MILLION KG)

ENVIRONMENTAL EFFECTS: DEMAND SOURCES BY YEAR
AIR EMISSIONS / CARBON DIOXIDE / NON-BIOGENIC
ALL FUELS
(BILLION KILOGRAMS)

	1990	1995	2000	2010	2020
INDUSTRY	308.66	302.63	277.40	244.46	219.48
TRANSPORT	223.51	269.38	298.12	225.27	187.03
AGRIC/FOR/FISH	15.72	18.32	18.72	18.65	18.65
HOUSEHOLD	68.19	74.74	76.48	72.37	64.10
COMMERCIAL	36.32	60.97	68.08	68.08	76.22
NON-ENERGY	0.00	0.00	0.00	0.00	0.00
TOTAL	652.39	726.03	738.80	628.82	565.47

D5. LEAP INPUT DATA SET (“DATA ECHO”): DEMAND

Business as Usual Path

AREA: NEA_JPN3 Page 1
SCENARIO: BASE CASE

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
INDUSTRY	1.000	1.000	1.000	1.000	1.000			
Water Treatment	66.139	67.188	68.162	69.772	68.675	THOUSAND	kcu.m/d cap.	DRIVERS AND ELASTICITIES: Population Growth
All End Uses	1.000	1.000	1.000	1.000	1.000			
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	47.025	70.640	70.640	70.640	70.640		GJ KEROSENE	
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			
-	470.251	507.540	507.540	507.540	507.540		GJ DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-	2.206	1.525	1.525	1.525	1.525	THOUSAND	GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	1.205	0.594	0.594	0.594	0.594		GJ HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	23.513	17.215	17.215	17.215	17.215		GJ HEAVY OIL C	
Mining & Quarry	1.202	0.917	1.131	1.023	1.023	THOUSAND	MY Min/Q GDP	DRIVERS AND ELASTICITIES: Mining/Quarrying GDP
All End Uses	1.000	1.000	1.000	1.000	1.000			
Blast Furn Gas --	1.000	1.000	1.000	1.000	1.000			
-	31.656	0.000	0.000	0.000	0.000		GJ BLAST FURN. GAS	
Electricity Use --	1.000	1.000	1.000	1.000	1.000			
-	7.626	9.223	9.223	9.223	9.223	THOUSAND	GJ ELECTRICITY	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	1.128	2.479	2.479	2.479	2.479	THOUSAND	GJ KEROSENE	
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			
-	7.329	11.132	11.132	11.132	11.132	THOUSAND	GJ DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-	1.625	8.784	8.784	8.784	8.784	THOUSAND	GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	165.819	0.000	0.000	0.000	0.000		GJ HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	2.222	4.305	4.305	4.305	4.305	THOUSAND	GJ HEAVY OIL C	
Construction	39.602	41.507	47.222	55.343	62.354	THOUSAND	MY Const GDP	DRIVERS AND ELASTICITIES: Construction GDP Gwth
All End Uses	1.000	1.000	1.000	1.000	1.000			
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	1.244	1.146	1.146	1.146	1.146	THOUSAND	GJ KEROSENE	
Electricity Use --	1.000	1.000	1.000	1.000	1.000			
-	128.980	107.395	107.395	107.395	107.395		GJ ELECTRICITY	
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			
-	3.448	3.794	3.794	3.794	3.794	THOUSAND	GJ DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-	714.880	602.363	602.363	602.363	602.363		GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	5.034	0.000	0.000	0.000	0.000		GJ HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	17.117	7.686	7.686	7.686	7.686		GJ HEAVY OIL C	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
Food Products	5.131	5.483	5.847	6.301	6.301	MILLION	te proc food	DRIVERS AND ELASTICITIES: Processed Food/Meat
All End Uses	1.000	1.000	1.000	1.000	1.000			
Munic. Gas Use --	1.000	1.000	1.000	1.000	1.000			
-	4.095	5.470	7.000	9.500	10.500		GJ MUNICIPAL GAS	
Electricity Use --	1.000	1.000	1.000	1.000	1.000			
-	14.566	16.004	17.000	18.000	18.000		GJ ELECTRICITY	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-	14.642	14.384	14.000	12.500	10.500		GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	342.000	21.000	0.000	0.000	0.000	10E-3	GJ HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	4.756	2.451	1.500	1.000	0.500		GJ HEAVY OIL C	
Cogen Heat Use --	10.000	10.000	10.000	10.000	10.000	10E-6		
-	0.000	0.000	0.000	0.000	0.000		GJ HEAT (COGEN)	
Textiles & Fiber	2.100	1.087	1.042	0.809	0.809	MILLION	th. m2 cloth	DRIVERS AND ELASTICITIES: Cloth Production
All End Uses	1.000	1.000	1.000	1.000	1.000			
Electricity Use --	1.000	1.000	1.000	1.000	1.000			
-	19.897	31.786	34.000	36.000	36.000		GJ ELECTRICITY	
Bituminous Coal --	1.000	1.000	1.000	1.000	1.000			
-	0.360	1.604	1.604	1.604	1.604		GJ COAL BITUMINOUS	
Petrol. Coke Use--	1.000	1.000	1.000	1.000	1.000			
-	512.000	807.000	807.000	807.000	807.000	10E-3	GJ PETROLEUM COKE	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	341.000	404.000	404.000	404.000	404.000	10E-3	GJ KEROSENE	
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			
-	19.000	0.000	0.000	0.000	0.000	10E-3	GJ DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-	13.975	31.410	23.000	21.000	19.000		GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	341.000	110.000	0.000	0.000	0.000	10E-3	GJ HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	25.348	46.492	33.000	26.300	18.300		GJ HEAVY OIL C	
LPG Use --	1.000	1.000	1.000	1.000	1.000			
-	2.582	5.798	7.000	9.000	9.000		GJ LPG/BOTTLED GAS	
Biomass Fuel Use--	1.000	1.000	1.000	1.000	1.000			
-	1.082	1.725	1.725	1.725	1.725		GJ Biomass/Wood/Wst	
Munic. Gas Use --	1.000	1.000	1.000	1.000	1.000			
-	1.866	5.009	7.000	12.500	20.000		GJ MUNICIPAL GAS	
Cogen Heat Use --	10.000	10.000	10.000	10.000	10.000	10E-6		
-	0.000	0.000	0.000	0.000	0.000		GJ HEAT (COGEN)	
Paper and Pulp	28.086	29.659	31.120	32.720	32.720	MILLION	te products	DRIVERS AND ELASTICITIES: Paper/Paperboard Prod
All End Uses	1.000	1.000	1.000	1.000	1.000			
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
-	2.840	2.750	2.750	2.750	2.750	10E-3	GJ	DIESEL/GAS OIL	
Electricity Use --	1.000	1.000	1.000	1.000	1.000				
-	4.217	4.102	4.102	4.102	4.102		GJ	ELECTRICITY	
Munic. Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	0.295	1.295	2.000	2.500	3.500		GJ	MUNICIPAL GAS	
Bituminous Coal --	1.000	1.000	1.000	1.000	1.000				
-	1.566	1.894	1.763	1.500	1.200		GJ	COAL BITUMINOUS	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000				
-	44.000	14.390	14.390	14.390	14.390	10E-3	GJ	KEROSENE	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000				
-	369.000	624.000	559.200	429.600	300.000	10E-3	GJ	HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000				
-	7.100	0.000	0.000	0.000	0.000	10E-3	GJ	HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000				
-	3.556	3.172	2.500	2.200	1.500		GJ	HEAVY OIL C	
Petroleum Coke --	1.000	1.000	1.000	1.000	1.000				
-	213.000	182.000	182.000	182.000	182.000	10E-3	GJ	PETROLEUM COKE	
LPG Use --	1.000	1.000	1.000	1.000	1.000				
-	96.500	260.800	260.800	260.800	260.800	10E-3	GJ	LPG/BOTTLED GAS	
Biomass Fuel Use--	1.000	1.000	1.000	1.000	1.000				
-	3.847	3.163	3.163	3.163	3.163		GJ	Biomass/Wood/Wst	
Cogen Heat Use --	10.000	10.000	10.000	10.000	10.000	10E-6			
-	0.000	0.000	0.000	0.000	0.000		GJ	HEAT (COGEN)	
Chemicals	19.816	20.907	21.947	23.070	23.070	MILLION	te 7 maj prd		DRIVERS AND ELASTICITIES: Chemical Production
All End Uses	1.000	1.000	1.000	1.000	1.000				
Electricity Use --	1.000	1.000	1.000	1.000	1.000				
-	10.511	10.612	10.612	10.612	10.612		GJ	ELECTRICITY	
Bituminous Coal --	1.000	1.000	1.000	1.000	1.000				
-	1.821	0.538	0.400	0.200	0.100		GJ	COAL BITUMINOUS	
Coking Coal --	1.000	1.000	1.000	1.000	1.000				
-	106.000	4.000	4.000	4.000	4.000	10E-3	GJ	COAL, COKING	
Anthracite Coal --	1.000	1.000	1.000	1.000	1.000				
-	144.000	391.000	391.000	391.000	391.000	10E-3	GJ	COAL ANTHRACITE	
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000				
-	4.000	3.900	3.900	3.900	3.900	10E-3	GJ	DIESEL/GAS OIL	
Coke Use --	1.000	1.000	1.000	1.000	1.000				
-	201.000	174.000	174.000	174.000	174.000	10E-3	GJ	COKE (from Coal)	
Coke Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	276.000	35.000	35.000	35.000	35.000	10E-3	GJ	Coke Oven Gas	
Blast Furn. Gas --	1.000	1.000	1.000	1.000	1.000				
-	61.500	61.900	61.900	61.900	61.900	10E-3	GJ	BLAST FURN. GAS	
Crude Oil Use --	1.000	1.000	1.000	1.000	1.000				
-	36.200	1.900	0.000	0.000	0.000	10E-3	GJ	CRUDE OIL	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
	ACTIVITY LEVELS/ENERGY INTENSITY								
Naptha Use --	1.000	1.000	1.000	1.000	1.000				
-	51.428	63.628	63.628	63.628	63.628		GJ	NAPTHA	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000				
-	553.000	572.000	572.000	572.000	572.000	10E-3	GJ	KEROSENE	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000				
-	2.843	2.067	1.500	0.800	0.500		GJ	HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000				
-	42.300	11.400	0.000	0.000	0.000	10E-3	GJ	HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000				
-	2.314	2.098	1.500	0.800	0.500		GJ	HEAVY OIL C	
Petroleum Coke --	1.000	1.000	1.000	1.000	1.000				
-	945.000	936.000	936.000	936.000	936.000	10E-3	GJ	PETROLEUM COKE	
LPG Use --	1.000	1.000	1.000	1.000	1.000				
-	5.475	4.471	4.471	4.471	4.471		GJ	LPG/BOTTLED GAS	
Natural Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	987.000	723.000	723.000	723.000	723.000	10E-3	GJ	NATURAL GAS	
Munic. Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	1.142	1.715	2.700	4.300	5.500		GJ	MUNICIPAL GAS	
Biomass Fuel Use--	1.000	1.000	1.000	1.000	1.000				
-	60.400	55.300	55.300	55.300	55.300	10E-3	GJ	Biomass/Wood/Wst	
Cogen Heat Use --	10.000	10.000	10.000	10.000	10.000	10E-6			
-	0.000	0.000	0.000	0.000	0.000		GJ	HEAT (COGEN)	
Ceramics	84.445	90.474	86.294	92.989	97.744	MILLION	te cement		DRIVERS AND ELASTICITIES: Ceramics Production
All End Uses	1.000	1.000	1.000	1.000	1.000				
Electricity Use --	1.000	1.000	1.000	1.000	1.000				
-	0.979	0.934	1.300	1.300	1.300		GJ	ELECTRICITY	
Bituminous Coal --	1.000	1.000	1.000	1.000	1.000				
-	2.536	2.353	2.235	2.000	1.800		GJ	COAL BITUMINOUS	
Anthracite Coal --	1.000	1.000	1.000	1.000	1.000				
-	211.000	377.000	377.000	377.000	377.000	10E-3	GJ	COAL ANTHRACITE	
Coke Use --	1.000	1.000	1.000	1.000	1.000				
-	118.000	54.000	54.000	54.000	54.000	10E-3	GJ	COKE (from Coal)	
Coke Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	79.300	65.200	65.200	65.200	65.200	10E-3	GJ	Coke Oven Gas	
Blast Furn. Gas --	1.000	1.000	1.000	1.000	1.000				
-	19.400	18.900	18.900	18.900	18.900	10E-3	GJ	BLAST FURN. GAS	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000				
-	51.500	42.300	42.300	42.300	42.300	10E-3	GJ	KEROSENE	
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000				
-	7.600	4.850	4.850	4.850	4.850	10E-3	GJ	DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000				
-	478.000	467.000	467.000	467.000	467.000	10E-3	GJ	HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000				

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
-	12.300	1.320	0.000	0.000	0.000	10E-3	GJ HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	815.000	749.000	800.000	750.000	650.000	10E-3	GJ HEAVY OIL C	
Petroleum Coke --	1.000	1.000	1.000	1.000	1.000			
-	138.000	295.000	295.000	295.000	295.000	10E-3	GJ PETROLEUM COKE	
LPG Use --	1.000	1.000	1.000	1.000	1.000			
-	113.000	97.000	97.000	97.000	97.000	10E-3	GJ LPG/BOTTLED GAS	
Munic. Gas Use --	1.000	1.000	1.000	1.000	1.000			
-	115.000	142.000	200.000	400.000	800.000	10E-3	GJ MUNICIPAL GAS	
Steel	109.548	100.911	89.622	81.052	77.089	MILLION	te steel ing	DRIVERS AND ELASTICITIES: Steel Production
All End-Uses	1.000	1.000	1.000	1.000	1.000			
Electricity Use --	1.000	1.000	1.000	1.000	1.000			
-	2.673	2.861	2.900	2.900	2.900		GJ ELECTRICITY	
Bituminous Coal --	1.000	1.000	1.000	1.000	1.000			
-	39.300	65.200	65.200	65.200	65.200	10E-3	GJ COAL BITUMINOUS	
Coking Coal Use --	1.000	1.000	1.000	1.000	1.000			
-	1.819	3.074	2.000	1.500	1.000		GJ COAL, COKING	
Coke Use --	1.000	1.000	1.000	1.000	1.000			
-	6.588	5.617	5.411	5.000	4.000		GJ COKE (from Coal)	
Coke Gas Use --	1.000	1.000	1.000	1.000	1.000			
-	1.304	1.276	1.276	1.276	1.276		GJ Coke Oven Gas	
Blast Furn. Gas --	1.000	1.000	1.000	1.000	1.000			
-	1.404	1.451	1.361	1.180	1.000		GJ BLAST FURN. GAS	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	125.000	111.000	111.000	111.000	111.000	10E-3	GJ KEROSENE	
Diesel Use --	1.000	1.000	1.000	1.000	1.000			
-	10.200	11.060	11.060	11.060	11.060	10E-3	GJ DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-	273.000	230.000	204.000	152.000	100.000	10E-3	GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	17.100	2.000	0.000	0.000	0.000	10E-3	GJ HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	471.000	382.000	300.000	200.000	100.000	10E-3	GJ HEAVY OIL C	
Petroleum Coke --	1.000	1.000	1.000	1.000	1.000			
-	17.500	127.200	127.200	127.200	127.200	10E-3	GJ PETROLEUM COKE	
LPG Use --	1.000	1.000	1.000	1.000	1.000			
-	282.000	274.000	274.000	274.000	274.000	10E-3	GJ LPG/BOTTLED GAS	
Munic. Gas Use --	1.000	1.000	1.000	1.000	1.000			
-	0.275	0.613	1.000	2.000	4.000		GJ MUNICIPAL GAS	
LNG Use --	1.000	1.000	1.000	1.000	1.000			
-	13.900	0.000	0.000	0.000	0.000	10E-3	GJ LNG	
Non-ferr. Metals	116.044	118.066	134.775	170.846	206.227	THOUSAND	MY Manu. GDP	DRIVERS AND ELASTICITIES: Manufacturing GDP
All End-Uses	1.000	1.000	1.000	1.000	1.000			

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
	ACTIVITY LEVELS/ENERGY INTENSITY								
Electricity Use --	1.000	1.000	1.000	1.000	1.000				
-	546.601	563.146	563.146	563.146	563.146		GJ	ELECTRICITY	
Bituminous Coal --	1.000	1.000	1.000	1.000	1.000				
-	34.361	41.204	39.136	35.000	25.000		GJ	COAL BITUMINOUS	
Coke Use --	1.000	1.000	1.000	1.000	1.000				
-	69.409	64.508	64.672	65.000	45.000		GJ	COKE (from Coal)	
Blast Furn. Gas --	1.000	1.000	1.000	1.000	1.000				
-	2.624	0.967	0.967	0.967	0.967		GJ	BLAST FURN. GAS	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000				
-	63.911	60.118	60.118	60.118	60.118		GJ	KEROSENE	
Diesel Use --	1.000	1.000	1.000	1.000	1.000				
-	1.374	1.351	1.351	1.351	1.351		GJ	DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000				
-	274.546	220.206	210.000	180.000	120.000		GJ	HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000				
-	687.000	0.000	0.000	0.000	0.000	10E-3	GJ	HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000				
-	202.731	138.810	110.000	60.000	40.000		GJ	HEAVY OIL C	
Petroleum Coke --	1.000	1.000	1.000	1.000	1.000				
-	17.180	4.728	4.728	4.728	4.728		GJ	PETROLEUM COKE	
LPG Use --	1.000	1.000	1.000	1.000	1.000				
-	82.123	85.448	85.448	85.448	85.448		GJ	LPG/BOTTLED GAS	
Munic. Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	71.830	86.077	120.000	200.000	300.000		GJ	MUNICIPAL GAS	
Biomass Fuel Use--	1.000	1.000	1.000	1.000	1.000				
-	17.524	0.000	0.000	0.000	0.000		GJ	Biomass/Wood/Wst	
Metal Finishing	116.044	118.066	134.775	170.846	206.227	THOUSAND	MY	Manu. GDP	DRIVERS AND ELASTICITIES: Manufacturing GDP
All End-Uses	1.000	1.000	1.000	1.000	1.000				
Electricity Use --	1.000	1.000	1.000	1.000	1.000				
-	2.108	2.294	2.294	2.294	2.294	THOUSAND	GJ	ELECTRICITY	
Bituminous Coal --	1.000	1.000	1.000	1.000	1.000				
-	43.982	54.376	54.376	54.376	54.376		GJ	COAL BITUMINOUS	
Coke Use --	1.000	1.000	1.000	1.000	1.000				
-	21.647	9.794	9.794	9.794	9.794		GJ	COKE (from Coal)	
Coke Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	33.783	34.496	34.496	34.496	34.496		GJ	Coke Oven Gas	
Blast Furn. Gas --	1.000	1.000	1.000	1.000	1.000				
-	53.791	0.000	0.000	0.000	0.000		GJ	BLAST FURN. GAS	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000				
-	146.378	126.989	126.326	125.000	100.000		GJ	KEROSENE	
Diesel Use --	1.000	1.000	1.000	1.000	1.000				
-	25.770	22.629	22.629	22.629	22.629		GJ	DIESEL/GAS OIL	
LPG Use --	1.000	1.000	1.000	1.000	1.000				

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
-	179.022	174.611	174.611	174.611	174.611		GJ	LPG/BOTTLED GAS	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000				
-	338.115	211.087	200.000	180.000	150.000		GJ	HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000				
-	6.528	1.689	0.000	0.000	0.000		GJ	HEAVY OIL B	
Munic. Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	408.024	491.963	500.000	520.000	570.000		GJ	MUNICIPAL GAS	
Other Manufactur	116.044	118.066	134.775	170.846	206.227	THOUSAND	MY	Manu. GDP	DRIVERS AND ELASTICITIES: Manufacturing GDP
All End-Uses	1.000	1.000	1.000	1.000	1.000				
Electricity Use --	1.000	1.000	1.000	1.000	1.000				
-	1.868	1.991	1.991	1.991	1.991	THOUSAND	GJ	ELECTRICITY	
Bituminous Coal --	1.000	1.000	1.000	1.000	1.000				
-	88.652	2.026	2.026	2.026	2.026		GJ	COAL BITUMINOUS	
Coking Coal Use --	1.000	1.000	1.000	1.000	1.000				
-	343.000	0.000	0.000	0.000	0.000	10E-3	GJ	COAL, COKING	
Coke Use --	1.000	1.000	1.000	1.000	1.000				
-	113.048	134.082	134.082	134.082	134.082		GJ	COKE (from Coal)	
Gasoline Use --	1.000	1.000	1.000	1.000	1.000				
-	33.674	45.257	45.257	45.257	45.257		GJ	GASOLINE	
Naptha Use --	1.000	1.000	1.000	1.000	1.000				
-	52.229	43.231	43.231	43.231	43.231		GJ	NAPTHA	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000				
-	1.133	0.821	0.821	0.821	0.821	THOUSAND	GJ	KEROSENE	
Diesel Use --	1.000	1.000	1.000	1.000	1.000				
-	670.731	730.867	730.867	730.867	730.867		GJ	DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000				
-	490.335	523.496	523.496	523.496	523.496		GJ	HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000				
-	5.154	0.000	0.000	0.000	0.000		GJ	HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000				
-	247.401	25.668	25.668	25.668	25.668		GJ	HEAVY OIL C	
Petroleum Coke --	1.000	1.000	1.000	1.000	1.000				
-	383.471	336.726	336.726	336.726	336.726		GJ	PETROLEUM COKE	
LPG Use --	1.000	1.000	1.000	1.000	1.000				
-	1.136	1.544	1.544	1.544	1.544	THOUSAND	GJ	LPG/BOTTLED GAS	
Natural Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	20.007	15.475	15.475	15.475	15.475		GJ	NATURAL GAS	
Munic. Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	0.000	93.492	93.492	93.492	93.492		GJ	MUNICIPAL GAS	
Cogen Heat Use --	10.000	10.000	10.000	10.000	10.000	10E-6			
-	0.000	0.000	0.000	0.000	0.000		GJ	HEAT (COGEN)	
TRANSPORT	1.000	1.000	1.000	1.000	1.000				
Freight Transp.	546.790	559.000	580.280	619.120	650.782	MILLION	th.	tonne-km	DRIVERS AND ELASTICITIES: Freight Transport

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
Air Freight	1.460	1.650	1.820	2.120	2.460	10E-3	% of te-km	
Jets, Std Effic.--	1.000	1.000	1.000	1.000	1.000		Fraction	
-	20.661	22.742	22.742	22.742	22.742		GJ JET FUEL	
Commercial Truck	355.200	399.100	429.930	463.280	477.370	10E-3	% of te-km	
Gasoline Fueled --	5.490	5.730	6.330	6.990	6.990	10E-3	Fraction	
-	8.721	9.917	9.917	9.917	9.917		GJ GASOLINE	
Hybr. Gas.--Mini--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	8.264	8.264	8.264	6.317	5.240		GJ GASOLINE	
Std. Diesel --	994.510	994.270	993.670	993.010	993.010	10E-3	Fraction	
-	2.435	2.717	2.717	2.717	2.717		GJ DIESEL/GAS OIL	
Hybrid CNG --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	2.264	2.264	2.264	1.731	1.436		GJ MUNICIPAL GAS	
Hybrid Diesel --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	0.000	1.132	2.264	1.731	1.436		GJ DIESEL/GAS OIL	
LPG-Fueled --	0.000	3.000	3.000	3.000	3.000	10E-6	Fraction	
-	8.721	9.917	9.917	9.917	9.917		GJ LPG/BOTTLED GAS	
Rail Freight	49.700	44.900	42.700	40.610	40.610	10E-3	% of te-km	
Diesel Trains --	84.400	69.900	55.830	36.770	36.770	10E-3	% of Freight	
-	412.000	430.000	430.000	430.000	430.000	10E-3	GJ DIESEL/GAS OIL	
Electric Trains --	915.600	930.100	944.170	963.230	963.230	10E-3	% of Freight	
-	181.000	189.000	189.000	189.000	189.000	10E-3	GJ ELECTRICITY	
Coastal Shipping	447.200	426.300	410.600	390.520	378.970	10E-3	% of te-km	
Diesel Fueled --	174.400	160.900	161.940	162.940	162.940	10E-3	Fraction	
-	714.000	752.000	752.000	752.000	752.000	10E-3	GJ DIESEL/GAS OIL	
Hvy Oil A-Fueled--	403.400	406.890	406.890	406.890	406.890	10E-3	Fraction	
-	714.000	752.000	752.000	752.000	752.000	10E-3	GJ HEAVY OIL A	
Hvy Oil B-Fueled--	54.600	4.200	1.000	0.000	0.000	10E-3	Fraction	
-	714.000	752.000	752.000	752.000	752.000	10E-3	GJ HEAVY OIL B	
Hvy Oil C-Fueled--	367.600	428.000	430.160	430.160	430.160	10E-3	Fraction	
-	714.000	752.000	752.000	752.000	752.000	10E-3	GJ HEAVY OIL C	
Private Road Veh	72.430	79.300	85.429	94.366	99.192	MILLION	total vehic.	
Gas./CNG/H2 Auto	439.800	502.600	521.900	533.530	532.290	10E-3	% of Veh.	
Std. Gas Autos --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	33.075	33.668	33.668	33.668	33.668		GJ GASOLINE	
Gasol. Hybrids --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	10.945	10.945	10.945	8.991	7.543		GJ GASOLINE	
Hypercar--Gasol.--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	7.028	6.616	6.205	5.382	4.559		GJ GASOLINE	
Hypercar--CNG --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	7.028	6.616	6.205	5.382	4.559		GJ MUNICIPAL GAS	
Hypercar--Hydrog--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	3.647	3.647	3.647	3.647	3.647		GJ HYDROGEN	
Diesel Autos	41.200	61.900	79.050	106.180	129.430	10E-3	% of Veh.	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
Std Diesel Autos--	1.000	1.000	1.000	1.000	1.000		Fraction	
-	40.402	48.405	54.766	54.766	54.766		GJ DIESEL/GAS OIL	
Diesel Hybr. Car--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	23.175	23.175	23.175	23.175	23.175		GJ DIESEL/GAS OIL	
LPG Autos	810.000	760.000	760.000	760.000	760.000	10E-6	% of Veh.	
Std. LPG Autos --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	33.075	33.668	33.668	33.668	33.668		GJ LPG/BOTTLED GAS	
High Eff. LPG --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	0.000	0.000	0.000	0.000	0.000		GJ LPG/BOTTLED GAS	
Motorcycles	37.800	38.280	38.280	38.280	38.280	10E-3	% of Veh.	
Std Motorcycles --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	6.360	6.360	6.360	6.234	6.110		GJ GASOLINE	DRIVERS AND ELASTICITIES: Trans. E. Int, Base
Bicyc. w/ Motors	200.900	154.200	132.400	108.180	93.000	10E-3	% of Veh.	
Std Mopeds --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	1.987	1.987	1.987	1.987	1.987		GJ GASOLINE	
Pr. Gas+ Trucks	209.400	170.900	154.450	139.680	132.850	10E-3	% of Veh.	
Std Gas Trucks --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	24.962	26.249	27.588	28.999	28.999		GJ GASOLINE	
Hybrid Gasol Tr.--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	12.506	12.506	12.506	10.405	9.038		GJ GASOLINE	
'Mini' Hybrids --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	12.506	12.506	12.506	10.405	9.038		GJ GASOLINE	
Pr. Dies+ Trucks	69.800	71.200	72.990	72.990	72.990	10E-3	% of Veh.	
Std Diesel Truck--	1.000	1.000	1.000	1.000	1.000		Fraction	
-	94.518	94.020	93.551	92.620	92.620		GJ DIESEL/GAS OIL	
Diesel Hybrids --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	77.642	77.642	77.642	59.344	49.232		GJ DIESEL/GAS OIL	
CNG Hybrid Truck--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	77.642	77.642	77.642	59.344	49.232		GJ MUNICIPAL GAS	
Priv. LPG Trucks	220.000	190.000	190.000	190.000	190.000	10E-6	% of Veh.	
Std LPG Trucks --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	24.962	26.249	27.588	28.999	28.999		GJ LPG/BOTTLED GAS	
High-Eff LPG --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	0.000	0.000	0.000	0.000	0.000		GJ LPG/BOTTLED GAS	
Public Passenger	1.223	1.414	1.545	1.836	1.996	BILLION	th. pass-km	DRIVERS AND ELASTICITIES: Population Growth, Pass-km pe
Commercial Autos	12.780	9.750	8.370	7.200	7.200	10E-3	Fraction	
LPG Taxis --	936.060	932.130	932.130	932.130	932.130	10E-3	Fraction	
-	5.068	5.820	5.820	5.648	5.481		GJ LPG/BOTTLED GAS	
Hybrid LPG Taxis--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	2.798	2.798	2.798	2.259	1.904		GJ LPG/BOTTLED GAS	
Diesel Taxis --	48.540	51.510	51.510	51.510	51.510	10E-3	Fraction	
-	3.671	3.138	3.138	3.045	2.955		GJ DIESEL/GAS OIL	
Gasoline Taxis --	15.410	16.350	16.350	16.350	16.350	10E-3	Fraction	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
-	4.689	6.715	6.715	6.516	6.323		GJ GASOLINE	
Commercial Buses	63.220	52.250	44.870	38.580	38.580	10E-3	Fraction	
Gasoline Buses --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	0.000	0.000	0.000	0.000	0.000		GJ GASOLINE	
Diesel Buses --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	687.000	746.000	784.000	784.000	784.000	10E-3	GJ DIESEL/GAS OIL	
Dies. Hybrid Bus--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	653.000	653.000	653.000	499.000	414.000	10E-3	GJ DIESEL/GAS OIL	
CNG Hybrid Bus --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	653.000	653.000	653.000	499.000	414.000	10E-3	GJ MUNICIPAL GAS	
Private Buses	27.000	16.520	12.790	10.990	10.990	10E-3	Fraction	
Diesel Buses --	949.670	979.550	982.500	985.000	985.000	10E-3	Fraction	
-	462.000	601.000	664.000	664.000	664.000	10E-3	GJ DIESEL/GAS OIL	
Dies. Hybrid Bus--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	553.000	553.000	553.000	423.000	351.000	10E-3	GJ DIESEL/GAS OIL	
CNG Hyb repl Die--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	553.000	553.000	553.000	423.000	351.000	10E-3	GJ DIESEL/GAS OIL	
Gasoline Buses --	50.330	20.450	17.500	15.000	15.000	10E-3	Fraction	
-	356.000	426.000	471.000	471.000	471.000	10E-3	GJ GASOLINE	
Hybrid Gas. Bus --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	0.000	0.000	0.000	0.000	0.000		GJ GASOLINE	
CNG Hyb repl Gas--	0.000	0.000	0.000	0.000	0.000		Fraction	
-	392.000	392.000	392.000	300.000	249.000	10E-3	GJ MUNICIPAL GAS	
Passenger Rail	316.740	282.820	255.650	231.200	231.200	10E-3	Fraction	
Electric Trains --	915.570	930.140	944.170	963.230	963.230	10E-3	Fraction	
-	163.000	170.000	170.000	170.000	170.000	10E-3	GJ ELECTRICITY	
Diesel Trains --	84.430	69.860	55.830	36.770	36.770	10E-3	Fraction	
-	370.000	385.000	385.000	385.000	385.000	10E-3	GJ DIESEL/GAS OIL	
Air Passenger	42.200	45.960	49.510	54.690	58.940	10E-3	Fraction	
Std Jet, Domest.--	1.000	1.000	1.000	1.000	1.000		Fraction	
-	2.194	2.271	2.271	2.271	2.271		GJ JET FUEL	
Water Passenger	5.130	3.910	3.360	2.740	2.480	10E-3	Fraction	
Diesel-Fueled --	964.070	962.730	962.730	962.730	962.730	10E-3	Fraction	
-	1.061	1.162	1.282	1.417	1.417		GJ DIESEL/GAS OIL	
Hvy Oil A Fueled--	17.960	18.630	18.630	18.630	18.630	10E-3	Fraction	
-	1.061	1.162	1.282	1.417	1.417		GJ HEAVY OIL A	
Hvy Oil C Fueled--	17.960	18.630	18.630	18.630	18.630	10E-3	Fraction	
-	1.061	1.162	1.282	1.417	1.417		GJ HEAVY OIL C	
Intl. Bunkers	1.000	1.000	1.000	1.000	1.000			
Marine Bunkers	1.000	1.022	1.061	1.132	1.190			DRIVERS AND ELASTICITIES: Freight Transport
Hvy Oil C-Fueled--	1.000	1.000	1.000	1.000	1.000		Fraction	
-	201.400	247.900	247.900	247.900	247.900	MILLION	GJ HEAVY OIL C	
Aviation Bunkers	0.723	1.000	1.159	1.413	1.640			DRIVERS AND ELASTICITIES: Internat. Air Travel

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
Jet Fuels Bunk. --	1.000	1.000	1.000	1.000	1.000			
-	24.426	12.860	12.860	12.860	12.860	MILLION	GJ JET FUEL	
AGRIC/FOR/FISH	10.803	9.668	9.668	9.668	9.668	MILLION	MYen Output	DRIVERS AND ELASTICITIES: Agric/Fish/For Output
All Subsectors	1.000	1.000	1.000	1.000	1.000			
All End Uses	1.000	1.000	1.000	1.000	1.000			
Electricity Use --	1.000	1.000	1.000	1.000	1.000			
-	776.000	972.000	997.000	997.000	997.000	10E-3	GJ ELECTRICITY	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	8.075	10.033	10.287	10.287	10.287		GJ KEROSENE	
Diesel Use --	1.000	1.000	1.000	1.000	1.000			
-	5.465	7.269	7.453	7.453	7.453		GJ DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-	6.065	8.604	8.821	8.821	8.821		GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	56.870	0.000	0.000	0.000	0.000	10E-3	GJ HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	387.000	178.000	100.000	0.000	0.000	10E-3	GJ HEAVY OIL C	
HOUSEHOLD	38.970	41.976	44.752	48.158	48.300	MILLION	Occ. Dwell.	DRIVERS AND ELASTICITIES: Population Growth, Household
All Subsectors	1.000	1.000	1.000	1.000	1.000			
Space Heating	1.000	1.000	1.000	1.000	1.000			
Coal Space Heat --	1.360	0.260	0.150	0.000	0.000	10E-3	% of Fuel	
-	12.155	12.958	12.958	12.958	12.958		GJ HARDCOAL BRIQUET	DRIVERS AND ELASTICITIES: Non-Elec Res Ht Inten
Kerosene Use --	717.500	728.910	720.800	702.670	690.940	10E-3	% of Fuel	
-	12.155	12.958	12.958	12.958	12.958		GJ KEROSENE	DRIVERS AND ELASTICITIES: Non-Elec Res Ht Inten
LPG Use --	82.680	72.000	70.220	66.780	66.780	10E-3	% of Fuel	
-	12.155	12.958	12.958	12.958	12.958		GJ LPG/BOTTLED GAS	DRIVERS AND ELASTICITIES: Non-Elec Res Ht Inten
Municipal Gas --	195.690	197.500	207.570	119.290	241.020	10E-3	% of Fuel	
-	12.155	12.958	12.958	12.958	12.958		GJ MUNICIPAL GAS	DRIVERS AND ELASTICITIES: Non-Elec Res Ht Inten
Biomass Fuel Use--	1.700	0.330	0.260	0.260	0.260	10E-3	% of Fuel	
-	12.155	12.958	12.958	12.958	12.958		GJ Biomass/Wood/Wst	DRIVERS AND ELASTICITIES: Non-Elec Res Ht Inten
District Heat --	1.060	1.000	1.000	1.000	1.000	10E-3	% of Fuel	
-	12.155	12.958	12.958	12.958	12.958		GJ HEAT (DISTRICT)	DRIVERS AND ELASTICITIES: Non-Elec Res Ht Inten
Elect Hot Air Ht--	459.000	520.000	520.000	494.600	470.400	10E-3	Units/Dwell.	
-	273.000	301.000	317.000	333.000	343.000	10E-3	GJ ELECTRICITY	
Elect. Kotatsu --	1.116	1.087	1.087	1.087	1.087		Units/Dwell.	
-	564.000	572.000	572.000	572.000	572.000	10E-3	GJ ELECTRICITY	
Elect. Heat Pump--	0.597	0.917	0.963	1.013	1.033		Units/Dwell.	
-	1.659	1.609	1.570	1.516	1.486		GJ ELECTRICITY	
High Eff. Ht Pmp--	0.000	0.000	0.000	0.000	0.000		Units/Dwell.	
-	0.000	1.226	1.226	0.979	0.886		GJ ELECTRICITY	
Elect. Blanket --	960.000	924.000	924.000	924.000	924.000	10E-3	Units/Dwell.	
-	164.000	164.000	164.000	164.000	164.000	10E-3	GJ ELECTRICITY	
Elect. Carpet --	450.000	631.000	663.200	697.100	718.300	10E-3	Units/Dwell	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
-	756.000	837.000	879.000	924.000	952.000	10E-3	GJ ELECTRICITY	
Water Heating	1.000	1.000	1.000	1.000	1.000			
LPG Water Heat --	290.100	299.000	291.600	277.300	277.300	10E-3	% Dwellings	
-	14.890	14.170	13.820	13.478	13.344		GJ LPG/BOTTLED GAS	
Condens. LPG WH --	0.000	0.000	0.000	0.000	0.000		% Dwellings	
-	10.365	10.365	10.365	10.109	10.008		GJ LPG/BOTTLED GAS	
Kerosene WH --	210.800	218.500	209.900	189.600	170.900	10E-3	% Dwellings	
-	14.890	14.170	13.820	13.478	13.344		GJ KEROSENE	
City Gas WH --	320.700	314.200	330.200	364.800	383.400	10E-3	% Dwellings	
-	14.210	13.530	13.192	12.866	12.738		GJ MUNICIPAL GAS	
Condens. Gas WH --	0.000	0.000	0.000	0.000	0.000		% Dwellings	
-	9.894	9.894	9.894	9.649	9.553		GJ MUNICIPAL GAS	
Coal Water Heat --	3.200	1.800	1.400	0.800	0.800	10E-3	% Dwellings	
-	17.870	17.143	17.143	17.143	17.143		GJ HARDCOAL BRIQUET	
Biomass Water Ht--	3.900	2.900	2.900	2.900	2.900	10E-3	% Dwellings	
-	17.870	17.143	17.143	17.143	17.143		GJ Biomass/Wood/Wst	
Distr. Heat WH --	1.100	1.100	1.100	1.100	1.100	10E-3	% Dwellings	
-	18.000	17.850	17.412	16.982	16.813		GJ HEAT (DISTRICT)	
Elec. Resist. WH--	69.400	59.500	59.500	59.500	59.500	10E-3	% Dwellings	
-	18.000	17.850	17.412	16.982	16.813		GJ ELECTRICITY	
Elect Ht Pmp WH --	0.000	0.000	0.000	0.000	0.000		% Dwellings	
-	5.804	5.804	5.804	5.661	5.604		GJ ELECTRICITY	
Solar Water Heat--	118.500	108.800	108.800	108.800	108.800	10E-3	% Dwellings	
-	10.187	8.910	8.910	8.910	8.910		GJ SOLAR	
Cooking	1.000	1.000	1.000	1.000	1.000			
LPG Stoves --	588.600	523.400	502.400	456.700	431.400	10E-3	% Dwellings	
-	3.442	3.252	3.252	3.252	3.252		GJ LPG/BOTTLED GAS	
Kerosene Stoves --	36.900	42.200	42.200	42.200	42.200	10E-3	% Dwellings	
-	3.442	3.252	3.252	3.252	3.252		GJ KEROSENE	
City Gas Stoves --	363.900	425.900	447.600	494.400	519.700	10E-3	% Dwellings	
-	3.285	3.285	3.285	3.285	3.285		GJ MUNICIPAL GAS	
Coal Stove --	4.800	3.400	2.600	1.600	1.600	10E-3	% Dwellings	
-	3.442	3.442	3.442	3.442	3.442		GJ HARDCOAL BRIQUET	
Biomass Cooking --	5.900	5.200	5.200	5.200	5.200	10E-3	% Dwellings	
-	3.442	3.442	3.442	3.442	3.442		GJ Biomass/Wood/Wst	
El. Rice Cooker --	738.000	780.700	808.500	824.800	824.800	10E-3	% Dwellings	
-	685.000	713.000	713.000	713.000	713.000	10E-3	GJ ELECTRICITY	
El. Microwave Ov--	697.000	872.000	920.000	950.000	965.000	10E-3	% Dwellings	
-	364.000	363.000	363.000	363.000	363.000	10E-3	GJ ELECTRICITY	
Oth. Elec. Appl.	1.000	1.000	1.000	1.000	1.000			
Heat Pump Cooler--	0.597	0.917	1.012	1.118	1.175		Units/Dwell.	
-	540.000	439.000	439.000	439.000	439.000	10E-3	GJ ELECTRICITY	
High Eff HP Cool--	0.000	0.000	0.000	0.000	0.000		Units/Dwell.	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
	0.000	348.000	348.000	309.000	280.000	10E-3	GJ ELECTRICITY	
Room Cooler	633.000	633.000	633.000	633.000	633.000	10E-3	Units/Dwell.	
	1.194	1.282	1.282	1.282	1.282		GJ ELECTRICITY	
High-Eff Rm Cool	0.000	0.000	0.000	0.000	0.000		Units/Dwell.	
	0.000	993.000	993.000	718.000	609.000	10E-3	GJ ELECTRICITY	
Fan	1.544	1.544	1.544	1.544	1.544		Units/Dwell.	
	51.000	58.000	61.000	64.000	64.000	10E-3	GJ ELECTRICITY	
Lighting	1.000	1.000	1.000	1.000	1.000			
	2.202	2.436	2.560	2.691	2.691		GJ ELECTRICITY	
Refrig w/ freez.	1.099	1.099	1.099	1.099	1.099		Units/Dwell.	
	2.573	2.500	2.438	2.366	2.366		GJ ELECTRICITY	
Clothes Washer	987.000	987.000	987.000	987.000	987.000	10E-3	Units/Dwell.	
	158.000	168.000	176.000	185.000	185.000	10E-3	GJ ELECTRICITY	
Clothes Dryer	163.000	196.000	200.900	211.200	211.200	10E-3	Units/Dwell.	
	1.651	1.779	1.870	1.965	1.965		GJ ELECTRICITY	
Color TV, 1st	985.000	986.000	986.000	986.000	986.000	10E-3	Units/Dwell.	
	1.111	1.142	1.171	1.206	1.206		GJ ELECTRICITY	
LCD TV, 1st	0.000	0.000	0.000	0.000	0.000		Units/Dwell.	
	0.000	0.000	0.000	0.000	0.000		GJ ELECTRICITY	
Color TV, 2nd	741.000	825.000	867.400	911.700	911.700	10E-3	Units/Dwell.	
	299.000	348.000	375.000	395.000	395.000	10E-3	GJ ELECTRICITY	
LCD TV, 2nd	0.000	0.000	0.000	0.000	0.000		Units/Dwell.	
	0.000	0.000	0.000	0.000	0.000		GJ ELECTRICITY	
Vacuum	981.000	982.000	982.000	982.000	982.000	10E-3	Units/Dwell.	
	399.000	440.000	463.000	486.000	486.000	10E-3	GJ ELECTRICITY	
Other Devices	1.000	1.000	1.000	1.000	1.000			
	4.994	6.602	7.654	8.883	9.337		GJ ELECTRICITY	
COMMERCIAL	1.285	1.493	1.714	2.131	2.597	MILLION	k.sq.m. Flr	DRIVERS AND ELASTICITIES: Comm'l/Services GDP, Bldg Floor
All Subsectors	1.000	1.000	1.000	1.000	1.000			
Non-Elect. Fuels	1.000	1.000	1.000	1.000	1.000			
Kerosene Use	1.000	1.000	1.000	1.000	1.000			
	121.830	136.460	136.460	136.460	136.460		GJ KEROSENE	
Coke Use	1.000	1.000	1.000	1.000	1.000			
	21.750	28.762	28.762	28.762	28.762		GJ COKE (from Coal)	
Bituminous Coal	1.000	1.000	1.000	1.000	1.000			
	1.365	0.160	0.100	0.000	0.000		GJ COAL BITUMINOUS	
Diesel Oil Use	1.000	1.000	1.000	1.000	1.000			
	2.358	1.843	1.843	1.843	1.843		GJ DIESEL/GAS OIL	
Heavy Oil A Use	1.000	1.000	1.000	1.000	1.000			
	22.490	243.746	243.746	243.746	243.746		GJ HEAVY OIL A	
Heavy Oil B Use	1.000	1.000	1.000	1.000	1.000			
	7.571	1.015	0.500	0.200	0.000		GJ HEAVY OIL B	
Heavy Oil C Use	1.000	1.000	1.000	1.000	1.000			

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
-	122.478	45.774	35.419	21.207	15.638		GJ	HEAVY OIL C	
LPG Use --	1.000	1.000	1.000	1.000	1.000				
-	53.962	69.676	88.926	119.510	138.690		GJ	LPG/BOTTLED GAS	
Natural Gas Use --	1.000	1.000	1.000	1.000	1.000				
-	2.607	1.351	1.045	0.626	0.626		GJ	NATURAL GAS	
Municipal Gas --	1.000	1.000	1.000	1.000	1.000				
-	104.115	118.380	133.940	163.270	189.480		GJ	MUNICIPAL GAS	
District Heat --	1.000	1.000	1.000	1.000	1.000				
-	5.572	9.674	13.889	22.623	31.912		GJ	HEAT (DISTRICT)	
Solar Water Ht --	1.000	1.000	1.000	1.000	1.000				
-	0.000	0.000	0.000	0.000	0.000		GJ	SOLAR	
Cogen Heat Use --	10.000	10.000	10.000	10.000	10.000	10E-6			
-	0.000	0.000	0.000	0.000	0.000		GJ	HEAT (COGEN)	
Electric Htg/WH	1.000	1.000	1.000	1.000	1.000				
Std. HVAC/WH Htg--	1.000	1.000	1.000	1.000	1.000				
-	11.011	12.127	12.746	13.398	13.398		GJ	ELECTRICITY	
Electric Cooling	1.000	1.000	1.000	1.000	1.000				
Std Elect. Cool.--	1.000	1.000	1.000	1.000	1.000				
-	49.565	54.592	57.377	60.311	60.311		GJ	ELECTRICITY	
High-Eff Elect. --	0.000	0.000	0.000	0.000	0.000				
-	0.000	49.133	49.133	49.133	49.133		GJ	ELECTRICITY	
Gas-Fired Cool. --	0.000	0.000	0.000	0.000	0.000				
-	0.000	142.481	142.481	142.481	142.481		GJ	MUNICIPAL GAS	
Lighting/Oth. El	1.000	1.000	1.000	1.000	1.000				
Std Ltg/Oth Equi--	1.000	1.000	1.000	1.000	1.000				
-	405.380	446.490	492.960	572.100	631.960		GJ	ELECTRICITY	
NON-ENERGY	1.000	1.000	1.000	1.000	1.000				
Lubricants	399.092	448.697	506.083	629.083	759.364	MILLION	MY	Total GDP	DRIVERS AND ELASTICITIES: Overall GDP Growth
All Types	1.000	1.000	1.000	1.000	1.000				
All Lubricants --	1.000	1.000	1.000	1.000	1.000				
-	234.000	207.000	197.333	178.000	178.000	10E-3	GJ	LUBRICATING OIL	
Other Oil Prod.	39.602	41.507	47.222	55.343	62.354	MILLION	MY	Const GDP	DRIVERS AND ELASTICITIES: Construction GDP Gwth
All Types	1.000	1.000	1.000	1.000	1.000				
All Products --	1.000	1.000	1.000	1.000	1.000				
■ 6.476	5.665	5.401	4.872	4.872		GJ	OTHER PETRO PROD		

Alternative Path (Note: Starred branches (*) have different values than the BAU Path)

AREA: NEA_JPN3 Page 1
SCENARIO: Alternative Path

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
INDUSTRY	1.000	1.000	1.000	1.000	1.000			
Water Treatment	66.139	67.188	68.162	69.772	68.675	THOUSAND	kcu.m/d cap.	DRIVERS AND ELASTICITIES: Population Growth
All End Uses	1.000	1.000	1.000	1.000	1.000			
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	47.025	70.640	70.640	70.640	70.640	GJ	KEROSENE	
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			
-	470.251	507.540	507.540	507.540	507.540	GJ	DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-*	2.206	2.206	2.177	1.919	1.765	THOUSAND GJ	HEAVY OIL A	DRIVERS AND ELASTICITIES: Indust. Furn Improv.
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	1.205	0.594	0.594	0.594	0.594	GJ	HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-*	23.513	23.513	23.207	20.456	18.810	GJ	HEAVY OIL C	DRIVERS AND ELASTICITIES: Indust. Furn Improv.
Mining & Quarry	1.202	0.917	1.131	1.023	1.023	THOUSAND	MY Min/Q GDP	DRIVERS AND ELASTICITIES: Mining/Quarrying GDP
All End Uses	1.000	1.000	1.000	1.000	1.000			
Blast Furn Gas --	1.000	1.000	1.000	1.000	1.000			
-	31.656	0.000	0.000	0.000	0.000	GJ	BLAST FURN. GAS	
Electricity Use --	1.000	1.000	1.000	1.000	1.000			
-*	7.626	7.626	7.550	6.863	6.101	THOUSAND GJ	ELECTRICITY	DRIVERS AND ELASTICITIES: Ind. Electr. Improv.
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	1.128	2.479	2.479	2.479	2.479	THOUSAND GJ	KEROSENE	
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			
-	7.329	11.132	11.132	11.132	11.132	THOUSAND GJ	DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-*	1.625	1.625	1.604	1.414	1.300	THOUSAND GJ	HEAVY OIL A	DRIVERS AND ELASTICITIES: Indust. Furn Improv.
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	165.819	0.000	0.000	0.000	0.000	GJ	HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-*	2.222	2.222	2.193	1.933	1.778	THOUSAND GJ	HEAVY OIL C	DRIVERS AND ELASTICITIES: Indust. Furn Improv.
Construction	39.602	41.507	47.222	55.343	62.354	THOUSAND	MY Const GDP	DRIVERS AND ELASTICITIES: Construction GDP Gwth
All End Uses	1.000	1.000	1.000	1.000	1.000			
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	1.244	1.146	1.146	1.146	1.146	THOUSAND GJ	KEROSENE	
Electricity Use --	1.000	1.000	1.000	1.000	1.000			
-*	128.980	128.980	127.690	116.082	103.184	GJ	ELECTRICITY	DRIVERS AND ELASTICITIES: Ind. Electr. Improv.
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			
-	3.448	3.794	3.794	3.794	3.794	THOUSAND GJ	DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-*	714.880	714.880	705.587	621.946	571.904	GJ	HEAVY OIL A	DRIVERS AND ELASTICITIES: Indust. Furn Improv.
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	5.034	0.000	0.000	0.000	0.000	GJ	HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	17.117	7.686	7.686	7.686	7.686	GJ	HEAVY OIL C	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
Food Products	5.131	5.483	5.847	6.301	6.301	MILLION	te proc food	DRIVERS AND ELASTICITIES: Processed Food/Meat
All End Uses	1.000	1.000	1.000	1.000	1.000			
Munic. Gas Use --*	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
-*	4.095	5.470	7.000	11.000	12.500		GJ MUNICIPAL GAS	
Electricity Use --*	1.000	1.000	0.990	0.900	0.800			DRIVERS AND ELASTICITIES: Ind. Electr. Improv.
-	14.566	16.004	17.000	18.000	18.000		GJ ELECTRICITY	
Heavy Oil A Use --*	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
-*	14.642	14.384	14.000	11.000	8.500		GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	342.000	21.000	0.000	0.000	0.000	10E-3	GJ HEAVY OIL B	
Heavy Oil C Use --*	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
-	4.756	2.451	1.500	1.000	0.500		GJ HEAVY OIL C	
Cogen Heat Use --*	0.010	0.010	13.000	96.000	142.000	10E-3		DRIVERS AND ELASTICITIES: Industrial Cogen Use
-*	0.000	0.000	17.861	17.861	17.861		GJ HEAT (COGEN)	
Textiles & Fiber	2.100	1.087	1.042	0.809	0.809	MILLION	th. m2 cloth	DRIVERS AND ELASTICITIES: Cloth Production
All End Uses	1.000	1.000	1.000	1.000	1.000			
Electricity Use --*	1.000	1.000	0.990	0.900	0.800			DRIVERS AND ELASTICITIES: Ind. Electr. Improv.
-	19.897	31.786	34.000	36.000	36.000		GJ ELECTRICITY	
Bituminous Coal --*	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
-	0.360	1.604	1.604	1.604	1.604		GJ COAL BITUMINOUS	
Petrol. Coke Use--*	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
-	512.000	807.000	807.000	807.000	807.000	10E-3	GJ PETROLEUM COKE	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	341.000	404.000	404.000	404.000	404.000	10E-3	GJ KEROSENE	
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			
-	19.000	0.000	0.000	0.000	0.000	10E-3	GJ DIESEL/GAS OIL	
Heavy Oil A Use --*	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
-*	13.975	31.410	23.000	18.000	14.000		GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	341.000	110.000	0.000	0.000	0.000	10E-3	GJ HEAVY OIL B	
Heavy Oil C Use --*	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
-*	25.348	46.492	33.000	23.300	13.300		GJ HEAVY OIL C	
LPG Use --*	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
-	2.582	5.798	7.000	9.000	9.000		GJ LPG/BOTTLED GAS	
Biomass Fuel Use--	1.000	1.000	1.000	1.000	1.000			
-	1.082	1.725	1.725	1.725	1.725		GJ Biomass/Wood/Wst	
Munic. Gas Use --*	1.000	1.000	0.987	0.904	0.858			DRIVERS AND ELASTICITIES: Ind. Non-E cogen decl
-*	1.866	5.009	7.000	18.500	30.000		GJ MUNICIPAL GAS	
Cogen Heat Use --*	0.010	0.010	13.000	96.000	142.000	10E-3		DRIVERS AND ELASTICITIES: Industrial Cogen Use
-*	0.000	0.000	74.254	74.254	74.254		GJ HEAT (COGEN)	
Paper and Pulp	28.086	29.659	31.120	32.720	32.720	MILLION	te products	DRIVERS AND ELASTICITIES: Paper/Paperboard Prod
All End Uses	1.000	1.000	1.000	1.000	1.000			
Diesel Oil Use --	1.000	1.000	1.000	1.000	1.000			

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
-	2.840	2.750	2.750	2.750	2.750	10E-3	GJ	DIESEL/GAS OIL	
Electricity Use --*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
-	4.217	4.102	4.102	4.102	4.102		GJ	ELECTRICITY	
Munic. Gas Use --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-*	0.295	1.295	2.000	3.500	4.500		GJ	MUNICIPAL GAS	
Bituminous Coal --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-*	1.566	1.894	1.596	1.000	0.700		GJ	COAL BITUMINOUS	
Kerosene Use --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	44.000	14.390	14.390	14.390	14.390	10E-3	GJ	KEROSENE	
Heavy Oil A Use --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	369.000	624.000	559.200	429.600	300.000	10E-3	GJ	HEAVY OIL A	
Heavy Oil B Use --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	7.100	0.000	0.000	0.000	0.000	10E-3	GJ	HEAVY OIL B	
Heavy Oil C Use --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-*	3.556	3.172	2.500	1.700	1.000		GJ	HEAVY OIL C	
Petroleum Coke --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	213.000	182.000	182.000	182.000	182.000	10E-3	GJ	PETROLEUM COKE	
LPG Use --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	96.500	260.800	260.800	260.800	260.800	10E-3	GJ	LPG/BOTTLED GAS	
Biomass Fuel Use--*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	3.847	3.163	3.163	3.163	3.163		GJ	Biomass/Wood/Wst	
Cogen Heat Use --*	0.010	0.010	13.000	96.000	142.000	10E-3			DRIVERS AND ELASTICITIES: Industrial Cogen Use
-*	0.000	0.000	8.589	8.589	8.589		GJ	HEAT (COGEN)	
Chemicals	19.816	20.907	21.947	23.070	23.070	MILLION	te 7 maj prd		DRIVERS AND ELASTICITIES: Chemical Production
All End Uses	1.000	1.000	1.000	1.000	1.000				
Electricity Use --*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
-	10.511	10.612	10.612	10.612	10.612		GJ	ELECTRICITY	
Bituminous Coal --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	1.821	0.538	0.400	0.200	0.100		GJ	COAL BITUMINOUS	
Coking Coal --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	106.000	4.000	4.000	4.000	4.000	10E-3	GJ	COAL, COKING	
Anthracite Coal --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	144.000	391.000	391.000	391.000	391.000	10E-3	GJ	COAL ANTHRACITE	
Diesel Oil Use --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	4.000	3.900	3.900	3.900	3.900	10E-3	GJ	DIESEL/GAS OIL	
Coke Use --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	201.000	174.000	174.000	174.000	174.000	10E-3	GJ	COKE (from Coal)	
Coke Gas Use --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	276.000	35.000	35.000	35.000	35.000	10E-3	GJ	Coke Oven Gas	
Blast Furn. Gas --*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
-	61.500	61.900	61.900	61.900	61.900	10E-3	GJ	BLAST FURN. GAS	
Crude Oil Use --*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
-	36.200	1.900	0.000	0.000	0.000	10E-3	GJ	CRUDE OIL	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device		1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
Naptha Use	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-	51.428	63.628	63.628	63.628	63.628		GJ	NAPTHA	
Kerosene Use	--*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
	-	553.000	572.000	572.000	572.000	572.000	10E-3	GJ	KEROSENE	
Heavy Oil A Use	--*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
	-*	2.843	2.067	1.500	0.500	0.200		GJ	HEAVY OIL A	
Heavy Oil B Use	--*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
	-	42.300	11.400	0.000	0.000	0.000	10E-3	GJ	HEAVY OIL B	
Heavy Oil C Use	--*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
	-*	2.314	2.098	1.500	0.500	0.200		GJ	HEAVY OIL C	
Petroleum Coke	--*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
	-	945.000	936.000	936.000	936.000	936.000	10E-3	GJ	PETROLEUM COKE	
LPG Use	--*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
	-*	5.475	4.471	4.471	4.100	3.500		GJ	LPG/BOTTLED GAS	
Natural Gas Use	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-	987.000	723.000	723.000	723.000	723.000	10E-3	GJ	NATURAL GAS	
Munic. Gas Use	--*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
	-*	1.142	1.715	2.700	5.300	6.700		GJ	MUNICIPAL GAS	
Biomass Fuel Use	--*	1.000	1.000	0.977	0.814	0.686				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv, Ind. Non-E
	-	60.400	55.300	55.300	55.300	55.300	10E-3	GJ	Biomass/Wood/Wst	
Cogen Heat Use	--*	0.010	0.010	13.000	96.000	142.000	10E-3			DRIVERS AND ELASTICITIES: Industrial Cogen Use
	-*	0.000	0.000	61.990	61.990	61.990		GJ	HEAT (COGEN)	
Ceramics		84.445	90.474	86.294	92.989	97.744	MILLION	te cement		DRIVERS AND ELASTICITIES: Ceramics Production
All End Uses		1.000	1.000	1.000	1.000	1.000				
Electricity Use	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-	0.979	0.934	1.300	1.300	1.300		GJ	ELECTRICITY	
Bituminous Coal	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-*	2.536	2.353	2.069	1.500	1.000		GJ	COAL BITUMINOUS	
Anthracite Coal	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-	211.000	377.000	377.000	377.000	377.000	10E-3	GJ	COAL ANTHRACITE	
Coke Use	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-	118.000	54.000	54.000	54.000	54.000	10E-3	GJ	COKE (from Coal)	
Coke Gas Use	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-	79.300	65.200	65.200	65.200	65.200	10E-3	GJ	Coke Oven Gas	
Blast Furn. Gas	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-	19.400	18.900	18.900	18.900	18.900	10E-3	GJ	BLAST FURN. GAS	
Kerosene Use	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-	51.500	42.300	42.300	42.300	42.300	10E-3	GJ	KEROSENE	
Diesel Oil Use	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-	7.600	4.850	4.850	4.850	4.850	10E-3	GJ	DIESEL/GAS OIL	
Heavy Oil A Use	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	-*	478.000	467.000	467.000	367.000	167.000	10E-3	GJ	HEAVY OIL A	
Heavy Oil B Use	--*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
	12.300	1.320	0.000	0.000	0.000	10E-3	GJ	HEAVY OIL B	
Heavy Oil C Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	815.000	749.000	800.000	600.000	400.000	10E-3	GJ	HEAVY OIL C	
Petroleum Coke	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	138.000	295.000	295.000	295.000	295.000	10E-3	GJ	PETROLEUM COKE	
LPG Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	113.000	97.000	97.000	97.000	97.000	10E-3	GJ	LPG/BOTTLED GAS	
Munic. Gas Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	0.115	0.142	0.200	1.150	2.050		GJ	MUNICIPAL GAS	
Steel	109.548	100.911	89.622	81.052	77.089	MILLION	te steel ing		DRIVERS AND ELASTICITIES: Steel Production
All End-Uses	1.000	1.000	1.000	1.000	1.000				
Electricity Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	2.673	2.861	2.900	2.900	2.900		GJ	ELECTRICITY	
Bituminous Coal	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	39.300	65.200	65.200	65.200	65.200	10E-3	GJ	COAL BITUMINOUS	
Coking Coal Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	1.819	3.074	2.000	1.000	0.500		GJ	COAL, COKING	
Coke Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	6.588	5.617	5.411	5.000	4.000		GJ	COKE (from Coal)	
Coke Gas Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	1.304	1.276	1.276	1.276	1.276		GJ	Coke Oven Gas	
Blast Furn. Gas	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	1.404	1.451	1.361	1.180	1.000		GJ	BLAST FURN. GAS	
Kerosene Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	125.000	111.000	111.000	111.000	111.000	10E-3	GJ	KEROSENE	
Diesel Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	10.200	11.060	11.060	11.060	11.060	10E-3	GJ	DIESEL/GAS OIL	
Heavy Oil A Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	273.000	230.000	204.000	152.000	100.000	10E-3	GJ	HEAVY OIL A	
Heavy Oil B Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	17.100	2.000	0.000	0.000	0.000	10E-3	GJ	HEAVY OIL B	
Heavy Oil C Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	471.000	382.000	300.000	200.000	100.000	10E-3	GJ	HEAVY OIL C	
Petroleum Coke	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	17.500	127.200	127.200	127.200	127.200	10E-3	GJ	PETROLEUM COKE	
LPG Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	282.000	274.000	274.000	274.000	274.000	10E-3	GJ	LPG/BOTTLED GAS	
Munic. Gas Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	0.275	0.613	1.000	2.500	4.500		GJ	MUNICIPAL GAS	
LNG Use	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Keidanren Eff. Improv
	13.900	0.000	0.000	0.000	0.000	10E-3	GJ	LNG	
Non-ferr. Metals	116.044	118.066	134.775	170.846	206.227	THOUSAND	MY Manu. GDP		DRIVERS AND ELASTICITIES: Manufacturing GDP
All End-Uses	1.000	1.000	1.000	1.000	1.000				

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
	ACTIVITY LEVELS/ENERGY INTENSITY								
Electricity Use --*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Ind. Electr. Improv.
-	546.601	563.146	563.146	563.146	563.146		GJ	ELECTRICITY	
Bituminous Coal --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-*	34.361	41.204	35.803	25.000	10.000		GJ	COAL BITUMINOUS	
Coke Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-*	69.409	64.508	64.672	65.000	30.000		GJ	COKE (from Coal)	
Blast Furn. Gas --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	2.624	0.967	0.967	0.967	0.967		GJ	BLAST FURN. GAS	
Kerosene Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	63.911	60.118	60.118	60.118	60.118		GJ	KEROSENE	
Diesel Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	1.374	1.351	1.351	1.351	1.351		GJ	DIESEL/GAS OIL	
Heavy Oil A Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-*	274.546	220.206	210.000	150.000	90.000		GJ	HEAVY OIL A	
Heavy Oil B Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	687.000	0.000	0.000	0.000	0.000	10E-3	GJ	HEAVY OIL B	
Heavy Oil C Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-*	202.731	138.810	110.000	40.000	25.000		GJ	HEAVY OIL C	
Petroleum Coke --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	17.180	4.728	4.728	4.728	4.728		GJ	PETROLEUM COKE	
LPG Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-*	82.123	85.448	80.299	70.000	55.000		GJ	LPG/BOTTLED GAS	
Munic. Gas Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-*	71.830	86.077	120.000	275.000	390.000		GJ	MUNICIPAL GAS	
Biomass Fuel Use--*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	17.524	0.000	0.000	0.000	0.000		GJ	Biomass/Wood/Wst	
Metal Finishing	116.044	118.066	134.775	170.846	206.227	THOUSAND	MY	Manu. GDP	DRIVERS AND ELASTICITIES: Manufacturing GDP
All End-Uses	1.000	1.000	1.000	1.000	1.000				
Electricity Use --*	1.000	1.000	0.990	0.900	0.800				DRIVERS AND ELASTICITIES: Ind. Electr. Improv.
-	2.108	2.294	2.294	2.294	2.294	THOUSAND	GJ	ELECTRICITY	
Bituminous Coal --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-*	43.982	54.376	51.376	45.376	35.376		GJ	COAL BITUMINOUS	
Coke Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	21.647	9.794	9.794	9.794	9.794		GJ	COKE (from Coal)	
Coke Gas Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	33.783	34.496	34.496	34.496	34.496		GJ	Coke Oven Gas	
Blast Furn. Gas --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	53.791	0.000	0.000	0.000	0.000		GJ	BLAST FURN. GAS	
Kerosene Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-*	146.378	126.989	121.326	110.000	70.000		GJ	KEROSENE	
Diesel Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.
-	25.770	22.629	22.629	22.629	22.629		GJ	DIESEL/GAS OIL	
LPG Use --*	1.000	1.000	0.987	0.870	0.800				DRIVERS AND ELASTICITIES: Indust. Furn Improv.

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
	179.022	174.611	174.611	174.611	174.611		GJ LPG/BOTTLED GAS	
Heavy Oil A Use	1.000	1.000	0.987	0.870	0.800			DRIVERS AND ELASTICITIES: Indust. Furn Improv.
	338.115	211.087	200.000	150.000	100.000		GJ HEAVY OIL A	
Heavy Oil B Use	1.000	1.000	0.987	0.870	0.800			DRIVERS AND ELASTICITIES: Indust. Furn Improv.
	6.528	1.689	0.000	0.000	0.000		GJ HEAVY OIL B	
Munic. Gas Use	1.000	1.000	0.987	0.870	0.800			DRIVERS AND ELASTICITIES: Indust. Furn Improv.
	408.024	491.963	500.000	574.000	660.000		GJ MUNICIPAL GAS	
Other Manufactur	116.044	118.066	134.775	170.846	206.227	THOUSAND	MY Manu. GDP	DRIVERS AND ELASTICITIES: Manufacturing GDP
All End-Uses	1.000	1.000	1.000	1.000	1.000			
Electricity Use	1.000	1.000	0.990	0.900	0.800			DRIVERS AND ELASTICITIES: Ind. Electr. Improv.
	1.868	1.991	1.991	1.991	1.991	THOUSAND	GJ ELECTRICITY	
Bituminous Coal	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	88.652	2.026	2.026	2.026	2.026		GJ COAL BITUMINOUS	
Coking Coal Use	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	343.000	0.000	0.000	0.000	0.000	10E-3	GJ COAL, COKING	
Coke Use	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	113.048	134.082	134.082	134.082	134.082		GJ COKE (from Coal)	
Gasoline Use	1.000	1.000	1.000	1.000	1.000			
	33.674	45.257	45.257	45.257	45.257		GJ GASOLINE	
Naptha Use	1.000	1.000	1.000	1.000	1.000			
	52.229	43.231	43.231	43.231	43.231		GJ NAPTHA	
Kerosene Use	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	1.133	0.821	0.821	0.821	0.821	THOUSAND	GJ KEROSENE	
Diesel Use	1.000	1.000	1.000	1.000	1.000			
	670.731	730.867	730.867	730.867	730.867		GJ DIESEL/GAS OIL	
Heavy Oil A Use	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	490.335	523.496	515.664	500.000	350.000		GJ HEAVY OIL A	
Heavy Oil B Use	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	5.154	0.000	0.000	0.000	0.000		GJ HEAVY OIL B	
Heavy Oil C Use	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	247.401	25.668	25.668	25.668	25.668		GJ HEAVY OIL C	
Petroleum Coke	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	383.471	336.726	325.151	302.000	202.000		GJ PETROLEUM COKE	
LPG Use	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	1.136	1.544	1.544	1.544	1.544	THOUSAND	GJ LPG/BOTTLED GAS	
Natural Gas Use	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	20.007	15.475	15.475	15.475	15.475		GJ NATURAL GAS	
Munic. Gas Use	1.000	1.000	0.974	0.786	0.686			DRIVERS AND ELASTICITIES: Indust. Furn Improv., Ind. Non-E
	0.000	93.492	113.328	153.000	403.000		GJ MUNICIPAL GAS	
Cogen Heat Use	0.010	0.010	13.000	96.000	142.000	10E-3		DRIVERS AND ELASTICITIES: Industrial Cogen Use
	0.000	0.000	0.000	0.000	0.000		GJ HEAT (COGEN)	
TRANSPORT	1.000	1.000	1.000	1.000	1.000			
Freight Transp.	546.790	559.000	580.280	619.120	650.782	MILLION	th. tonne-km	DRIVERS AND ELASTICITIES: Freight Transport

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
	ACTIVITY LEVELS/ENERGY INTENSITY							
Air Freight	1.460	1.650	1.820	2.120	2.460	10E-3	% of te-km	
Jets, Std Effic.--	1.000	1.000	1.000	1.000	1.000		Fraction	
-	20.661	22.742	22.742	22.742	22.742		GJ JET FUEL	
Commercial Truck *	355.200	399.100	410.060	435.730	398.750	10E-3	% of te-km	
Gasoline Fueled --*	5.490	5.730	6.310	4.390	2.800	10E-3	Fraction	
-*	8.721	9.917	9.917	9.838	9.758		GJ GASOLINE	
Hybr. Gas.--Mini--*	0.000	0.000	0.020	2.600	4.190	10E-3	Fraction	
-*	8.264	8.264	8.264	6.266	5.156		GJ GASOLINE	
Std. Diesel --*	994.510	994.270	988.070	565.310	148.910	10E-3	Fraction	
-*	2.435	2.717	2.714	2.709	2.701		GJ DIESEL/GAS OIL	
Hybrid CNG --*	0.000	0.000	2.000	44.700	99.300	10E-3	Fraction	
-*	2.264	2.264	2.264	1.725	1.427		GJ MUNICIPAL GAS	
Hybrid Diesel --*	0.000	0.000	3.600	383.000	744.800	10E-3	Fraction	
-*	0.000	1.132	2.264	1.725	1.427		GJ DIESEL/GAS OIL	
LPG-Fueled --	0.000	3.000	3.000	3.000	3.000	10E-6	Fraction	
-*	8.721	9.917	9.917	9.838	9.758		GJ LPG/BOTTLED GAS	
Rail Freight *	49.700	44.900	56.580	59.350	94.090	10E-3	% of te-km	
Diesel Trains --	84.400	69.900	55.830	36.770	36.770	10E-3	% of Freight	
-	412.000	430.000	430.000	430.000	430.000	10E-3	GJ DIESEL/GAS OIL	
Electric Trains --	915.600	930.100	944.170	963.230	963.230	10E-3	% of Freight	
-	181.000	189.000	189.000	189.000	189.000	10E-3	GJ ELECTRICITY	
Coastal Shipping *	447.200	426.300	416.600	399.340	404.120	10E-3	% of te-km	
Diesel Fueled --	174.400	160.900	161.940	162.940	162.940	10E-3	Fraction	
-	714.000	752.000	752.000	752.000	752.000	10E-3	GJ DIESEL/GAS OIL	
Hvy Oil A-Fueled--	403.400	406.890	406.890	406.890	406.890	10E-3	Fraction	
-	714.000	752.000	752.000	752.000	752.000	10E-3	GJ HEAVY OIL A	
Hvy Oil B-Fueled--	54.600	4.200	1.000	0.000	0.000	10E-3	Fraction	
-	714.000	752.000	752.000	752.000	752.000	10E-3	GJ HEAVY OIL B	
Hvy Oil C-Fueled--	367.600	428.000	430.160	430.160	430.160	10E-3	Fraction	
-	714.000	752.000	752.000	752.000	752.000	10E-3	GJ HEAVY OIL C	
Private Road Veh	72.430	79.300	85.429	94.366	99.192	MILLION	total vehic.	
Gas./CNG/H2 Auto	439.800	502.600	521.900	533.530	532.290	10E-3	% of Veh.	
Std. Gas Autos --*	1.000	1.000	0.991	0.097	0.070		Fraction	
-*	33.075	33.668	33.668	32.835	30.889		GJ GASOLINE	
Gasol. Hybrids --*	0.000	0.000	8.600	742.900	600.000	10E-3	Fraction	
-*	10.945	10.945	10.945	8.881	7.257		GJ GASOLINE	
Hypercar--Gasol.--*	0.000	0.000	0.000	50.000	200.000	10E-3	Fraction	
-*	7.028	7.006	6.985	6.942	4.386		GJ GASOLINE	
Hypercar--CNG --*	0.000	0.000	0.000	10.000	100.000	10E-3	Fraction	
-*	7.028	7.006	6.985	6.942	4.386		GJ MUNICIPAL GAS	
Hypercar--Hydrog--*	0.000	0.000	0.000	0.000	30.000	10E-3	Fraction	
-*	3.647	3.624	3.601	3.555	3.509		GJ HYDROGEN	
Diesel Autos	41.200	61.900	79.050	106.180	129.430	10E-3	% of Veh.	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
Std Diesel Autos--*	1.000	1.000	0.997	0.628	0.400		Fraction	
-*	40.402	48.405	54.766	53.411	50.244		GJ DIESEL/GAS OIL	
Diesel Hybr. Car--*	0.000	0.000	3.000	371.500	600.000	10E-3	Fraction	
-*	23.175	23.175	23.175	18.805	15.366		GJ DIESEL/GAS OIL	
LPG Autos	810.000	760.000	760.000	760.000	760.000	10E-6	% of Veh.	
Std. LPG Autos --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	33.075	33.668	33.668	33.668	33.668		GJ LPG/BOTTLED GAS	
High Eff. LPG --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	0.000	0.000	0.000	0.000	0.000		GJ LPG/BOTTLED GAS	
Motorcycles	37.800	38.280	38.280	38.280	38.280	10E-3	% of Veh.	
Std Motorcycles --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	6.360	6.360	6.360	6.234	6.110		GJ GASOLINE	DRIVERS AND ELASTICITIES: Trans. E. Int, Base
Bicyc. w/ Motors	200.900	154.200	132.400	108.180	93.000	10E-3	% of Veh.	
Std Mopeds --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	1.987	1.987	1.987	1.987	1.987		GJ GASOLINE	
Pr. Gas+ Trucks	209.400	170.900	154.450	139.680	132.850	10E-3	% of Veh.	
Std Gas Trucks --*	1.000	1.000	0.997	0.625	0.380		Fraction	
-	24.962	26.249	27.588	28.999	28.999		GJ GASOLINE	
Hybrid Gasol Tr.--*	0.000	0.000	3.000	371.500	600.000	10E-3	Fraction	
-	12.506	12.506	12.506	10.405	9.038		GJ GASOLINE	
'Mini' Hybrids --*	0.000	0.000	0.000	3.000	20.000	10E-3	Fraction	
-	12.506	12.506	12.506	10.405	9.038		GJ GASOLINE	
Pr. Dies+ Trucks	69.800	71.200	72.990	72.990	72.990	10E-3	% of Veh.	
Std Diesel Truck--*	1.000	1.000	0.994	0.569	0.150		Fraction	
-	94.518	94.020	93.551	92.620	92.620		GJ DIESEL/GAS OIL	
Diesel Hybrids --*	0.000	0.000	3.600	385.700	750.000	10E-3	Fraction	
-	77.642	77.642	77.642	59.344	49.232		GJ DIESEL/GAS OIL	
CNG Hybrid Truck--*	0.000	0.000	2.000	45.000	100.000	10E-3	Fraction	
-	77.642	77.642	77.642	59.344	49.232		GJ MUNICIPAL GAS	
Priv. LPG Trucks	220.000	190.000	190.000	190.000	190.000	10E-6	% of Veh.	
Std LPG Trucks --	1.000	1.000	1.000	1.000	1.000		Fraction	
-	24.962	26.249	27.588	28.999	28.999		GJ LPG/BOTTLED GAS	
High-Eff LPG --	0.000	0.000	0.000	0.000	0.000		Fraction	
-	0.000	0.000	0.000	0.000	0.000		GJ LPG/BOTTLED GAS	
Public Passenger	1.223	1.414	1.545	1.836	1.996	BILLION	th. pass-km	DRIVERS AND ELASTICITIES: Population Growth, Pass-km pe
Commercial Autos	12.780	9.750	8.370	7.200	7.200	10E-3	Fraction	
LPG Taxis --*	936.060	932.130	929.130	532.130	232.130	10E-3	Fraction	
-	5.068	5.820	5.820	5.648	5.481		GJ LPG/BOTTLED GAS	
Hybrid LPG Taxis--*	0.000	0.000	3.000	400.000	700.000	10E-3	Fraction	
-	2.798	2.798	2.798	2.259	1.904		GJ LPG/BOTTLED GAS	
Diesel Taxis --	48.540	51.510	51.510	51.510	51.510	10E-3	Fraction	
-	3.671	3.138	3.138	3.045	2.955		GJ DIESEL/GAS OIL	
Gasoline Taxis --	15.410	16.350	16.350	16.350	16.350	10E-3	Fraction	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
-	4.689	6.715	6.715	6.516	6.323		GJ GASOLINE	
Commercial Buses *	63.220	52.250	45.930	41.560	47.520	10E-3	Fraction	
Gasoline Buses --*	0.000	0.000	0.000	0.000	0.000		Fraction	
-	0.000	0.000	0.000	0.000	0.000		GJ GASOLINE	
Diesel Buses --*	1.000	1.000	0.994	0.569	0.150		Fraction	
-	687.000	746.000	784.000	784.000	784.000	10E-3	GJ DIESEL/GAS OIL	
Dies. Hybrid Bus--*	0.000	0.000	3.600	385.700	750.000	10E-3	Fraction	
-	653.000	653.000	653.000	499.000	414.000	10E-3	GJ DIESEL/GAS OIL	
CNG Hybrid Bus --*	0.000	0.000	2.000	45.000	100.000	10E-3	Fraction	
-	653.000	653.000	653.000	499.000	414.000	10E-3	GJ MUNICIPAL GAS	
Private Buses	27.000	16.520	12.790	10.990	10.990	10E-3	Fraction	
Diesel Buses --*	949.670	979.550	977.000	560.760	147.750	10E-3	Fraction	
-	462.000	601.000	664.000	664.000	664.000	10E-3	GJ DIESEL/GAS OIL	
Dies. Hybrid Bus--*	0.000	0.000	3.540	379.910	738.750	10E-3	Fraction	
-	553.000	553.000	553.000	423.000	351.000	10E-3	GJ DIESEL/GAS OIL	
CNG Hyb repl Die--*	0.000	0.000	1.960	44.330	98.500	10E-3	Fraction	
-	553.000	553.000	553.000	423.000	351.000	10E-3	GJ DIESEL/GAS OIL	
Gasoline Buses --*	50.330	20.450	17.450	9.380	5.700	10E-3	Fraction	
-	356.000	426.000	471.000	471.000	471.000	10E-3	GJ GASOLINE	
Hybrid Gas. Bus --*	0.000	0.000	0.050	5.570	9.000	10E-3	Fraction	
-	0.000	0.000	0.000	0.000	0.000		GJ GASOLINE	
CNG Hyb repl Gas--*	0.000	0.000	0.000	50.000	300.000	10E-6	Fraction	
-	392.000	392.000	392.000	300.000	249.000	10E-3	GJ MUNICIPAL GAS	
Passenger Rail *	316.740	282.820	256.420	222.720	212.160	10E-3	Fraction	
Electric Trains --	915.570	930.140	944.170	963.230	963.230	10E-3	Fraction	
-	163.000	170.000	170.000	170.000	170.000	10E-3	GJ ELECTRICITY	
Diesel Trains --	84.430	69.860	55.830	36.770	36.770	10E-3	Fraction	
-	370.000	385.000	385.000	385.000	385.000	10E-3	GJ DIESEL/GAS OIL	
Air Passenger *	42.200	45.960	48.640	47.350	45.430	10E-3	Fraction	
Std Jet, Domest.--	1.000	1.000	1.000	1.000	1.000		Fraction	
-	2.194	2.271	2.271	2.271	2.271		GJ JET FUEL	
Water Passenger	5.130	3.910	3.360	2.740	2.480	10E-3	Fraction	
Diesel-Fueled --	964.070	962.730	962.730	962.730	962.730	10E-3	Fraction	
-	1.061	1.162	1.282	1.417	1.417		GJ DIESEL/GAS OIL	
Hvy Oil A Fueled--	17.960	18.630	18.630	18.630	18.630	10E-3	Fraction	
-	1.061	1.162	1.282	1.417	1.417		GJ HEAVY OIL A	
Hvy Oil C Fueled--	17.960	18.630	18.630	18.630	18.630	10E-3	Fraction	
-	1.061	1.162	1.282	1.417	1.417		GJ HEAVY OIL C	
Intl. Bunkers	1.000	1.000	1.000	1.000	1.000			
Marine Bunkers	1.000	1.022	1.061	1.132	1.190			DRIVERS AND ELASTICITIES: Freight Transport
Hvy Oil C-Fueled--	1.000	1.000	1.000	1.000	1.000		Fraction	
-	201.400	247.900	247.900	247.900	247.900	MILLION	GJ HEAVY OIL C	
Aviation Bunkers	0.723	1.000	1.159	1.413	1.640			DRIVERS AND ELASTICITIES: Internat. Air Travel

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
	ACTIVITY LEVELS/ENERGY INTENSITY							
Jet Fuels Bunk. --	1.000	1.000	1.000	1.000	1.000			
-	24.426	12.860	12.860	12.860	12.860	MILLION	GJ JET FUEL	
AGRIC/FOR/FISH	10.803	9.668	9.668	9.668	9.668	MILLION	MYen Output	DRIVERS AND ELASTICITIES: Agric/Fish/For Output
All Subsectors	1.000	1.000	1.000	1.000	1.000			
All End Uses	1.000	1.000	1.000	1.000	1.000			
Electricity Use --*	1.000	1.000	0.990	0.900	0.800			DRIVERS AND ELASTICITIES: Ind. Electr. Improv.
-	776.000	972.000	997.000	997.000	997.000	10E-3	GJ ELECTRICITY	
Kerosene Use --	1.000	1.000	1.000	1.000	1.000			
-	8.075	10.033	10.287	10.287	10.287		GJ KEROSENE	
Diesel Use --	1.000	1.000	1.000	1.000	1.000			
-	5.465	7.269	7.453	7.453	7.453		GJ DIESEL/GAS OIL	
Heavy Oil A Use --	1.000	1.000	1.000	1.000	1.000			
-	6.065	8.604	8.821	8.821	8.821		GJ HEAVY OIL A	
Heavy Oil B Use --	1.000	1.000	1.000	1.000	1.000			
-	56.870	0.000	0.000	0.000	0.000	10E-3	GJ HEAVY OIL B	
Heavy Oil C Use --	1.000	1.000	1.000	1.000	1.000			
-	387.000	178.000	100.000	0.000	0.000	10E-3	GJ HEAVY OIL C	
HOUSEHOLD	38.970	41.976	44.752	48.158	48.300	MILLION	Occ. Dwell.	DRIVERS AND ELASTICITIES: Population Growth, Household
All Subsectors	1.000	1.000	1.000	1.000	1.000			
Space Heating	1.000	1.000	1.000	1.000	1.000			
Coal Space Heat --	1.360	0.260	0.150	0.000	0.000	10E-3	% of Fuel	
-	12.155	12.958	12.958	12.958	12.958		GJ HARDCOAL BRIQUET	DRIVERS AND ELASTICITIES: Non-Elec Res Ht Inten
Kerosene Use --*	717.500	728.910	708.400	612.000	482.000	10E-3	% of Fuel	
-*	12.155	12.958	12.713	11.287	10.213		GJ KEROSENE	
LPG Use --	82.680	72.000	70.220	66.780	66.780	10E-3	% of Fuel	
-*	12.155	12.958	12.713	11.287	10.213		GJ LPG/BOTTLED GAS	
Municipal Gas --*	195.690	197.500	220.000	320.000	450.000	10E-3	% of Fuel	
-*	12.155	12.958	12.713	11.287	10.213		GJ MUNICIPAL GAS	
Biomass Fuel Use--	1.700	0.330	0.260	0.260	0.260	10E-3	% of Fuel	
-	12.155	12.958	12.958	12.958	12.958		GJ Biomass/Wood/Wst	DRIVERS AND ELASTICITIES: Non-Elec Res Ht Inten
District Heat --	1.060	1.000	1.000	1.000	1.000	10E-3	% of Fuel	
-	12.155	12.958	12.958	12.958	12.958		GJ HEAT (DISTRICT)	DRIVERS AND ELASTICITIES: Non-Elec Res Ht Inten
Elect Hot Air Ht--	459.000	520.000	520.000	494.600	470.400	10E-3	Units/Dwell.	
-	273.000	301.000	317.000	333.000	343.000	10E-3	GJ ELECTRICITY	
Elect. Kotatsu --	1.116	1.087	1.087	1.087	1.087		Units/Dwell.	
-	564.000	572.000	572.000	572.000	572.000	10E-3	GJ ELECTRICITY	
Elect. Heat Pump--*	597.000	916.800	915.000	101.000	0.000	10E-3	Units/Dwell.	
-*	1.659	1.609	1.538	1.259	1.147		GJ ELECTRICITY	
High Eff. Ht Pmp--*	0.000	0.024	0.048	0.912	1.033		Units/Dwell.	
-	0.000	1.226	1.226	0.979	0.886		GJ ELECTRICITY	
Elect. Blanket --	960.000	924.000	924.000	924.000	924.000	10E-3	Units/Dwell.	
-	164.000	164.000	164.000	164.000	164.000	10E-3	GJ ELECTRICITY	
Elect. Carpet --	450.000	631.000	663.200	697.100	718.300	10E-3	Units/Dwell	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
-	756.000	837.000	879.000	924.000	952.000	10E-3	GJ ELECTRICITY	
Water Heating	1.000	1.000	1.000	1.000	1.000			
LPG Water Heat --*	290.100	299.000	280.000	160.000	84.300	10E-3	% Dwellings	
-	14.890	14.170	13.820	13.478	13.344		GJ LPG/BOTTLED GAS	
Condens. LPG WH --*	0.000	10.000	20.000	80.000	56.200	10E-3	% Dwellings	
-	10.365	10.365	10.365	10.109	10.008		GJ LPG/BOTTLED GAS	
Kerosene WH --*	210.800	218.500	200.000	130.000	70.000	10E-3	% Dwellings	
-	14.890	14.170	13.820	13.478	13.344		GJ KEROSENE	
City Gas WH --*	320.700	314.200	300.000	310.000	330.000	10E-3	% Dwellings	
-	14.210	13.530	13.192	12.866	12.738		GJ MUNICIPAL GAS	
Condens. Gas WH --*	0.000	12.500	25.000	120.000	220.000	10E-3	% Dwellings	
-	9.894	9.894	9.894	9.649	9.553		GJ MUNICIPAL GAS	
Coal Water Heat --	3.200	1.800	1.400	0.800	0.800	10E-3	% Dwellings	
-	17.870	17.143	17.143	17.143	17.143		GJ HARDCOAL BRIQUET	
Biomass Water Ht--	3.900	2.900	2.900	2.900	2.900	10E-3	% Dwellings	
-	17.870	17.143	17.143	17.143	17.143		GJ Biomass/Wood/Wst	
Distr. Heat WH --	1.100	1.100	1.100	1.100	1.100	10E-3	% Dwellings	
-	18.000	17.850	17.412	16.982	16.813		GJ HEAT (DISTRICT)	
Elec. Resist. WH--*	69.400	59.500	58.500	52.000	44.700	10E-3	% Dwellings	
-	18.000	17.850	17.412	16.982	16.813		GJ ELECTRICITY	
Elect Ht Pmp WH --*	0.000	0.500	1.000	7.500	14.900	10E-3	% Dwellings	
-	5.804	5.804	5.804	5.661	5.604		GJ ELECTRICITY	
Solar Water Heat--*	118.500	108.800	115.000	140.000	180.000	10E-3	% Dwellings	
-	10.187	8.910	8.910	8.910	8.910		GJ SOLAR	
Cooking	1.000	1.000	1.000	1.000	1.000			
LPG Stoves --*	588.600	523.400	492.200	413.200	323.200	10E-3	% Dwellings	
-	3.442	3.252	3.252	3.252	3.252		GJ LPG/BOTTLED GAS	
Kerosene Stoves --*	36.900	42.200	40.000	30.000	20.000	10E-3	% Dwellings	
-	3.442	3.252	3.252	3.252	3.252		GJ KEROSENE	
City Gas Stoves --*	363.900	425.900	460.000	550.000	650.000	10E-3	% Dwellings	
-	3.285	3.285	3.285	3.285	3.285		GJ MUNICIPAL GAS	
Coal Stove --	4.800	3.400	2.600	1.600	1.600	10E-3	% Dwellings	
-	3.442	3.442	3.442	3.442	3.442		GJ HARDCOAL BRIQUET	
Biomass Cooking --	5.900	5.200	5.200	5.200	5.200	10E-3	% Dwellings	
-	3.442	3.442	3.442	3.442	3.442		GJ Biomass/Wood/Wst	
El. Rice Cooker --	738.000	780.700	808.500	824.800	824.800	10E-3	% Dwellings	
-	685.000	713.000	713.000	713.000	713.000	10E-3	GJ ELECTRICITY	
El. Microwave Ov--	697.000	872.000	920.000	950.000	965.000	10E-3	% Dwellings	
-*	364.000	363.000	346.000	224.000	206.000	10E-3	GJ ELECTRICITY	
Oth. Elec. Appl.	1.000	1.000	1.000	1.000	1.000			
Heat Pump Cooler--*	597.000	917.000	962.000	112.000	0.000	10E-3	Units/Dwell.	
-*	540.000	439.000	430.000	365.000	339.000	10E-3	GJ ELECTRICITY	
High Eff HP Cool--*	0.000	0.025	0.051	1.006	1.175		Units/Dwell.	

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel	PROJECTION METHOD (If not Interpolation)
	0.000	348.000	348.000	309.000	280.000	10E-3	GJ ELECTRICITY	
Room Cooler	633.000	643.000	611.000	64.000	0.000	10E-3	Units/Dwell.	
	1.194	1.282	1.247	1.002	0.921		GJ ELECTRICITY	
High-Eff Rm Cool	0.000	16.000	32.000	5.790	6.430	10E-3	Units/Dwell.	
	0.000	993.000	993.000	718.000	609.000	10E-3	GJ ELECTRICITY	
Fan	1.544	1.544	1.544	1.544	1.544		Units/Dwell.	
	51.000	58.000	60.000	60.000	57.000	10E-3	GJ ELECTRICITY	
Lighting	1.000	1.000	1.000	1.000	1.000			
	2.202	2.436	2.457	1.814	1.445		GJ ELECTRICITY	
Refrig w/ freez.	1.099	1.099	1.099	1.099	1.099		Units/Dwell.	
	2.573	2.500	2.217	1.075	0.946		GJ ELECTRICITY	
Clothes Washer	987.000	987.000	987.000	987.000	987.000	10E-3	Units/Dwell.	
	158.000	168.000	175.000	175.000	166.000	10E-3	GJ ELECTRICITY	
Clothes Dryer	163.000	196.000	200.900	211.200	211.200	10E-3	Units/Dwell.	
	1.651	1.779	1.851	1.851	1.760		GJ ELECTRICITY	
Color TV, 1st	985.000	986.000	981.000	956.000	690.000	10E-3	Units/Dwell.	
	1.111	1.142	1.165	1.158	1.152		GJ ELECTRICITY	
LCD TV, 1st	0.000	0.000	4.900	29.600	295.800	10E-3	Units/Dwell.	
	0.000	228.000	233.000	232.000	230.000	10E-3	GJ ELECTRICITY	
Color TV, 2nd	741.000	825.000	867.000	884.000	638.000	10E-3	Units/Dwell.	
	299.000	348.000	369.000	347.000	341.000	10E-3	GJ ELECTRICITY	
LCD TV, 2nd	0.000	6.850	13.700	27.400	273.500	10E-3	Units/Dwell.	
	0.000	70.000	74.000	69.000	68.000	10E-3	GJ ELECTRICITY	
Vacuum	981.000	982.000	982.000	982.000	982.000	10E-3	Units/Dwell.	
	399.000	440.000	458.000	458.000	436.000	10E-3	GJ ELECTRICITY	
Other Devices	1.000	1.000	1.000	1.000	1.000			
	4.994	6.602	7.501	7.017	5.135		GJ ELECTRICITY	
COMMERCIAL	1.285	1.493	1.714	2.131	2.597	MILLION	k.sq.m. Flr	DRIVERS AND ELASTICITIES: Comm'l/Services GDP, Bldg Floor
All Subsectors	1.000	1.000	1.000	1.000	1.000			
Non-Elect. Fuels	1.000	1.000	1.000	1.000	1.000			
Kerosene Use	1.000	1.000	0.987	0.903	0.895			DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl
	121.830	136.460	134.115	110.177	75.487		GJ KEROSENE	
Coke Use	1.000	1.000	0.987	0.903	0.895			DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl
	21.750	28.762	28.330	23.221	19.701		GJ COKE (from Coal)	
Bituminous Coal	1.000	1.000	0.987	0.903	0.895			DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl
	1.365	0.160	0.099	0.000	0.000		GJ COAL BITUMINOUS	
Diesel Oil Use	1.000	1.000	0.987	0.903	0.895			DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl
	2.358	1.843	1.833	1.750	1.611		GJ DIESEL/GAS OIL	
Heavy Oil A Use	1.000	1.000	0.987	0.903	0.895			DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl
	22.490	243.746	238.381	184.771	113.231		GJ HEAVY OIL A	
Heavy Oil B Use	1.000	1.000	0.987	0.903	0.895			DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl
	7.571	1.015	0.497	0.190	0.000		GJ HEAVY OIL B	
Heavy Oil C Use	1.000	1.000	0.987	0.903	0.895			DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl

----- D E M A N D B R A N C H D A T A (at Reporting Years) -----

Sector / Subsector / Enduse / Device	1990	1995	2000	2010	2020	Scale	Variable/Fuel		PROJECTION METHOD (If not Interpolation)
	-* 122.478	45.774	33.717	11.921	5.392		GJ	HEAVY OIL C	
LPG Use	--* 1.000	1.000	0.987	0.903	0.895				DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl
	-* 53.962	69.676	88.332	110.789	108.066		GJ	LPG/BOTTLED GAS	
Natural Gas Use	--* 1.000	1.000	0.987	0.903	0.895				DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl
	-* 2.607	1.351	1.038	0.580	0.537		GJ	NATURAL GAS	
Municipal Gas	--* 1.000	1.000	0.987	0.903	0.895				DRIVERS AND ELASTICITIES: Ser. Non-E cogen decl
	-* 104.115	118.380	136.013	171.097	270.165		GJ	MUNICIPAL GAS	
District Heat	-- 1.000	1.000	1.000	1.000	1.000				
	-* 5.572	9.674	13.818	21.488	28.762		GJ	HEAT (DISTRICT)	
Solar Water Ht	-- 1.000	1.000	1.000	1.000	1.000				
	- 0.000	0.000	0.000	0.000	0.000		GJ	SOLAR	
Cogen Heat Use	--* 0.010	0.010	13.000	97.000	105.000	10E-3			DRIVERS AND ELASTICITIES: Services Cogen Use
	-* 0.000	0.000	547.713	590.607	629.743		GJ	HEAT (COGEN)	
Electric Htg/WH	1.000	1.000	1.000	1.000	1.000				
Std. HVAC/WH Htg	-- 1.000	1.000	1.000	1.000	1.000				
	- 11.011	12.127	12.746	13.398	13.398		GJ	ELECTRICITY	
Electric Cooling	1.000	1.000	1.000	1.000	1.000				
Std Elect. Cool.	--* 1.000	1.000	0.979	0.790	0.550				
	- 49.565	54.592	57.377	60.311	60.311		GJ	ELECTRICITY	
High-Eff Elect.	--* 0.000	3.000	6.000	60.000	200.000	10E-3			
	-* 0.000	49.133	51.562	53.466	52.652		GJ	ELECTRICITY	
Gas-Fired Cool.	--* 0.000	7.500	15.000	150.000	250.000	10E-3			
	-* 0.000	142.481	149.524	155.046	152.685		GJ	MUNICIPAL GAS	
Lighting/Oth. El	1.000	1.000	1.000	1.000	1.000				
Std Ltg/Oth Equi	-- 1.000	1.000	1.000	1.000	1.000				
	-* 405.380	446.490	484.092	469.127	442.373		GJ	ELECTRICITY	
NON-ENERGY	1.000	1.000	1.000	1.000	1.000				
Lubricants	399.092	448.697	506.083	629.083	759.364	MILLION	MY	Total GDP	DRIVERS AND ELASTICITIES: Overall GDP Growth
All Types	1.000	1.000	1.000	1.000	1.000				
All Lubricants	-- 1.000	1.000	1.000	1.000	1.000				
	- 234.000	207.000	197.333	178.000	178.000	10E-3	GJ	LUBRICATING OIL	
Other Oil Prod.	39.602	41.507	47.222	55.343	62.354	MILLION	MY	Const GDP	DRIVERS AND ELASTICITIES: Construction GDP Gwth
All Types	1.000	1.000	1.000	1.000	1.000				
All Products	-- 1.000	1.000	1.000	1.000	1.000				
	- 6.476	5.665	5.401	4.872	4.872		GJ	OTHER PETRO PROD	

D6. LEAP INPUT DATA SET (“DATA ECHO”): TRANSFORMATION

Business as Usual Path

AREA: NEA_JPN3, Scenario: BA - BASE CASE

TRANSFORMATION DATA ECHO REPORT

PART 1: Data Echo by Module, Process and Year

TRANSMISSION & DISTRIBUTION MODULE: T&D LOSSES

Fuel	Losses (in Reporting Years) 1990	1995	2000	2010	2020	Base Year Cost	Esc. Rate	FEF	Cost Unit
ELECTRICITY	5.9%	5.7%	5.5%	5.0%	4.5%	0.00	0.0%	0.0%	Y/GIGAWATT-HOURS
MUNICIPAL GAS	0.3%	0.3%	0.3%	0.3%	0.3%	0.00	0.0%	0.0%	Y/CUB. METERS

Fuel	EDB Links
ELECTRICITY	
MUNICIPAL GAS	FUEL DISTRIBUTION LOSSES/NATURAL GAS / GENERIC

DETAILED MODULE: CHARCOAL PRODN

Kiln(s) dispatched by percentage share

KILN NAMES, INPUT FUELS & INPUT FUEL SHARES

Kiln Name	Input Fuels (Shares)
All Kilns	WOOD FOR CHARC. (100%)

KILN EFFICIENCIES (IN REPORTING YEARS)

Kiln Name	1990	1995	2000	2010	2020
All Kilns	35.0%	35.0%	35.0%	35.0%	35.0%

EDB LINKS

Kiln Name	EDB Link
All Kilns	

BASE YEAR COSTS

Kiln Name	Variable O&M Cost	Esc. Rate	For. Ex. Fraction

DETAILED MODULE: DISTRICT HEAT

Process(s) dispatched by percentage share

PROCESS NAMES, INPUT FUELS & INPUT FUEL SHARES

Process Name	Input Fuels (Shares)
All Plants--1993	MUNICIPAL GAS (79%), LPG/BOTTLED GAS (2.6%), HEAVY OIL C (7.7%), COAL BITUMINOUS (5.9%), KEROSENE (4.8%)
All Plants--1990	COAL BITUMINOUS (7.9%), KEROSENE (16.7%), HEAVY OIL C (7.5%), LPG/BOTTLED GAS (3.1%), MUNICIPAL GAS (64.8%)
All Plants--1995	MUNICIPAL GAS (83.6%), LPG/BOTTLED GAS (1.9%), HEAVY OIL C (6.2%), KEROSENE (4%), COAL BITUMINOUS (4.3%)

PROCESS EFFICIENCIES (IN REPORTING YEARS)

Process Name	1990	1995	2000	2010	2020
All Plants--1993	100.0%	100.0%	100.0%	100.0%	100.0%
All Plants--1990	100.0%	100.0%	100.0%	100.0%	100.0%
All Plants--1995	100.0%	100.0%	100.0%	100.0%	100.0%

PROCESS SHARES (in Reporting Years)

Process Name	1990	1995	2000	2010	2020
All Plants--1993	0.0%	0.0%	0.0%	0.0%	0.0%
All Plants--1990	100.0%	0.0%	0.0%	0.0%	0.0%
All Plants--1995	0.0%	100.0%	100.0%	100.0%	100.0%

EDB LINKS

Process Name	EDB Link
All Plants--1993	ELECTRICITY GENERATION/STEAM-NAT GAS / SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
All Plants--1990	ELECTRICITY GENERATION/STEAM-NAT GAS / SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
All Plants--1995	ELECTRICITY GENERATION/STEAM-NAT GAS / SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC

BASE YEAR COSTS

Process Name	Variable O&M Cost	Esc. Rate	For. Ex. Fraction

ELECTRICITY MODULE: ELECTRICITY GEN.

Plant(s) dispatched by merit order using default load curve

PLANT NAMES, INPUT FUELS & INPUT FUEL SHARES

Plant Name	Input Fuels (Shares)
Nucl.--Exist BWR	NUCLEAR (100%)
Nucl.--Exist PWR	NUCLEAR (100%)
Nucl.--Exist HWR	NUCLEAR (100%)
Nucl.--Exist GCR	NUCLEAR (100%)
Nucl.--New BWRs	NUCLEAR (100%)
Nucl.--New PWRs	NUCLEAR (100%)
Nucl. New APWRs	NUCLEAR (100%)
Nucl. New ABWRs	NUCLEAR (100%)
Nucl., FBR	NUCLEAR (100%)
Hydro--Convent.	HYDRO (100%)
Pumped St. Hydro	ELECTRICITY (100%)
Geothermal--Util	GEOTHERMAL (100%)
Geothermal--Auto	GEOTHERMAL (100%)
Gas Turbine-Util	NATURAL GAS (100%)
Int. Comb--Util	DIESEL/GAS OIL (5.1%), NAPTHA (4.3%), NATURAL GAS LIQ. (16.6%), LPG/BOTTLED GAS (38.3%), NATURAL GAS (35.7%)
Coal Steam--Util	COAL BITUMINOUS (100%)
Coal Steam--Auto	COAL BITUMINOUS (97.3%), COAL ANTHRACITE (2.7%)
Coal/Ck Gas-Util	Coke Oven Gas (27.8%), BLAST FURN. GAS (72.2%)
Coal/Ck Gas-Auto	Coke Oven Gas (19.3%), BLAST FURN. GAS (80.7%)
Std. Coal, New	COAL BITUMINOUS (100%)
Stm Nat Gas-Util	NATURAL GAS (100%)
Stm Nat Gas-Auto	MUNICIPAL GAS (100%)
Steam Gas--New	NATURAL GAS (100%)
Gas Comb Cy, New	NATURAL GAS (100%)
Serv Cogen--Gas	MUNICIPAL GAS (100%)
Serv FC Cogen-Gs	MUNICIPAL GAS (100%)
Ind Cogen--Gas	MUNICIPAL GAS (100%)
Ind FC Cogen-Gas	MUNICIPAL GAS (100%)
Steam Oil--Util	CRUDE OIL (46.4%), HEAVY OIL C (53.6%)
Stm Hvy Oil-Auto	HEAVY OIL B (.1%), HEAVY OIL C (90.1%), PETROLEUM COKE (9.8%)
Stm Lt Oil--Auto	NAPTHA (44%), HEAVY OIL A (23.4%), Refinery Gas (26.7%), LPG/BOTTLED GAS (5.9%)
Oil CC, New	HEAVY OIL C (100%)
MSW-Fired Plants	MUN. SOLID WASTE (100%)
Wind Power	WIND (100%)
Biomass/Wst-Auto	Biomass/Wood/Wst (100%)
Solar PV--Resid.	SOLAR (100%)
Solar PV-Comml	SOLAR (100%)
Solar PV--Util.	SOLAR (100%)

PLANT EFFICIENCIES (IN REPORTING YEARS)

Plant Name	1990	1995	2000	2010	2020
Nucl.--Exist BWR	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--Exist PWR	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--Exist HWR	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--Exist GCR	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--New BWRs	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--New PWRs	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl. New APWRs	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl. New ABWRs	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl., FBR	33.0%	33.0%	33.0%	33.0%	33.0%
Hydro--Convent.	100.0%	100.0%	100.0%	100.0%	100.0%
Pumped St. Hydro	72.0%	72.0%	72.0%	72.0%	72.0%
Geothermal--Util	10.0%	10.0%	10.0%	10.0%	10.0%
Geothermal--Auto	10.0%	10.0%	10.0%	10.0%	10.0%
Gas Turbine-Util	30.0%	30.0%	30.0%	30.0%	30.0%
Int. Comb--Util	28.0%	28.0%	28.0%	28.0%	28.0%
Coal Steam--Util	44.6%	44.6%	44.6%	44.6%	44.6%
Coal Steam--Auto	44.6%	44.6%	44.6%	44.6%	44.6%
Coal/Ck Gas-Util	44.6%	44.6%	44.6%	44.6%	44.6%
Coal/Ck Gas-Auto	44.6%	44.6%	44.6%	44.6%	44.6%
Std. Coal, New	44.6%	44.6%	44.6%	44.6%	44.6%
Stm Nat Gas-Util	44.7%	44.7%	44.7%	44.7%	44.7%
Stm Nat Gas-Auto	44.7%	44.7%	44.7%	44.7%	44.7%
Steam Gas--New	44.0%	44.0%	44.0%	44.0%	44.0%
Gas Comb Cy, New	47.0%	47.0%	47.0%	47.0%	47.0%
Serv Cogen--Gas	28.0%	28.0%	28.0%	28.0%	28.0%
Serv FC Cogen-Gs	45.0%	45.0%	45.0%	45.0%	45.0%
Ind Cogen--Gas	28.0%	28.0%	28.0%	28.0%	28.0%
Ind FC Cogen-Gas	45.0%	45.0%	45.0%	45.0%	45.0%
Steam Oil--Util	43.5%	43.5%	43.5%	43.5%	43.5%
Stm Hvy Oil-Auto	43.5%	43.5%	43.5%	43.5%	43.5%
Stm Lt Oil--Auto	43.5%	43.5%	43.5%	43.5%	43.5%
Oil CC, New	46.0%	46.0%	46.0%	46.0%	46.0%
MSW-Fired Plants	25.0%	25.0%	25.0%	25.0%	25.0%
Wind Power	20.0%	20.0%	20.0%	20.0%	20.0%
Biomass/Wst-Auto	25.0%	25.0%	25.0%	25.0%	25.0%
Solar PV--Resid.	12.0%	12.0%	12.0%	12.0%	12.0%
Solar PV-Comml	12.0%	12.0%	12.0%	12.0%	12.0%
Solar PV--Util.	15.0%	15.0%	15.0%	15.0%	15.0%

PLANT BASE YEAR OUTPUTS & CAPACITIES

Output Unit: GIGAWATT-HOURS
Capacity Unit: Rate

Plant Name	Base Yr. Output	Capacity (in Reporting Years) 1990	1995	2000	2010	2020
Nucl.--Exist BWR	121970.0	19297.0	23999.0	23999.0	23642.0	17106.0
Nucl.--Exist PWR	78279.3	12596.0	17026.0	17026.0	17026.0	10279.0
Nucl.--Exist HWR	969.0	165.0	165.0	165.0	165.0	0.0
Nucl.--Exist GCR	1041.1	166.0	166.0	166.0	0.0	0.0
Nucl.--New BWRs	0.0	0.0	0.0	2712.0	6545.0	6545.0
Nucl.--New PWRs	0.0	0.0	0.0	1180.0	1180.0	1180.0
Nucl. New APWRs	0.0	0.0	0.0	0.0	0.0	0.0
Nucl. New ABWRs	0.0	0.0	0.0	0.0	1977.0	4657.0
Nucl., FBR	0.0	0.0	246.0	246.0	246.0	246.0
Hydro--Convent.	88421.0	20831.0	21025.0	21025.0	21025.0	21025.0
Pumped St. Hydro	7201.0	17000.0	22430.0	22430.0	26400.0	28400.0
Geothermal--Util	1485.0	240.0	260.0	260.0	260.0	260.0
Geothermal--Auto	257.0	31.0	31.0	31.0	31.0	31.0
Gas Turbine-Util	8857.0	2365.0	2545.0	2545.0	2545.0	2545.0
Int. Comb--Util	9094.0	2822.0	2822.0	2822.0	2822.0	2822.0
Coal Steam--Util	72600.0	12420.0	15970.0	15970.0	15970.0	15970.0
Coal Steam--Auto	14021.0	2776.0	3570.0	3570.0	3570.0	3570.0
Coal/Ck Gas-Util	21665.0	3706.0	3706.0	3706.0	3706.0	3706.0
Coal/Ck Gas-Auto	14966.0	2964.0	2964.0	2964.0	2964.0	2964.0
Std. Coal, New	0.0	0.0	0.0	2400.0	9600.0	20400.0
Stm Nat Gas-Util	153501.0	35409.0	38179.0	38179.0	38179.0	38179.0
Stm Nat Gas-Auto	168.0	33.3	33.0	33.0	33.0	33.0
Steam Gas--New	0.0	0.0	0.0	3600.0	10200.0	19000.0
Gas Comb Cy, New	0.0	0.0	0.0	1800.0	10300.0	22500.0
Serv Cogen--Gas	0.0	0.0	0.0	0.0	0.0	0.0
Serv FC Cogen-Gs	0.0	0.0	0.0	0.0	0.0	0.0
Ind Cogen--Gas	0.0	0.0	0.0	0.0	0.0	0.0
Ind FC Cogen-Gas	0.0	0.0	0.0	0.0	0.0	0.0
Steam Oil--Util	200248.0	53894.0	53684.0	53684.0	53684.0	53684.0
Stm Hvy Oil-Auto	52262.0	10349.0	7836.0	7836.0	7836.0	7836.0
Stm Lt Oil--Auto	10216.0	2023.0	1532.0	1532.0	1532.0	1532.0
Oil CC, New	0.0	0.0	0.0	1200.0	6600.0	16000.0
MSW-Fired Plants	1180.0	234.0	283.0	283.0	283.0	283.0
Wind Power	0.0	0.0	0.0	0.0	0.0	0.0
Biomass/Wst-Auto	8717.0	1726.0	1746.0	1746.0	1746.0	1746.0
Solar PV--Resid.	0.0	0.0	0.0	0.0	0.0	0.0
Solar PV-Comml	0.0	0.0	0.0	0.0	0.0	0.0
Solar PV--Util.	0.0	0.0	0.0	0.0	0.0	0.0

ENERGY RECOVERED AS FUEL: HEAT (COGEN) (Share In Reporting Years)

Plant Name	1990	1995	2000	2010	2020
Nucl.--Exist BWR	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--Exist PWR	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--Exist HWR	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--Exist GCR	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--New BWRs	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--New PWRs	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl. New APWRs	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl. New ABWRs	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl., FBR	0.0%	0.0%	0.0%	0.0%	0.0%
Hydro--Convent.	0.0%	0.0%	0.0%	0.0%	0.0%
Pumped St. Hydro	0.0%	0.0%	0.0%	0.0%	0.0%
Geothermal--Util	0.0%	0.0%	0.0%	0.0%	0.0%
Geothermal--Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Gas Turbine-Util	0.0%	0.0%	0.0%	0.0%	0.0%
Int. Comb--Util	0.0%	0.0%	0.0%	0.0%	0.0%
Coal Steam--Util	0.0%	0.0%	0.0%	0.0%	0.0%
Coal Steam--Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Coal/Ck Gas-Util	0.0%	0.0%	0.0%	0.0%	0.0%
Coal/Ck Gas-Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Std. Coal, New	0.0%	0.0%	0.0%	0.0%	0.0%
Stm Nat Gas-Util	0.0%	0.0%	0.0%	0.0%	0.0%
Stm Nat Gas-Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Steam Gas--New	0.0%	0.0%	0.0%	0.0%	0.0%
Gas Comb Cy, New	0.0%	0.0%	0.0%	0.0%	0.0%
Serv Cogen--Gas	52.0%	52.0%	52.0%	52.0%	52.0%
Serv FC Cogen-Gs	40.0%	40.0%	40.0%	40.0%	40.0%
Ind Cogen--Gas	52.0%	52.0%	52.0%	52.0%	52.0%
Ind FC Cogen-Gas	40.0%	40.0%	40.0%	40.0%	40.0%
Steam Oil--Util	0.0%	0.0%	0.0%	0.0%	0.0%
Stm Hvy Oil-Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Stm Lt Oil--Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Oil CC, New	0.0%	0.0%	0.0%	0.0%	0.0%
MSW-Fired Plants	0.0%	0.0%	0.0%	0.0%	0.0%
Wind Power	0.0%	0.0%	0.0%	0.0%	0.0%
Biomass/Wst-Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Solar PV--Resid.	0.0%	0.0%	0.0%	0.0%	0.0%
Solar PV-Comml	0.0%	0.0%	0.0%	0.0%	0.0%
Solar PV--Util.	0.0%	0.0%	0.0%	0.0%	0.0%

EDB LINKS

Plant Name	EDB Link
Nucl.--Exist BWR	ELECTRICITY GENERATION/STEAM-NUCLEAR / BOILING WATER REACTOR (GENERAL ELECTRIC BWR/6)
Nucl.--Exist PWR	ELECTRICITY GENERATION/STEAM-NUCLEAR / PRESSURIZED WATER REACTOR (USDOE)
Nucl.--Exist HWR	
Nucl.--Exist GCR	
Nucl.--New BWRs	ELECTRICITY GENERATION/STEAM-NUCLEAR / BOILING WATER REACTOR (GENERAL ELECTRIC BWR/6)
Nucl.--New PWRs	ELECTRICITY GENERATION/STEAM-NUCLEAR / PRESSURIZED WATER REACTOR (USDOE)
Nucl. New APWRs	ELECTRICITY GENERATION/STEAM-NUCLEAR / PRESSURIZED WATER REACTOR (USDOE)
Nucl. New ABWRs	ELECTRICITY GENERATION/STEAM-NUCLEAR / BOILING WATER REACTOR (GENERAL ELECTRIC BWR/6)
Nucl., FBR	
Hydro--Convent.	
Pumped St. Hydro	
Geothermal--Util	ELECTRICITY GENERATION/STEAM-GEOTHERMAL / VAPOR DOMINATED SYSTEM (DRY STEAM)
Geothermal--Auto	ELECTRICITY GENERATION/STEAM-GEOTHERMAL / VAPOR DOMINATED SYSTEM (DRY STEAM)
Gas Turbine-Util	ELECTRICITY GENERATION/TURBINE-NAT GAS / GENERIC * NO EC
Int. Comb--Util	ELECTRICITY GENERATION/ENGINE-NAT GAS / GENERIC
Coal Steam--Util	ELECTRICITY GENERATION/STEAM-BITUM COAL / US * ELECTROSTATIC PRECIPITATOR AND SOX SCRUBBER
Coal Steam--Auto	ELECTRICITY GENERATION/STEAM-BITUM COAL / US * ELECTROSTATIC PRECIPITATOR AND SOX SCRUBBER
Coal/Ck Gas-Util	ELECTRICITY GENERATION/STEAM-NAT GAS / SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
Coal/Ck Gas-Auto	ELECTRICITY GENERATION/STEAM-NAT GAS / SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
Std. Coal, New	US AVERAGES/ELECTRICITY GEN. / NEW COAL STEAM: 67% AFBC / 33% IGCC
Stm Nat Gas-Util	US AVERAGES/ELECTRICITY GEN. / EXISTING NATURAL GAS STEAM
Stm Nat Gas-Auto	US AVERAGES/ELECTRICITY GEN. / EXISTING NATURAL GAS STEAM
Steam Gas--New	US AVERAGES/ELECTRICITY GEN. / EXISTING NATURAL GAS STEAM
Gas Comb Cy, New	US AVERAGES/ELECTRICITY GEN. / NEW NATURAL GAS COMBINED CYCLE
Serv Cogen--Gas	US AVERAGES/ELECTRICITY GEN. / NEW NATURAL GAS COMBINED CYCLE
Serv FC Cogen-Gs	ELECTRICITY GENERATION/FUEL CELLS / 11 MW PHOSPHORIC ACID CELL-NG
Ind Cogen--Gas	US AVERAGES/ELECTRICITY GEN. / NEW NATURAL GAS COMBINED CYCLE
Ind FC Cogen-Gas	ELECTRICITY GENERATION/FUEL CELLS / 11 MW PHOSPHORIC ACID CELL-NG
Steam Oil--Util	US AVERAGES/ELECTRICITY GEN. / EXISTING RESIDUAL STEAM
Stm Hvy Oil-Auto	US AVERAGES/ELECTRICITY GEN. / EXISTING RESIDUAL STEAM
Stm Lt Oil--Auto	US AVERAGES/ELECTRICITY GEN. / EXISTING DISTILLATE STEAM
Oil CC, New	US AVERAGES/ELECTRICITY GEN. / NEW DISTILLATE COMBUSTION TURBINE
MSW-Fired Plants	ELECTRICITY GENERATION/STEAM-MSW / GENERIC * MASS FEED
Wind Power	
Biomass/Wst-Auto	US AVERAGES/ELECTRICITY GEN. / EXISTING WOOD/BARK STEAM
Solar PV--Resid.	
Solar PV-Comml	
Solar PV--Util.	

BASE YEAR COSTS

Plant Name	Variable O&M Cost	Esc. Rate	For. Ex. Fixed O&M Cost Fraction	Esc. Rate	For. Ex. Capital Cost Fraction	Esc. Rate	For. Ex. Interest Rate	Recovery Period

DETAILED MODULE: MUNICIPAL GAS PR.

Process(s) dispatched by percentage share

PROCESS NAMES, INPUT FUELS & INPUT FUEL SHARES

Process Name	Input Fuels (Shares)
Gas Prod--1990	Input to Mun Gas (93%), Refinery Gas (2.4%), COKE (from Coal) (.1%), Coke Oven Gas (2.9%), NAPTHA (1.6%)
Gas Prod--1993	Input to Mun Gas (94.5%), Coke Oven Gas (1.9%), NAPTHA (1.7%), Refinery Gas (1.9%)
Gas Prod--1995	Input to Mun Gas (95.1%), Refinery Gas (1.8%), NAPTHA (1.7%), Coke Oven Gas (1.4%)
Gas Prod--Hi NG	Input to Mun Gas (97.5%), Refinery Gas (1%), NAPTHA (1%), Coke Oven Gas (.5%)

PROCESS EFFICIENCIES (IN REPORTING YEARS)

Process Name	1990	1995	2000	2010	2020
Gas Prod--1990	100.0%	100.0%	100.0%	100.0%	100.0%
Gas Prod--1993	100.0%	100.0%	100.0%	100.0%	100.0%
Gas Prod--1995	100.0%	100.0%	100.0%	100.0%	100.0%
Gas Prod--Hi NG	100.0%	100.0%	100.0%	100.0%	100.0%

PROCESS SHARES (in Reporting Years)

Process Name	1990	1995	2000	2010	2020
Gas Prod--1990	100.0%	0.0%	0.0%	0.0%	0.0%
Gas Prod--1993	0.0%	0.0%	0.0%	0.0%	0.0%
Gas Prod--1995	0.0%	100.0%	87.5%	62.5%	50.0%
Gas Prod--Hi NG	0.0%	8.3%	16.7%	37.5%	50.0%

EDB LINKS

Process Name	EDB Link
Gas Prod--1990	
Gas Prod--1993	
Gas Prod--1995	
Gas Prod--Hi NG	

BASE YEAR COSTS

Process Name	Variable O&M Cost	Esc. Rate	For. Ex. Fraction

DETAILED MODULE: MUNIC GAS INPUT

Process(s) dispatched by percentage share

PROCESS NAMES, INPUT FUELS & INPUT FUEL SHARES

Process Name	Input Fuels (Shares)
LNG/NG input '90	NATURAL GAS (79.5%), LPG/BOTTLED GAS (20.5%)
LNG/NG input '93	LPG/BOTTLED GAS (18.1%), NATURAL GAS (81.9%)
LNG/NG input '95	NATURAL GAS (83.6%), LPG/BOTTLED GAS (16.4%)
Higher NG input	NATURAL GAS (85.5%), LPG/BOTTLED GAS (14.5%)
Pipeline/LNG	NATURAL GAS (100%)

PROCESS EFFICIENCIES (IN REPORTING YEARS)

Process Name	1990	1995	2000	2010	2020
LNG/NG input '90	100.0%	100.0%	100.0%	100.0%	100.0%
LNG/NG input '93	100.0%	100.0%	100.0%	100.0%	100.0%
LNG/NG input '95	100.0%	100.0%	100.0%	100.0%	100.0%
Higher NG input	100.0%	100.0%	100.0%	100.0%	100.0%
Pipeline/LNG	100.0%	100.0%	100.0%	100.0%	100.0%

PROCESS SHARES (in Reporting Years)

Process Name	1990	1995	2000	2010	2020
LNG/NG input '90	100.0%	0.0%	0.0%	0.0%	0.0%
LNG/NG input '93	0.0%	0.0%	0.0%	0.0%	0.0%
LNG/NG input '95	0.0%	100.0%	70.0%	50.0%	0.0%
Higher NG input	0.0%	15.0%	30.0%	50.0%	75.0%
Pipeline/LNG	0.0%	4.2%	8.3%	16.7%	25.0%

EDB LINKS

Process Name	EDB Link
LNG/NG input '90	
LNG/NG input '93	
LNG/NG input '95	
Higher NG input	
Pipeline/LNG	

BASE YEAR COSTS

Process Name	Variable O&M Cost	Esc. Rate	For. Ex. Fraction

SIMPLE MODULE: BLAST FURN GAS PR

Input Fuel	Output Fuel	Efficiency (in Reporting Years) 1990	1995	2000	2010	2020	Base Year Cost	Esc. Rate	FEF	Cost Unit
COKE (from Coal)	BLAST FURN. GAS	84.0%	84.0%	84.0%	84.0%	84.0%	0.00	0.0%	0.0%	1990 Y/CUB. METERS

Input Fuel	Output Fuel	EDB Links
COKE (from Coal)	BLAST FURN. GAS	COKE PRODUCTION/OVENS / GENERIC

DETAILED MODULE: PETROCHEM. PROD.

Process(s) dispatched by percentage share

PROCESS NAMES, INPUT FUELS & INPUT FUEL SHARES

Process Name	Input Fuels (Shares)
All processes	NATURAL GAS LIQ. (100%)

PROCESS EFFICIENCIES (IN REPORTING YEARS)

Process Name	1990	1995	2000	2010	2020
All processes	100.0%	100.0%	100.0%	100.0%	100.0%

PROCESS BASE YEAR OUTPUTS & CAPACITIES

Output Unit: TONNES
Capacity Unit: THOUSAND Rate

Process Name	Base Yr. Output	Capacity (in Reporting Years) 1990	1995	2000	2010	2020
All processes	3908.7	4000.0	2145.0	2145.0	2145.0	2145.0

EDB LINKS

Process Name	EDB Link
All processes	

BASE YEAR COSTS

Process Name	Variable O&M Cost	Esc. Rate	For. Ex. Fixed Fraction	O&M Cost	Esc. Rate	For. Ex. Capital Fraction	Cost	Esc. Rate	For. Ex. Interest Fraction	Rate	Recovery Period

DETAILED MODULE: REFINING--NON-EN.

Refinery(s) dispatched by percentage share

REFINERY NAMES, INPUT FUELS & INPUT FUEL SHARES

Refinery Name	Input Fuels (Shares)
Non-Energy Prod.	Non-Energy Prod. (100%)

REFINERY EFFICIENCIES (IN REPORTING YEARS)

Refinery Name	1990	1995	2000	2010	2020
Non-Energy Prod.	100.0%	100.0%	100.0%	100.0%	100.0%

EDB LINKS

Refinery Name	EDB Link
Non-Energy Prod.	

BASE YEAR COSTS

Refinery Name	Variable O&M Cost	Esc. Rate	For. Ex. Fraction

DETAILED MODULE: OIL REFINING

Refinery(s) dispatched in proportion to available capacity

REFINERY NAMES, INPUT FUELS & INPUT FUEL SHARES

Refinery Name	Input Fuels (Shares)
All Refineries	CRUDE OIL (99.3%), NATURAL GAS LIQ. (.7%)

REFINERY EFFICIENCIES (IN REPORTING YEARS)

Refinery Name	1990	1995	2000	2010	2020
All Refineries	98.7%	98.4%	98.4%	98.4%	98.4%

REFINERY BASE YEAR OUTPUTS & CAPACITIES

Output Unit: THOUSAND TONNES
Capacity Unit: MILLION Rate

	Base Yr.	Capacity (in Reporting Years)				
Refinery Name	Output	1990	1995	2000	2010	2020
All Refineries	178.8	240.0	240.0	240.0	240.0	240.0

EDB LINKS

Refinery Name	EDB Link
All Refineries	REFINERY/STANDARD / GENERIC

BASE YEAR COSTS

Refinery Name	Variable O&M Cost	Esc. Rate	For. Ex. Fixed Fraction	O&M Cost	Esc. Rate	For. Ex. Capital Fraction	Cost	Esc. Rate	For. Ex. Interest Fraction	Rate	Recovery Period

SIMPLE MODULE: COAL BRIQUETTE PR

Input Fuel	Output Fuel	Efficiency (in Reporting Years) 1990	1995	2000	2010	2020	Base Year Cost	Esc. Rate	FEF	Cost Unit
COAL ANTHRACITE	HARDCOAL BRIQUET	100.0%	100.0%	100.0%	100.0%	100.0%	0.00	0.0%	0.0%	1990 Y/TONNES

Input Fuel	Output Fuel	EDB Links
COAL ANTHRACITE	HARDCOAL BRIQUET	

DETAILED MODULE: PIPELINE GAS IMP.

Pipeline(s) dispatched in proportion to available capacity

PIPELINE NAMES, INPUT FUELS & INPUT FUEL SHARES

Pipeline Name	Input Fuels (Shares)
Sakhal. Pipeline	Pipeline Gas (100%)
Other Pipelines	Pipeline Gas (100%)

PIPELINE EFFICIENCIES (IN REPORTING YEARS)

Pipeline Name	1990	1995	2000	2010	2020
Sakhal. Pipeline	100.0%	100.0%	100.0%	100.0%	100.0%
Other Pipelines	100.0%	100.0%	100.0%	100.0%	100.0%

PIPELINE BASE YEAR OUTPUTS & CAPACITIES

Output Unit: CUB. METERS
Capacity Unit: BILLION Rate

Pipeline Name	Base Yr. Capacity (in Reporting Years) Output	1990	1995	2000	2010	2020
Sakhal. Pipeline	0.0	0.0	0.0	0.0	0.0	0.0
Other Pipelines	0.0	0.0	0.0	0.0	0.0	0.0

EDB LINKS

Pipeline Name	EDB Link
Sakhal. Pipeline	
Other Pipelines	

BASE YEAR COSTS (NOT SHOWN)

DETAILED MODULE: COKE PRODUCTION

Process(s) dispatched in proportion to available capacity

PROCESS NAMES, INPUT FUELS & INPUT FUEL SHARES

Process Name	Input Fuels (Shares)
Gas Coke Prod.	COAL, COKING (79.4%), COAL ANTHRACITE (.7%), PETROLEUM COKE (19.9%)
Steel Coke Prod.	COAL, COKING (99.3%), COAL ANTHRACITE (0%), PETROLEUM COKE (.7%)
Special Coke Pr.	COAL, COKING (96.5%), COAL ANTHRACITE (.3%), PETROLEUM COKE (3.2%)

PROCESS EFFICIENCIES (IN REPORTING YEARS)

Process Name	1990	1995	2000	2010	2020
Gas Coke Prod.	77.5%	77.2%	77.2%	77.2%	77.2%
Steel Coke Prod.	67.1%	67.9%	67.9%	67.9%	67.9%
Special Coke Pr.	70.3%	71.9%	71.9%	71.9%	71.9%

PROCESS BASE YEAR OUTPUTS & CAPACITIES

Output Unit: THOUSAND TONNES
Capacity Unit: THOUSAND Rate

	Base Yr.	Capacity (in Reporting Years)				
Process Name	Output	1990	1995	2000	2010	2020
Gas Coke Prod.	1450.0	1500.0	583.0	583.0	583.0	583.0
Steel Coke Prod.	38700.0	40000.0	36500.0	36500.0	36500.0	36500.0
Special Coke Pr.	7219.0	7500.0	6650.0	6650.0	6650.0	6650.0

ENERGY RECOVERED AS FUEL: COKE OVEN GAS (Share In Reporting Years)

Process Name	1990	1995	2000	2010	2020
Gas Coke Prod.	19.0%	18.2%	18.2%	18.2%	18.2%
Steel Coke Prod.	16.3%	17.2%	17.2%	17.2%	17.2%
Special Coke Pr.	17.2%	17.3%	17.3%	17.3%	17.3%

EDB LINKS

Process Name	EDB Link
Gas Coke Prod.	COKE PRODUCTION/OVENS / GENERIC
Steel Coke Prod.	COKE PRODUCTION/OVENS / GENERIC
Special Coke Pr.	COKE PRODUCTION/OVENS / GENERIC

BASE YEAR COSTS (NONE ENTERED)

DETAILED MODULE: GAS PRODUCTION

Well(s) dispatched in proportion to available capacity

WELL NAMES, INPUT FUELS & INPUT FUEL SHARES

Well Name	Input Fuels (Shares)
All Wells	DOM. NAT GAS RES (100%)
All Wells--1995	DOM. NAT GAS RES (100%)

WELL EFFICIENCIES (IN REPORTING YEARS)

Well Name	1990	1995	2000	2010	2020
All Wells	99.6%	99.6%	99.6%	99.6%	99.6%
All Wells--1995	100.0%	100.0%	100.0%	100.0%	100.0%

WELL BASE YEAR OUTPUTS & CAPACITIES

Output Unit: CUB. METERS
Capacity Unit: MILLION Rate

	Base Yr.	Capacity (in Reporting Years)				
Well Name	Output	1990	1995	2000	2010	2020
All Wells	2127.5	2250.0	0.0	0.0	0.0	0.0
All Wells--1995	0.0	0.0	2400.0	2400.0	2400.0	2400.0

ENERGY RECOVERED AS FUEL: LPG/BOTTLED GAS (Share In Reporting Years)

Well Name	1990	1995	2000	2010	2020
All Wells	0.4%	0.0%	0.0%	0.0%	0.0%
All Wells--1995	0.0%	0.0%	0.0%	0.0%	0.0%

EDB LINKS

Well Name	EDB Link
All Wells	US AVERAGES/NATURAL GAS PROD / NATURAL GAS EXTRACTION
All Wells--1995	US AVERAGES/NATURAL GAS PROD / NATURAL GAS EXTRACTION

BASE YEAR COSTS

Well Name	Variable O&M Cost	Esc. Rate	For. Ex. Fixed Fraction O&M Cost	Esc. Rate	For. Ex. Capital Fraction Cost	Esc. Rate	For. Ex. Interest Fraction Rate	Recovery Period

DETAILED MODULE: LNG IMPORTS

Facilit.(s) dispatched in proportion to available capacity

FACILIT. NAMES, INPUT FUELS & INPUT FUEL SHARES

Facilit. Name	Input Fuels (Shares)
Exist. LNG Term.	LNG (100%)
New LNG Term	LNG (100%)

FACILIT. EFFICIENCIES (IN REPORTING YEARS)

Facilit. Name	1990	1995	2000	2010	2020
Exist. LNG Term.	100.0%	100.0%	100.0%	100.0%	100.0%
New LNG Term	100.0%	100.0%	100.0%	100.0%	100.0%

FACILIT. BASE YEAR OUTPUTS & CAPACITIES

Output Unit: CUB. METERS
Capacity Unit: BILLION Rate

	Base Yr. Capacity (in Reporting Years)					
Facilit. Name	Output	1990	1995	2000	2010	2020
Exist. LNG Term.	49.6	99.2	116.2	116.2	116.2	116.2
New LNG Term	0.0	0.0	0.0	20.0	80.0	160.0

EDB LINKS

Facilit. Name	EDB Link
Exist. LNG Term.	
New LNG Term	

BASE YEAR COSTS

Facilit. Name	Variable O&M Cost	Esc. Rate	For. Ex. Fixed Fraction O&M Cost	Esc. Rate	For. Ex. Capital Fraction Cost	Esc. Rate	For. Ex. Interest Fraction Rate	Recovery Period

DETAILED MODULE: CRUDE OIL PRODN.

Well(s) dispatched in proportion to available capacity

WELL NAMES, INPUT FUELS & INPUT FUEL SHARES

Well Name	Input Fuels (Shares)
All Wells	CRUDE OIL (100%)

WELL EFFICIENCIES (IN REPORTING YEARS)

Well Name	1990	1995	2000	2010	2020
All Wells	100.0%	100.0%	100.0%	100.0%	100.0%

WELL BASE YEAR OUTPUTS & CAPACITIES

Output Unit: THOUSAND TONNES
Capacity Unit: THOUSAND Rate

	Base Yr.	Capacity (in Reporting Years)				
Well Name	Output	1990	1995	2000	2010	2020
All Wells	55.6	60.0	79.5	79.5	79.5	79.5

EDB LINKS

Well Name	EDB Link
All Wells	CRUDE OIL PRODUCTION/OFFSHORE / US MAINLAND

BASE YEAR COSTS

Well Name	Variable O&M Cost	Esc. Rate	For. Ex. Fixed Fraction O&M Cost	Esc. Rate	For. Ex. Capital Fraction Cost	Esc. Rate	For. Ex. Interest Fraction Rate	Recovery Period

DETAILED MODULE: ANTHR. COAL PROD.

Mines(s) dispatched by percentage share

MINES NAMES, INPUT FUELS & INPUT FUEL SHARES

Mines Name	Input Fuels (Shares)
Anthracite Mines	COAL ANTHRACITE (100%)

MINES EFFICIENCIES (IN REPORTING YEARS)

Mines Name	1990	1995	2000	2010	2020
Anthracite Mines	80.0%	80.0%	80.0%	80.0%	80.0%

MINES BASE YEAR OUTPUTS & CAPACITIES

Output Unit: THOUSAND TONNES
Capacity Unit: THOUSAND Rate

	Base Yr.	Capacity (in Reporting Years)				
Mines Name	Output	1990	1995	2000	2010	2020
Anthracite Mines	150.8	165.0	120.6	120.6	120.6	120.6

EDB LINKS

Mines Name	EDB Link
Anthracite Mines	COAL PRODUCTION/UNDERGROUND MINES / EASTERN US TYPE * WITH COAL PREPARATION PLANT

BASE YEAR COSTS

Mines Name	Variable O&M Cost	Esc. Rate	For. Ex. Fixed O&M Fraction	Esc. Rate	For. Ex. Capital Cost Fraction	Esc. Rate	For. Ex. Interest Fraction	Recovery Period

DETAILED MODULE: COKING COAL PROD.

Mines(s) dispatched by percentage share

MINES NAMES, INPUT FUELS & INPUT FUEL SHARES

Mines Name	Input Fuels (Shares)
Coking Coal Mine	COAL, COKING (100%)

MINES EFFICIENCIES (IN REPORTING YEARS)

Mines Name	1990	1995	2000	2010	2020
Coking Coal Mine	80.0%	80.0%	80.0%	80.0%	80.0%

MINES BASE YEAR OUTPUTS & CAPACITIES

Output Unit: MILLION TONNES
Capacity Unit: THOUSAND Rate

	Base Yr.	Capacity (in Reporting Years)				
Mines Name	Output	1990	1995	2000	2010	2020
Coking Coal Mine	694.7	750.0	0.0	0.0	0.0	0.0

EDB LINKS

Mines Name	EDB Link
Coking Coal Mine	COAL PRODUCTION/UNDERGROUND MINES / EASTERN US TYPE * WITH COAL PREPARATION PLANT

BASE YEAR COSTS

Mines Name	Variable O&M Cost	Esc. Rate	For. Ex. Fixed Fraction	O&M Cost	Esc. Rate	For. Ex. Capital Fraction	Cost	Esc. Rate	For. Ex. Interest Fraction	Recovery Rate	Period

DETAILED MODULE: BITUM. COAL PROD.

Mine(s) dispatched in proportion to available capacity

MINE NAMES, INPUT FUELS & INPUT FUEL SHARES

Mine Name	Input Fuels (Shares)
Bituminous Mines	COAL BITUMINOUS (100%)

MINE EFFICIENCIES (IN REPORTING YEARS)

Mine Name	1990	1995	2000	2010	2020
Bituminous Mines	80.0%	80.0%	80.0%	80.0%	80.0%

MINE BASE YEAR OUTPUTS & CAPACITIES

Output Unit: THOUSAND TONNES
Capacity Unit: THOUSAND Rate

Mine Name	Base Yr. Output	Capacity (in Reporting Years) 1990	1995	2000	2010	2020
Bituminous Mines	9248.6	10000.0	6746.0	6746.0	6746.0	6746.0

EDB LINKS

Mine Name	EDB Link
Bituminous Mines	COAL PRODUCTION/UNDERGROUND MINES / EASTERN US TYPE * WITH COAL PREPARATION PLANT

BASE YEAR COSTS

Mine Name	Variable O&M Cost	Esc. Rate	For. Ex. Fixed Fraction O&M Cost	Esc. Rate	For. Ex. Capital Fraction Cost	Esc. Rate	For. Ex. Interest Fraction Rate	Recovery Period

AREA: NEA_JPN3, Scenario: BA - BASE CASE

TRANSFORMATION DATA ECHO REPORT

PART 2: Base Year Data Echo by Process

```
Module:               T&D Losses
Process:              ELECTRICITY
Efficiency:           94.14%
EDB Link:             None
Feedstock Fuels:      ELECTRICITY
Output Fuels:         ELECTRICITY

Module:               T&D Losses
Process:              MUNICIPAL GAS
Efficiency:           99.66%
EDB Link:             FUEL DISTRIBUTION LOSSES/NATURAL GAS/GENERIC
Feedstock Fuels:      MUNICIPAL GAS
Output Fuels:         MUNICIPAL GAS


Module:               Charcoal Prodn
Kiln:                 All Kilns
Efficiency:           35.00%
Kiln Lifetime:        not specified (see costs screen)
EDB Link:             None
Feedstock Fuels:      WOOD FOR CHARC.
Output Fuels:         CHARCOAL


Module:               District Heat
Process:              All Plants--1993
Efficiency:           100.00%
Process Lifetime:     not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-NAT GAS
                      /SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
Feedstock Fuels:      MUNICIPAL GAS (79%), LPG/BOTTLED GAS (2.6%), HEAVY OIL C (7.7%), ...(5)
Output Fuels:         HEAT (DISTRICT)

Module:               District Heat
Process:              All Plants--1990
Efficiency:           100.00%
Process Lifetime:     not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-NAT GAS
                      /SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
Feedstock Fuels:      COAL BITUMINOUS (7.9%), KEROSENE (16.7%), HEAVY OIL C (7.5%), ...(5)
Output Fuels:         HEAT (DISTRICT)
Aux. Input Fuels:     ELECTRICITY

Module:               District Heat
Process:              All Plants--1995
Efficiency:           100.00%
Process Lifetime:     not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-NAT GAS
                      /SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
Feedstock Fuels:      MUNICIPAL GAS (83.6%), LPG/BOTTLED GAS (1.9%), HEAVY OIL C (6.2%), ...(5)
Output Fuels:         HEAT (DISTRICT)


Module:               Electricity Gen.
Plant:                Nucl.--Exist BWR
Efficiency:           33.00%
Base Year Output:     121970.00 GIGAWATT-HOURS
Capacity:             19297.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-NUCLEAR
                      /BOILING WATER REACTOR (GENERAL ELECTRIC BWR/6)
Feedstock Fuels:      NUCLEAR
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)
```

```
Module:               Electricity Gen.
Plant:                Nucl.--Exist PWR
Efficiency:           33.00%
Base Year Output:     78279.30 GIGAWATT-HOURS
Capacity:             12596.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-NUCLEAR
                      /PRESSURIZED WATER REACTOR (USDOE)
Feedstock Fuels:      NUCLEAR
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Nucl.--Exist HWR
Efficiency:           33.00%
Base Year Output:     969.00 GIGAWATT-HOURS
Capacity:             165.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             None
Feedstock Fuels:      NUCLEAR
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Nucl.--Exist GCR
Efficiency:           33.00%
Base Year Output:     1041.10 GIGAWATT-HOURS
Capacity:             166.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             None
Feedstock Fuels:      NUCLEAR
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Nucl.--New BWRs
Efficiency:           33.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       30 years
EDB Link:             ELECTRICITY GENERATION/STEAM-NUCLEAR
                      /BOILING WATER REACTOR (GENERAL ELECTRIC BWR/6)
Feedstock Fuels:      NUCLEAR
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Nucl.--New PWRs
Efficiency:           33.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       30 years
EDB Link:             ELECTRICITY GENERATION/STEAM-NUCLEAR
                      /PRESSURIZED WATER REACTOR (USDOE)
Feedstock Fuels:      NUCLEAR
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)
```

```
Module:               Electricity Gen.
Plant:                Nucl. New APWRs
Efficiency:           33.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-NUCLEAR
                      /PRESSURIZED WATER REACTOR (USDOE)
Feedstock Fuels:      NUCLEAR
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Nucl. New ABWRs
Efficiency:           33.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-NUCLEAR
                      /BOILING WATER REACTOR (GENERAL ELECTRIC BWR/6)
Feedstock Fuels:      NUCLEAR
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Nucl., FBR
Efficiency:           33.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             None
Feedstock Fuels:      NUCLEAR
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Hydro--Convent.
Efficiency:           100.00%
Base Year Output:     88421.00 GIGAWATT-HOURS
Capacity:             20831.00 MEGAWATTS
Max. Capacity Factor: 55.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             None
Feedstock Fuels:      HYDRO
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Pumped St. Hydro
Efficiency:           72.00%
Base Year Output:     7201.00 GIGAWATT-HOURS
Capacity:             17000.00 MEGAWATTS
Max. Capacity Factor: 10.00%
Merit Order:          Peak load
Plant Lifetime:       not specified (see costs screen)
EDB Link:             None
Feedstock Fuels:      ELECTRICITY
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)
```

```
Module:               Electricity Gen.
Plant:                Geothermal--Util
Efficiency:           10.00%
Base Year Output:     1485.00 GIGAWATT-HOURS
Capacity:             240.00 MEGAWATTS
Max. Capacity Factor: 80.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-GEOTHERMAL
                      /VAPOR DOMINATED SYSTEM (dry steam)
Feedstock Fuels:      GEOTHERMAL
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Geothermal--Auto
Efficiency:           10.00%
Base Year Output:     257.00 GIGAWATT-HOURS
Capacity:             31.00 MEGAWATTS
Max. Capacity Factor: 95.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-GEOTHERMAL
                      /VAPOR DOMINATED SYSTEM (dry steam)
Feedstock Fuels:      GEOTHERMAL
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Gas Turbine-Util
Efficiency:           30.00%
Base Year Output:     8857.00 GIGAWATT-HOURS
Capacity:             2365.00 MEGAWATTS
Max. Capacity Factor: 55.00%
Merit Order:          Peak load
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/TURBINE-NAT GAS
                      /GENERIC * NO EC
Feedstock Fuels:      NATURAL GAS
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Int. Comb--Util
Efficiency:           28.00%
Base Year Output:     9094.00 GIGAWATT-HOURS
Capacity:             2822.00 MEGAWATTS
Max. Capacity Factor: 55.00%
Merit Order:          Peak load
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/ENGINE-NAT GAS/GENERIC
Feedstock Fuels:      DIESEL/GAS OIL (5.1%), NAPTHA (4.3%), NATURAL GAS LIQ. (16.6%), ...(5)
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Coal Steam--Util
Efficiency:           44.60%
Base Year Output:     72600.00 GIGAWATT-HOURS
Capacity:             12420.00 MEGAWATTS
Max. Capacity Factor: 75.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-BITUM COAL
                      /US * ELECTROSTATIC PRECIPITATOR AND SOX SCRUBBER
Feedstock Fuels:      COAL BITUMINOUS
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)
```

```
Module:               Electricity Gen.
Plant:                Coal Steam--Auto
Efficiency:           44.60%
Base Year Output:     14021.00 GIGAWATT-HOURS
Capacity:             2776.00 MEGAWATTS
Max. Capacity Factor: 75.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-BITUM COAL
                      /US * ELECTROSTATIC PRECIPITATOR AND SOX SCRUBBER
Feedstock Fuels:      COAL BITUMINOUS (97.3%), COAL ANTHRACITE (2.7%)
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Coal/Ck Gas-Util
Efficiency:           44.60%
Base Year Output:     21665.00 GIGAWATT-HOURS
Capacity:             3706.00 MEGAWATTS
Max. Capacity Factor: 75.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-NAT GAS
                      /SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
Feedstock Fuels:      Coke Oven Gas (27.8%), BLAST FURN. GAS (72.2%)
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Coal/Ck Gas-Auto
Efficiency:           44.60%
Base Year Output:     14966.00 GIGAWATT-HOURS
Capacity:             2964.00 MEGAWATTS
Max. Capacity Factor: 75.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             ELECTRICITY GENERATION/STEAM-NAT GAS
                      /SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
Feedstock Fuels:      Coke Oven Gas (19.3%), BLAST FURN. GAS (80.7%)
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Std. Coal, New
Efficiency:           44.60%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 75.00%
Merit Order:          Base load 1
Plant Lifetime:       25 years
EDB Link:             US Averages/Electricity Gen.
                      /NEW COAL STEAM: 67% AFBC / 33% IGCC
Feedstock Fuels:      COAL BITUMINOUS
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Stm Nat Gas-Util
Efficiency:           44.70%
Base Year Output:     153501.00 GIGAWATT-HOURS
Capacity:             35409.00 MEGAWATTS
Max. Capacity Factor: 50.50%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             US Averages/Electricity Gen.
                      /EXISTING NATURAL GAS STEAM
Feedstock Fuels:      NATURAL GAS
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)
```

```
Module:               Electricity Gen.
Plant:                Stm Nat Gas-Auto
Efficiency:           44.70%
Base Year Output:     168.00 GIGAWATT-HOURS
Capacity:             33.30 MEGAWATTS
Max. Capacity Factor: 60.00%
Merit Order:          Base load 2
Plant Lifetime:       not specified (see costs screen)
EDB Link:             US Averages/Electricity Gen.
                      /EXISTING NATURAL GAS STEAM
Feedstock Fuels:      MUNICIPAL GAS
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Steam Gas--New
Efficiency:           44.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 75.00%
Merit Order:          Base load 2
Plant Lifetime:       25 years
EDB Link:             US Averages/Electricity Gen.
                      /EXISTING NATURAL GAS STEAM
Feedstock Fuels:      NATURAL GAS
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Gas Comb Cy, New
Efficiency:           47.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 75.00%
Merit Order:          Base load 2
Plant Lifetime:       25 years
EDB Link:             US Averages/Electricity Gen.
                      /NEW NATURAL GAS COMBINED CYCLE
Feedstock Fuels:      NATURAL GAS
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Serv Cogen--Gas
Efficiency:           28.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 42.00%
Merit Order:          Base load 1
Plant Lifetime:       20 years
EDB Link:             US Averages/Electricity Gen.
                      /NEW NATURAL GAS COMBINED CYCLE
Feedstock Fuels:      MUNICIPAL GAS
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Serv FC Cogen-Gs
Efficiency:           45.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 42.00%
Merit Order:          Base load 1
Plant Lifetime:       20 years
EDB Link:             ELECTRICITY GENERATION/FUEL CELLS
                      /11 MW PHOSPHORIC ACID CELL-NG
Feedstock Fuels:      MUNICIPAL GAS
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)
```

```
Module:               Electricity Gen.
Plant:                Ind Cogen--Gas
Efficiency:           28.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 52.00%
Merit Order:          Base load 1
Plant Lifetime:       20 years
EDB Link:             US Averages/Electricity Gen.
                      /NEW NATURAL GAS COMBINED CYCLE
Feedstock Fuels:      MUNICIPAL GAS
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Ind FC Cogen-Gas
Efficiency:           45.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 52.00%
Merit Order:          Base load 1
Plant Lifetime:       20 years
EDB Link:             ELECTRICITY GENERATION/FUEL CELLS
                      /11 MW PHOSPHORIC ACID CELL-NG
Feedstock Fuels:      MUNICIPAL GAS
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Steam Oil--Util
Efficiency:           43.50%
Base Year Output:     200248.00 GIGAWATT-HOURS
Capacity:             53894.00 MEGAWATTS
Max. Capacity Factor: 60.00%
Merit Order:          Base load 2
Plant Lifetime:       not specified (see costs screen)
EDB Link:             US Averages/Electricity Gen.
                      /EXISTING RESIDUAL STEAM
Feedstock Fuels:      CRUDE OIL (46.4%), HEAVY OIL C (53.6%)
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Stm Hvy Oil-Auto
Efficiency:           43.50%
Base Year Output:     52262.00 GIGAWATT-HOURS
Capacity:             10349.00 MEGAWATTS
Max. Capacity Factor: 60.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             US Averages/Electricity Gen.
                      /EXISTING RESIDUAL STEAM
Feedstock Fuels:      HEAVY OIL B (.1%), HEAVY OIL C (90.1%), PETROLEUM COKE (9.8%)
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Stm Lt Oil--Auto
Efficiency:           43.50%
Base Year Output:     10216.00 GIGAWATT-HOURS
Capacity:             2023.00 MEGAWATTS
Max. Capacity Factor: 60.00%
Merit Order:          Base load 1
Plant Lifetime:       not specified (see costs screen)
EDB Link:             US Averages/Electricity Gen.
                      /EXISTING DISTILLATE STEAM
Feedstock Fuels:      NAPTHA (44%), HEAVY OIL A (23.4%), Refinery Gas (26.7%), ...(4)
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)
```

```
Module:               Electricity Gen.
Plant:                Oil CC, New
Efficiency:           46.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 75.00%
Merit Order:          Base load 2
Plant Lifetime:       25 years
EDB Link:             US Averages/Electricity Gen.
                      /NEW DISTILLATE COMBUSTION TURBINE
Feedstock Fuels:      HEAVY OIL C
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                MSW-Fired Plants
Efficiency:           25.00%
Base Year Output:     1180.00 GIGAWATT-HOURS
Capacity:             234.00 MEGAWATTS
Max. Capacity Factor: 70.00%
Merit Order:          Base load 1
Plant Lifetime:       25 years
EDB Link:             ELECTRICITY GENERATION/STEAM-MSW
                      /GENERIC * MASS FEED
Feedstock Fuels:      MUN. SOLID WASTE
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Wind Power
Efficiency:           20.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 30.00%
Merit Order:          Base load 1
Plant Lifetime:       25 years
EDB Link:             None
Feedstock Fuels:      WIND
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Biomass/Wst-Auto
Efficiency:           25.00%
Base Year Output:     8717.00 GIGAWATT-HOURS
Capacity:             1726.00 MEGAWATTS
Max. Capacity Factor: 70.00%
Merit Order:          Base load 1
Plant Lifetime:       25 years
EDB Link:             US Averages/Electricity Gen.
                      /EXISTING WOOD/BARK STEAM
Feedstock Fuels:      Biomass/Wood/Wst
Output Fuels:         ELECTRICITY
Aux. Input Fuels:     ELECTRICITY
Recovered Fuel:       HEAT (COGEN)

Module:               Electricity Gen.
Plant:                Solar PV--Resid.
Efficiency:           12.00%
Base Year Output:     0.00 GIGAWATT-HOURS
Capacity:             0.00 MEGAWATTS
Max. Capacity Factor: 15.50%
Merit Order:          Base load 1
Plant Lifetime:       20 years
EDB Link:             None
Feedstock Fuels:      SOLAR
Output Fuels:         ELECTRICITY
Recovered Fuel:       HEAT (COGEN)
```

Module: Electricity Gen.
Plant: Solar PV-Comml
Efficiency: 12.00%
Base Year Output: 0.00 GIGAWATT-HOURS
Capacity: 0.00 MEGAWATTS
Max. Capacity Factor: 15.50%
Merit Order: Base load 1
Plant Lifetime: 20 years
EDB Link: None
Feedstock Fuels: SOLAR
Output Fuels: ELECTRICITY
Recovered Fuel: HEAT (COGEN)

Module: Electricity Gen.
Plant: Solar PV--Util.
Efficiency: 15.00%
Base Year Output: 0.00 GIGAWATT-HOURS
Capacity: 0.00 MEGAWATTS
Max. Capacity Factor: 20.00%
Merit Order: Base load 1
Plant Lifetime: 20 years
EDB Link: None
Feedstock Fuels: SOLAR
Output Fuels: ELECTRICITY
Recovered Fuel: HEAT (COGEN)

Module: Municipal Gas Pr.
Process: Gas Prod--1990
Efficiency: 100.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: Input to Mun Gas (93%), Refinery Gas (2.4%), COKE (from Coal) (.1%), ...(5)
Output Fuels: MUNICIPAL GAS

Module: Municipal Gas Pr.
Process: Gas Prod--1993
Efficiency: 100.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: Input to Mun Gas (94.5%), Coke Oven Gas (1.9%), NAPTHA (1.7%), ...(4)
Output Fuels: MUNICIPAL GAS

Module: Municipal Gas Pr.
Process: Gas Prod--1995
Efficiency: 100.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: Input to Mun Gas (95.1%), Refinery Gas (1.8%), NAPTHA (1.7%), ...(4)
Output Fuels: MUNICIPAL GAS

Module: Municipal Gas Pr.
Process: Gas Prod--Hi NG
Efficiency: 100.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: Input to Mun Gas (97.5%), Refinery Gas (1%), NAPTHA (1%), ...(4)
Output Fuels: MUNICIPAL GAS

Module: Munic Gas Input
Process: LNG/NG input '90
Efficiency: 100.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: NATURAL GAS (79.5%), LPG/BOTTLED GAS (20.5%)
Output Fuels: Input to Mun Gas

Module: Munic Gas Input
Process: LNG/NG input '93
Efficiency: 100.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: LPG/BOTTLED GAS (18.1%), NATURAL GAS (81.9%)
Output Fuels: Input to Mun Gas

Module: Munic Gas Input
Process: LNG/NG input '95
Efficiency: 100.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: NATURAL GAS (83.6%), LPG/BOTTLED GAS (16.4%)
Output Fuels: Input to Mun Gas

Module: Munic Gas Input
Process: Higher NG input
Efficiency: 100.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: NATURAL GAS (85.5%), LPG/BOTTLED GAS (14.5%)
Output Fuels: Input to Mun Gas

Module: Munic Gas Input
Process: Pipeline/LNG
Efficiency: 100.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: NATURAL GAS
Output Fuels: Input to Mun Gas

Module: Blast Furn Gas Pr
Process: BLAST FURN. GAS
Efficiency: 84.03%
EDB Link: COKE PRODUCTION/OVENS/GENERIC
Feedstock Fuels: COKE (from Coal)
Output Fuels: BLAST FURN. GAS

Module: Petrochem. Prod.
Process: All processes
Efficiency: 100.00%
Base Year Output: 3908.70 THOUSAND TONNES
Capacity: 4000.00 THOUSAND TONNES/YR
Max. Capacity Factor: 98.00%
Process Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: NATURAL GAS LIQ.
Output Fuels: NAPTHA, Refinery Gas

Module: Refining--Non-En.
Refinery: Non-Energy Prod.
Efficiency: 100.00%
Refinery Lifetime: not specified (see costs screen)
EDB Link: None
Feedstock Fuels: Non-Energy Prod.
Output Fuels: OTHER PETRO PROD, LUBRICATING OIL, PETROLEUM COKE

Module: Oil Refining
Refinery: All Refineries
Efficiency: 98.70%
Base Year Output: 178.80 MILLION TONNES
Capacity: 240.00 MILLION TONNES/YR
Max. Capacity Factor: 95.00%
Refinery Lifetime: not specified (see costs screen)
EDB Link: REFINERY/STANDARD/GENERIC
Feedstock Fuels: CRUDE OIL (99.3%), NATURAL GAS LIQ. (.7%)
Output Fuels: GASOLINE, NAPTHA, KEROSENE, ...(11)
Aux. Input Fuels: Refinery Gas, ELECTRICITY

Module: Coal Briquette Pr
Process: HARDCOAL BRIQUET
Efficiency: 100.00%
EDB Link: None
Feedstock Fuels: COAL ANTHRACITE
Output Fuels: HARDCOAL BRIQUET

Module: Pipeline Gas Imp.
Pipeline: Sakhal. Pipeline
Efficiency: 100.00%
Base Year Output: 0.00 BILLION CUB. METERS
Capacity: 0.00 BILLION M3/YR
Max. Capacity Factor: 100.00%
Pipeline Lifetime: 25 years
EDB Link: None
Feedstock Fuels: Pipeline Gas
Output Fuels: NATURAL GAS
Aux. Input Fuels: NATURAL GAS

Module: Pipeline Gas Imp.
Pipeline: Other Pipelines
Efficiency: 100.00%
Base Year Output: 0.00 BILLION CUB. METERS
Capacity: 0.00 BILLION M3/YR
Max. Capacity Factor: 100.00%
Pipeline Lifetime: 25 years
EDB Link: None
Feedstock Fuels: Pipeline Gas
Output Fuels: NATURAL GAS

Module: Coke Production
Process: Gas Coke Prod.
Efficiency: 77.50%
Base Year Output: 1450.00 THOUSAND TONNES
Capacity: 1500.00 THOUSAND TONNES/YR
Max. Capacity Factor: 97.00%
Process Lifetime: not specified (see costs screen)
EDB Link: COKE PRODUCTION/OVENS/GENERIC
Feedstock Fuels: COAL, COKING (79.4%), COAL ANTHRACITE (.7%), PETROLEUM COKE (19.9%)
Output Fuels: COKE (from Coal)
Recovered Fuel: Coke Oven Gas

Module: Coke Production
Process: Steel Coke Prod.
Efficiency: 67.10%
Base Year Output: 38700.00 THOUSAND TONNES
Capacity: 40000.00 THOUSAND TONNES/YR
Max. Capacity Factor: 97.00%
Process Lifetime: not specified (see costs screen)
EDB Link: COKE PRODUCTION/OVENS/GENERIC
Feedstock Fuels: COAL, COKING (99.3%), COAL ANTHRACITE, PETROLEUM COKE (.7%)
Output Fuels: COKE (from Coal)
Recovered Fuel: Coke Oven Gas

Module: Coke Production
Process: Special Coke Pr.
Efficiency: 70.30%
Base Year Output: 7219.00 THOUSAND TONNES
Capacity: 7500.00 THOUSAND TONNES/YR
Max. Capacity Factor: 97.00%
Process Lifetime: not specified (see costs screen)
EDB Link: COKE PRODUCTION/OVENS/GENERIC
Feedstock Fuels: COAL, COKING (96.5%), COAL ANTHRACITE (.3%), PETROLEUM COKE (3.2%)
Output Fuels: COKE (from Coal)
Recovered Fuel: Coke Oven Gas

Module: Gas Production
Well: All Wells
Efficiency: 99.60%
Base Year Output: 2127.50 MILLION CUB. METERS
Capacity: 2250.00 MILLION M3/YR
Max. Capacity Factor: 95.00%
Well Lifetime: not specified (see costs screen)
EDB Link: US Averages/Natural Gas Prod
/NATURAL GAS EXTRACTION
Feedstock Fuels: DOM. NAT GAS RES
Output Fuels: NATURAL GAS
Aux. Input Fuels: NATURAL GAS
Recovered Fuel: LPG/BOTTLED GAS

```
Module:               Gas Production
Well:                 All Wells--1995
Efficiency:           100.00%
Base Year Output:     0.00 MILLION CUB. METERS
Capacity:             0.00 MILLION M3/YR
Max. Capacity Factor: 100.00%
Well Lifetime:        not specified (see costs screen)
EDB Link:             US Averages/Natural Gas Prod
                      /NATURAL GAS EXTRACTION
Feedstock Fuels:      DOM. NAT GAS RES
Output Fuels:         NATURAL GAS
Aux. Input Fuels:     NATURAL GAS
Recovered Fuel:       LPG/BOTTLED GAS


Module:               LNG Imports
Facilit.:             Exist. LNG Term.
Efficiency:           100.00%
Base Year Output:     49.60 BILLION CUB. METERS
Capacity:             99.20 BILLION M3/YR
Max. Capacity Factor: 100.00%
Facilit. Lifetime:    25 years
EDB Link:             None
Feedstock Fuels:      LNG
Output Fuels:         NATURAL GAS
Aux. Input Fuels:     NATURAL GAS

Module:               LNG Imports
Facilit.:             New LNG Term
Efficiency:           100.00%
Base Year Output:     0.00 BILLION CUB. METERS
Capacity:             0.00 BILLION M3/YR
Max. Capacity Factor: 100.00%
Facilit. Lifetime:    25 years
EDB Link:             None
Feedstock Fuels:      LNG
Output Fuels:         NATURAL GAS
Aux. Input Fuels:     NATURAL GAS


Module:               Crude Oil Prodn.
Well:                 All Wells
Efficiency:           100.00%
Base Year Output:     55.60 THOUSAND TONNES
Capacity:             60.00 THOUSAND TONNES/YR
Max. Capacity Factor: 93.00%
Well Lifetime:        not specified (see costs screen)
EDB Link:             CRUDE OIL PRODUCTION/OFFSHORE/US MAINLAND
Feedstock Fuels:      CRUDE OIL
Output Fuels:         CRUDE OIL
Aux. Input Fuels:     DIESEL/GAS OIL


Module:               Anthr. Coal Prod.
Mines:                Anthracite Mines
Efficiency:           80.00%
Base Year Output:     150.80 THOUSAND TONNES
Capacity:             165.00 THOUSAND TONNES/YR
Max. Capacity Factor: 97.00%
Mines Lifetime:       not specified (see costs screen)
EDB Link:             COAL PRODUCTION/UNDERGROUND MINES
                      /EASTERN US TYPE * WITH COAL PREPARATION PLANT
Feedstock Fuels:      COAL ANTHRACITE
Output Fuels:         COAL ANTHRACITE


Module:               Coking Coal Prod.
Mines:                Coking Coal Mine
Efficiency:           80.00%
Base Year Output:     694.70 THOUSAND TONNES
Capacity:             750.00 THOUSAND TONNES/YR
Max. Capacity Factor: 97.00%
Mines Lifetime:       not specified (see costs screen)
EDB Link:             COAL PRODUCTION/UNDERGROUND MINES
                      /EASTERN US TYPE * WITH COAL PREPARATION PLANT
Feedstock Fuels:      COAL, COKING
Output Fuels:         COAL, COKING
```

Module:	Bitum. Coal Prod.
Mine:	Bituminous Mines
Efficiency:	80.00%
Base Year Output:	9248.60 THOUSAND TONNES
Capacity:	10000.00 THOUSAND TONNES/YR
Max. Capacity Factor:	97.00%
Mine Lifetime:	not specified (see costs screen)
EDB Link:	COAL PRODUCTION/UNDERGROUND MINES /EASTERN US TYPE * WITH COAL PREPARATION PLANT
Feedstock Fuels:	COAL BITUMINOUS
Output Fuels:	COAL BITUMINOUS
Aux. Input Fuels:	COAL BITUMINOUS

LEAP Transformation "Data Echo" for Alternative Path
(Electricity, LNG, and Pipeline Gas Modules Only)

ELECTRICITY MODULE: ELECTRICITY GEN.

Plant(s) dispatched by merit order using default load curve

PLANT NAMES, INPUT FUELS & INPUT FUEL SHARES

Plant Name	Input Fuels (Shares)
Nucl.--Exist BWR	NUCLEAR (100%)
Nucl.--Exist PWR	NUCLEAR (100%)
Nucl.--Exist HWR	NUCLEAR (100%)
Nucl.--Exist GCR	NUCLEAR (100%)
Nucl.--New BWRs	NUCLEAR (100%)
Nucl.--New PWRs	NUCLEAR (100%)
Nucl. New APWRs	NUCLEAR (100%)
Nucl. New ABWRs	NUCLEAR (100%)
Nucl., FBR	NUCLEAR (100%)
Hydro--Convent.	HYDRO (100%)
Pumped St. Hydro	ELECTRICITY (100%)
Geothermal--Util	GEOTHERMAL (100%)
Geothermal--Auto	GEOTHERMAL (100%)
Gas Turbine-Util	NATURAL GAS (100%)
Int. Comb--Util	DIESEL/GAS OIL (5.1%), NAPTHA (4.3%), NATURAL GAS LIQ. (16.6%), LPG/BOTTLED GAS (38.3%), NATURAL GAS (35.7%)
Coal Steam--Util	COAL BITUMINOUS (100%)
Coal Steam--Auto	COAL BITUMINOUS (97.3%), COAL ANTHRACITE (2.7%)
Coal/Ck Gas-Util	Coke Oven Gas (27.8%), BLAST FURN. GAS (72.2%)
Coal/Ck Gas-Auto	Coke Oven Gas (19.3%), BLAST FURN. GAS (80.7%)
Std. Coal, New	COAL BITUMINOUS (100%)
Stm Nat Gas-Util	NATURAL GAS (100%)
Stm Nat Gas-Auto	MUNICIPAL GAS (100%)
Steam Gas--New	NATURAL GAS (100%)
Gas Comb Cy, New	NATURAL GAS (100%)
Serv Cogen--Gas	MUNICIPAL GAS (100%)
Serv FC Cogen-Gs	MUNICIPAL GAS (100%)
Ind Cogen--Gas	MUNICIPAL GAS (100%)
Ind FC Cogen-Gas	MUNICIPAL GAS (100%)
Steam Oil--Util	CRUDE OIL (46.4%), HEAVY OIL C (53.6%)
Stm Hvy Oil-Auto	HEAVY OIL B (.1%), HEAVY OIL C (90.1%), PETROLEUM COKE (9.8%)
Stm Lt Oil--Auto	NAPTHA (44%), HEAVY OIL A (23.4%), Refinery Gas (26.7%), LPG/BOTTLED GAS (5.9%)
Oil CC, New	HEAVY OIL C (100%)
MSW-Fired Plants	MUN. SOLID WASTE (100%)
Wind Power	WIND (100%)
Biomass/Wst-Auto	Biomass/Wood/Wst (100%)
Solar PV--Resid.	SOLAR (100%)
Solar PV-Comml	SOLAR (100%)
Solar PV--Util.	SOLAR (100%)

PLANT EFFICIENCIES (IN REPORTING YEARS)

Plant Name	1990	1995	2000	2010	2020
Nucl.--Exist BWR	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--Exist PWR	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--Exist HWR	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--Exist GCR	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--New BWRs	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl.--New PWRs	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl. New APWRs	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl. New ABWRs	33.0%	33.0%	33.0%	33.0%	33.0%
Nucl., FBR	33.0%	33.0%	33.0%	33.0%	33.0%
Hydro--Convent.	100.0%	100.0%	100.0%	100.0%	100.0%
Pumped St. Hydro	72.0%	72.0%	72.0%	72.0%	72.0%
Geothermal--Util	10.0%	10.0%	10.0%	10.0%	10.0%
Geothermal--Auto	10.0%	10.0%	10.0%	10.0%	10.0%
Gas Turbine-Util	30.0%	30.0%	30.0%	30.0%	30.0%
Int. Comb--Util	28.0%	28.0%	28.0%	28.0%	28.0%
Coal Steam--Util	44.6%	44.6%	44.6%	44.6%	44.6%
Coal Steam--Auto	44.6%	44.6%	44.6%	44.6%	44.6%
Coal/Ck Gas-Util	44.6%	44.6%	44.6%	44.6%	44.6%
Coal/Ck Gas-Auto	44.6%	44.6%	44.6%	44.6%	44.6%
Std. Coal, New	44.6%	44.6%	44.6%	44.6%	44.6%
Stm Nat Gas-Util	44.7%	44.7%	44.7%	46.7%	47.7%
Stm Nat Gas-Auto	44.7%	44.7%	44.7%	44.7%	44.7%
Steam Gas--New	44.0%	44.0%	44.0%	44.0%	44.0%
Gas Comb Cy, New	47.0%	47.0%	47.0%	47.0%	47.0%
Serv Cogen--Gas	28.0%	28.0%	28.0%	30.0%	32.0%
Serv FC Cogen-Gs	45.0%	45.0%	45.0%	46.0%	47.0%
Ind Cogen--Gas	28.0%	28.0%	28.0%	30.0%	32.0%
Ind FC Cogen-Gas	45.0%	45.0%	45.0%	46.0%	47.0%
Steam Oil--Util	43.5%	43.5%	43.5%	45.5%	46.5%
Stm Hvy Oil-Auto	43.5%	43.5%	43.5%	43.5%	43.5%
Stm Lt Oil--Auto	43.5%	43.5%	43.5%	43.5%	43.5%
Oil CC, New	46.0%	46.0%	46.0%	46.0%	46.0%
MSW-Fired Plants	25.0%	25.0%	25.0%	30.0%	34.0%
Wind Power	20.0%	20.0%	20.0%	20.0%	20.0%
Biomass/Wst-Auto	25.0%	25.0%	25.0%	35.0%	40.0%
Solar PV--Resid.	12.0%	12.0%	12.0%	12.0%	12.0%
Solar PV-Comml	12.0%	12.0%	12.0%	12.0%	12.0%
Solar PV--Util.	15.0%	15.0%	15.0%	15.0%	15.0%

PLANT BASE YEAR OUTPUTS & CAPACITIES

Output Unit: GIGAWATT-HOURS
Capacity Unit: Rate

Plant Name	Base Yr. Output	Capacity (in Reporting Years) 1990	1995	2000	2010	2020
Nucl.--Exist BWR	121970.0	19297.0	23999.0	23999.0	23642.0	17106.0
Nucl.--Exist PWR	78279.3	12596.0	17026.0	17026.0	17026.0	10279.0
Nucl.--Exist HWR	969.0	165.0	165.0	165.0	165.0	0.0
Nucl.--Exist GCR	1041.1	166.0	166.0	166.0	0.0	0.0
Nucl.--New BWRs	0.0	0.0	796.0	3426.0	4222.0	4222.0
Nucl.--New PWRs	0.0	0.0	0.0	1180.0	1180.0	1180.0
Nucl. New APWRs	0.0	0.0	0.0	0.0	0.0	0.0
Nucl. New ABWRs	0.0	0.0	0.0	0.0	0.0	0.0
Nucl., FBR	0.0	0.0	246.0	246.0	246.0	246.0
Hydro--Convent.	88421.0	20831.0	21025.0	21025.0	21025.0	21025.0
Pumped St. Hydro	7201.0	17000.0	22430.0	22430.0	26400.0	28400.0
Geothermal--Util	1485.0	240.0	260.0	260.0	260.0	260.0
Geothermal--Auto	257.0	31.0	31.0	31.0	31.0	31.0
Gas Turbine-Util	8857.0	2365.0	2545.0	2545.0	2545.0	2545.0
Int. Comb--Util	9094.0	2822.0	2822.0	2822.0	2822.0	2822.0
Coal Steam--Util	72600.0	12420.0	15970.0	15970.0	10000.0	6000.0
Coal Steam--Auto	14021.0	2776.0	3570.0	3570.0	3000.0	2500.0
Coal/Ck Gas-Util	21665.0	3706.0	3706.0	3706.0	2500.0	2000.0
Coal/Ck Gas-Auto	14966.0	2964.0	2964.0	2964.0	2500.0	1500.0
Std. Coal, New	0.0	0.0	0.0	1200.0	4500.0	8000.0
Stm Nat Gas-Util	153501.0	35409.0	38179.0	38179.0	32000.0	21000.0
Stm Nat Gas-Auto	168.0	33.3	33.0	33.0	33.0	33.0
Steam Gas--New	0.0	0.0	0.0	3600.0	4200.0	4200.0
Gas Comb Cy, New	0.0	0.0	0.0	1200.0	7000.0	17000.0
Serv Cogen--Gas	0.0	0.0	0.0	500.0	4680.0	5940.0
Serv FC Cogen-Gs	0.0	0.0	0.0	5.0	1170.0	3960.0
Ind Cogen--Gas	0.0	0.0	0.0	600.0	5720.0	7260.0
Ind FC Cogen-Gas	0.0	0.0	0.0	6.0	1430.0	4840.0
Steam Oil--Util	200248.0	53894.0	53684.0	50000.0	27500.0	6000.0
Stm Hvy Oil-Auto	52262.0	10349.0	7836.0	7836.0	5000.0	2500.0
Stm Lt Oil--Auto	10216.0	2023.0	1532.0	1532.0	1532.0	1532.0
Oil CC, New	0.0	0.0	0.0	1200.0	5000.0	14000.0
MSW-Fired Plants	1180.0	234.0	283.0	283.0	500.0	700.0
Wind Power	0.0	0.0	0.0	10.0	5500.0	22000.0
Biomass/Wst-Auto	8717.0	1726.0	1746.0	1746.0	3500.0	4800.0
Solar PV--Resid.	0.0	0.0	0.0	10.0	2160.0	6000.0
Solar PV-Comml	0.0	0.0	0.0	10.0	1690.0	5000.0
Solar PV--Util.	0.0	0.0	0.0	50.0	3000.0	14000.0

ENERGY RECOVERED AS FUEL: HEAT (COGEN) (Share In Reporting Years)

Plant Name	1990	1995	2000	2010	2020
Nucl.--Exist BWR	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--Exist PWR	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--Exist HWR	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--Exist GCR	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--New BWRs	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl.--New PWRs	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl. New APWRs	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl. New ABWRs	0.0%	0.0%	0.0%	0.0%	0.0%
Nucl., FBR	0.0%	0.0%	0.0%	0.0%	0.0%
Hydro--Convent.	0.0%	0.0%	0.0%	0.0%	0.0%
Pumped St. Hydro	0.0%	0.0%	0.0%	0.0%	0.0%
Geothermal--Util	0.0%	0.0%	0.0%	0.0%	0.0%
Geothermal--Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Gas Turbine-Util	0.0%	0.0%	0.0%	0.0%	0.0%
Int. Comb--Util	0.0%	0.0%	0.0%	0.0%	0.0%
Coal Steam--Util	0.0%	0.0%	0.0%	0.0%	0.0%
Coal Steam--Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Coal/Ck Gas-Util	0.0%	0.0%	0.0%	0.0%	0.0%
Coal/Ck Gas-Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Std. Coal, New	0.0%	0.0%	0.0%	0.0%	0.0%
Stm Nat Gas-Util	0.0%	0.0%	0.0%	0.0%	0.0%
Stm Nat Gas-Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Steam Gas--New	0.0%	0.0%	0.0%	0.0%	0.0%
Gas Comb Cy, New	0.0%	0.0%	0.0%	0.0%	0.0%
Serv Cogen--Gas	52.0%	52.0%	52.0%	52.0%	53.0%
Serv FC Cogen-Gs	40.0%	40.0%	40.0%	40.0%	40.0%
Ind Cogen--Gas	52.0%	52.0%	52.0%	52.0%	53.0%
Ind FC Cogen-Gas	40.0%	40.0%	40.0%	40.0%	40.0%
Steam Oil--Util	0.0%	0.0%	0.0%	0.0%	0.0%
Stm Hvy Oil-Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Stm Lt Oil--Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Oil CC, New	0.0%	0.0%	0.0%	0.0%	0.0%
MSW-Fired Plants	0.0%	0.0%	0.0%	0.0%	0.0%
Wind Power	0.0%	0.0%	0.0%	0.0%	0.0%
Biomass/Wst-Auto	0.0%	0.0%	0.0%	0.0%	0.0%
Solar PV--Resid.	0.0%	0.0%	0.0%	0.0%	0.0%
Solar PV-Comml	0.0%	0.0%	0.0%	0.0%	0.0%
Solar PV--Util.	0.0%	0.0%	0.0%	0.0%	0.0%

EDB LINKS

Plant Name	EDB Link
Nucl.--Exist BWR	ELECTRICITY GENERATION/STEAM-NUCLEAR / BOILING WATER REACTOR (GENERAL ELECTRIC BWR/6)
Nucl.--Exist PWR	ELECTRICITY GENERATION/STEAM-NUCLEAR / PRESSURIZED WATER REACTOR (USDOE)
Nucl.--Exist HWR	
Nucl.--Exist GCR	
Nucl.--New BWRs	ELECTRICITY GENERATION/STEAM-NUCLEAR / BOILING WATER REACTOR (GENERAL ELECTRIC BWR/6)
Nucl.--New PWRs	ELECTRICITY GENERATION/STEAM-NUCLEAR / PRESSURIZED WATER REACTOR (USDOE)
Nucl. New APWRs	ELECTRICITY GENERATION/STEAM-NUCLEAR / PRESSURIZED WATER REACTOR (USDOE)
Nucl. New ABWRs	ELECTRICITY GENERATION/STEAM-NUCLEAR / BOILING WATER REACTOR (GENERAL ELECTRIC BWR/6)
Nucl., FBR	
Hydro--Convent.	
Pumped St. Hydro	
Geothermal--Util	ELECTRICITY GENERATION/STEAM-GEOTHERMAL / VAPOR DOMINATED SYSTEM (DRY STEAM)
Geothermal--Auto	ELECTRICITY GENERATION/STEAM-GEOTHERMAL / VAPOR DOMINATED SYSTEM (DRY STEAM)
Gas Turbine-Util	ELECTRICITY GENERATION/TURBINE-NAT GAS / GENERIC * NO EC
Int. Comb--Util	ELECTRICITY GENERATION/ENGINE-NAT GAS / GENERIC
Coal Steam--Util	ELECTRICITY GENERATION/STEAM-BITUM COAL / US * ELECTROSTATIC PRECIPITATOR AND SOX SCRUBBER
Coal Steam--Auto	ELECTRICITY GENERATION/STEAM-BITUM COAL / US * ELECTROSTATIC PRECIPITATOR AND SOX SCRUBBER
Coal/Ck Gas-Util	ELECTRICITY GENERATION/STEAM-NAT GAS / SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
Coal/Ck Gas-Auto	ELECTRICITY GENERATION/STEAM-NAT GAS / SMALL BOILER * < 100 GJ/HR (100 MMBTU/HR) * NO EC
Std. Coal, New	US AVERAGES/ELECTRICITY GEN. / NEW COAL STEAM: 67% AFBC / 33% IGCC
Stm Nat Gas-Util	US AVERAGES/ELECTRICITY GEN. / EXISTING NATURAL GAS STEAM
Stm Nat Gas-Auto	US AVERAGES/ELECTRICITY GEN. / EXISTING NATURAL GAS STEAM
Steam Gas--New	US AVERAGES/ELECTRICITY GEN. / EXISTING NATURAL GAS STEAM
Gas Comb Cy, New	US AVERAGES/ELECTRICITY GEN. / NEW NATURAL GAS COMBINED CYCLE
Serv Cogen--Gas	US AVERAGES/ELECTRICITY GEN. / NEW NATURAL GAS COMBINED CYCLE
Serv FC Cogen-Gs	ELECTRICITY GENERATION/FUEL CELLS / 11 MW PHOSPHORIC ACID CELL-NG
Ind Cogen--Gas	US AVERAGES/ELECTRICITY GEN. / NEW NATURAL GAS COMBINED CYCLE
Ind FC Cogen-Gas	ELECTRICITY GENERATION/FUEL CELLS / 11 MW PHOSPHORIC ACID CELL-NG
Steam Oil--Util	US AVERAGES/ELECTRICITY GEN. / EXISTING RESIDUAL STEAM
Stm Hvy Oil-Auto	US AVERAGES/ELECTRICITY GEN. / EXISTING RESIDUAL STEAM
Stm Lt Oil--Auto	US AVERAGES/ELECTRICITY GEN. / EXISTING DISTILLATE STEAM
Oil CC, New	US AVERAGES/ELECTRICITY GEN. / NEW DISTILLATE COMBUSTION TURBINE
MSW-Fired Plants	ELECTRICITY GENERATION/STEAM-MSW / GENERIC * MASS FEED
Wind Power	
Biomass/Wst-Auto	US AVERAGES/ELECTRICITY GEN. / EXISTING WOOD/BARK STEAM
Solar PV--Resid.	
Solar PV-Comml	
Solar PV--Util.	

BASE YEAR COSTS (NOT SHOWN)

DETAILED MODULE: PIPELINE GAS IMP.

Pipeline(s) dispatched in proportion to available capacity

PIPELINE NAMES, INPUT FUELS & INPUT FUEL SHARES

Pipeline Name	Input Fuels (Shares)
Sakhal. Pipeline	Pipeline Gas (100%)
Other Pipelines	Pipeline Gas (100%)

PIPELINE EFFICIENCIES (IN REPORTING YEARS)

Pipeline Name	1990	1995	2000	2010	2020
Sakhal. Pipeline	100.0%	100.0%	100.0%	100.0%	100.0%
Other Pipelines	100.0%	100.0%	100.0%	100.0%	100.0%

PIPELINE BASE YEAR OUTPUTS & CAPACITIES

Output Unit: CUB. METERS
Capacity Unit: BILLION Rate

	Base Yr. Capacity (in Reporting Years)					
Pipeline Name	Output	1990	1995	2000	2010	2020
Sakhal. Pipeline	0.0	0.0	0.0	0.0	20.0	20.0
Other Pipelines	0.0	0.0	0.0	0.0	0.0	30.0

EDB LINKS

Pipeline Name	EDB Link
Sakhal. Pipeline	
Other Pipelines	

BASE YEAR COSTS (NOT SHOWN)

DETAILED MODULE: LNG IMPORTS

Facilit.(s) dispatched in proportion to available capacity

FACILIT. NAMES, INPUT FUELS & INPUT FUEL SHARES

Facilit. Name	Input Fuels (Shares)
Exist. LNG Term.	LNG (100%)
New LNG Term	LNG (100%)

FACILIT. EFFICIENCIES (IN REPORTING YEARS)

Facilit. Name	1990	1995	2000	2010	2020
Exist. LNG Term.	100.0%	100.0%	100.0%	100.0%	100.0%
New LNG Term	100.0%	100.0%	100.0%	100.0%	100.0%

FACILIT. BASE YEAR OUTPUTS & CAPACITIES

Output Unit: CUB. METERS
Capacity Unit: BILLION Rate

	Base Yr.	Capacity (in Reporting Years)				
Facilit. Name	Output	1990	1995	2000	2010	2020
Exist. LNG Term.	49.6	99.2	116.2	116.2	116.2	116.2
New LNG Term	0.0	0.0	0.0	20.0	40.0	40.0

EDB LINKS

Facilit. Name	EDB Link
Exist. LNG Term.	
New LNG Term	

BASE YEAR COSTS (NOT SHOWN)

D7. PRINTOUT OF DATA PREPARATION WORKBOOK "NEA_JPN6.XLS" AS USED TO ASSEMBLE AND PROCESS INFORMATION FOR INCORPORATION INTO LEAP DATA SETS

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

IEA Energy Balance for Japan, 1990: Millions of Tonnes of Oil Equivalent
Source: International Energy Agency (IEA), World Energy Balances. IEA, Paris, France.

Balance Category	Coal	Other Solids	Crude Oil	Petroleum Products	Gas	Nuclear	Hydro	Geoth./ Solar, etc	Electricity	Heat	Total
Indigenous Production	4.57	0.05	0.64		1.8	52.71	7.68	1.5			68.95
Import	69.99		198.53	64.91	41.66						375.09
Export	-1.13			-8.32							-9.45
Int. Marine Bunkers				-5.13							-5.13
Stock Change	0.47		0.37	-1.86	-0.21						-1.23
TPES	73.9		199.54	49.6	43.25	52.71	7.68		0	0	428.23
Returns and Transfers			4.84	-5.12							-0.28
Statistical Differences	-0.23		-1.92	-0.99	0.78						-2.36
Public Electricity	-19.27		-18.44	-22.31	-31.81	-52.49	-7.07	-1.28	64.59		-88.08
Autoproducers of Electricity +CHP	-4.48			-12.28		-0.23	-0.61	-0.22	8.57		-9.25
District Heating	-0.02	-0.05		-0.04	-0.14					0.2	-0.05
Gas Works	-0.61			-3.45	3.42						-0.64
Petroleum Refineries			-180.02	168.97 .					-0.55		-11.6
Coal Transformation	-9.35										-9.35
Liquefaction											0
Other Transformation											0
Own Use	-2.42				-0.66				-4.58		-7.66
Distribution Losses					-0.05				-2.81		-2.86
TFC	37.52		4	174.38	14.79	-0.01	-8.9E-16		65.22	0.2	296.1
Industrial Sector	37.39		4	53.85	4.68	0	0		24.1	0	137.38
Iron and Steel	28.23			1.66	0.72				6.75		37.36
Chemical	1.3		4	24.39	0.46				4.74		34.89
(of which, Feedstocks)			3.98	21.77							25.75
Non-Ferrous Metals	0.18			0.95					1.28		2.41
Non-Metallic Minerals	4.92			2.46					1.69		9.07
Transport Equipment and Mach.									2.12		2.12
Machinery									2.91		2.91
Mining and Quarrying				0.38					0.15		0.53
Food and Tobacco				2.01					1.07		3.08
Pulp, Paper and Printing	1.19			1.59					2.74		5.52
Wood and Wood Products											0
Construction				4.96							4.96
Textile and Leather	0			1.13					0.65		1.78
Non-Specified Industry	1.57			14.32	3.5				13.36		32.75
Transport Sector	0		0	74.52	0	0	0		1.71	0	76.23
Air				3.04							3.04
Road				63.06							63.06
Rail				0.76					1.71		2.47
Internal Navigation				7.63							7.63
Non-specified Transport				0.03							0.03
OTHER SECTORS	0.12		0	36.1	10.13	0	0		26.05	0.2	72.6
Agriculture				6.48					0.14		6.62
Public/Commerce				7.98	2.27				10.01	0.2	20.46
Residential	0.12			13.91	7.78				15.9		37.71
Non-Specified Other				7.73	0.08						7.81
Non-Energy Use				9.93							9.93
in Industry				8.98							8.98
in Transport				0.23							0.23
in Other Sectors				0.72							0.72
Electricity Generated (GWh)	123252		0	268585	165586	202272	89305	1742	0	0	850742
Public	94265			206107	165586	201403	82218	1485			751064
Autoproducers	28987			62478		869	7087	257			99678

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

Miscellaneous Driving Activity Data

(Values in italics estimated based on trends in other years)

	1989	1990	1991	1992	1993	1995	1989 to 1995 Growth (%/yr)	***Source/Notes***
Population (million)	123.07	123.61	123.92	124.32	124.67	125.2	0.323%	*1, page 207*
(additional years)	1994-->	124.96	1995-->	125.2		1989-->95	0.286%	*2*
Employment (millions)	61.28	62.49	63.69	64.36	64.5	64.57	1.289%	*1, page 207, 3*
GDP, Current Prices (trillion Yen)								
Total GDP	396.197	424.537	451.297	463.850			5.396%	*1, page 208*
Manufacturing GDP	114.455	123.443	131.336	129.570			4.221%	*1, page 208*
Wholesale/Retail GDP	50.377	54.501	57.830	59.272			5.570%	*1, page 208*
Transport/Communic GDP	26.301	27.100	28.618	29.042			3.360%	*1, page 208*
Finance etc. GDP	67.005	69.529	72.026	74.053			3.390%	*1, page 208*
Other Services	99.341	108.355	115.001	120.549			6.662%	*1, page 208*
Mining and Quarrying	1.054	1.279	1.304	1.331			8.088%	*1, page 208*
Construction	37.985	42.127	45.021	46.959			7.325%	*1, page 208*
GDP per capita (current and 1985 thousand Yen)								
GDP/capita--current prices	3,218	3,437	3,642	3,731			5.054%	*1, page 209*
GDP/capita--constant prices	3,093	3,231	3,357	3,385			3.053%	*1, page 209*

GDP Data from LBNL	1989	1990	1991	1992	1993	1995	1989 to 1995 Growth (%/yr)	93 to 95 Growth (%/yr)
Total GDP (billion 1985 Yen)	380,735	399,069	416,064	420,830	419,766	431,431	2.11%	1.38%
Total GDP (billion 1990 Yen)	409,184	429,986	446,315	450,924	452,282	461,456	2.02%	1.01%
Manufacturing GDP (billion 1990 Yen)	113,488	121,218	127,597	125,820	120,839	123,326	1.40%	1.02%
Wholesale/Retail GDP (billion 1985 Yen)	51,485	55,256	57,255	58,980	59,060	60,639	2.76%	1.33%
Transport/Communic GDP (B. 1985 Yen)	24,637	25,355	26,256	26,290	26,830	27,546	1.88%	1.33%
Finance etc. GDP (billion 1985 Yen)	64,338	64,922	65,420	65,853	65,266	67,080	0.70%	1.38%
Community, Soc, Pers Serv (B 1985 Y)	52,738	56,913	58,837	59,520	58,640	59,670	2.08%	0.87%
Government Services GDP (B 1985 Yen)	27,163	27,262	26,948	27,128	27,539	28,666	0.90%	2.02%
Total Services GDP (billion 1985 Yen)	220,361	229,708	234,716	237,771	237,335	243,601	1.69%	1.31%
Mining and Quarrying (billion 1990 Yen)	910	1,122	1,092	1,072	1,024	814	-1.85%	-10.87%
Construction (billion 1990 Yen)	40,587	43,428	45,044	45,404	46,757	44,232	1.44%	-2.74%

GDP, Constant Prices (trillion 1985 Yen)						89 to '92 Growth (%/yr)	
Total GDP	380.81	399.09	415.98	420.83	*425.744*	3.388%	*Calculated*
Manufacturing GDP	110.01	116.04	121.06	117.55	*114.151*	2.236%	*Calculated*
Wholesale/Retail GDP	48.42	51.23	53.30	53.78	*54.250*	3.558%	*Calculated*
Transport/Communic GDP	25.28	25.48	26.38	26.35	*26.319*	1.391%	*Calculated*
Finance etc. GDP	64.40	65.36	66.39	67.19	*67.991*	1.420%	*Calculated*
Other Services	95.48	101.86	106.00	109.37	*112.845*	4.630%	*Calculated*
Sum of Wholesale/Ret., Finance, Other	208.30	218.46	225.70	230.33	235.09	3.407%	*Calculated*
Mining and Quarrying	1.013	1.202	1.202	1.208	*1.213*	6.029%	*Calculated*
Construction	36.51	39.60	41.50	42.60	*43.740*	5.281%	*Calculated*

Misc Economic Statistics	1989	1990	1991	1992	1993	Growth (%/yr)	
Fish and Marine Prod (kt)	11,173	10,354	9,301	8,460		-8.855%	*1, page 211*
Tractors	2,049	2,142	1,966	2,003		-0.754%	*1, page 211*
Agricultural land (thous ha)	4,637	4,596	4,555	4,515		-0.885%	*1, page 210*
Pasture (thous ha)	642	647	649	650		0.414%	*1, page 210*
Forests and woodlands	25,105	25,105	25,230	25,230		0.166%	*1, page 210*
Other land	7,268	7,304	7,218	7,257		-0.050%	*1, page 210*
Nitrogen Fertilizer Consumpt (kt)	640	641	612	574	572	-2.769%	*1, page 211*
Phosphate Fertilizer Consumpt (kt)	726	728	690	695	699	-0.943%	*1, page 211*
Potash Fertilizer Consumpt (kt)	577	569	537	494	513	-2.896%	*1, page 211*
Urban & Rural Waterworks (kcu.m/day)	65,461	66,139		66,432	*66,759*	0.492%	*1, page 212*
Wood Removals (all thousand cubic m.)							
Total Roundwood Removals	30,842	29,632	28,272	28,063		-3.098%	*1, page 211*
Total Industrial Wood	30,522	29,307	27,945	27,736		-3.140%	*1, page 211*
Sawlogs, Veneer logs, etc.	18,934	18,377	17,644	17,435		-2.712%	*1, page 211*
Pulpwood and particles	10,901	10,313	9,728	9,728		-3.724%	*1, page 211*
Other industrial wood	687	617	573	573		-5.869%	*1, page 211*
Fuelwood (incl wood for charcoal)	320	325	327	327		0.724%	*1, page 211*
							Source/Notes
Mining and Quarrying (kt output)							
Coal	10,187	8,262	8,053	7,597	7,224	-8.234%	*1, page 213*
Crude Oil	548	540	208	852	780	9.227%	*1, page 213*
Natural Gas (PJ)	82	84	88	89	90	2.355%	*1, page 213*
Iron ore (Fe content)	25	21	19				*1, page 213*
Copper ores (Cu content)	15	13	15	12	10	-9.640%	*1, page 213*
Lead Ores (Pb content)	19	19	18	18		-1.786%	*1, page 213*
Zinc Ores (Zn content)	132	127	133	135	119	-2.559%	*1, page 213*
Tungsten ores (W content-tonnes)	296	254	279				*1, page 213*
Silver ores (Ag content--tonnes)	156	150	171				*1, page 213*
Gold ores (Au content--kg)	6,097	7,303	8,299				*1, page 213*
Salt, unrefined	1,377	1,378	1,379	1,402		0.602%	*1, page 213*

Manufacturing Statistics (thousand tonnes except where indicated otherwise)							
Production of fresh meat	2,142	2,104	2,058	2,024	2,015	-1.516%	*1, page 213*
Butter	78	76	76	95		6.793%	*1, page 213*
Cheese	85	82	89	92		2.673%	*1, page 213*
Wheat Flour	4,582	4,652	4,677				*1, page 213*
Raw sugar	293	978	915				*1, page 213*
Refined Sugar	2,583	2,554	2,440				*1, page 213*
Beer (thous hectoliters)	62,869	65,636	69,157	70,106		3.699%	*1, page 213*
Cigarettes (millions)	268,400	268,100	275,000				*1, page 213*
Canned and Bottled Foods		4,606		4,851	4,796	1.361%	*3*
Processed Meat Products		525			546	1.316%	*3*
Wool Yarn	118	105	107	106	84	-8.146%	*1, page 213*
Cotton Yarn	459	426	373	338	284	-11.310%	*1, page 213*
Woven Cotton (million square meters)	1,915	1,765	1,603	1,465	1,205	-10.936%	*1, page 213*
Woven Wool (million square meters)	351	335	345	326	287	-4.908%	*1, page 213*
Sawnwood (thousand cubic meters)	30,543	29,781	28,264	-	-		*1, page 213*
Coniferous	27,098	26,421	25,075				*1, page 213*
Hardwood	3,445	3,360	3,189				*1, page 213*
Plywood (thousand cubic meters)	6,700	6,415	6,174				*1, page 213*
Newsprint	3,217	3,479	3,516	3,523	2,917	-2.418%	*1, page 213*
Other printing and writing papers	8,828	9,250	9,727	9,580	9,504	1.862%	*1, page 213*
Total Paper and Paperboards		28,086			*29,030*	1.108%	*3*

Manufacturing Statistics (thousand tonnes except where indicated otherwise--cont.)							
	1989	1990	1991	1992	1993	Growth (%/yr)	
Hydrochloric Acid	762	799	823		*889*	3.926%	*1, page 213*
Sulphuric Acid	6,885	6,887	7,057	7,100	6,937	0.188%	*1, page 213*
Caustic Soda	3,564	3,800	3,788	3,866	3,777	1.462%	*1, page 213*
Soda Ash	1,100	1,129	1,098	1,057	1,056	-1.015%	*1, page 213*
Nitrogenous Fertilizer (as N)	977	946	957	931	*916*	-1.595%	*1, page 213*
Phosphate Fertilizer (as P2O5)	490	445	429	425	*405*	-4.633%	*1, page 213*
Ethylene		5,810			*6,490*	3.760%	*3*
Sum of 7 Chemical Products above		19,816			20,471	1.089%	*calculated*
Tires for Road Vehicles	155,038	153,226	153,677	165,209	152,535	-0.406%	*1, page 213*
Cement	79,717	84,445	78,776	73,144	73,738	-1.930%	*1, page 214*
Cement (1995)	90,474	Ave. Annual Growth: 1990 to 1995:				1.389%	*3*
Pig Iron	79,177	79,124	78,776	73,144	73,738	-1.763%	*1, page 214*
Crude Steel Ingots	107,160	109,548	108,914	98,132	99,623	-1.807%	*1, page 214*
Sewing Machines	2,308	2,461	2,416				*1, page 214*
Refrigerators	5,018	5,048	5,212	4,425	4,351	-3.503%	*1, page 214*
Televisions	12,578	13,243	13,438	12,024	10,758	-3.832%	*1, page 214*
Bicycles	7,792	7,969	7,448	7,286		-2.213%	*1, page 214*

Source/Notes

Transport Statistics							
Locomotives	1956	(as of 1988)					*1, page 215*
Passenger "wagons"	25103	(as of 1988)					*1, page 215*
Freight "wagons"	19500	(as of 1988)					*1, page 215*
Rail pass-km (billion)	369.6	383.7	396.5	402.3		2.866%	*1, page 215*
Rail freight te-km (billion)	24.8	26.7	27.3	26.7		2.491%	*1, page 215*
Passenger autos (thous)	32,621	34,924	38,964	40,772		7.718%	*1, page 215*
Commercial road veh (thous)	21,330	21,571					*1, page 215*
Merchant shipping fleet (kt reg.)	28,030	27,078	26,407			-2.938%	*1, page 215*
Int. Marine goods loaded (kt)	81,100	84,300	89,800	100,000	105,400	6.771%	*1, page 215*
Int. Marine goods unloaded (kt)	703,200	711,600	725,100	707,700	721,600	0.648%	*1, page 215*
Int. Marine goods loaded+unloaded (kt)	784,300	795,900	814,900	807,700	827,000	1.334%	
Aircraft	93	109	117	116		7.644%	*1, page 215*
Hours flown (thousand)	340	340.5	353.3	373.2		3.154%	*1, page 215*
Kilometers flown (millions)	514	522	557				*1, page 215*
Passenger km (millions) (dom. + int.)	94,719	101,604	101,715	105,732	105,600	2.756%	*1, page 215, 2*
Freight tonne-km (millions) (dom. + int.)	5,290	5,252	5,422	5,512	5,869	2.631%	*1, page 215, 2*
Passenger km (millions) (international)	49,048	50,695	47,356	55,320	53,976	2.422%	*1, page 215, 2*
Cargo tonne-km (millions) (international)	4,549	4,462	4,604	4,757	5,106	2.932%	*1, page 215, 2*
Pass-km per km	184.3	194.6	182.6				*Calculated*
km flown per plane	5.53E+06	4.79E+06	4.76E+06				*Calculated*
km flown per hour	1.51E+06	1.53E+06	1.58E+06				*Calculated*
Freight tonne-km per km	10.3	10.1	9.7				*Calculated*

OLDER ROAD TRANSPORT DATA *(Source 4)*		Vehicles in Use (IRF, Table IV)			Average Distance Traveled by (IRF, Table V; km/yr)		
COUNTRY	Data Year	Cars	Buses & Coaches	Goods Vehicles	Cars	Buses & Coaches	Goods Vehicles
JAPAN	1987	29478368	234137	20194377	10097	27838	10921

Motor Fuel Use (IRF Table VI)				Fraction of Fuel Use by Road Vehicles	
Petrol		Diesel			
Cons (kT)	Fract in Road Veh.	Cons (kT)	Fract in Road Veh.	Petrol	Diesel
28888	0.995	25460	0.947	54.38%	45.62%

Household Statistics	1990	1991	1994	1995	Growth Rate 90 - '95	
Households (thousand)	40,670	40,500		43,900	1.540%	*1, page 225, 3*
Persons/Household	2.99	3.04		2.82	-1.178%	*1, page 225, 3*

Sources/Notes

1 United Nations, Statistical Yearbook for Asia and the Pacific, 1994. United Nations Economic and Social Commission for Asia and the Pacific, Bangkok, Thailand, 1995.

2 United Nations (1996), Monthly Bulletin of Statistics On-line. Internet resource.

3 Japan Management and Coordinating Agency (1996), JAPAN IN FIGURES, 1997, Obtained from Japan Management and Coordinating Agency Statistics Bureau and Statistics Center WWW site (http://www.stat.go.jp/1.htm)

4 International Road Federation (IRF, 1989?) World Road Statistics, 1984-1988. IRF, Geneva, Switzerland.

5 From spreadsheet JAPGDP.XLS, as obtained from Lee Schipper and Mike Ting of the International Energy Studies Group, Lawrence Berkeley National Laboratory (1/98). Original Data from OECD National Accounts and other sources ("STANS").

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
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SELECTED U.S. DEPARTMENT OF ENERGY, ENERGY INFORMATION ADMINISTRATION (US DOE EIA)STATISTICS FOR JAPAN

(Statistics extracted from Microsoft Access database "World20.MBD" downloaded from EIA WWW Site)

COAL (thousand short tons and quads)

FIPS	Country	Year	Anthracite Production	Anthracite Production Btu's	Bituminous Production	Bituminous Production Btu's	Hard Coal Imports	Hard Coal Imports Btu's	Hard Coal Exports	Hard Coal Exports Btu's
JA	Japan	1990	245.82	0.005443	11,068.31	0.2332	114,177	2.4835	-	0.000000
JA	Japan	1991	238.10	0.005272	9,335.47	0.1967	120,573	2.6226	71.403	0.001510
JA	Japan	1992	239.20	0.005297	8,378.67	0.1766	120,285	2.5855	-	0.000000
JA	Japan	1993	219.36	0.004858	7,717.28	0.1626	122,802	3.2278	-	0.000000
JA	Japan	1994	223.77	0.004955	7,867.20	0.1658	127,536	3.3523	-	0.000000

Year	Hard Coal Stock Build	Hard Coal Stock Build Btu's	Lignite Production	Lignite Production Btu's	Lignite Imports	Lignite Imports Btu's	Lignite Exports	Lignite Exports Btu's	Lignite Stock Build	Lignite Stock Build Btu's
1990	1,929.04	0.04079	18.226	0.0002691	15.432	0.0004042	0	0	0	0
1991	(1,922.43)	(0.04065)	18.226	0.0002691	2.892	7.576E-05	0	0	0	0
1992	(207.23)	(0.00438)	16.535	0.0002441	23.149	0.0006063	0	0	0	0
1993	254.63	0.00564	-	0	26.455	0.00022	0	0	0	0
1994	254.63	0.00564	-	0	26.455	0.00022	0	0	0	0

Year	Coke Production	Coke Imports	Coke Imports Btu's	Coke Exports	Coke Exports Btu's	Coke Stock Build	Coke Stock Build Btu's	Hard Coal Briquet Production	Lignite Briquet Production
1990	52,181.22	360.46	0.00894	1,825.43	0.04679	480.61	0.01232	124.56	-
1991	50,710.73	399.04	0.00990	2,658.77	0.06815	200.62	0.00514	121.25	-
1992	49,059.47	203.93	0.00506	3,195.60	0.08191	(169.76)	(0.00435)	123.46	-
1993	49,063.88	256.84	0.00677	3,171.35	0.08365	(681.23)	(0.01797)	124.56	-
1994	47,003.66	256.84	0.00677	3,440.31	0.09075	(681.23)	(0.01797)	124.56	-

ELECTRICITY (GW, TWh, and quads)

FIPS	Country	Year	Hydro Capacity	Hydro Generation	Hydro Generation Btu's	Nuclear Capacity	Nuclear Generation	Nuclear Generation Btu's	Geothermal/ Other Capacity	Geothermal/ Other Generation
JA	Japan	1990	20.41	88.421	0.9195806	29.445	182.293	1.8727	0.216	1.644
JA	Japan	1991	20.82	96.527	1.0038832	31.645	201.378	2.0641	0.271	1.676
JA	Japan	1992	20.90	81.728	0.8499732	33.404	207.172	2.1235	0.282	1.704
JA	Japan	1993	20.99	96.832	1.0070552	34.584	233.985	2.3946	0.281	1.709
JA	Japan	1994	21.01	74.841	0.7783483	38.541	252.501	2.5821	0.31	1.796

Year	Geothermal/Other Generation Btu's	Thermal Capacity	Thermal Generation	Electricity Imports	Electricity Imports Btu's	Electricity Exports	Electricity Exports Btu's	Electricity T&D Losses
1990	0.03455	124.985	520.956	0	0	0	0	55.5320
1991	0.03520	127.183	530.147	0	0	0	0	58.0810
1992	0.03563	130.743	542.667	0	0	0	0	58.3290
1993	0.03573	130.743	513.804	0	0	0	0	59.2431
1994	0.03755	134.1	589.587	0	0	0	0	64.3108

GAS (billion cubic feet and quads)

FIPS	Country	Year	NG Gross Production	NG Vented and Flared	NG Reinjected	NG Marketed Production	NG Dry Production	NG Dry Production Btu's	NG Dry Imports	NG Dry Imports Btu's
JA	Japan	1990	72.00	0	0	72.00	72.00	0.07510	1,761.0	0
JA	Japan	1991	75.00	0	0	75.00	75.00	0.07823	1,883.0	0
JA	Japan	1992	76.25	0	0	76.25	76.25	0.07952	1,930.0	0
JA	Japan	1993	76.63	0	0	76.63	76.63	0.08437	1,872.8	0
JA	Japan	1994	-	0	0	-	77.00	0.08478	-	0

Year	NG Dry Exports	NG Dry Exports Btu's	NG Dry Consumption	NG Dry Consumption Btu's
1990	0	0	1,851.0	1.9306
1991	0	0	1,976.0	2.0610
1992	0	0	2,023.4	2.1104
1993	0	0	1,949.4	2.1463
1994	0	0	2,083.0	2.2934

OIL AND OIL PRODUCTS

FIPS	Country	Year	Units	Crude Production	Crude Production Btu's	Crude Imports	Crude Exports	Crude Stock Build	Crude Direct Use	Crude Unaccounted For
JA	Japan	1990	thous bpd	11.00	0.02369	3,828.18	0	(9.997)	354.150	(111.982)
JA	Japan	1991	thous bpd	14.92	0.03213	4,180.22	0	76.365	367.026	(42.019)
JA	Japan	1992	thous bpd	17.00	0.03671	4,200.57	0	(22.000)	-	-
JA	Japan	1993	thous bpd	12.45	0.02681	4,360.10	0	43.792	274.043	(26.255)
JA	Japan	1994	thous bpd	10.84	0.02334	4,644.24	0	54.760	362.806	(14.134)

Year	NGL Production	NGL Production Btu's	NGL Imports	NGL Exports	NGL Stock Build	NGL Direct Use	NGL Unaccounted For	Other Liquids Production	Other Liquids Imports	Other Liquids Exports
1990	0.381	0.000602	156.39	0	0	125.69	0	2.540	0	0
1991	0.400	0.000632	129.19	0	0	107.17	0	2.560	0	0
1992	0.400	0.000632	-	0	0	-	0	2.633	0	0
1993	4.219	0.006663	121.62	0	0	74.17	1.212	2.620	0	0
1994	4.049	0.006395	95.24	0	0	63.55	0	2.660	0	0

Year	Other Liquids Stock Build	Other Liquids Consumption	Recycled Oil	Refinery Gain	Refinery Fuel and Loss	Gasoline Refined	Gasoline Imports	Gasoline Exports	Gasoline Stock Build	Gasoline Consumption
1990	2.922	0	147.316	60.00	0.00	726.032	39.659	1.799	4.580	759.849
1991	(17.250)	0	118.744	58.00	0.00	761.320	23.066	0.514	(0.958)	787.167
1992	15.000	0	0	59.00	199.33	793.034	19.228	-	4.000	806.669
1993	(2.352)	0	118.553	63.00	194.91	817.173	10.094	10.950	1.713	813.609
1994	1.034	0	148.33	63.00	0.00	858.001	22.833	14.746	3.903	839.119

Year	Jet Fuel Refined	Jet Fuel Imports	Jet Fuel Exports	Jet Fuel Stock Build	Jet Fuel Consumption	Kerosene Refined	Kerosene Imports	Kerosene Exports	Kerosene Stock Build	Kerosene Consumption
1990	75.542	79.495	91.575	1.260	61.833	398.550	93.671	9.509	17.684	453.889
1991	88.251	71.870	95.617	0.130	64.374	422.647	46.122	10.369	(19.721)	467.497
1992	101.942	66.582	3.033	1.000	164.517	447.651	40.328	8.776	(5.000)	474.318
1993	109.090	59.046	2.332	0.820	168.785	473.793	36.334	5.311	(2.288)	492.963
1994	121.796	58.595	0.739	3.128	174.981	469.447	38.615	8.249	3.435	481.894

Year	Distillate Refined	Distillate Imports	Distillate Exports	Distillate Stock Build	Distillate Consumption	Residual Refined	Residual Imports	Residual Exports	Residual Stock Build	Residual Consumption
1990	1,001.42	137.61	22.26	11.02	1,109.74	748.51	183.23	30.07	(1.70)	907.57
1991	1,114.26	69.29	29.04	(3.66)	1,162.33	752.71	141.87	39.54	(1.70)	861.97
1992	1,147.09	52.71	39.52	(6.00)	1,183.37	815.52	120.59	46.91	(4.00)	872.81
1993	1,190.86	44.74	40.79	1.06	1,199.90	769.95	76.27	50.75	3.83	796.37
1994	1,243.49	45.29	48.79	3.31	1,247.25	864.10	73.72	52.86	(3.54)	890.30

Year	LPG Refined	LPG Imports	LPG Exports	LPG Stock Build	LPG Consumption	Unspecified Oil Products Refined	Unspecified Oil Products Imports	Unspecified Oil Products Exports	Unspecified Oil Products Stock Build	Unspecified Oil Products Consumption
1990	141.39	467.56	0.06399	15.000	596.080	520.708	422.172	13.198	(5.331)	771.43
1991	144.03	503.24	0	(7.055)	615.847	577.585	411.142	12.877	3.738	850.54
1992	149.72	616.18	0	10.000	717.876	596.435	415.862	21.586	(3.000)	1,226.70
1993	146.19	484.15	0	(4.163)	634.631	661.467	416.440	12.884	(0.912)	947.03
1994	145.71	482.53	0.03199	7.786	619.026	665.745	447.882	17.167	(0.665)	994.93

Year	Total Oil Consumption Btu's	Bunkers-Residual	Bunkers-Other
1990	10.440	88.897	8.7780
1991	10.758	99.736	8.2740
1992	11.095	99.536	7.0931
1993	10.952	112.336	8.2700
1994	11.558	0.000	0.0000

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SELECTED TABLES FROM JAPAN IN FIGURES, 1997, OBTAINED FROM THE JAPAN DEPARTMENT OF STATISTICS WWW Site (http://www.stat.go.jp/1611.htm)

Land

(1) Area and Islands of National Land (As of 1 October 1995)

District	Area (km^2)	Percentage (%)	Number of islands	District	Area (km^2)	Percentage (%)	Number of islands
Japan	377 829	100.0	6 852	Shikoku	a)18 785	a)5.0	626
Hokkaido	83 452	22.1	509	Kyushu	42 157	11.2	2 160
Honshu	a)231 053	a)61.2	3 194	Okinawa	2 266	0.6	363

a) Excluding the areas (118km^2) of which boundaries are not yet fixed.
Source: Ministry of Construction; Maritime Safety Agency.

(Thousand square kilometres)

Year	Total	Forest and grassland	Farm land	Land for building 1)	Water area, rivers and channels	Roads	Other
1985	377.8	256.1	54.8	15.1	13.0	10.7	28.1
1990	377.7	255.2	53.3	16.0	13.1	11.4	28.7
1994	377.8	254.2	51.7	16.8	13.2	11.9	30.0
Percentage distribution (%)	100.0	67.3	13.7	4.5	3.5	3.1	7.9

1) Total of residential land, industrial land and other land for building.
Source: National Land Agency.

Population

(1) Growth of Population and Future Population

Year	Total population (10 000)			Percentage by 3 age groups (%)		
	Total	Males	Females	Child population (0-14 years old)	Productive age population (15-64)	Elderly population (65 and over)
1930	6 445	3 239	3 206	36.6	58.7	4.8
1950	8 411	4 124	4 287	35.4	59.6	4.9
1970	10 467	5 137	5 330	24.0	68.9	7.1
1980	11 706	5 759	5 947	23.5	67.3	9.1
1985	12 105	5 950	6 155	21.5	68.2	10.3
1990	12 361	6 070	6 291	18.2	69.5	12.0
1995 p	12 557	6 134	6 423	15.9	69.2	14.8
	Projections a)					
2000	12 739	6 253	6 485	15.2	67.8	17.0
2010	13 040	6 399	6 641	16.4	62.4	21.3
2020	12 835	6 285	6 549	15.5	59.0	25.5

a) Medium-variant projections as of September 1992.
Source: Statistics Bureau, Management and Coordination Agency; Ministry of Health and Welfare.

[Table below not from Japan in Figures---Part of 1995 Census results from same WWW Site]

Table 1 Principal figures for the whole country : 1990 and 1995

			[1] [1995]	[2] [1990]	Population change:1990 to 1995 [1]-[2]	(%)
Total Population		Both sexes	125,570,246	123,611,167	1,959,079	1.6
		Male	61,574,398	60,696,724	877,674	1.4
		Female	63,995,848	62,914,443	1,081,405	1.7
Population density(per km^2)			336.8	331.6	5.2	¥¥¥
Population by age (3 groups)		Under15	20,013,730	22,486,239	(2,472,509)	-11.0
		15-64	87,164,721	85,903,976	1,260,745	1.5
		65 and over	18,260,822	14,894,595	3,366,227	22.6
	Male	Under15	10,246,810	11,517,752	(1,270,942)	-11.0
		15-64	43,734,829	42,968,512	766,317	1.8
		65 and over	7,504,253	5,987,637	1,516,616	25.3
	Female	Under15	9,766,920	10,968,487	(1,201,567)	-11.0
		15-64	43,429,892	42,935,464	494,428	1.2
		65 and over	10,756,569	8,906,958	1,849,611	20.8
Percent by age(3groups) (All ages=100)		Under15	15.9	18.2	-2.3	¥¥¥
		15-64	69.4	69.5	-0.1	¥¥¥
		65 and over	14.5	12.0	2.5	¥¥¥
	Male	Under15	16.6	19.0	-2.4	¥¥¥
		15-64	71.0	70.8	0.2	¥¥¥
		65 and over	12.2	9.9	2.3	¥¥¥
	Female	Under15	15.3	17.4	-2.1	¥¥¥
		15-64	67.9	68.2	-0.3	¥¥¥
		65 and over	16.8	14.2	2.6	¥¥¥
Average age		Both sexes	39.6	37.6	2.0	¥¥¥
		Male	38.3	36.4	1.9	¥¥¥
		Female	40.8	38.8	2.0	¥¥¥
Percent never married(%)		Male	32.1	31.2	0.9	¥¥¥
		Female	24.0	23.4	0.6	¥¥¥
	25-29years	Male	66.9	64.4	2.5	¥¥¥
		Female	48.0	40.2	7.8	¥¥¥
Private households		Number of households(a)	43,899,923	40,670,475	3,229,448	7.9
		Household members(b)	123,646,108	121,545,271	2,100,837	1.7
		Average size of households(b/a)	2.82	2.99	(0.17)	¥¥¥
	Number of one-person private households		11,239,389	9,389,660	1,849,729	19.7
	Number of one-aged-person		2,202,160	1,623,433	578,727	35.6
		Male	460,159	310,335	149,824	48.3
		Female	1,742,001	1,313,098	428,903	32.7
Institutional households		Household members	1,793,829	1,741,756	52,073	3.0
	Inmates of social institutions		524,527	433,924	90,603	20.9
		65years and over	325,813	246,713	79,100	32.1

Note : The sum of each figure does not agree with the related total, because the latter includes those whose ages were not reported and those whose types of household were not reported.

(4) Employed Persons by Industry

Industry	Employed (10 000)				Change from previous year	Percentage distribution
	1980	1985	1990	1995	(%)	(%)
Total 1)	5 536	5 807	6 249	6 457	0.1	100.0
Agriculture and forestry	532	464	411	340	-1.4	5.3
Fisheries	45	45	40	27	-3.6	0.4
Mining	11	9	6	6	0.0	0.1
Construction	548	530	588	663	1.2	10.3
Manufacturing	1 367	1 453	1 505	1 456	-2.7	22.5
Electricity, gas and water	30	33	30	42	7.7	0.7
Transport and communications	350	343	375	402	2.6	6.2
Wholesale and retail trade, eating and drinking places	1 248	1 318	1 415	1 449	0.4	22.4
Finance, insurance and real estate	191	217	259	262	0.0	4.1
Services	1 001	1 173	1 394	1 566	1.6	24.3
Government	199	199	195	218	1.4	3.4

1) Including the employed not classifiable and not reported.
Source: Statistics Bureau, Management and Coordination Agency.

S Economic Conditions

(1) Economic Conditions (1990=100)

Year	Indexes of industrial production 1)						Index of operating rate (manufacturing)
	Total	Fabricated metal products	General machinery	Electrical machinery	Transportation equipment	Chemicals	
1984	77.4	82.0	70.8	62.9	76.3	70.9	96.0
1985	80.3	82.3	76.8	66.9	81.8	73.2	96.1
1986	80.1	82.1	73.4	69.7	80.3	75.6	91.7
1987	82.8	85.0	73.7	76.0	79.2	81.3	91.8
1988	90.8	92.8	86.9	87.9	85.6	89.0	97.1
1989	96.1	97.1	96.0	94.5	93.5	95.5	99.0
1990	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1991	101.7	101.1	100.3	106.5	100.3	102.7	98.0
1992	95.5	96.6	84.3	96.0	98.8	102.5	89.9
1993	91.2	93.0	75.4	93.8	91.7	101.8	84.3
1994	92.0	94.6	74.2	100.5	87.7	106.4	84.2
1995	95.1	95.6	80.1	110.6	86.4	113.7	86.0
Change from previous year (%	3.4	1.1	8.0	10.0	-1.5	6.9	2.1

1) Value added weights.
Source: Ministry of International Trade and Industry.

Year	Index of tertiary industry's activities (1990=100) 1)	Bankruptcy of enterprises		New housing construction started	Value of construction orders received by private sector	Value of public construction started
		Cases	Amount of liabilities (billion yen)	(1000 units)	(billion yen) 2)	(billion yen)
1984	73.3	20 841	3 625.9	1 187	5 545.1	10 727.8
1985	75.9	18 812	4 186.0	1 236	•Ÿ7 262.8	10 565.4
1986	80.0	17 476	3 751.5	1 365	7 824.2	11 431.6
1987	85.0	12 655	2 054.6	1 674	9 430.8	12 277.8
1988	91.0	10 123	2 059.1	1 685	12 364.1	12 755.9
1989	95.7	7 234	1 194.6	1 663	14 448.6	13 085.5
1990	100.0	6 468	1 944.5	1 707	19 206.5	14 076.7
1991	103.3	10 723	7 960.0	1 370	18 877.6	16 693.2
1992	103.8	14 167	7 563.0	1 403	15 957.8	18 147.9
1993	104.3	14 041	6 714.2	1 486	12 107.5	18 798.6
1994	106.7	13 963	5 499.6	1 570	11 419.5	18 617.4
1995	108.9	15 086	9 033.5	1 470	11 095.4	17 887.8
Change from previous year (%	2.1	8.0	64.3	-6.4	-2.8	-3.9

1) The tertiary industry contains industries other than agriculture, forestry and fisheries, mining, construction, and manufacturing. 2) In 1984, 43 main companies. After 1985, 50 main companies. Companies were selected by purposive sampling.
Source: Ministry of International Trade and Industry; Teikoku Data Bank, Ltd.; Ministry of Construction.

T National Accounts

(1) Gross Domestic Product at Constant Prices (Base year=1990) (Billion yen)

Item	F.Y. 1980	F.Y. 1985	F.Y. 1990	F.Y. 1995 p	Change from previous F.Y.(%)
Private final consumption expenditure	173 354	202 226	250 756	276 265	2.7
Government final consumption expenditure	30 515	34 503	39 042	43 136	1.6
Gross domestic capital formation	84 681	94 082	142 058	141 528	5.1
Gross fixed capital formation	83 219	92 381	139 316	140 293	4.4
Increase in stocks	1 462	1 702	2 742	1 235	353.6
Net exports of goods and services	4 188	14 635	4 239	4 055	-52.0
Exports of goods and services	28 175	39 276	46 735	57 133	4.7
Imports of goods and services	23 988	24 641	42 496	53 078	15.1
Gross domestic expenditure (=GDP)	292 737	345 446	436 095	464 984	2.3

Source: Economic Planning Agency.

(3) Establishments by Industry and Form of Organization

1) (As of 1 July)

(Thousands)

Industry	1986	1991	Change from 1986 to 1991 (%)
Total	6709	6754	0.7
Corporations	2368	2771	17.1
Individual proprietorships	4106	3749	-8.7
Agriculture, forestry and fisheries	21	21	-2.3
Mining	6	5	-12.1
Construction	576	603	4.6
Manufacturing	875	857	-2
Electricity, gas, heat supply and water	10	10	-3
Transport & communications	169	182	8.1
Wholesale & retail trade, eating & drinking places	3048	2923	-4
Finance and insurance	95	105	10.1
Real estate	258	287	11.4
Services	1604	1715	7
Government	46	46	-0.2

1) Excluding individual proprietorships in agriculture, forestry and fisheries; domestic services; and foreign governments and international agencies in Japan.
Source: Statistics Bureau, Management and Coordination Agency.

(3) Demand and Supply of Food

(Thousand tons)

Item	F.Y. 1994 P			Self-sufficiency rate (volume basis) (%)			
	Domestic production	Imports	Exports	F.Y. 1980	F.Y. 1985	F.Y. 1990	F.Y. 1994 p
Total food				a)80	a)76	a)67	a)62
Cereals	12 794	30 083	0	b)69	b)69	b)67	b)74
Rice	11 981	1 835	0	100	107	100	120
Wheat	565	6 044	0	10	14	15	9
Potatoes	4 592	606	1	96	96	93	88
Pulses	244	5 114	0	7	8	8	5
Fruits 1)	4 275	4 790	19	81	77	63	47
Meat	3 259	2 157	3	80	81	70	60
Eggs	2 577	104	0	98	98	98	96
Cow milk and dairy products	8 387	2 734	4	82	85	78	73
Fish and shellfish 1)	7 227	5 249	381	c)97	c)86	c)72	c)61
Sugar (refined)	2 454	2	1	27	33	33	29
Fats and oils 1)	2 056	660	16	29	32	28	15

1) Calendar year. a)Value basis. b) Staple food cereals. c)Excluding livestock feeds.
Source: Ministry of Agriculture, Forestry and Fisheries.

8 Manufacturing

(1) Principal Industrial Production

Item	1980	1985	1990	1995	Change from previous year (%)
Iron and steel products					
Crude steel (1000 t)	111 395	105 279	110 339	101 640	3.4
Ceramic, stone and clay products					
Cement (1000 t)	87 957	72 847	84 445	90 474	-1.3
Chemical products					
Ethylene (1000 t)	4 175	4 227	5 810	6 944	13.4
Pulp, paper and paperboard products					
Paper and paperboards (1000 t)	18 088	20 469	28086	29659	4.0
General machinery					
Industrial robots (units)	2 461	21 833	34 110	•Ÿ33 103	20.9
Japanese word processors (1000 units)	•|	1 123	2 534	1 823	-8.4
Automatic vending machines (1000 units)	437	431	717	497	-4.1
Air conditioners for households (1000 units)	3 702	5 426	7 813	19 612	21.7
Microwave ovens (1000 units)	1 876	7 909	4 673	3 174	0.2

(1) Principal Industrial Production (Cont.) (Thousand units)

Item	1980	1985	1990	1995	Change from previous year (%)
Electrical machinery					
Cordless telephones			7 113	7 359	-28.9
Facsimiles	100	866	4 350	5 747	8.7
T.V. receivers					
Braun tube (colour) 1)	10 909	16 880	13 243	7 854	-16.8
Liquid crystal display	•|	b)1 853	1 889	1 168	-33.2
Video tape recorders 2)	4 441	28 283	27 921	12 655	-17.8
Video cameras 3)	•|	2 574	8 803	8 658	8.3
Stereo sets	2 795	2 705	3 356	2 137	-18.3
Digital audio disk players	•|	4 135	9 139	13 184	6.7
Magnetic tapes (100 000 ‡u)	a)666	16 862	32 015	21 074	-5.3
Semi-conductor integrated circuits (100 000	25 430	89 907	154 502	223 339	13.2
Processors of electronic computers	18	2 026	3 292	6 647	67.9
Personal computers	•|	1 924	3 018	6 382	70.3
Transportation equipment					
Passenger cars	7 038	7 647	9 948	7 611	-2.4
Precision instruments					
35mm still cameras	11 802	16 520	16 702	11 285	-4.7

1) Excluding kit. 2) Excluding those for broadcasting and kit. 3) Excluding those for broadcasting.
a) 100 000 metres. b) 1986.
Source: Ministry of International Trade and Industry.

X Energy

(1) Supply of Primary Energy **(Trillion kcal)**

Fiscal year	Total	Petroleum	Coal	Natural gas	Nuclear	Hydro power	Geothermal	Other
1985	4 053	2 280	788	382	359	191	4	49
1990	4 863	2 836	808	493	455	205	5	62
1994	5 339	3 065	875	575	606	154	6	59

Source: Agency of Natural Resources and Energy.

(2) Expectation of Energy Supply

Fiscal year	Total (million kl)	Petroleum (million kl)	Coal (million t)	Natural gas (million t)	Nuclear (billion kWh)	Hydro power (billion kWh)	Geothermal (million kl)	Other (million kl)
2010	a)635	303	134	58	480	105	a)3.8	a)19.1
Percentage distribution(%)	100.0	47.7	15.4	12.8	16.9	3.7	0.6	3.0

a) Crude oil equivalent.
Source: Agency of Natural Resources and Energy.

(3) Consumption per Capita and Dependency on Imports of Primary Energy by Country (1993)

Country	Consumption per capita (oil equivalent kg)	Dependency on imports 1) (%)	Country	Consumption per capita (oil equivalent kg)	Dependency on imports 1) (%)
Japan	3 357	81.5	U.K.	3 910	0.8
Germany	4 054	55.9	U.S.A.	7 570	20.8

1) Dependency on imports=(Imports-Exports)/(Imports-Exports+Domestic)
Source: United Nations.

(4) Volume of Imports by Principal Import Partners and Prices of Crude Oil

Year	Total imports (1000 kl)					Prices (yen per kilolitre)
		United Arab Emirates	Saudi Arabia	Iran	Indonesia	
1980	256 833	35 063	81 096	15 547	36 828	47 206
1985	198 330	42 212	34 452	14 295	22 587	42 374
1990	228 760	47 784	40 609	22 448	27 976	19 842
1994	270 848	70 675	52 183	26 359	24 280	10 581
1995	266 921	71 900	51 997	22 887	21 022	10 687
Change from previous year (%)	-1.4	1.7	-0.4	-13.2	-13.4	1.0

Source: Ministry of International Trade and Industry.

(5) Oil Reserve Stocks

End of fiscal year	Quantity (10 000 kl)	Days of stocks 1)		
			Public	Private
1980	6 982	100	10	90
1985	7 098	126	35	92
1990	8 278	142	54	88
1994	8 816	157	76	81
1995	8 953	150	76	74
Difference from previous F.Y.	0	0	0	0

1) Derived by dividing oil reserve stocks by daily average oil consumption.
Source: Ministry of International Trade and Industry.

(6) Electric Power Consumed (10 million kWh)

Fiscal year	Total	Industrial		Residential
			Manufac-turing	
1980	52 025	33 215	24 283	10 068
1985	59 931	35 731	24 660	12 790
1990	76 560	43 867	31 131	17 072
1994	85 882	46 120	32 191	20 603
Change from previous F.Y. (%)	6.7	5.3	4.0	8.9

Source: Agency of Natural Resources and Energy.

10 Transport and Communications

(1) Transport

Item	F.Y. 1985	F.Y. 1990	F.Y. 1994	F.Y. 1995	Change from previous F.Y. (%)
Index of domestic transport (1990=100)	...	100.7	105.0	p 107.8	2.7
Volume of freight transport (million ton-km)					
Railways	21 919	27 196	24 493	25 101	2.5
Motor vehicles	205 941	274 244	a)280 587		
Coastwise vessels 1)	197 816	233 950	229 534	229 411	-0.1
Aircraft (domestic scheduled services)	430	635	715	762	6.5
Volume of passenger transport (million passenger-km)					
Railways	330 083	387 478	396 332	400 056	0.9
Motor vehicles	489 260	853 060	a)896 751		
Aircraft (domestic scheduled services)	33 119	51 623	61 289	65 014	6.1

1) Steel and wooden vessels. a) Excluding January to March data for Hyogo Prefecture.
Source: Ministry of Transport.

15 Prices

(1) Consumer Price Indexes (Change from previous year)

Item	1985	1990	1991	1992	1993	1994	1995
All items	2.0	3.1	3.3	1.6	1.3	0.7	-0.1
Food	1.7	4.0	4.8	0.6	1.0	0.8	-1.2
Housing	2.5	3.1	3.1	3.1	2.6	2.3	2.0
Fuel, light and water charges	-0.4	2.3	2.3	0.1	0.7	-0.3	0.2
Furniture and household utensils	0.7	0.1	0.8	1.2	-0.3	-2.1	-1.8
Clothes and footwear	3.4	4.8	4.7	3.1	0.0	-1.2	-0.5
Medical care	5.9	0.5	0.3	3.1	0.4	0.3	0.1
Transport and communications	2.1	1.4	0.7	0.5	0.3	-0.6	0.1
Education	4.5	5.0	4.8	4.4	4.2	3.2	2.9
Reading and recreation	2.1	3.4	2.9	3.2	1.6	1.2	-0.7
Miscellaneous	1.3	1.1	1.9	1.7	1.4	0.8	0.3

Source: Statistics Bureau, Management and Coordination Agency.

17 Housing

(1) Dwellings (Thousand dwelling units)

Year	Total dwellings	Occupied	Type of building				Tenure	
			Detached houses	Tenement-houses	Apartments	Other	Owned houses	Rented houses
1973	31 059	28 731	18 620	3 533	6 452	127	17 007	11 724
1978	35 451	32 189	20 962	3 103	7 963	161	19 428	12 689
1983	38 607	34 705	22 306	2 882	9 329	187	21 650	12 951
1988	42 007	37 413	23 311	2 490	11 409	203	22 948	14 015
1993	45 879	40 773	24 141	2 163	14 267	202	24 376	15 691
Change from 1988 to 1993 (%)	9.2	9.0	3.6	-13.1	25.1	-0.5	6.2	12.0

Source: Statistics Bureau, Management and Coordination Agency.

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

GENERAL ENERGY BALANCE, 1994, By the Japanese Institute for Energy Economics
and the Energy Conservation Center, Published by the MITI Research Institute.

ENERGY BALANCE FOR 1990 (Units: 10^{10} kcal)

	No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
		COAL					Coke	Blast	Coal	Crude	Natural	Total Oil	Total Fuel		
Balance Category		Total	Coking	Bituminous	Anthracite	Coke	Gas	Furn. Gas	Briquettes	Oil	Gas Liq.	Products	Oils	Gasoline	Naptha
Domestic Production	1	6,150	425	5,633	92					604		8			
Imports	2	74,605	51,834	21,501	1,270					213,706	6,031	63,210	42,371	1,786	16,867
Total Supply	3	80,755	52,259	27,134	1,362	-	-	-	-	214,310	6,031	63,218	42,371	1,786	16,867
Exports	4	-				(1,192)						(14,538)	(14,231)	(41)	(367)
Change in Stocks	5	952	181	771	-	(48)				(4,591)		(615)	(561)	(231)	15
Domestic Primary Supply	6	81,707	52,440	27,905	1,362	(1,240)	-	-	-	209,719	6,031	48,065	27,579	1,514	16,515
Electricity Utilities	7	(16,529)		(16,529)			(1,290)	(3,345)		(20,221)	(464)	(24,665)	(23,595)		(121)
Pumped Storage Hydro	8	-										-	-		
Autoproduction of Electr.	9	(2,889)		(2,810)	(79)		(515)	(2,155)				(9,675)	(8,368)		(696)
District Heating	10	(18)		(18)								(62)	(55)		
Municipal Gas Production	11	-				(17)	(446)					(3,408)	(235)		(235)
Gas Coke Production	12	(1,078)	(1,068)		(10)	1,044	269					(268)	-		
Steel Coke Production	13	(41,157)	(41,157)			27,845	7,063					(297)	-		
Special Use Coke Producti	14	(7,159)	(7,135)		(24)	5,194	1,331					(233)	-		
Gasworks Gas Prod.	15	-				(11,496)		11,496				-	-		
Oil Refining	16	-								(188,860)	(1,288)	187,760	171,099	36,101	9,461
Petrochemical Production	17	-									(4,339)	4,340	4,155		4,155
Other	18	(72)			(72)				73			-	-		
Sum of Transformation	19	(68,902)	(49,360)	(19,357)	(185)	22,570	6,412	5,996	73	(209,081)	(6,091)	153,492	143,001	36,101	12,564
Own Use	20	(80)		(70)	(10)		(2,082)	(1,563)		(24)		(9,712)	(2,477)	(125)	(123)
Distribution Losses	21	-										-	-		
Statistical Error	22	897	1,971	(428)	(646)	(1,583)	(154)	(141)		(597)		3,667	(2,083)	128	(3,246)
Total Demand	23	13,620	5,052	8,048	520	19,747	4,176	4,291	73	18	-	195,507	166,017	37,617	25,710
All Industry	24	13,564	5,052	7,992	520	19,046	4,176	4,291	-	18	-	79,510	69,350	98	25,710
Agriculture/Forestry	25	-										7,051	7,051		
"Water Industry"	26	-										4,558	4,558		
Mining and Quarrying	27	-						1				376	376		
Construction	28	-										5,392	5,392		
Manufacturing	29	13,564	5,052	7,992	520	19,046	4,176	4,290	-	18	-	62,133	51,973	98	25,710
Food Products	30	-										2,540	2,540		
Textiles and Fiber	31	19		19								2,271	2,108		
Paper and Pulp	32	1,103		1,103								3,021	2,803		
Chemicals	33	1,030	53	905	72	100	144	32		18		31,610	28,419		25,558
Ceramics	34	5,819		5,371	448	250	176	43				3,425	2,892		
Steel	35	5,106	4,998	108		18,102	3,753	4,043				3,289	2,465		
Non-ferrous Metals	36	100		100		202		8				1,870	1,581		
Metal Finishing	37	128		128		63	103	164				2,025	1,504		
Other Manufacturing	38	259	1	258	-	329						12,082	7,661	98	152
General Sectors	39	56	-	56	-	701	-	-	73	-	-	34,553	26,288	-	-
Household	40	12		12					73			17,451	10,925		
General/Commercial	41	44		44		701						17,102	15,363		
Transport	42	-	-	-	-	-	-	-	-	-	-	72,672	70,379	37,519	-
Passenger Transport	43	-										42,700	40,407	32,393	
Goods Transport	44	-										29,972	29,972	5,126	
Non-Energy Products	45	-										8,772	-		

ENERGY BALANCE FOR 1990 (Units: 10^{10} kcal)

Balance Category	No.	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
					Residual Oil				Lubricating	Other	Refinery	Petroleum		Natural		Municipal
		Jet Fuel	Kerosene	Diesel Oil	Total	"A"	"B"	"C"	Oils	Oil Prod.	Gases	Coke	LPG	Gas	LNG	Gas
Domestic Production	1												8	2,078		
Imports	2	3,868	3,376	4,588	11,886	1,547		10,339	132	3		3,496	17,208		47,206	
Total Supply	3	3,868	3,376	4,588	11,886	1,547	-	10,339	132	3	-	3,496	17,216	2,078	47,206	-
Exports	4	(4,694)	(441)	(618)	(8,070)	(993)	(2)	(7,075)	(245)	(60)			(2)			
Change in Stocks	5	(1)	255	(258)	(341)	(74)	(3)	(264)	(28)	(38)			12	(8)		
Domestic Primary Supply	6	(827)	3,190	3,712	3,475	480	(5)	3,000	(141)	(95)	-	3,496	17,226	2,070	47,206	-
Electricity Utilities	7			(142)	(23,332)			(23,332)					(1,070)	(541)	(35,911)	
Pumped Storage Hydro	8				-											
Autoproduction of Electr.	9				(7,672)	(371)	(7)	(7,294)			(422)	(792)	(93)	(37)		
District Heating	10		(38)		(17)			(17)					(7)			(154)
Municipal Gas Production	11				-						(369)		(2,804)	(948)	(10,474)	15,879
Gas Coke Production	12				-							(268)				
Steel Coke Production	13				-							(297)				
Special Use Coke Producti	14				-							(233)				
Gasworks Gas Prod.	15				-											
Oil Refining	16	4,099	21,117	30,816	69,505	24,676	720	44,109	2,444	6,562	8,025	272	5,470			
Petrochemical Production	17				-						185					
Other	18				-											
Sum of Transformation	19	4,099	21,079	30,674	38,484	24,305	713	13,466	2,444	6,562	7,419	(1,318)	1,496	(1,526)	(46,385)	15,725
Own Use	20		(80)	(114)	(2,035)	(104)	(7)	(1,924)	(23)	(5)	(7,125)	(23)	(59)	(343)	(36)	(468)
Distribution Losses	21				-											
Statistical Error	22	(18)	(462)	217	1,298	76	11	1,211	59	(29)	(294)		(98)	462	(744)	-
Total Demand	23	3,254	23,725	34,489	41,222	24,757	712	15,753	2,340	6,432	-	2,154	18,564	663	40	15,257
All Industry	24	-	8,874	8,427	26,241	15,818	229	10,194	-	-	-	2,154	8,006	575	40	3,978
Agriculture/Forestry	25		2,840	1,922	2,289	2,133	20	136								
"Water Industry"	26		78	780	3,700	3,659	2	39								
Mining and Quarrying	27		34	221	121	49	5	67								
Construction	28		1,236	3,424	732	710	5	17								
Manufacturing	29	-	4,686	2,080	19,399	9,267	197	9,935	-	-	-	2,154	8,006	575	40	3,978
Food Products	30				2,540	1,884	44	612								552
Textiles and Fiber	31		18	1	2,089	736	18	1,335				27	136			103
Paper and Pulp	32		31	2	2,770	260	5	2,505				150	68			218
Chemicals	33		275	2	2,584	1,413	21	1,150				470	2,721	514		595
Ceramics	34		109	16	2,767	1,013	26	1,728				293	240			256
Steel	35		344	28	2,093	751	47	1,295				48	776		40	791
Non-ferrous Metals	36		186	4	1,391	799	2	590				50	239			219
Metal Finishing	37		426	75	1,003	984	19						521			1,244
Other Manufacturing	38		3,297	1,952	2,162	1,427	15	720				1,116	3,305	61		
General Sectors	39	-	14,851	76	11,361	7,170	244	3,947	-	-	-	-	8,265	88	-	11,279
Household	40		10,925		-								6,526			7,764
General/Commercial	41		3,926	76	11,361	7,170	244	3,947					1,739	88		3,515
Transport	42	3,254	-	25,986	3,620	1,769	239	1,612	-	-	-	-	2,293	-	-	-
Passenger Transport	43	2,840		5,168	6	3		3					2,293			
Goods Transport	44	414		20,818	3,614	1,766	239	1,609								
Non-Energy Products	45				-				2,340	6,432						

ENERGY BALANCE FOR 1990 (Units: 10^{10} kcal)

Balance Category	No.	30 "New" En. Total	31 Solar	32 MSW Incinerat.	33 Other	34 Geotherm	35 Hydro	36 Nuclear	37 Electricity Generation	38 Public Utilities	39 Auto-Generators	40 Heat	41 All Fuels	Added to Balance Oil Prod.
Domestic Production	1	6,226	1,167	407	4,652	465	20,512	45,511	-				81,554	
Imports	2	-							-				404,758	
Total Supply	3	6,226	1,167	407	4,652	465	20,512	45,511	-	-	-	-	486,312	
Exports	4	-							-				(15,730)	
Change in Stocks	5	-							-				(4,310)	
Domestic Primary Supply	6	6,226	1,167	407	4,652	465	20,512	45,511	-	-	-	-	466,272	
Electricity Utilities	7	(130)		(130)		(329)	(19,613)	(45,316)	65,154	65,490	(336)		(103,200)	
Pumped Storage Hydro	8	-					402		(860)	(860)			(458)	
Autoproduction of Electr.	9	(3,274)		(276)	(2,998)	(58)	(1,301)	(196)	8,572		8,572		(11,528)	
District Heating	10	-							(29)	(29)		236	(27)	
Municipal Gas Production	11	-							-				586	
Gas Coke Production	12	-							-				(33)	
Steel Coke Production	13	-							-				(6,546)	
Special Use Coke Producti	14	-							-				(867)	
Gasworks Gas Prod.	15	-							-				-	
Oil Refining	16	-							-				(2,388)	(6,112)
Petrochemical Production	17	-							-				1	
Other	18	-							-				1	
Sum of Transformation	19	(3,404)	-	(406)	(2,998)	(387)	(20,512)	(45,512)	72,837	64,601	8,236	236	(118,347)	(6,112)
Own Use	20	-							(3,634)	(3,245)	(389)		(17,942)	
Distribution Losses	21	-							(4,128)	(3,371)	(757)		(4,128)	
Statistical Error	22	1,301	1		1,300				-			(34)	3,074	6,112
Total Demand	23	4,122	1,168	-	2,954	79	-	-	65,074	57,984	7,090	202	322,869	
All Industry	24	2,848	-	-	2,848	34	-	-	32,706	26,043	6,663	-	160,786	
Agriculture/Forestry	25	-				34			273	273			7,358	
"Water Industry"	26	-							-				4,558	
Mining and Quarrying	27	-							219	175	44		596	
Construction	28	-							122	122			5,514	
Manufacturing	29	2,848	-	-	2,848	-	-	-	32,092	25,473	6,619	-	142,760	
Food Products	30	-							1,785	1,687	98		4,877	
Textiles and Fiber	31	57			57				998	937	61		3,448	
Paper and Pulp	32	2,710			2,710				2,829	1,113	1,716		9,881	
Chemicals	33	30			30				4,975	2,677	2,298		39,048	
Ceramics	34	-							1,976	1,574	402		11,945	
Steel	35	-							6,995	5,311	1,684		42,119	
Non-ferrous Metals	36	51			51				1,515	1,316	199		3,965	
Metal Finishing	37	-							5,842	5,744	98		9,569	
Other Manufacturing	38	-							5,177	5,114	63		17,908	
General Sectors	39	1,274	1,168	-	106	45	-	-	30,654	30,534	120	202	78,925	
Household	40	1,230	1,124		106				16,353	16,353		31	42,914	
General/Commercial	41	44	44			45			14,301	14,181	120	171	36,011	
Transport	42	-	-	-	-	-	-	-	1,714	1,407	307	-	74,386	
Passenger Transport	43	-							1,606	1,318	288		44,306	
Goods Transport	44	-							108	89	19		30,080	
Non-Energy Products	45	-							-				8,772	

ENERGY BALANCE FOR 1993 (Units: 10^{10} kcal)

	No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
		COAL					Coke	Blast	Coal	Crude	Natural	Total Oil	Total Fuel		
Balance Category		Total	Coking	Bituminous	Anthracite	Coke	Gas	Furn. Gas	Briquettes	Oil	Gas Liq.	Products	Oils	Gasoline	Naptha
Domestic Production	1	4,348		4,268	80					831		-			
Imports	2	77,203	47,863	27,601	1,739					231,121	5,300	49,339	27,411	395	15,507
Total Supply	3	81,551	47,863	31,869	1,819	-	-	-	-	231,952	5,300	49,339	27,411	395	15,507
Exports	4	-				(2,247)						(19,940)	(19,408)	(643)	(193)
Change in Stocks	5	208		232	(24)	(25)				(56)		454	259	(13)	158
Domestic Primary Supply	6	81,759	47,863	32,101	1,795	(2,272)	-	-	-	231,896	5,300	29,853	8,262	(261)	15,472
Electricity Utilities	7	(21,110)		(21,110)			(1,383)	(3,064)		(14,654)	(210)	(19,582)	(18,867)		(75)
Pumped Storage Hydro	8	-										-	-		
Autoproduction of Electr.	9	(3,559)		(3,498)	(61)		(645)	(2,090)				(10,586)	(9,285)		(851)
District Heating	10	(16)		(16)								(41)	(34)		
Municipal Gas Production	11	-					(360)					(3,735)	(300)		(300)
Gas Coke Production	12	(747)	(743)		(4)	723	176					(183)	-		
Steel Coke Production	13	(37,697)	(36,778)	(861)	(58)	25,201	6,533					(297)	-		
Special Use Coke Producti	14	(6,392)	(6,371)	(9)	(12)	4,749	1,203					(254)	-		
Gasworks Gas Prod.	15	-				(10,740)		10,740				-	-		
Oil Refining	16	-								(214,209)	(2,153)	213,093	197,347	40,807	14,031
Petrochemical Production	17	-									(2,938)	2,937	2,761		2,761
Other	18	(68)			(68)				61			-	-		
Sum of Transformation	19	(69,589)	(43,892)	(25,494)	(203)	19,933	5,524	5,586	61	(228,863)	(5,301)	181,352	171,622	40,807	15,566
Own Use	20	(75)		(56)	(19)		(1,677)	(1,504)		(20)	-	(10,899)	(2,740)	(91)	(103)
Distribution Losses	21	-										-	-		
Statistical Error	22	2,500	2,107	1,074	(681)	(850)	(212)	33		(3,013)		(3,895)	(4,301)	63	(3,121)
Total Demand	23	14,591	6,075	7,624	892	16,812	3,635	4,114	61	-	-	204,326	172,846	40,517	27,814
All Industry	24	14,561	6,075	7,594	892	16,100	3,635	4,114	-	-	-	80,084	67,928	98	27,814
Agriculture/Forestry	25	-										7,754	7,754		
"Water Industry"	26	-										3,840	3,840		
Mining and Quarrying	27	-						1				514	514		
Construction	28	-										5,626	5,626		
Manufacturing	29	14,561	6,075	7,594	892	16,100	3,635	4,113	-	-	-	62,350	50,194	98	27,814
Food Products	30	-										2,281	2,281		
Textiles and Fiber	31	28		28								2,199	2,035		
Paper and Pulp	32	1,176		1,176								2,743	2,541		
Chemicals	33	865		814	51	93	65	43				33,354	30,135		27,714
Ceramics	34	6,040		5,199	841	191	158	43				3,637	2,638		
Steel	35	6,208	6,075	133		15,223	3,282	3,841				2,740	1,876		
Non-ferrous Metals	36	116		116		202		8				1,804	1,518		
Metal Finishing	37	125		125		44	130	178				1,751	1,254		
Other Manufacturing	38	3		3		347						11,840	5,915	98	100
General Sectors	39	30	-	30	-	712	-	-	61	-	-	37,433	28,340	-	-
Household	40	6		6					61			19,771	12,797		
General/Commercial	41	24		24		712						17,662	15,543		
Transport	42	-	-	-	-	-	-	-	-	-	-	78,407	76,578	40,419	-
Passenger Transport	43	-										48,013	46,184	36,206	
Goods Transport	44	-										30,394	30,394	4,213	
Non-Energy Products	45	-										8,402	-		

SELECTED ROWS FROM ENERGY BALANCE FOR 1993 (Mass and Volume Units)

	No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Units		kt	kt	kt	kt	kt	Mcu.m.	Mcu.m.	kt	th kl	th kl	th kl oe?	th kl	th kl	th kl
		COAL					Coke	Blast	Coal	Crude	Natural	Total Oil	Total Fuel		
Balance Category		Total	Coking	Bituminous	Anthracite	Coke	Gas	Furn. Gas	Briquettes	Oil	Gas Liq.	Products	Oils	Gasoline	Naptha
Sum of Transformation	19	(99,881)	(57,754)	(41,758)	(369)	27,686	11,509	63,034	106	(247,419)	(6,543)	210,144	192,870	48,580	19,458
Domestic Supply	1														

Implied conv. factor:	6967.191	7599.82	6105.1775	5501.355	7199.668	0.0048	0.000886	5754.717	9250.017	8101.788	8629.892	8898.325	8399.959	7999.794	
Unit	Mcal/te	Mcal/te	Mcal/te	Mcal/te	Mcal/te	Mcal/cu.m.	Mcal/cu.m.	Mcal/te	Mcal/kl	Mcal/kl	Mcal/kl	Mcal/kl	Mcal/kl	Mcal/kl	
Implied conv. factor:	29.15073	31.79765	25.544062	23.01767	30.12341	0.020082	0.003708	24.07774	38.70207	33.89788	36.10747	37.23059	35.14543	33.47114	
Unit	GJ/te	GJ/te	GJ/te	GJ/te	GJ/te	GJ/cu.m.	GJ/cu.m.	GJ/te	GJ/kl	GJ/kl	GJ/kl	GJ/kl	GJ/kl	GJ/kl	

ENERGY BALANCE FOR 1993 (Units: 10^{10} kcal)

	No.	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
						Residual Oil			Lubricating	Other	Refinery	Petroleum		Natural		Municipal
Balance Category		Jet Fuel	Kerosene	Diesel Oil	Total	"A"	"B"	"C"	Oils	Oil Prod.	Gases	Coke	LPG	Gas	LNG	Gas
Domestic Production	1													2,223		
Imports	2	3,002	1,868	1,400	5,239	1,077		4,162	73	3		3,770	18,082		51,938	
Total Supply	3	3,002	1,868	1,400	5,239	1,077	-	4,162	73	3	-	3,770	18,082	2,223	51,938	-
Exports	4	(5,057)	(398)	(1,474)	(11,643)	(1,290)		(10,353)	(379)	(140)			(13)			
Change in Stocks	5	(63)	130	(4)	51	5	2	44	(28)	9			214	-		
Domestic Primary Supply	6	(2,118)	1,600	(78)	(6,353)	(208)	2	(6,147)	(334)	(128)	-	3,770	18,283	2,223	51,938	-
Electricity Utilities	7			(188)	(18,604)			(18,604)					(715)	(624)	(37,931)	
Pumped Storage Hydro	8				-											
Autoproduction of Electr.	9				(8,434)	(389)	(3)	(8,042)			(492)	(689)	(120)	(29)		
District Heating	10		(13)		(21)			(21)					(7)			(225)
Municipal Gas Production	11				-						(353)		(3,082)	(1,092)	(13,519)	19,615
Gas Coke Production	12				-							(183)				
Steel Coke Production	13				-							(297)				
Special Use Coke Producti	14				-							(254)				
Gasworks Gas Prod.	15				-											
Oil Refining	16	5,644	24,724	38,409	73,732	26,030	140	47,562	2,485	6,356	8,800	555	5,460			
Petrochemical Production	17				-						176					
Other	18				-											
Sum of Transformation	19	5,644	24,711	38,221	46,673	25,641	137	20,895	2,485	6,356	8,131	(868)	1,536	(1,745)	(51,450)	19,390
Own Use	20		(111)	(117)	(2,318)	(105)	(6)	(2,207)	(32)	(2)	(8,060)	(26)	(39)	(339)	(21)	(510)
Distribution Losses	21				-											
Statistical Error	22	70	(551)	209	(971)	(132)	4	(843)	45	11	(71)	2	419	412	(467)	(4)
Total Demand	23	3,597	25,650	38,234	37,034	25,196	139	11,699	2,164	6,238	-	2,878	20,200	551	-	18,875
All Industry	24	-	7,992	9,301	22,723	14,893	43	7,787	-	-	-	2,878	9,278	490	-	5,865
Agriculture/Forestry	25		3,096	2,184	2,474	2,431	-	43								
"Water Industry"	26		103	813	2,924	2,896	2	26								
Mining and Quarrying	27		58	273	183	103	-	80								
Construction	28		1,145	3,875	606	594	-	12								
Manufacturing	29	-	3,590	2,156	16,536	8,869	41	7,626	-	-	-	2,878	9,278	490	-	5,865
Food Products	30				2,281	1,890	5	386								710
Textiles and Fiber	31		14	-	2,021	882	4	1,135				25	139			140
Paper and Pulp	32		74	2	2,465	432	4	2,029				131	71			904
Chemicals	33		277	2	2,142	1,061	9	1,072				539	2,680	440		894
Ceramics	34		100	11	2,527	939	7	1,581				769	230			291
Steel	35		328	24	1,524	569	4	951				166	698			1,400
Non-ferrous Metals	36		172	4	1,342	943	-	399				49	237			276
Metal Finishing	37		371	70	813	805	8						497			1,250
Other Manufacturing	38		2,254	2,043	1,420	1,348	-	72				1,199	4,726	50		
General Sectors	39	-	17,658	53	10,629	8,589	59	1,981	-	-	-	-	9,093	61	-	13,010
Household	40		12,797		-								6,974			8,987
General/Commercial	41		4,861	53	10,629	8,589	59	1,981					2,119	61		4,023
Transport	42	3,597	-	28,880	3,682	1,714	37	1,931	-	-	-	-	1,829	-	-	-
Passenger Transport	43	3,129		6,842	7	3		4					1,829			
Goods Transport	44	468		22,038	3,675	1,711	37	1,927								
Non-Energy Products	45				-				2,164	6,238						

SELECTED ROWS FROM ENERGY BALANCE FOR 1993 (Mass and Volume Units)

	No.	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Units		th kl	th kl	th kl	th kl	th kl	th kl	th kl	th kl	kt	10^{10} kcal	kt	kt	M cu.m.	kt	10^{10} kcal
						Residual Oil			Lubricating	Other	Refinery	Petroleum		Natural		Municipal
Balance Category		Jet Fuel	Kerosene	Diesel Oil	Total	"A"	"B"	"C"	Oils	Oil Prod.	Gases	Coke	LPG	Gas	LNG	Gas
Sum of Transformation	19	6,487	27,765	41,544	49,036	27,571	143	21,322	2,589	6,294	8,131	(1,020)	1,280	(1,785)	(39,577)	19,390
Domestic Supply	1															

Implied conv. factor:	8700.478	8900.054	9200.125	9518.109	9299.989	9580.42	9799.737	9598.301	10098.51		8509.804	12000	0.00978	13000		
Unit	Mcal/kl	Mcal/kl	Mcal/kl	Mcal/kl	Mcal/kl	Mcal/kl	Mcal/kl	Mcal/kl	Mcal/kl		Mcal/te	Mcal/te	Mcal/cu.n	Mcal/te		
Implied conv. factor:	36.4028	37.23783	38.49332	39.82377	38.91115	40.08448	41.0021	40.15929	42.25215		35.60502	50.208	0.0409	54.3919		
Unit	GJ/kl	GJ/kl	GJ/kl	GJ/kl	GJ/kl	GJ/kl	GJ/kl	GJ/kl	GJ/kl		GJ/te	GJ/te	GJ/cu.m.	GJ/te		

ENERGY BALANCE FOR 1993 (Units: 10^{10} kcal)

Balance Category	No.	30 "New" En. Total	31 Solar	32 MSW Incinerat.	33 Other	34 Geotherm	35 Hydro	36 Nuclear	37 Electricity Generation	38 Public Utilities	39 Auto-Generators	40 Heat	41 All Fuels	Added to Balance Oil Prod.
Domestic Production	1	5,800	976	491	4,333	504	22,008	56,083	-				91,797	
Imports	2	-							-				414,901	
Total Supply	3	5,800	976	491	4,333	504	22,008	56,083	-	-	-	-	506,698	
Exports	4	-							-				(22,187)	
Change in Stocks	5	-							-				581	
Domestic Primary Supply	6	5,800	976	491	4,333	504	22,008	56,083	-	-	-	-	485,092	
Electricity Utilities	7	(152)		(152)		(332)	(21,340)	(55,849)	68,431	68,957	(526)		(107,800)	
Pumped Storage Hydro	8	-					659		(1,303)	(1,303)			(644)	
Autoproduction of Electr.	9	(3,372)		(339)	(3,033)	(68)	(1,326)	(234)	9,546		9,546		(12,363)	
District Heating	10	-							(44)	(44)		329	3	
Municipal Gas Production	11	-							-				909	
Gas Coke Production	12	-							-				(31)	
Steel Coke Production	13	-							-				(6,260)	
Special Use Coke Producti	14	-							-				(694)	
Gasworks Gas Prod.	15	-							-				-	
Oil Refining	16	-							-				(3,269)	(7,910)
Petrochemical Production	17	-							-				(1)	
Other	18	-							-				(7)	
Sum of Transformation	19	(3,524)	-	(491)	(3,033)	(400)	(22,007)	(56,083)	76,630	67,610	9,020	329	(130,157)	(7,910)
Own Use	20	-							(3,925)	(3,473)	(452)		(18,970)	
Distribution Losses	21	-							(4,395)	(3,504)	(891)		(4,395)	
Statistical Error	22	1,239			1,239				-			(45)	3,608	7,910
Total Demand	23	3,515	976	-	2,539	104	-	-	68,312	60,634	7,678	284	335,180	
All Industry	24	2,447	-	-	2,447	45	-	-	32,357	25,143	7,214	-	159,698	
Agriculture/Forestry	25	-				45			274	274			8,073	
"Water Industry"	26	-							-				3,840	
Mining and Quarrying	27	-							204	161	43		719	
Construction	28	-							116	116			5,742	
Manufacturing	29	2,447	-	-	2,447	-	-	-	31,763	24,592	7,171	-	141,324	
Food Products	30	-							1,928	1,809	119		4,919	
Textiles and Fiber	31	55			55				886	812	74		3,308	
Paper and Pulp	32	2,329			2,329				2,761	956	1,805		9,913	
Chemicals	33	28			28				4,974	2,416	2,558		40,756	
Ceramics	34	-							1,962	1,507	455		12,322	
Steel	35	-							6,579	4,901	1,678		39,273	
Non-ferrous Metals	36	35			35				1,500	1,302	198		3,941	
Metal Finishing	37	-							5,937	5,777	160		9,415	
Other Manufacturing	38	-							5,236	5,112	124		17,476	
General Sectors	39	1,068	976	-	92	59	-	-	34,154	34,005	149	284	86,872	
Household	40	1,028	936		92				18,108	18,108		33	47,994	
General/Commercial	41	40	40			59			16,046	15,897	149	251	38,878	
Transport	42	-	-	-	-	-	-	-	1,801	1,486	315	-	80,208	
Passenger Transport	43	-							1,688	1,393	295		49,701	
Goods Transport	44	-							113	93	20		30,507	
Non-Energy Products	45	-							-				8,402	

SELECTED ROWS FROM ENERGY BALANCE FOR 1993 (Mass and Volume Units)

Balance Category	No.	30 "New" En. Total	31 Solar	32 MSW Incinerat.	33 Other	34 Geotherm	35 Hydro	36 Nuclear	37 Electricity Generation	38 Public Utilities	39 Auto-Generators	40 Heat	41 All Fuels
Units		th kl oe?	th kl oe?	GWh	th kl oe?	th kl oe?	GWh	GWh	GWh	GWh	GWh	1010 kcal	th kl oe?
Sum of Transformation	19	(5,461)		(2,182)	-3279	(432)	(97,812)	(249,256)	891,047	786,171	104,876	329	475,079
Domestic Supply	1		1,055	2182	4684								

Implied conv. factor:	6453.031	9251.185	2250.229	9249.771	9259.259	2249.928	2250.016	859.99953	859.99102	860.063313		-2739.69
Unit	Mcal/kl	Mcal/kl	Mcal/GWh	Mcal/kl	Mcal/kl	Mcal/GWh	Mcal/GWh	Mcal/GWh	Mcal/GWh	Mcal/GWh		Mcal/kl
Implied conv. factor:	26.99948	38.70696	9,415	38.70104	38.74074	9,414	9,414	3,598	3,598	3,599		-11.4629
Unit	GJ/kl	GJ/kl	GJ/GWh	GJ/kl	GJ/kl	GJ/GWh	GJ/GWh	GJ/GWh	GJ/GWh	GJ/GWh		GJ/kl

ENERGY BALANCE FOR 1995 (Units: 10^{10} kcal)

Balance Category	No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
		COAL					Coke	Blast	Coal	Crude	Natural	Total Oil	Total Fuel		
		Total	Coking	Bituminous	Anthracite	Coke	Gas	Furn. Gas	Briquettes	Oil	Gas Liq.	Products	Oils	Gasoline	Naptha
Domestic Production	1	3,666		3599	67					802		-			
Imports	2	86,233	49620	34298	2315					241776	3357	57,643	36,254	1127	21914
Total Supply	3	89,899	49,620	37,897	2,382	-	-	-	-	242,578	3,357	57,643	36,254	1,127	21,914
Exports	4	-				-2019						(21,998)	(21,161)	-1131	-248
Change in Stocks	5	(37)		-60	23	-1				-734		1,713	1,364	192	-58
Domestic Primary Supply	6	89,862	49,620	37,837	2,405	(2,020)	-	-	-	241,844	3,357	37,358	16,457	188	21,608
Electricity Utilities	7	(25,466)		-25466			-1534	-3183		-15485	-194	(19,265)	(18,618)		-124
Pumped Storage Hydro	8	-										-	-		
Autoproduction of Electr.	9	(3,996)		-3937	-59		-699	-2175				(12,070)	(10,505)		-983
District Heating	10	(14)		-14								(39)	(33)		
Municipal Gas Production	11	-					-292					(3,743)	(323)		-323
Gas Coke Production	12	(420)	-416		-4	406	100					(106)	-		
Steel Coke Production	13	(38,378)	-37165	-1163	-50	25429	6740					(262)	-		
Special Use Coke Producti	14	(6,172)	-6123	-2	-47	4605	1160					(234)	-		
Gasworks Gas Prod.	15	-				-11261		11261				-	-		
Oil Refining	16	-								-223262	-871	220,141	204,555	43181	13823
Petrochemical Production	17	-									-2292	2,291	2,106		2106
Other	18	(46)			-46				46			-	-		
Sum of Transformation	19	(74,492)	(43,704)	(30,582)	(206)	19,179	5,475	5,903	46	(238,747)	(3,357)	186,713	177,182	43,181	14,499
Own Use	20	(73)		-66	-7		-1591	-1532		-25		(11,359)	(2,560)	-83	-140
Distribution Losses	21	-										-	-		
Statistical Error	22	1,058	1865	331	-1138	-1035	-220	-443		-3072		(3,225)	(3,630)	81	-2476
Total Demand	23	16,362	7,781	7,520	1,061	16,124	3,664	3,929	46	1	-	218,648	187,452	43,368	33,490
All Industry	24	16,354	7,781	7,512	1,061	15,047	3,664	3,929	-	1	-	86,553	74,950	134	33,490
Agriculture/Forestry	25	-										8,210	8,210		
"Water Industry"	26	-										3,573	3,573		
Mining and Quarrying	27	-						0				614	614		
Construction	28	-										5,777	5,777		
Manufacturing	29	16,354	7,781	7,512	1,061	15,047	3,664	3,929	-	1	-	68,379	56,776	134	33,490
Food Products	30	-										2,318	2,318		
Textiles and Fiber	31	29		29								2,317	2,137		
Paper and Pulp	32	1,409		1409								3,261	2,932		
Chemicals	33	489	2	282	205	91	19	34		1		38,690	35,855		33362
Ceramics	34	6,194		5338	856	123	155	45				3,759	2,869		
Steel	35	7,944	7779	165		14216	3383	3847				2,880	1,864		
Non-ferrous Metals	36	122		122		191		3				1,512	1,245		
Metal Finishing	37	161		161		29	107					1,590	1,073		
Other Manufacturing	38	6		6		397						12,052	6,483	134	128
General Sectors	39	8	-	8	-	1,077	-	-	46	-	-	39,177	29,370	-	-
Household	40	2		2					46			20,510	13,312		
General/Commercial	41	6		6		1,077						18,667	16,058		
Transport	42	-	-	-	-	-	-	-	-	-	-	84,780	83,132	43,234	-
Passenger Transport	43	-										52,467	50,819	39163	
Goods Transport	44	-										32,313	32,313	4071	
Non-Energy Products	45	-										8,138	-		

ENERGY BALANCE FOR 1995 (Units: 10^{10} kcal)

Balance Category	No.	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
					Residual Oil				Lubricating	Other	Refinery	Petroleum		Natural		Municipal
		Jet Fuel	Kerosene	Diesel Oil	Total	"A"	"B"	"C"	Oils	Oil Prod.	Gases	Coke	LPG	Gas	LNG	Gas
Domestic Production	1													2203		
Imports	2	3127	3040	1585	5,461	1092		4369	68	2		3524	17795		56724	
Total Supply	3	3,127	3,040	1,585	5,461	1,092	-	4,369	68	2	-	3,524	17,795	2,203	56,724	-
Exports	4	-5937	-434	-2437	(10,974)	-1132		-9842	-431	-398			-8			
Change in Stocks	5	22	509	52	647	299	4	344	20				329	-4		
Domestic Primary Supply	6	(2,788)	3,115	(800)	(4,866)	259	4	(5,129)	(343)	(396)	-	3,524	18,116	2,199	56,724	-
Electricity Utilities	7			-194	(18,300)			-18300					-647	-617	-41071	
Pumped Storage Hydro	8				-											
Autoproduction of Electr.	9				(9,522)	-465	-1	-9056			-624	-820	-121	-4		
District Heating	10		-13		(20)			-20					-6			-283
Municipal Gas Production	11				-						-370		-3050	-1137	-15168	21318
Gas Coke Production	12				-							-106				
Steel Coke Production	13				-							-262				
Special Use Coke Producti	14				-							-234				
Gasworks Gas Prod.	15				-											
Oil Refining	16	6709	24521	42305	74,016	26566	86	47364	2581	6264	9436	577	5885			
Petrochemical Production	17				-						185					
Other	18				-											
Sum of Transformation	19	6,709	24,508	42,111	46,174	26,101	85	19,988	2,581	6,264	8,627	(845)	2,061	(1,758)	(56,239)	21,035
Own Use	20		-123	-125	(2,089)	-96	-4	-1989	-37	-3	-8627	-28	-104	-396	-28	-425
Distribution Losses	21				-											
Statistical Error	22	305	-771	400	(1,169)	-348	-3	-818	39	31			335	656	-457	-2
Total Demand	23	4,226	26,730	41,588	38,050	25,916	83	12,051	2,241	5,897	-	2,651	20,407	498	-	20,608
All Industry	24	-	8,308	9,627	23,391	14,956	26	8,409	-	-	-	2,651	8,952	445	-	6,929
Agriculture/Forestry	25		3158	2288	2,764	2708		56								
"Water Industry"	26		119	855	2,599	2569	1	29								
Mining and Quarrying	27		57	256	301	202		99								
Construction	28		1193	3949	635	627	0	8								
Manufacturing	29	-	3,781	2,279	17,092	8,850	25	8,217	-	-	-	2,651	8,952	445	-	6,929
Food Products	30				2,318	1978	3	337								788
Textiles and Fiber	31		11	0	2,126	856	3	1267				22	158			143
Paper and Pulp	32		107	2	2,823	464	0	2359				135	194			1009
Chemicals	33		300	3	2,190	1084	6	1100				491	2344	397		942
Ceramics	34		96	11	2,762	1059	3	1700				670	220			338
Steel	35		282	28	1,554	582	5	967				322	694			1626
Non-ferrous Metals	36		178	4	1,063	652	0	411				14	253			267
Metal Finishing	37		376	67	630	625	5						517			1526
Other Manufacturing	38		2431	2164	1,626	1550		76				997	4572	48		290
General Sectors	39	-	18,422	69	10,879	9,127	38	1,714	-	-	-	-	9,807	53	-	13,679
Household	40		13312		-								7198			9035
General/Commercial	41		5,110	69	10,879	9,127	38	1,714					2,609	53		4,644
Transport	42	4,226	-	31,892	3,780	1,833	19	1,928	-	-	-	-	1,648	-	-	-
Passenger Transport	43	3703		7947	6	3		3					1648			
Goods Transport	44	523		23945	3,774	1830	19	1925								
Non-Energy Products	45				-				2241	5897						

ENERGY BALANCE FOR 1995 (Units: 10^{10} kcal)

Balance Category	No.	30 "New" En. Total	31 Solar	32 MSW Incinerat.	33 Other	34 Geotherm	35 Hydro	36 Nuclear	37 Electricity Generation	38 Public Utilities	39 Auto-Generators	40 Heat	41 All Fuels	Added to Balance Oil Prod.
Domestic Production	1	6,157	1006	631	4520	922	18888	65532	-				98,170	
Imports	2	-							-				445,733	
Total Supply	3	6,157	1,006	631	4,520	922	18,888	65,532	-	-	-	-	543,903	
Exports	4	-							-				(24,017)	
Change in Stocks	5	-							-				937	
Domestic Primary Supply	6	6,157	1,006	631	4,520	922	18,888	65,532	-	-	-	-	520,823	
Electricity Utilities	7	(237)		-237		-657	-18450	-65228	74,650	75272	-622		(116,737)	
Pumped Storage Hydro	8	-					625		(1,284)	-1284			(659)	
Autoproduction of Electr.	9	(3,720)		-394	-3326	-57	-1063	-304	10,479		10479		(13,609)	
District Heating	10	-							(61)	-61		425	28	
Municipal Gas Production	11	-							-				978	
Gas Coke Production	12	-							-				(20)	
Steel Coke Production	13	-							-				(6,471)	
Special Use Coke Producti	14	-							-				(641)	
Gasworks Gas Prod.	15	-							-				-	
Oil Refining	16	-							-				(3,992)	(9,157)
Petrochemical Production	17	-							-				(1)	
Other	18	-							-				-	
Sum of Transformation	19	(3,957)	-	(631)	(3,326)	(714)	(18,888)	(65,532)	83,784	73,927	9,857	425	(131,967)	(9,157)
Own Use	20	-							(4,316)	-3813	-503		(19,745)	
Distribution Losses	21	-							(4,637)	-3698	-939		(4,637)	
Statistical Error	22	1,311			1311				-			-48	3,680	9,157
Total Demand	23	3,511	1,006	-	2,505	208	-	-	74,831	66,417	8,414	378	358,808	
All Industry	24	2,429	-	-	2,429	89	-	-	34,327	26,428	7,899	-	169,767	
Agriculture/Forestry	25	-				89			306	306			8,605	
"Water Industry"	26	-							-				3,573	
Mining and Quarrying	27	-							202	159	43		816	
Construction	28	-							107	107			5,884	
Manufacturing	29	2,429	-	-	2,429	-	-	-	33,712	25,856	7,856	-	150,889	
Food Products	30	-							2,096	1947	149		5,202	
Textiles and Fiber	31	47			47				825	754	71		3,361	
Paper and Pulp	32	2,353			2353				2,906	906	2000		10,938	
Chemicals	33	29			29				5,299	2515	2784		45,991	
Ceramics	34	-							2,019	1537	482		12,633	
Steel	35	-							6,895	5084	1811		40,791	
Non-ferrous Metals	36	-							1,588	1390	198		3,683	
Metal Finishing	37	-							6,469	6258	211		9,882	
Other Manufacturing	38	-							5,615	5465	150		18,408	
General Sectors	39	1,082	1,006	-	76	119	-	-	38,653	38,453	200	378	94,272	
Household	40	1,046	970		76				20,351	20351		33	51,023	
General/Commercial	41	36	36			119			18,302	18,102	200	345	43,249	
Transport	42	-	-	-	-	-	-	-	1,851	1,536	315	-	86,631	-
Passenger Transport	43	-							1,747	1450	297		54,214	
Goods Transport	44	-							104	86	18		32,417	
Non-Energy Products	45	-							-				8,138	

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CONVERSION FACTORS

Source/Notes

1 TOE	41.868	GJ/te	
1 kcal =	4.1868	kJ	
10^{10} kcal =	41,868	GJ	
one thousand bbl/day =	3.65E+05	bbl/yr	
Liters per gallon	3.785		
gallons per barrel	42		
one thousand bbl/day =	58,024	kl/yr	
one thousand bbl/day =	49,320	te crude/yr	(assumes average oil used in Japanese Refineries)

Gross-to-net heating value conversion		
"GHV" = Gross Heating Value, "NHV" = Net Heating Value		
Solid Fuels	1.05	GHV/NHV
Liquid Fuels	1.05	GHV/NHV
Natural Gas	1.10	GHV/NHV
Other Gases	1.10	GHV/NHV

Heating Value Calculations				
Solid Fuels	GHV	NHV	Units	
Weighted Average Coals	29.151	27.763	GJ/te	*1*
Coking Coal	31.798	30.283	GJ/te	*1*
Bituminous Coal	25.544	24.328	GJ/te	*1*
Anthracite Coal	23.018	21.922	GJ/te	*1*
Coke	30.123	28.689	GJ/te	*1*
Coal Briquettes	24.078	22.931	GJ/te	*1*
Petroleum Coke	35.605	33.910	GJ/te	*1*

Liquids	GJ/kl				
	GHV	NHV	te/kl	GJ/te (NHV)	
Crude Oil	38.702	36.859	0.850	43.364	*1,2*
Natural Gas Liquids	33.898	32.284	0.729	44.302	*1,2*
Gasoline	35.145	33.472	0.740	45.232	*1,2*
Naptha	33.471	31.877	0.720	44.274	*1,2*
Jet Fuel	36.403	34.669	0.810	42.802	*1,2*
Kerosene	37.238	35.465	0.810	43.783	*1,2*
Diesel Oil	38.493	36.660	0.870	42.138	*1,2*
Residual Oil "A"	38.911	37.058	0.900	41.176	*1,2,4*
Residual Oil "B"	40.084	38.176	0.920	41.495	*1,2,4*
Residual Oil "C"	41.002	39.050	0.950	41.105	*1,2*
Lubricating Oil	40.159	38.247	0.900	42.497	*1,2*
Other Oil Products	42.252	40.240	0.950	42.358	*1,2*
LPG	27.112	25.821	0.540	47.817	*1,2*
Gases	GHV	NHV			
Coke Oven Gas	0.020082	0.018256	GJ/cubic meter		*1,2*
Blast Furnace Gas	0.003708	0.003371	GJ/cubic meter		*1,2*
LNG	54.392	49.447	GJ/te	0.42 te/cu. m.	*1,2,3*
Natural Gas	0.040902	0.037184	GJ/cubic meter		*1,2*
Municipal Gas		0.03545	GJ/cubic meter		*Assumption*
Refinery Gas	0.050242	0.046055	GJ/cubic meter		*4*

					Source/Notes
Other Energy					
Solar	9251	kcal/kloe	38.71	GJ/kloe	*1*
Geothermal	9259	kcal/kloe	38.74	GJ/kloe	*1*
Other Renewable	9250	kcal/kloe	38.70	GJ/kloe	*1*
MSW Incineration	2250	Mcal/GWh	9415	GJ/GWh	*1*
Hydro	2250	Mcal/GWh	9414	GJ/GWh	*1*
Nuclear	2250	Mcal/GWh	9414	GJ/GWh	*1*
Electricity Generation	860	Mcal/GWh	3598	GJ/GWh	*1*
Other Densities of Petroleum Products					
Bitumen	1.04	kg/liter			*2*
Paraffin wax	0.8	kg/liter			*2*
Petroleum Coke	1.14	kg/liter			*2*
White spirit	0.81	kg/liter			*2*
Other Petroleum Prod.	0.86	kg/liter			*2*

Calculation of Carbon Content of Blast Furnace Gas *(data from Source 3, page 1926)*

Component	Fraction	Mol wt.	Fraction C	Total Wt.	Total C	Wt% C
CO2	13.00%	44	27.27%	5.72	1.56	
CO	26.20%	28	42.86%	7.336	3.144	
H2	3.20%	2	0.00%	0.064	0	
N2	57.60%	28	0.00%	16.128	0	
TOTAL	100.00%			29.248	4.704	**16.08%**

Sources/Notes

1 Calculated from values in detailed energy balance for Japan (see "Detailed Balance" sheet)

2 United Nations (1994), 1992 Energy Statistics Yearbook. United Nations, New York, NY, USA.

3 US Federal Energy Administration, National Energy Information Center (1977), Energy Interrelationships A Handbook of Tables and Conversion Factors for Combining and Comparing International Energy Data Report # FEA/B-77/166. (Now US Department of Energy, Washington, DC, USA)

4 Densities shown are upper end of range for "Industrial Diesel" (Residual Oil "A"), and the lower end of the range for "Light Residual Fuel Oil" (Residual Oil "B"), respectively.

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ELECTRICITY GENERATION

Source/Notes

UN-ESCAP data

	Generating Capacity (MW)	Generation (GWh)	Implied Capacity Factor	
PLANT TYPE	1990	1990	1990	*1*
Hydro	37,831	95,835	28.92%	*1*
Steam	119,794	539,373	51.40%	*1*
Internal Combustion	2,822	9,094	36.79%	*1*
Gas Turbines	2,365	8,857	42.75%	*1*
Nuclear	28,862	202,272	80.00%	*1*
Geothermal	271	1,741	73.34%	*1*
NRSE				
SUM OF ABOVE	191,945	857,172	50.98%	
Aggregate Max Demand	143,718			*1*
Implied Reserve Margin	33.56%			*1*
Losses as % of gross production		9.27%		*1*

Generating Capacity and Electricity Production: Electric Utilities (MITI/ANRE Data)

	Generating Capacity (GW)		Generation (TWh)		Implied Capacity Factor		
PLANT TYPE	1990	1993	1990	1993	1990	1993	
Nuclear	31.48	38.38	201.4	248.2	73.03%	73.82%	*2*
Coal	12.42	15.97	72.6	95.6	66.73%	68.34%	*2*
LNG	38.78	41.73	165.6	173.6	48.75%	47.49%	*2*
Hydro--Conventional	19.45	19.65	79.5	84.5	46.66%	49.09%	*2*
Hydro--Pumped Storage	17	18.94	9.3	13.4	6.24%	8.08%	*2*
Geothermal	0.24	0.26	1.5	1.5	71.35%	65.86%	*2*
Oil and LPG	55.71	55.5	206.1	155.1	42.23%	31.90%	*2*
Others			21.7	21			*2*
SUM (or average) OF ABOVE	175.08	190.43	757.70	792.90	49.40%	47.53%	
	107.15						

Electricity Data from USDOE EIA

	Generating Capacity (GW)			Generation (TWh)			Implied Capacity Factor		
PLANT TYPE	1990	1993	1995	1990	1993	1995	1990	1993	1995
Nuclear	29.445	34.584	40.531	182.293	233.985	276.691	70.67%	77.23%	77.93%
Hydro	20.41	20.99	21.067	88.421	96.832	81.381	49.45%	52.66%	44.10%
Thermal	124.985	130.743	138.049	520.956	513.804	567.955	47.58%	44.86%	46.97%
Geothermal and Other	0.216	0.281	0.386	1.644	1.709	3.04285	86.88%	69.43%	89.99%
SUM OF ABOVE	175.06	186.60	200.03	793.31	846.33	929.07			
Losses				55.53198	59.2431	65.03489			
Trans. and Distrib. Losses as % of Generation				7.00%	7.00%	7.00%			

Electricity Data from EDMC--Utility and Autoproducers *(Source 10)*

	Generating Capacity (GW)			Generation (TWh)			Implied Capacity Factor		
PLANT TYPE	1990	1993	1995	1990	1993	1995	1990	1993	1995
Nuclear	31.645	38.541	41.356	202.272	249.256	291.254	72.97%	73.83%	80.40%
Hydro (must incl. pump. stor.)	37.831	39.965	43.455	95.835	105.47	91.301	28.92%	30.13%	23.98%
Thermal	125.253	134.101	141.665	557.423	550.18	604.206	50.80%	46.83%	48.69%
SUM OF ABOVE	194.729	212.607	226.476	855.53	904.906	986.761	50.15%	48.59%	49.74%
Total as Listed	194.73	212.914	226.994	857.272	906.705	989.996	50.26%	48.61%	49.79%
Implied Other Generation	0.001	0.307	0.518	1.742	1.799	3.235	19886%	66.89%	71.29%

Compilation of Electricity Data from Detailed Energy Balance

Data in 10^{10} kcal

Conversion: 10^{10} kcal to GJ: 41,868 GJ/10^{10} kcal

	Public Utilities			Autoproducers			**Total**		
Fuel or Output	1990	1993	1995	1990	1993	1995	1990	1993	1995
Bituminous Coal	(16,529)	(21,110)	(25,466)	(2,810)	(3,498)	(3,937)	(19,339)	(24,608)	(29,403)
Anthracite Coal	-	-	-	(79)	(61)	(59)	(79)	(61)	(59)
Coke Gas	(1,290)	(1,383)	(1,534)	(515)	(645)	(699)	(1,805)	(2,028)	(2,233)
Blast Furnace Gas	(3,345)	(3,064)	(3,183)	(2,155)	(2,090)	(2,175)	(5,500)	(5,154)	(5,358)
Crude Oil	(20,221)	(14,654)	(15,485)	-	-	-	(20,221)	(14,654)	(15,485)
Natural Gas Liquids	(464)	(210)	(194)	-	-	-	(464)	(210)	(194)
Naptha	(121)	(75)	(124)	(696)	(851)	(983)	(817)	(926)	(1,107)
Diesel	(142)	(188)	(194)	-	-	-	(142)	(188)	(194)
Residual "A"	-	-	-	(371)	(389)	(465)	(371)	(389)	(465)
Residual "B"	-	-	-	(7)	(3)	(1)	(7)	(3)	(1)
Residual "C"	(23,332)	(18,604)	(18,300)	(7,294)	(8,042)	(9,056)	(30,626)	(26,646)	(27,356)
Refinery Gases	-	-	-	(422)	(492)	(624)	(422)	(492)	(624)
Petroleum Coke	-	-	-	(792)	(689)	(820)	(792)	(689)	(820)
LPG	(1,070)	(715)	(647)	(93)	(120)	(121)	(1,163)	(835)	(768)
Natural Gas	(541)	(624)	(617)	(37)	(29)	(4)	(578)	(653)	(621)
LNG	(35,911)	(37,931)	(41,071)	-	-	-	(35,911)	(37,931)	(41,071)
MSW Incineration	(130)	(152)	(237)	(276)	(339)	(394)	(406)	(491)	(631)
Other Renewable Fuels	-	-	-	(2,998)	(3,033)	(3,326)	(2,998)	(3,033)	(3,326)
Total Fuel Input	103,096	98,710	107,052	18,545	20,281	22,664	121,641	118,991	129,716
Total Fuel Input (GJ) (GHV)	4.32E+09	4.13E+09	4.48E+09	7.76E+08	8.49E+08	9.49E+08	5.09E+09	4.98E+09	5.43E+09
Total Fuel Input (GJ) (NHV)	4.04E+09	3.86E+09	4.18E+09	7.34E+08	8.03E+08	8.97E+08	4.77E+09	4.66E+09	5.08E+09
Geothermal	(329)	(332)	(657)	(58)	(68)	(57)	(387)	(400)	(714)
Hydro	(19,613)	(21,340)	(18,450)	(1,301)	(1,326)	(1,063)	(20,914)	(22,666)	(19,513)
Nuclear	(45,316)	(55,849)	(65,228)	(196)	(234)	(304)	(45,512)	(56,083)	(65,532)
Electricity (from Public)				(336)	(526)	(622)	(336)	(526)	(622)
Electricity Output	65,490	68,957	75,272	8,572	9,546	10,479	74,062	78,503	85,751
"Hydro" from Pumping	402	659	625	-	-	-	402	659	625
Input to Pumping	(860)	(1,303)	(1,284)	-	-	-	(860)	(1,303)	(1,284)
Own Use	(3,245)	(3,473)	(3,813)	(389)	(452)	(503)	(3,634)	(3,925)	(4,316)
Distribution Losses	(3,371)	(3,504)	(3,698)	(757)	(891)	(939)	(4,128)	(4,395)	(4,637)
Own Use as % of Output	-4.95%	-5.04%	-5.07%	-4.54%	-4.73%	-4.80%	-4.91%	-5.00%	-5.03%
Losses as % of Output	-5.15%	-5.08%	-4.91%	-8.83%	-9.33%	-8.96%	-5.57%	-5.60%	-5.41%
Losses as % of Net Output	5.42%	5.35%	5.17%	9.25%	9.80%	9.41%	5.86%	5.89%	5.69%
Implied Pumped-Stor. Output	4,674	7,663	7,267	GWh	(Hydro output conv. at 860 Mcal/GWh)				

Compilation of Electricity Data from IEA Energy Balance

Data in million tonnes oil equivalent (Mtoe)

Conversion: Mtoe to GJ: 4.187E+07 GJ/Mtoe

	Fuel Input and Electricity Output			Fract. Thermal Input to Generation		
	Public Utilities	Auto-producers	**Total**	Public Utilities	Auto-producers	**Total**
Fuel or Output	1990	1990	1990	1990	1990	1990
Coal	-19.27	-4.48	-23.75	20.98%	26.73%	21.87%
Crude Oil	-18.44	0	-18.44	20.08%	0.00%	16.98%
Petroleum Products	-22.31	-12.28	-34.59	24.29%	73.27%	31.85%
Gas	-31.81	0	-31.81	34.64%	0.00%	29.29%
Nuclear	-52.49	-0.23	-52.72			
Hydro	-7.07	-0.61	-7.68			
Geothermal/Solar/Etc	-1.28	-0.22	-1.5			
Electricity Output	64.59	8.57	73.16			
Own Use			-4.58			
Distribution Losses			-2.81			
Total Thermal Input	-91.83	-16.76	-108.59	100.00%	100.00%	100.00%
Total Thermal Input (GJ)	3.84E+09	7.02E+08	4.55E+09			
Own Use as % of Output			6.26%			
Losses as % of Output			3.84%			

	GWh Output by Fuel			Implied Efficiency by fuel		
	Public Utilities	Auto-producers	**Total**	Public Utilities	Auto-producers	**Total**
Fuel	1990	1990	1990	1990	1990	1990
Coal	94,265	28,987	123,252	42.06%	55.63%	44.62%
Crude Oil		-	-	N/A	N/A	N/A
Petroleum Products*	206,107	62,478	268,585	43.49%	43.75%	43.55%
Gas	165,586	-	165,586	44.76%	N/A	44.76%
Nuclear	201,403	869	202,272	32.99%	32.49%	32.99%
Hydro	82,218	7,087	89,305	99.99%	99.90%	99.98%
Geothermal/Solar/Etc	1,485	257	1,742	9.98%	10.04%	9.99%
TOTAL	751,064	99,678	850,742			

*Efficiency Calculation includes crude oil input.

Derivation of Capacity, Output, and Fuel Content Data to be Used in LEAP

	Capacity (GW)			Output (GWh)		Efficiency	Assumed	
Plant Type	1990	1993	1995	1990	1993		Own Use	
Nuclear (all)	32.224	39.641	41.602	202,272	249,069	33.0%	*4.1%*	*9, 11*
Hydro--Conventional	20.831	21.025	*21.025*	88,421	96,832	100%	0.5%	
Hydro--Pumped Storage	17	18.940	22.430	7,201	10,911	72%		*3*
Geothermal--Utility Plants	0.24	0.260		1,485	1,485	10.0%	5.0%	
Geothermal--Autoproducers	0.0310	0.0310		257	257	10.0%	5.0%	
Gas Turbine--Utility	2.365	2.545		8,857	9,285	30%	2.0%	*Efficiencies*
Internal Combustion--Utility	2.822	2.822		9,094	9,094	28%	2.0%	*Assumed*
Coal Steam--Utility	12.420	15.970		72,600	95,600	44.62%	6.5%	
Fuel Fractions:	100%	Bituminous	0%	Anthracite				
Coal Steam--Autoproducers	2.776	3.57		14,021	18,462	44.62%	6.5%	
Fuel Fractions:	97.27%	Bituminous	2.73%	Anthracite				
Coal/Coke Gases--Utility	3.706	3.706		21,665	21,665	44.62%	3.0%	
Fuel Fractions:	27.83%	Coke Gas	72.17%	Bl. Furn. Gas				
Coal/Coke Gases--Autoprod.	2.964	2.964		14,966	14,966	44.62%	3.0%	
Fuel Fractions:	19.29%	Coke Gas	80.71%	Bl. Furn. Gas				

Designation of Fuel Input to Internal Combustion Utility Generation

Total Fuel Required	1.17E+08	GJ	at	28% Efficiency
		Fuel	GJ	Fraction
Lighter Liquid Fuels used for Generation		Diesel	5.95E+06	5.08%
(from Detailed Balance)		Naptha	5.07E+06	4.33%
		NGL	1.94E+07	16.62%
		LPG	4.48E+07	38.31%
		LNG	4.17E+07	35.65%
		Total	1.17E+08	100.00%

	Capacity (GW)		Output (GWh)		Efficiency	Assumed	
Plant Type	1990	1993	1990	1993		Own Use	
Steam Nat. Gas/LNG--Utility	35.409	38.179	153,501	161,073	44.76%	3.0%	*4*
Fuel Fractions:	1.35%	Natural Gas	98.65%	LNG			
Steam Natural Gas--Autoprod.	0.0333	0.033	168	168	44.76%	3.0%	
Steam Oil-Fueled--Utility	53.894	53.684	200,248	151,616	43.55%	5.8%	
Fuel Fractions:	46.43%	Crude Oil	53.57%	Residual Oil "C"			
Steam Oil-fueled--Autoprod.	12.372	9.367	62,478	47,304	43.55%		
Steam-Hvy Oil--Autoprod.	10.349	7.836	52,262	39,570	43.55%	5.5%	
Steam-Lt Oil--Autoprod.	2.023	1.532	10,216	7,735	43.55%	5.5%	

Estimate of Fuel Fractions for Steam Oil-fueled Autoproducers (1990)

Fuel	GJ^	Fraction	Hvy Fuels	Fraction	Lt Fuels	Fraction
Naptha	2.91E+07	7.19%		0.00%	2.91E+07	43.99%
Residual Oil "A"	1.55E+07	3.83%		0.00%	1.55E+07	23.45%
Residual Oil "B"	2.93E+05	0.07%	2.93E+05	0.09%		0.00%
Residual Oil "C"	3.05E+08	75.39%	3.05E+08	90.13%		0.00%
Refinery Gases	1.77E+07	4.36%		0.00%	1.77E+07	26.68%
Petroleum Coke	3.32E+07	8.19%	3.32E+07	9.79%		0.00%
LPG	3.89E+06	0.96%		0.00%	3.89E+06	5.88%
TOTAL	4.05E+08	100.00%	3.39E+08	100.00%	6.62E+07	100.00%

^GJ GHV as in Detailed Balance. Total is actually less than that required to fuel generation at assumed efficiency.

Estimate of Fuel Fractions for Steam Oil-fueled Autoproducers (1995)

Fuel	GJ^	Fraction	Hvy Fuels	Fraction	Lt Fuels	Fraction
Naptha	4.12E+07	8.14%		0.00%	4.12E+07	44.82%
Residual Oil "A"	1.95E+07	3.85%		0.00%	1.95E+07	21.20%
Residual Oil "B"	4.19E+04	0.01%	4.19E+04	0.01%		0.00%
Residual Oil "C"	3.79E+08	75.03%	3.79E+08	91.69%		0.00%
Refinery Gases	2.61E+07	5.17%		0.00%	2.61E+07	28.45%
Petroleum Coke	3.43E+07	6.79%	3.43E+07	8.30%		0.00%
LPG	5.07E+06	1.00%		0.00%	5.07E+06	5.52%
TOTAL	5.05E+08	100.00%	4.14E+08	100.00%	9.18E+07	100.00%

^GJ GHV as in Detailed Balance. Total is actually less than that required to fuel generation at assumed efficiency.

Utilization of capacity by autoproducers, Thermal Power Plants, 1990:	5050	kWh/kW	*6*

	Capacity (GW)		Output (GWh)			Efficiency	Assumed	
Plant Type	1990	1993	1990	1993	1995		Own Use	
MSW-fired (all)	0.234	0.283	1.180E+03	1.428E+03	1.835E+03	25%	6.0%	*5*
Other biomass-fired--Autoprod.	1.726	1.746	8.717E+03	8.818E+03	9.670E+03	25%	6.0%	
SUM OF UTILITY GEN.	181.145	197.055	766,525	808,057				
SUM OF ALL GENERATION	201.05	214.77	867,132	898,034				

Implied total GWh Own Use	36,227	GWh, which is	4.18%	of total gross generation	

ESTIMATES OF FUTURE NUCLEAR CAPACITY *8*

Total Operable Nuclear Generating Units as of 12/31/95:	39.893	GW (Net)

Reactors under construction as of the end of 1995:

Name	Type	Net MW	Estimated Gross MW	EIA Estimate of compl. "Low"	EIA Estimate of compl. "High"	Implied Own Use	
Genkai 4	PWR	1,127	1,180	1997	1997	4.49%	x
Kashiwazaki Kaniwa 6	BWR	1,315	1,356	1996	1996	3.00%	x
Kashiwazaki Kaniwa 7	BWR	1,315	1,356	1997	1997	3.00%	x
TOTAL OF ABOVE		3,757	3,891			3.45%	

Additional Reactors "In the construction pipeline" as of the end of 1995

Name	Type	Net MW	Estimated Gross MW	EIA Estimate of compl.* "Reference"	EIA Estimate of compl.* "High"	Implied Own Use	
Ashihama 1	ABWR	1,300	1,340	2011	2009	3.00%	
Ashihama 2	ABWR	1,300	1,340	2012	2009	3.00%	
Hamaoka 5	ABWR	1,092	1,126	2005	2005	3.00%	x
Higashidori 1	BWR	1,067	1,100	2005	2005	3.00%	x
Higashidori 2	BWR	1,067	1,100	2008	2006	3.00%	x
Maki 1	BWR	780	808	2004	2004	3.52%	x
Naime Odaka	BWR	825	855	ND	2007	3.52%	
Onagawa 3	BWR	796	825	2002	2002	3.52%	x
Oura 1	APWR	1,300	1,361	ND	2014	4.49%	
Oura 2	APWR	1,300	1,361	ND	2014	4.49%	
Shika 2	ABWR	796	851	2005	2005	6.48%	x
TOTAL OF ABOVE		11,623	12,068			3.69%	

*ND = No date given. "Low" estimates represent more pessimistic estimates of plant completion dates, while "high" estimates are more optimistic. In most cases, even the "high" estimates are later than published completion dates.

Assuming that Japanese nuclear plants are retired after 40 years, those plants from the following list plants that were built before 1980 will be retired before 2020:

Roster of Plants in Operation As of December 1995 *(Sources 8, 10)*

Name	Type	Gross MW *(10)*	Net MW *(8)*	Date of Operation	"Start Date" *(10)*	Retirement Date	Implied Own Use	
Fugen ATR	HWLWR	165	148	Jul-78	Sep-79	2019	10.3%	
Fukushima-Daiichi 1	BWR	460	439	Nov-70	Mar-71	2011	4.6%	
Fukushima-Daiichi 2	BWR	784	760	Dec-73	Jul-74	2014	3.1%	
Fukushima-Daiichi 3	BWR	784	760	Oct-74	Mar-76	2015	3.1%	
Fukushima-Daiichi 4	BWR	784	760	Feb-78	Oct-78	2019	3.1%	
Fukushima-Daiichi 5	BWR	784	760	Sep-77	Apr-78	2018	3.1%	
Fukushima-Daiichi 6	BWR	1100	1067	May-79	Oct-79	2020	3.0%	Pre-82 nucl
Fukushima-Daini 1	BWR	1100	1067	Jul-81	Apr-82		3.0%	16,581
Fukushima-Daini 2	BWR	1100	1067	Jun-83	Feb-84		3.0%	Pre-86 nucl
Fukushima-Daini 3	BWR	1100	1067	Dec-84	Jun-85		3.0%	23,631
Fukushima-Daini 4	BWR	1100	1067	Dec-86	Aug-87		3.0%	
Genkai 1	PWR	559	529	Feb-75	Oct-75	2016	5.4%	x
Genkai 2	PWR	559	529	Jun-80	Mar-81		5.4%	
Genkai 3	PWR	1180	1127	Jun-93	Mar-94		4.5%	
Hamaoka 1	BWR	540	515	Aug-74	Mar-76	2015	4.6%	
Hamaoka 2	BWR	840	806	May-78	Nov-78	2019	4.0%	
Hamaoka 3	BWR	1100	1056	Jan-87	Aug-87		4.0%	
Hamaoka 4	BWR	1137	1092	Jan-93	Sep-93		4.0%	
Ikata 1	PWR	566	538	Feb-77	Sep-77	2018	4.9%	x
Ikata 2	PWR	566	538	Aug-81	Mar-82		4.9%	
Ikata 3	PWR	890	846	Jun-94	Dec-94		4.9%	
Kashiwazaki Kariwa 1	BWR	1100	1067	Feb-85	Sep-85		3.0%	
Kashiwazaki Kariwa 2	BWR	1100	1067	Feb-90	Mar-90		3.0%	
Kashiwazaki Kariwa 3	BWR	1100	1067	Dec-92	Aug-93		3.0%	
Kashiwazaki Kariwa 4	BWR	1100	1067	Dec-93	Aug-94		3.0%	
Kashiwazaki Kariwa 5	BWR	1100	1067	Sep-89	Apr-90		3.0%	
Mihama 1	PWR	340	320	Aug-70	Nov-70	2011	5.9%	
Mihama 2	PWR	500	470	Apr-72	Jul-92	2013	6.0%	
Mihama 3	PWR	826	780	Feb-76	Dec-76	2017	5.6%	x
Monju	FBR	246	246	Feb-94			0.0%	
Ohi 1	PWR	1175	1120	Dec-77	Mar-79	2018	4.7%	x
Ohi 2	PWR	1175	1120	Oct-78	Dec-79	2019	4.7%	x
Ohi 3	PWR	1180	1127	Jun-91	Dec-91		4.5%	
Ohi 4	PWR	1180	1127	Jun-92	Feb-93		4.5%	
Onagawa 1	BWR	524	497	Nov-83	Jun-84		5.2%	
Onagawa 2	BWR	825	796	Dec-94	Jul-95		3.5%	
Sendai 1	PWR	890	846	Sep-83	Jul-84		4.9%	
Sendai 2	PWR	890	846	Apr-85	Nov-85		4.9%	
Shika 1	BWR	540	505	Jan-93	Jul-93		6.5%	
Shimane 1	BWR	460	439	Dec-73	Mar-74	2014	4.6%	
Shimane 2	BWR	820	790	Jul-88	Feb-89		3.7%	
Takahama 1	PWR	826	780	Mar-74	Nov-74	2015	5.6%	x
Takahama 2	PWR	826	780	Jan-75	Nov-75	2016	5.6%	x
Takahama 3	PWR	870	830	May-84	Jan-85		4.6%	
Takahama 4	PWR	870	830	Nov-84	Jun-85		4.6%	
Tokai 1	GCR	166	159	Nov-65	Jul-66	2006	4.2%	
Tokai 2	BWR	1100	1056	Mar-78	Nov-78		4.0%	
Tomari 1	PWR	579	550	Dec-88	Jun-89		5.0%	
Tomari 2	PWR	579	550	Aug-90	Apr-91		5.0%	
Tsunga 1	BWR	357	341	Nov-69	Mar-70	2010	4.5%	
Tsunga 2	BWR	1160	1115	Jun-86	Feb-87		3.9%	
TOTAL OF ABOVE		41,602	39,893					
TOTAL OF BWR TYPE		23,999	23,157				3.51%	
TOTAL OF PWR TYPE		17,026	16,183		Fractions		4.95%	
TOTAL BUILT BEFORE 1991		32,224	30,893		100.00%		4.13%	
TOTAL BWR BUILT BEFORE 1991		19,297	18,630	Jan-91	60.30%		3.46%	
TOTAL PWR BUILT BEFORE 1991		12,596	11,956		38.70%		5.08%	
TOTAL BUILT BEFORE 1994		39,641	38,005				4.13%	
TOTAL BWR BUILT BEFORE 1994		23,174	22,361	Jan-94			3.51%	
TOTAL PWR BUILT BEFORE 1994		16,136	15,337				4.95%	
TOTAL BUILT BEFORE 1996		41,602	39,893				4.11%	
TOTAL BWR BUILT BEFORE 1996		23,999	23,157	Jan-96			3.51%	
TOTAL PWR BUILT BEFORE 1996		17,026	16,183				4.95%	
TOTAL RETIREMENTS BY 2020		41,356	13,391					
TOTAL BWR RETIREMENTS BY 2020		6,893	6,647					
TOTAL PWR RETIREMENTS BY 2020		6,793	6,437					

Sources/Notes

1 United Nations (1993), Electric Power in Asia and the Pacific, 1989 and 1990. United Nations Economic and Social Commission for Asia and the Pacific, Bangkok, Thailand. (Published by United Nation, NY, NY USA)

2 Ministry of International Trade and Industry and Agency of Natural Resources and Energy (MITI/ANRE 1995), Energy In Japan, Facts and Figures. MITI/ANRE, Tokyo, Japan. May 1995. Pages 70 and 71.

3 Use of "hydro" output and electricity input values from the Detailed Balances result in an efficiency of about 55 percent for pumped hydro in Japan, which seems too low. Using the pumped hydro output figures cited in the MITI/ANRE data with the electricity input values from the Detailed Balances yields an apparent efficiency of 93 percent, which seems too high. Accordingly, an efficiency of 72 percent (California Energy Commission Energy Technology Status Report, Appendix A Volume 2, Section 16) was assumed for this analysis.

4 Assumes MITI/ANRE data for output and capacity of gas-fired plants, less capacity of gas turbines from UN data, and less fraction of internal combustion capacity estimated to be fueled by LNG.

5 Efficiency assumed; plant output calculated based on fuel use reported in detailed balances. "Other Renewable Fuels" assumed to be biomass fuels used by autoproducers (for example, wood products, pulp and paper).

6 United Nations, 1992 Energy Statistics Yearbook. United Nations, New York, NY, USA. 1994. Page 416.

7 US Department of Energy, Energy Information Administration (USDOE EIA, 1995), World Nuclear Outlook, 1995. Report DOE/EIA-0436(95), October 1995. USDOE, Washington, DC, USA.

8 US Department of Energy, Energy Information Administration (USDOE EIA, 1996), Nuclear Power Generation and Fuel Cycle Report, 1996. Report DOE/EIA-0436(96), October 1996. USDOE, Washington, DC, USA.

9 Assumes USDOE EIA figures for capacity (slightly less than capacity figures quoted by MITI/ANRE) and IEA figures for gross output of nuclear generators

10 Economic Data and Modelling Center (EDMC, 1997), EDMC '97 Handbook of Energy and Economic Statistics in Japan. Edited by EDMC and The Institute of Energy Economics, Japan, and Published by The Energy Conservation Center, Tokyo, Japan. Data from Chapter V: "Outlooks".

11 Own use for nuclear plants as shown is an average over plants built before 1991. Different types of nuclear plants have different estimated own-use fractions, as shown in the plant-by-plant roster above.

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

Derivation of LEAP Data for Petroleum Products Production and Other Transformation Processes

PETROLEUM REFINING

				Source/Notes
Crude Oil/NGL Input to Refining (GJ)	1990	1993	1995	
Total from IEA Balance	7.54E+09			
Total From Detailed Balance (GHV basis)	7.96E+09	9.06E+09	9.38E+09	
Total From Detailed Balance (NHV basis)	7.58E+09	8.63E+09	8.94E+09	
Fraction as Crude Oil	99.32%	99.00%	99.61%	
Fraction as NGL	0.68%	1.00%	0.39%	

Refined Products Output

	10^{10} kcal GHV products			
Product	1990	1993	1995	
Gasoline	36,101	40,807	43,181	
Naptha	9,461	14,031	13,823	
Jet Fuel	4,099	5,644	6,709	
Kerosene	21,117	24,724	24,521	
Diesel Oil	30,816	38,409	42,305	
Residual Oil "A"	24,676	26,030	26,566	
Residual Oil "B"	720	140	86	
Residual Oil "C"	44,109	47,562	47,364	
Lubricating Oil	2,444	2,485	2,581	
Other Oil Products	6,562	6,356	6,264	
Refinery Gases	8,025	8,800	9,436	
Petroleum Coke	272	555	577	
LPG	5,470	5,460	5,885	
TOTAL OF ABOVE	193,872	221,003	229,298	*1*
Total Non-Energy Prod.	9,278	9,396	9,422	

	Fraction of Production			Fraction of Non-Energy Products		
Product	1990	1993	1995	1990	1993	1995
Gasoline	18.62%	18.46%	18.83%			
Naptha	4.88%	6.35%	6.03%			
Jet Fuel	2.11%	2.55%	2.93%			
Kerosene	10.89%	11.19%	10.69%			
Diesel Oil	15.90%	17.38%	18.45%			
Residual Oil "A"	12.73%	11.78%	11.59%			
Residual Oil "B"	0.37%	0.06%	0.04%			
Residual Oil "C"	22.75%	21.52%	20.66%			
Lubricating Oil	1.26%	1.12%	1.13%	26.34%	26.45%	27.39%
Other Oil Products	3.38%	2.88%	2.73%	70.73%	67.65%	66.48%
Refinery Gases	4.14%	3.98%	4.12%			
Petroleum Coke	0.14%	0.25%	0.25%	2.93%	5.91%	6.12%
LPG	2.82%	2.47%	2.57%			
TOTAL OF ABOVE	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total Non-Energy Prod.	4.79%	4.25%	4.11%			

Total Output as Stated in Detailed Balance:	1990	1993	1995	
10^{10} kcal GHV products	187,760	213,093	220,141	*1*
Total GJ GHV products	7.86E+09	8.92E+09	9.22E+09	
Implied Refinery Efficiency	98.74%	98.49%	98.22%	
Refinery Gas "Own Use", 10^{10} kcal GHV	7,125	8,060	8,627	
Refinery Gas Use as a fraction of total Output	3.795%	3.782%	3.919%	
Total TOE NHV products	1.788E+08	2.029E+08	2.097E+08	
Electricity Use in Refining (from IEA balance)	2.30E+07	GJ NHV		
Electricity Use in Refining	6.40E+03	GWh		
Electricity Use in Refining	1.29E-01	GJ/TOE		
Total Output from IEA Balance (GJ NHV):	7.07E+09			*2*
Total Output from IEA Balance (GJ GHV):	7.43E+09	(approximate)		
Refinery Gas "Own Use" from Detailed Bal. (GJ GHV):	2.98E+08			
Refinery Gas "Own Use" as fraction of output:	3.79%			
Refinery Gas "Own Use" per unit output:	1.52	GJ/TOE		
IEA Output plus "Own Use" (GJ GHV):	7.73E+09			

				Source/Notes
Refinery Capacity (as of 1/1/96)	bbl crude per day	tonnes crude per year	GJ input per year	*3*
Total Capacity	4,866,950	2.4004E+08	1.04E+10	
Catalytic Cracking Capacity	748,950	3.6939E+07	1.64E+09	
Catalytic Reforming Capacity	687,350	3.3900E+07	1.53E+09	

Refined Product Imports (from Detailed Balances)

	10^{10} kcal GHV imports			GJ NHV Imports		
Product	1990	1993	1995	1990	1993	1995
Gasoline	1,786	395	1,127	7.122E+07	1.575E+07	4.494E+07
Naptha	16,867	15,507	21,914	6.726E+08	6.183E+08	8.738E+08
Jet Fuel	3,868	3,002	3,127	1.542E+08	1.197E+08	1.247E+08
Kerosene	3,376	1,868	3,040	1.346E+08	7.449E+07	1.212E+08
Diesel Oil	4,588	1,400	1,585	1.829E+08	5.582E+07	6.320E+07
Residual Oil "A"	1,547	1,077	1,092	6.169E+07	4.294E+07	4.354E+07
Residual Oil "B"	-	-	-	0.000E+00	0.000E+00	0.000E+00
Residual Oil "C"	10,339	4,162	4,369	4.123E+08	1.660E+08	1.742E+08
Lubricating Oil	132	73	68	5.263E+06	2.911E+06	2.711E+06
Other Oil Products	3	3	2	1.196E+05	1.196E+05	7.975E+04
Refinery Gases	-	-	-	0.000E+00	0.000E+00	0.000E+00
Petroleum Coke	3,496	3,770	3,524	1.394E+08	1.503E+08	1.405E+08
LPG	17,208	18,082	17,795	6.862E+08	7.210E+08	7.096E+08
TOTAL OF ABOVE	63,210	49,339	57,643	2.520E+09	1.967E+09	2.298E+09
Total Non-Energy Prod.	3,631	3,846	3,594	1.448E+08	1.534E+08	1.433E+08
Refined Prod. Imports from IEA Balances				2.718E+09		

Refined Product Exports (from Detailed Balances)

	10^{10} kcal GHV exports			GJ NHV Exports			
Product	1990	1993	1995	1990	1993	1995	
Gasoline	(41)	(643)	(1,131)	1.635E+06	2.564E+07	4.510E+07	
Naptha	(367)	(193)	(248)	1.463E+07	7.696E+06	9.889E+06	
Jet Fuel	(4,694)	(5,057)	(5,937)	1.872E+08	2.016E+08	2.367E+08	
Kerosene	(441)	(398)	(434)	1.758E+07	1.587E+07	1.731E+07	
Diesel Oil	(618)	(1,474)	(2,437)	2.464E+07	5.877E+07	9.717E+07	
Residual Oil "A"	(993)	(1,290)	(1,132)	3.960E+07	5.144E+07	4.514E+07	
Residual Oil "B"	(2)	-	-	7.975E+04	0.000E+00	0.000E+00	
Residual Oil "C"	(7,075)	(10,353)	(9,842)	2.821E+08	4.128E+08	3.924E+08	
Lubricating Oil	(245)	(379)	(431)	9.769E+06	1.511E+07	1.719E+07	
Other Oil Products	(60)	(140)	(398)	2.392E+06	5.582E+06	1.587E+07	
Refinery Gases	-	-	-	0.000E+00	0.000E+00	0.000E+00	
Petroleum Coke	-	-	-	0.000E+00	0.000E+00	0.000E+00	
LPG	(2)	(13)	(8)	7.975E+04	5.184E+05	3.190E+05	
TOTAL OF ABOVE	(14,538)	(19,940)	(21,998)	5.797E+08	7.951E+08	8.772E+08	
Total Non-Energy Prod.	(305)	(519)	(829)	1.216E+07	2.069E+07	3.306E+07	
Refined Prod. Exports from IEA Balances				3.48E+08			*2*
International Marine Bunkers, IEA Balances				2.15E+08		1.17327809	*2*
Residual Int. Oil Bunkers (likely Marine), USDOE/EIA data				2.01E+08	2.55E+08	2.48E+08	
"Other" Int. Oil Bunkers (likely Jet), USDOE/EIA data				1.77E+07	1.66E+07	1.29E+07	
GJ NHV Heavy Oil "C" Exports less Bunkers				8.069E+07	1.583E+08	1.445E+08	
GJ NHV Jet Fuel Exports less Bunkers				1.695E+08	1.850E+08	2.239E+08	
Imports Net of Exports, from Detailed Balances				1.94E+09	1.17E+09	1.42E+09	*2*
Imports Net of Exp., Bunkers: IEA Balances				2.15E+09			*2*
Stock Change, Detailed Balance				-2.45E+07	1.81E+07	6.83E+07	*2*
Stock Change, IEA Balances				-7.79E+07			*2*
Imports Net of Exp., Stock Changes: Detailed				1.92E+09	1.19E+09	1.49E+09	*2*
Imports Net of Exp., Stock Changes: IEA				2.08E+09			*2*

PETROCHEMICALS PRODUCTION

Data from Detailed Balance

	10^{10} kcal GHV			GJ NHV		
Product/Inputs	1990	1993	1995	1990	1993	1995
Naptha Production	4,155	2,761	2,106	1.66E+08	1.10E+08	8.40E+07
Refinery Gas Prod.	185	176	185	7.38E+06	7.02E+06	7.38E+06
NGL Input	(4,339)	(2,938)	(2,292)	-1.73E+08	-1.17E+08	-9.14E+07
Implied Efficiency	100%	100%	100%	100%	100%	100%
Fraction of Output as Naptha				95.74%	94.01%	91.92%
Fraction of Output as Refinery Gas				4.26%	5.99%	8.08%
ESTIMATED OUTPUT--Tonnes Product				3,908,714	2,645,137	2,063,333

Source/Notes

COKE PRODUCTION

Data from Detailed Balance

	10^{10} kcal GHV			GJ NHV		
Product/Input	1990	1993	1995	1990	1993	1995
Gas Coke Production						
Coke Production	1,044	723	406	4.16E+07	2.88E+07	1.62E+07
Coke Gas Production	269	176	100	1.02E+07	6.70E+06	3.81E+06
Coking Coal Input	(1,068)	(743)	(416)	-4.26E+07	-2.96E+07	-1.66E+07
Anthracite Coal Input	(10)	(4)	(4)	-3.99E+05	-1.59E+05	-1.59E+05
Petroleum Coke Input	(268)	(183)	(106)	-1.07E+07	-7.30E+06	-4.23E+06
Implied Efficiency	97.55%	96.67%	96.20%	96.64%	95.81%	95.33%
Steel Coke Production						
Coke Production	27,845	25,201	25,429	1.11E+09	1.00E+09	1.01E+09
Coke Gas Production	7,063	6,533	6,740	2.69E+08	2.49E+08	2.57E+08
Coking Coal Input	(41,157)	(36,778)	(37,165)	-1.64E+09	-1.47E+09	-1.48E+09
Anthracite Coal Input	-	(58)	(50)	0.00E+00	-2.31E+06	-1.99E+06
Petroleum Coke Input	(297)	(297)	(262)	-1.18E+07	-1.18E+07	-1.04E+07
Implied Efficiency	84.21%	85.46%	85.84%	83.43%	84.66%	85.02%
Special Coke Prod.						
Coke Production	5,194	4,749	4,605	2.07E+08	1.89E+08	1.84E+08
Coke Gas Production	1,331	1,203	1,160	5.07E+07	4.58E+07	4.42E+07
Coking Coal Input	(7,135)	(6,371)	(6,123)	-2.85E+08	-2.54E+08	-2.44E+08
Anthracite Coal Input	(24)	(12)	(47)	-9.57E+05	-4.78E+05	-1.87E+06
Petroleum Coke Input	(233)	(254)	(234)	-9.29E+06	-1.01E+07	-9.33E+06
Implied Efficiency	88.27%	89.68%	90.02%	87.45%	88.86%	89.20%
Coke Exports	1,192	2,247	2,019	4.75E+07	8.96E+07	8.05E+07

	Tonnes coke output			Coke Making Efficiency		
Process	1990	1993	1995	1990	1993	1995
Gas Coke Production	1.451E+06	1.005E+06	5.643E+05	77.56%	77.74%	77.19%
Steel Coke Production	3.870E+07	3.503E+07	3.534E+07	67.17%	67.87%	67.85%
Special Coke Prod.	7.219E+06	6.601E+06	6.400E+06	70.27%	71.55%	71.91%

	Fract. Input or Output		
Product/Input	1990	1993	1995
Gas Coke Production			
Coke Production	80.26%	81.14%	80.96%
Coke Gas Production	19.74%	18.86%	19.04%
Coking Coal Input	79.35%	79.89%	79.09%
Anthracite Coal Input	0.74%	0.43%	0.76%
Petroleum Coke Input	19.91%	19.68%	20.15%
Steel Coke Production			
Coke Production	80.51%	80.16%	79.81%
Coke Gas Production	19.49%	19.84%	20.19%
Coking Coal Input	99.28%	99.04%	99.17%
Anthracite Coal Input	0.00%	0.16%	0.13%
Petroleum Coke Input	0.72%	0.80%	0.70%
Special Coke Prod.			
Coke Production	80.35%	80.53%	80.62%
Coke Gas Production	19.65%	19.47%	19.38%
Coking Coal Input	96.52%	95.99%	95.61%
Anthracite Coal Input	0.32%	0.18%	0.73%
Petroleum Coke Input	3.15%	3.83%	3.65%

	Coke Gas Energy Recovery		
Process	1990	1993	1995
Gas Coke Production	19.08%	18.06%	18.15%
Steel Coke Production	16.26%	16.79%	17.17%
Special Coke Prod.	17.19%	17.30%	17.29%

MUNICIPAL GAS PRODUCTION

Data from Detailed Balance

	10^{10} kcal GHV			GJ NHV		
Product/Input	1990	1993	1995	1990	1993	1995
Municipal Gas Prod.	15,879	19,615	21,318	6.04E+08	7.47E+08	8.11E+08
Coke Input	(17)	-	-	-6.78E+05	0.00E+00	0.00E+00
Coke Gas Input	(446)	(360)	(292)	-1.70E+07	-1.37E+07	-1.11E+07
Naptha Input	(235)	(300)	(323)	-9.37E+06	-1.20E+07	-1.29E+07
Refinery Gas Input	(369)	(353)	(370)	-1.40E+07	-1.34E+07	-1.41E+07
LPG Input	(2,804)	(3,082)	(3,050)	-1.12E+08	-1.23E+08	-1.22E+08
Natural Gas Input	(948)	(1,092)	(1,137)	-3.61E+07	-4.16E+07	-4.33E+07
LNG Input	(10,474)	(13,519)	(15,168)	-3.99E+08	-5.15E+08	-5.77E+08
Sum of 3 main gases	(14,226)	(17,693)	(19,355)	-5.47E+08	-6.79E+08	-7.42E+08
Sum of Input	15,293	18,706	20,340	5.88E+08	7.18E+08	7.80E+08
Own Use (Mun Gas)	(468)	(510)	(425)	-1.78E+07	-1.94E+07	-1.62E+07
Net Output	15,411	19,105	20,893	5.87E+08	7.27E+08	7.95E+08
Implied Efficiency				99.82%	101.26%	101.91%
Net Gas Output (1990) from IEA Balance			6.21E+08			
Gas Losses from IEA Balance			2.09E+06			
Losses as a fraction of net output			0.337%			

	Fraction of Input		
Product/Input	1990	1993	1995
Municipal Gas Prod.			
Coke Input	0.12%	0.00%	0.00%
Coke Gas Input	2.89%	1.91%	1.42%
Naptha Input	1.59%	1.67%	1.65%
Refinery Gas Input	2.39%	1.87%	1.80%
LPG Input	19.03%	17.11%	15.59%
Natural Gas Input	6.14%	5.79%	5.55%
LNG Input	67.84%	71.65%	73.99%
Sum of 3 main gases	93.01%	94.56%	95.12%
Sum of Input	100.00%	100.00%	100.00%

Source/Notes

BLAST FURNACE GAS PRODUCTION

Data from Detailed Balance

	10^{10} kcal GHV			GJ NHV		
Product/Input	1990	1993	1995	1990	1993	1995
Blast Furnace Gas Prod.	11,496	10,740	11,261	4.38E+08	4.09E+08	4.29E+08
Coke Input	(11,496)	(10,740)	(11,261)	-4.58E+08	-4.28E+08	-4.49E+08
Own Use	(1,563)	(1,504)	(1,532)	-6.23E+07	-6.00E+07	-6.11E+07
Implied Efficiency				84.03%	83.73%	84.02%

DISTRICT HEAT PRODUCTION

Data from Detailed Balance

	10^{10} kcal GHV			GJ NHV		
Product/Input	1990	1993	1995	1990	1993	1995
Heat Output	236	329	425	9.88E+06	1.38E+07	1.78E+07
Bituminous Coal Input	(18)	(16)	(14)	-7.18E+05	-6.38E+05	-5.58E+05
Kerosene	(38)	(13)	(13)	-1.52E+06	-5.18E+05	-5.18E+05
Residual Oil "C"	(17)	(21)	(20)	-6.78E+05	-8.37E+05	-7.97E+05
LPG	(7)	(7)	(6)	-2.79E+05	-2.79E+05	-2.39E+05
Municipal Gas	(154)	(225)	(283)	-5.86E+06	-8.56E+06	-1.08E+07
Electricity	(29)	(44)	(61)	-1.21E+06	-1.84E+06	-2.55E+06
Sum of Input	(263)	(326)	(397)	-1.03E+07	-1.27E+07	-1.54E+07
Sum of Input less Electr.	(234)	(282)	(336)	-9.05E+06	-1.08E+07	-1.29E+07
Implied Efficiency	89.73%	100.92%	107.05%	96.25%	108.64%	115.25%
Electricity Use, GWh per GJ heat output				-3.413E-05	-3.715E-05	-3.987E-05

	Fraction of Input		
Product/Input	1990	1993	1995
Bituminous Coal Input	7.93%	5.89%	4.33%
Kerosene	16.74%	4.78%	4.02%
Residual Oil "C"	7.49%	7.73%	6.19%
LPG	3.08%	2.58%	1.86%
Municipal Gas	64.76%	79.03%	83.60%
Sum of Input less Electr.	100.00%	100.00%	100.00%

COAL BRIQUETTE PRODUCTION

Data from Detailed Balance

	10^{10} kcal GHV			GJ NHV		
Product/Input	1990	1993	1995	1990	1993	1995
Briquette Production	73	61	46	2.91E+06	2.43E+06	1.83E+06
Anthracite Coal Input	(72)	(68)	(46)	-2.87E+06	-2.71E+06	-1.83E+06
Implied Efficiency	101.39%	89.71%	100.00%	101.39%	89.71%	100.00%

Sources/Notes

1 There is a discrepancy between the total of the individual refined product figures from the Detailed Balances and the value reported as the sum of oil products output in the Balances. This discrepancy exists to similar degrees in (at least) the 1985, 1990, and 1993 balances. Since the total of the individual refined product figures is greater than the energy input to refining, a physical impossibility, we have used the reported refined products output total to figure refinery efficiency.

2 Calculation performed as a rough consistency check between data sets.

3 International Petroleum Encyclopedia, 1996.

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

Derivation of LEAP Data for Domestic Primary Fuels Production and Reserves

COAL PRODUCTION

Source/Notes

Domestic Coal Output (from Detailed Balance Sheet Except as Noted)

	10^{10} kcal GHV prod.			GJ NHV		
Product	1990	1993	1995	1990	1993	1995
Coking Coal	425	-	-	1.69E+07	0.00E+00	0.00E+00
Bituminous Coal	5,633	4,268	3,599	2.25E+08	1.70E+08	1.44E+08
Anthracite Coal	92	80	67	3.67E+06	3.19E+06	2.67E+06
Total Domestic Production	6,150	4,348	3,666	2.45E+08	1.73E+08	1.46E+08
Own Use, Bituminous	(70)	(56)	(66)	-2.79E+06	-2.23E+06	-2.63E+06
Own Use, Anthracite	(10)	(19)	(7)	-3.99E+05	-7.58E+05	-2.79E+05
Total Own Use	(80)	(75)	(73)	-3.19E+06	-2.99E+06	-2.91E+06
Own Use as Fract. of Output	-1.30%	-1.72%	-1.99%	-1.30E-02	-1.72%	-1.99%
Total Prod. from IEA Bal.				1.91E+08		

	Fraction of Output		
Product	1990	1993	1995
Coking Coal	6.91%	0.00%	0.00%
Bituminous Coal	91.59%	98.16%	98.17%
Anthracite Coal	1.50%	1.84%	1.83%
Total Domestic Production	100.00%	100.00%	100.00%

Coal Imports (from Detailed Balance Sheet)

	10^{10} kcal GHV			GJ NHV		
Product	1990	1993	1995	1990	1993	1995
Coking Coal	51,834	47,863	49,620	2.07E+09	1.91E+09	1.98E+09
Bituminous Coal	21,501	27,601	34,298	8.57E+08	1.10E+09	1.37E+09
Anthracite Coal	1,270	1,739	2,315	5.06E+07	6.93E+07	9.23E+07
Total Imports	74,605	77,203	86,233	2.97E+09	3.08E+09	3.44E+09

Coal Reserves (1990)		Mte
Bituminous	In-place	8319
	Recoverable	827
"Sub-bituminous"	In-place	175
	Recoverable	17

1

Assume that reserves of Coking Coal, Anthracite are covered in Bituminous figure, and proportional to 1990 output. Then Recoverable reserves would be as follows:

Coking Coal	57.2	(Million tonnes)
Bituminous Coal	757.5	(Million tonnes)
Anthracite Coal	12.4	(Million tonnes)

OIL PRODUCTION

Domestic Oil Output (from Detailed Balance Sheet Except as Noted)

	10^{10} kcal GHV prod.			GJ NHV		
Product	1990	1993	1995	1990	1993	1995
Crude Oil	604	831	802	2.41E+07	3.31E+07	3.20E+07
Own Use in Crude Oil Prod.	(24)	(20)	(25)			
Own Use as Fract. of Output	3.97%	2.41%	3.12%			
Domestic Production from IEA Balance				2.68E+07		

Crude Oil Reserves (1990)	Mte
Reserves	7

1

Source/Notes

NATURAL GAS PRODUCTION

Domestic Gas Output (from Detailed Balance Sheet Except as Noted)

	10^{10} kcal GHV prod.			GJ NHV		
Product	1990	1993	1995	1990	1993	1995
Natural Gas	2,078	2,223	2203	7.91E+07	8.46E+07	8.39E+07
LPG	8	-	0	3.19E+05	0.00E+00	0.00E+00
Total Domestic Production	2,086	2,223	2,203	7.94E+07	8.46E+07	8.39E+07
Own Use in Natural Gas Prod.	(343)	(339)	(396)	-1.31E+07	-1.29E+07	-1.51E+07
Own Use as Fract. of Output	16.44%	15.25%	17.98%	16.51%	15.25%	17.98%
Domestic Production from IEA Balance				7.54E+07		
Own Use from IEA Balance				-2.76E+07		
LNG Imports	47,206	51,938	56,724	1.80E+09	1.98E+09	2.16E+09
Own Use of LNG	(36)	(21)	(28)	-1.37E+06	-7.99E+05	-1.07E+06
Own Use as Fract. of Imports	0.08%	0.04%	0.05%	0.08%	0.04%	0.05%
Est. Gross LNG Imports at	2.50%	own-use rate		1.843E+09		

Natural Gas Reserves (1990)	10^9 cu.m.	GJ (NHV)		*1*
Proved Recoverable Reserves	36	1.339E+09		

Osaka Gas Statistics (1997) *2*

Total LNG Terminal Capacity	34.70	Million cubic Meters/day
Total Gas Sales (1997)	6,370	Million cubic Meters
Implied Capacity Factor	50%	
Total Gas Sales (1995)	5,556	Million cubic Meters
Osaka Gas Sales as Fraction of total 1995 LNG Imports		9.6%

HYDRO RESERVES

Hydraulic Resource (1990)	TJ		*1*
Gross Theoretical Capacity	2.58E+06		
1990 (conventional) Hydroelectric Production	3.18E+05	(for comparison)	

GEOTHERMAL RESERVES

Geothermal Resources	GWh	GJ
Total Geothermal Electrical Output, 1990	1742	6.27E+06
Total Geothermal Energy Input to Elect. Gen at 10% Efficiency		6.27E+07
Assumed Geothermal Resource (usable)		2.00E+08

1 United Nations, 1992 Energy Statistics Yearbook. United Nations, New York, NY, USA. 1994. Page 486-7.

2 Osaka Gas, 1998. World-wide web pages http://www.osakagas.co.jp/English/gas_dema.html and http://www.osakagas.co.jp/English/operat/product.html, visited 5/14/98.

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

Derivation of LEAP Demand Data
Industrial Sector

DATA FROM DETAILED BALANCES			UNIT: 10^{10} kcal GHV fuel used									
			COAL				Coke	Blast	Crude			
Industrial Subsector	Year		Coking	Bituminous	Anthracite	Coke	Gas	Furn. Gas	Oil	Gasoline	Naptha	
Water Treatment	1990											
Water Treatment	1993											
Water Treatment	1995											
Mining and Quarrying	1990							1				
Mining and Quarrying	1993							1				
Mining and Quarrying	1995											
Construction	1990											
Construction	1993											
Construction	1995											
Food Products	1990											
Food Products	1993											
Food Products	1995											
Textiles and Fiber	1990			19								
Textiles and Fiber	1993			28								
Textiles and Fiber	1995			29								
Paper and Pulp	1990			1103								
Paper and Pulp	1993			1176								
Paper and Pulp	1995			1409								
Chemicals	1990		53	905	72	100	144	32	18		25558	
Chemicals	1993			814	51	93	65	43			27714	
Chemicals	1995		2	282	205	91	19	34	1		33362	
Ceramics	1990			5371	448	250	176	43				
Ceramics	1993			5199	841	191	158	43				
Ceramics	1995			5338	856	123	155	45				
Steel	1990		4998	108		18102	3753	4043				
Steel	1993		6075	133		15223	3282	3841				
Steel	1995		7779	165		14216	3383	3847				
Non-ferrous Metals	1990			100		202		8				
Non-ferrous Metals	1993			116		202		8				
Non-ferrous Metals	1995			122		191		3				
Metal Finishing	1990			128		63	103	164				
Metal Finishing	1993			125		44	130	178				
Metal Finishing	1995			161		29	107					
Other Manufacturing	1990		1	258		329				98	152	
Other Manufacturing	1993			3		347				98	100	
Other Manufacturing	1995			6		397				134	128	

DATA FROM DETAILED BALANCES			UNIT: 10^{10} kcal GHV fuel used										
					Residual Oils			Petroleum		Natural		Municipal	Biomass
Industrial Subsector	Year		Kerosene	Diesel Oil	"A"	"B"	"C"	Coke	LPG	Gas	LNG	Gas	Fuel
Water Treatment	1990		78	780	3659	2	39						
Water Treatment	1993		103	813	2896	2	26						
Water Treatment	1995		119	855	2569	1	29						
Mining and Quarrying	1990		34	221	49	5	67						
Mining and Quarrying	1993		58	273	103		80						
Mining and Quarrying	1995		57	256	202		99						
Construction	1990		1236	3424	710	5	17						
Construction	1993		1145	3875	594		12						
Construction	1995		1193	3949	627		8						
Food Products	1990				1884	44	612					552	
Food Products	1993				1890	5	386					710	
Food Products	1995				1978	3	337					788	
Textiles and Fiber	1990		18	1	736	18	1335	27	136			103	57
Textiles and Fiber	1993		14		882	4	1135	25	139			140	55
Textiles and Fiber	1995		11		856	3	1267	22	158			143	47
Paper and Pulp	1990		31	2	260	5	2505	150	68			218	2710
Paper and Pulp	1993		74	2	432	4	2029	131	71			904	2329
Paper and Pulp	1995		107	2	464		2359	135	194			1009	2353
Chemicals	1990		275	2	1413	21	1150	470	2721	514		595	30
Chemicals	1993		277	2	1061	9	1072	539	2680	440		894	28
Chemicals	1995		300	3	1084	6	1100	491	2344	397		942	29
Ceramics	1990		109	16	1013	26	1728	293	240			256	
Ceramics	1993		100	11	939	7	1581	769	230			291	
Ceramics	1995		96	11	1059	3	1700	670	220			338	
Steel	1990		344	28	751	47	1295	48	776		40	791	
Steel	1993		328	24	569	4	951	166	698			1400	
Steel	1995		282	28	582	5	967	322	694			1626	
Non-ferrous Metals	1990		186	4	799	2	590	50	239			219	51
Non-ferrous Metals	1993		172	4	943		399	49	237			276	35
Non-ferrous Metals	1995		178	4	652		411	14	253			267	
Metal Finishing	1990		426	75	984	19			521			1244	
Metal Finishing	1993		371	70	805	8			497			1250	
Metal Finishing	1995		376	67	625	5			517			1526	
Other Manufacturing	1990		3297	1952	1427	15	720	1116	3305	61			
Other Manufacturing	1993		2254	2043	1348		72	1199	4726	50			
Other Manufacturing	1995		2431	2164	1550		76	997	4572	48		290	

DERIVATION OF ENERGY INTENSITIES FOR USE IN LEAP

				GJ NHV fuel used per unit of activity								
		Driving Activity		COAL				Coke	Blast	Crude		
Industrial Subsector	Year	Unit*	Value	Coking	Bituminous	Anthracite	Coke	Gas	Furn. Gas	Oil	Gasoline	Naptha
Water Treatment	1990	th. cu.m./day capacity	66,139									
Water Treatment	1993	th. cu.m./day capacity	66,759									
Water Treatment	1995	th. cu.m./day capacity	*67,172*									
Mining and Quarrying	1990	Mining/Quarrying GDP	1,202						31.6564			
Mining and Quarrying	1993	Mining/Quarrying GDP	1,213						31.3730			
Mining and Quarrying	1995	Mining/Quarrying GDP	917									
Construction	1990	Construction GDP	39,602									
Construction	1993	Construction GDP	43,740									
Construction	1995	Construction GDP	41,505									
Food Products	1990	tonnes proc. food/meat	5,130,640									
Food Products	1993	tonnes proc. food/meat	5,342,260									
Food Products	1995	tonnes proc. food/meat	*5,483,340*									
Textiles and Fiber	1990	th. sq.m. of cloth	2,100,000		0.3608							
Textiles and Fiber	1993	th. sq.m. of cloth	1,492,000		0.7483							
Textiles and Fiber	1995	th. sq.m. of cloth	*1,086,667*		1.0641							
Paper and Pulp	1990	tonnes of products	28,086,000		1.5660							
Paper and Pulp	1993	tonnes of products	29,029,800		1.6153							
Paper and Pulp	1995	tonnes of products	29,659,000		1.8943							
Chemicals	1990	tonnes 7 major prod.	19,816,000	0.1066	1.8211	0.1449	0.2012	0.2766	0.0615	0.0362		51.4285
Chemicals	1993	tonnes 7 major prod.	20,470,746		1.5856	0.0993	0.1812	0.1209	0.0800			53.9832
Chemicals	1995	tonnes 7 major prod.	*20,907,243*	0.0038	0.5378	0.3910	0.1736	0.0346	0.0619	0.0019		63.6280
Ceramics	1990	tonnes of Cement	84,445,000		2.5361	0.2115	0.1180	0.0793	0.0194			
Ceramics	1993	tonnes of Cement	73,738,000		2.8114	0.4548	0.1033	0.0816	0.0222			
Ceramics	1995	tonnes of Cement	90,474,000		2.3526	0.3773	0.0542	0.0652	0.0189			
Steel	1990	Tonnes steel ingots	109,548,000	1.8192	0.0393		6.5889	1.3040	1.4047			
Steel	1993	Tonnes steel ingots	99,623,000	2.4315	0.0532		6.0930	1.2539	1.4675			
Steel	1995	Tonnes steel ingots	100,911,362	3.0738	0.0652		5.6173	1.2760	1.4510			
Non-ferrous Metals	1990	Manufacturing GDP	116,044		34.3613		69.4097		2.6240			
Non-ferrous Metals	1993	Manufacturing GDP	114,151		40.5201		70.5608		2.6675			
Non-ferrous Metals	1995	Manufacturing GDP	118,062		41.2042		64.5082		0.9672			
Metal Finishing	1990	Manufacturing GDP	116,044		43.9824		21.6476	33.7834	53.7910			
Metal Finishing	1993	Manufacturing GDP	114,151		43.6639		15.3697	43.3463	59.3511			
Metal Finishing	1995	Manufacturing GDP	118,062		54.3760		9.7944	34.4955				
Other Manufacturing	1990	Manufacturing GDP	116,044	0.3436	88.6520		113.0485				33.6740	52.2291
Other Manufacturing	1993	Manufacturing GDP	114,151		1.0479		121.2109				34.2325	34.9311
Other Manufacturing	1995	Manufacturing GDP	118,062		2.0264		134.0825				45.2571	43.2306

*GDP Values in Billions of 1985 Yen; Shaded figures in *italics* are rough extrapolations based on 1990 and 1993 activity data.

DERIVATION OF ENERGY INTENSITIES FOR USE IN LEAP

				GJ NHV fuel used per unit of activity										
		Driving Activity				Residual Oils			Petroleum		Natural		Municipal	Biomass
Industrial Subsector	Year	Unit*	Value	Kerosene	Diesel Oil	"A"	"B"	"C"	Coke	LPG	Gas	LNG	Gas	Fuel
Water Treatment	1990	th. cu.m./day capacity	66,139	47.025	470.251	2205.96	1.2058	23.513						
Water Treatment	1993	th. cu.m./day capacity	66,759	61.521	485.595	1729.75	1.1946	15.529						
Water Treatment	1995	th. cu.m./day capacity	*67,172*	70.640	507.540	1524.99	0.5936	17.215						
Mining and Quarrying	1990	Mining/Quarrying GDP	1,202	1127.571	7329.211	1625.03	165.8193	2221.98						
Mining and Quarrying	1993	Mining/Quarrying GDP	1,213	1906.281	8972.668	3385.29		2629.35						
Mining and Quarrying	1995	Mining/Quarrying GDP	917	2478.704	11132.43	8784.18		4305.12						
Construction	1990	Construction GDP	39,602	1244.496	3447.535	714.88	5.0344	17.117						
Construction	1993	Construction GDP	43,740	1043.807	3532.536	541.50		10.939						
Construction	1995	Construction GDP	41,505	1,146.12	3,793.83	602.363	-	7.686	-	-	-	-	-	-
Food Products	1990	tonnes proc. food/meat	5,130,640			14.6421	0.3420	4.7563					4.0950	
Food Products	1993	tonnes proc. food/meat	5,342,260			14.1068	0.0373	2.8811					5.0585	
Food Products	1995	tonnes proc. food/meat	*5,483,340*			14.3838	0.0218	2.4506					5.4698	
Textiles and Fiber	1990	th. sq.m. of cloth	2,100,000	0.3418	0.0190	13.9750	0.3418	25.3487	0.5127	2.5823			1.8668	1.0823
Textiles and Fiber	1993	th. sq.m. of cloth	1,492,000	0.3742		23.5718	0.1069	30.3333	0.6681	3.7148			3.5715	1.4699
Textiles and Fiber	1995	th. sq.m. of cloth	*1,086,667*	0.4036		31.4102	0.1101	46.4915	0.8073	5.7977			5.0087	1.7246
Paper and Pulp	1990	tonnes of products	28,086,000	0.0440	0.00284	0.3691	0.00710	3.5564	0.2130	0.0965			0.2954	3.8474
Paper and Pulp	1993	tonnes of products	29,029,800	0.1016	0.00275	0.5934	0.00549	2.7870	0.1799	0.0975			1.1853	3.1990
Paper and Pulp	1995	tonnes of products	29,659,000	0.1439	0.00269	0.6238		3.1715	0.1815	0.2608			1.2949	3.1634
Chemicals	1990	tonnes 7 major prod.	19,816,000	0.5534	0.0040	2.8433	0.0423	2.3141	0.9457	5.4753	0.9873		1.1429	0.0604
Chemicals	1993	tonnes 7 major prod.	20,470,746	0.5396	0.0039	2.0667	0.0175	2.0881	1.0499	5.2203	0.8181		1.6622	0.0545
Chemicals	1995	tonnes 7 major prod.	*20,907,243*	0.5722	0.0057	2.0674	0.0114	2.0979	0.9364	4.4705	0.7227		1.7149	0.0553
Ceramics	1990	tonnes of Cement	84,445,000	0.0515	0.00756	0.4783	0.01228	0.8159	0.1384	0.1133			0.1154	
Ceramics	1993	tonnes of Cement	73,738,000	0.0541	0.00595	0.5078	0.00379	0.8549	0.4158	0.1244			0.1502	
Ceramics	1995	tonnes of Cement	90,474,000	0.0423	0.00485	0.4667	0.00132	0.7492	0.2953	0.0970			0.1422	
Steel	1990	Tonnes steel ingots	109,548,000	0.1252	0.01019	0.2734	0.0171	0.4714	0.0175	0.2825		0.0139	0.2748	
Steel	1993	Tonnes steel ingots	99,623,000	0.1313	0.00961	0.2277	0.0016	0.3806	0.0664	0.2794			0.5349	
Steel	1995	Tonnes steel ingots	100,911,362	0.1114	0.01106	0.2300	0.0020	0.3821	0.1272	0.2742			0.6133	
Non-ferrous Metals	1990	Manufacturing GDP	116,044	63.9119	1.3745	274.546	0.6872	202.7314	17.1806	82.1234			71.8306	17.5242
Non-ferrous Metals	1993	Manufacturing GDP	114,151	60.0815	1.3972	329.400		139.3751	17.1162	82.7867			92.0276	12.2259
Non-ferrous Metals	1995	Manufacturing GDP	118,062	60.1176	1.3510	220.206		138.8108	4.7283	85.4480			86.0774	
Metal Finishing	1990	Manufacturing GDP	116,044	146.3789	25.7709	338.115	6.5286			179.022			408.0243	
Metal Finishing	1993	Manufacturing GDP	114,151	129.5944	24.4518	281.195	2.7945			173.608			416.7916	
Metal Finishing	1995	Manufacturing GDP	118,062	126.9899	22.6285	211.087	1.6887			174.611			491.9632	
Other Manufacturing	1990	Manufacturing GDP	116,044	1132.8906	670.7317	490.335	5.1542	247.4010	383.4716	1135.639	20.0076			
Other Manufacturing	1993	Manufacturing GDP	114,151	787.3471	713.6425	470.871		25.1504	418.8240	1650.844	16.6717			
Other Manufacturing	1995	Manufacturing GDP	118,062	821.0440	730.8677	523.496		25.6682	336.7260	1544.144	15.4746		93.4924	

*GDP Values in Billions of 1985 Yen; Shaded figures in *italics* are rough extrapolations based on 1990 and 1993 activity data.

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

Derivation of LEAP Demand Data
Transport Sector

DATA FROM DETAILED BALANCES (converted to GJ NHV)						
	Passenger Transport			Freight Transport		
Fuel	1990	1993	1995	1990	1993	1995
Gasoline	1.29E+09	1.44E+09	1.56E+09	2.04E+08	1.68E+08	1.62E+08
Jet Fuel	1.13E+08	1.25E+08	1.48E+08	1.65E+07	1.87E+07	2.09E+07
Diesel	2.27E+08	3.01E+08	3.49E+08	8.30E+08	8.79E+08	9.55E+08
Residual "A"	1.20E+05	1.20E+05	1.20E+05	7.04E+07	6.82E+07	7.30E+07
Residual "B"	0.00E+00	0.00E+00	0.00E+00	9.53E+06	1.48E+06	7.58E+05
Residual "C"	1.20E+05	1.59E+05	1.20E+05	6.42E+07	7.68E+07	7.68E+07
LPG	9.14E+07	7.29E+07	6.57E+07	0.00E+00	0.00E+00	0.00E+00
Electricity	6.72E+07	7.07E+07	7.08E+07	4.52E+06	4.73E+06	4.35E+06
Sum of Oil Products	1.72E+09	1.94E+09	2.12E+09	1.20E+09	1.21E+09	1.29E+09
Sum of Oil Products	**1990-->**	2.92E+09	**1993-->**	3.15E+09	**1995-->**	3.41E+09
Sum of Electricity	**1990-->**	7.18E+07	**1993-->**	7.54E+07	**1995-->**	7.51E+07

DATA FROM IEA BALANCES, 1990 (converted to GJ NHV)		
Subsector	Petroleum Products	Electricity
Air	1.27E+08	0.00E+00
Road	2.64E+09	0.00E+00
Rail	3.18E+07	7.16E+07
Internal Navigation	3.19E+08	0.00E+00
Non-specified Transport	1.26E+06	0.00E+00
TOTAL OF ABOVE	3.12E+09	7.16E+07
International Bunkers	2.15E+08	

Review of Bunkers Data from USDOE/EIA and (possibly) Related Activities *Assumes "Other" is primarily Jet Fuel*							
	1990	1991	1992	1993	1994	1995	Ann. Growth 1990 - 1995
Thous. BBL/Day Residual	88.897	99.735992	99.5360656	112.336	120.19	109.407	4.24%
Thous. BBL/Day "Other"	8.778	8.273999	7.09311475	8.27	7.584	6.392	-6.15%
GJ NHV Residual Oil	2.014E+08	2.260E+08	2.255E+08	2.545E+08	2.723E+08	2.479E+08	4.24%
GJ NHV "Other" Oil	1.766E+07	1.664E+07	1.427E+07	1.664E+07	1.526E+07	1.286E+07	-6.15%
Total International Bunkers	2.19E+08	2.43E+08	2.40E+08	2.71E+08	2.88E+08	2.61E+08	3.54%
Thous. Tonnes Int'l Shipping	7.96E+05	8.15E+05	8.08E+05	8.27E+05	Growth: 1990 to 1993		1.29%
Implied GJ/kte shipped	2.53E+02	2.77E+02	2.79E+02	3.08E+02	Growth: 1990 to 1993		6.74%
International Air Pass-km (Mil)	5.07E+04	4.74E+04	5.53E+04	5.40E+04	6.30E+04	7.02E+04	6.71%
International Air Mte-km	4.46E+03	4.60E+03	4.76E+03	5.11E+03	5.48E+03	6.00E+03	6.11%
Implied GJ/kpass-km flown	0.348	0.351	0.258	0.308	0.242	0.183	-12.05%
Implied GJ/kte-km freight	3.957	3.615	3.000	3.258	2.783	2.143	-11.55%

ESTIMATE OF 1990 TRANSPORT SECTOR FUEL USE BY SUBSECTOR AND FUEL TYPE (GJ NHV) **[SEE CALCULATIONS BELOW FOR DETAILS ON MANY SUBSECTORS]**										
					Residual Fuels					Sum of
Subsector		Gasoline	Jet Fuel	Diesel	"A"	"B"	"C"	LPG	Electricity	Oil Prod
Air	Passenger		1.13E+08							1.13E+08
Air	Freight		1.65E+07							1.65E+07
Road	Passenger	1.29E+09		1.40E+08				9.14E+07		1.52E+09
Road	Freight	2.04E+08		7.96E+08						1.00E+09
Rail	Passenger			7.99E+07					6.72E+07	7.99E+07
Rail	Freight			6.04E+06					4.52E+06	6.04E+06
Internal Navigation	Passenger			7.02E+06	1.20E+05	0.00E+00	1.20E+05			7.26E+06
Internal Navigation	Freight			2.81E+07	7.04E+07	9.53E+06	6.42E+07			1.72E+08
International Bunkers							2.15E+08			2.15E+08
TOTAL PASSENGER (without bunkers)		1.29E+09	1.13E+08	2.27E+08	1.20E+05	0.00E+00	1.20E+05	9.14E+07	6.72E+07	1.72E+09
TOTAL FREIGHT (without bunkers)		2.04E+08	1.65E+07	8.30E+08	7.04E+07	9.53E+06	6.42E+07	0.00E+00	4.52E+06	1.20E+09
OVERALL TOTAL (without bunkers)		1.50E+09	1.30E+08	1.06E+09	7.05E+07	9.53E+06	6.43E+07	9.14E+07	7.18E+07	2.92E+09
TOTAL FROM DETAILED BALANCES										2.99E+09

Information for comparison purposes only--not used directly in June, 1998 version of Japan Energy Paths Analysis.

Energy Intensity Data for 1990
(From Source 1)

	kcal per pass-km	GJ/pass-km
Passenger Cars, private	547	2.29E-03
Buses	173	7.24E-04
Railway	101	4.23E-04

	kcal per tonne-km	GJ/te-km
Private Trucks	1991	8.34E-03
Business Trucks	620	2.60E-03
Railway	112	4.69E-04
Marine Transport	121	5.07E-04

Passenger Transport Energy Consumption 1993
(From Source 2)

Subsector	10^{10} kcal	Fraction
Railways	4,081	8.21%
Buses	1,736	3.49%
Passenger Cars	38,852	78.19%
Passenger Ships	2,567	5.17%
Aviation	2,453	4.94%
TOTAL	49,689	100.00%

Freight Transport Energy Consumption 1993
(From Source 2)

Subsector	10^{10} kcal	Fraction
Railways	300	0.88%
Motor Vehicles	30,491	89.50%
Shipping	2,810	8.25%
Aviation	468	1.37%
TOTAL	34,069	100.00%

Estimate of Rail Transport Fuel Use

Total 1990 Rail Tonne-km	2.67E+10			
Implied Rail Freight Energy Use	1.25E+07	GJ (Using intensities above)		
Total 1990 Rail Passenger-km	3.837E+11			
Implied Rail Passenger Energy Use	1.62E+08	GJ (Using intensities above)		
Total Implied Rail Energy Use	1.75E+08	GJ--Method 1		
IEA Estimate, 1990 Rail Energy Use	1.03E+08	GJ		
Fraction of total transport energy use (1993) in trains		4.9%	*(Source 1)*	
Total transport energy use in 1990 from Detailed Balance			2.99E+09	GJ
Implied Rail Energy Use		1.47E+08	GJ	(Method 2)
Assuming 1993 fract. of energy use by passenger rail,		8.21%	holds for 1990, implied energy use in	
passenger rail in 1990 is	1.47E+08	GJ, so diesel use in passenger rail is	7.99E+07	GJ
Assuming 1993 fraction of energy use by rail freight,		0.88%	holds for 1990, implied energy use in	
rail freight in 1990 is	1.06E+07	GJ, so diesel use in rail freight is	6.04E+06	GJ

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Estimate of Fraction of Freight and Passengers on diesel and electric rail

Relative energy intensity, diesel versus electric rail		2.270	*(Source 3)*		
Fraction of tonne-km on diesel rail	37.05%	Implied Diesel Intensity		0.0006108	GJ/tonne-km
Fraction of tonne-km on electric rail	62.95%	Implied Electric Intensity		0.0002691	GJ/tonne-km
Implied Diesel Use	6.04E+06	GJ	(check)		
Implied Electricity Use	4.52E+06	GJ	(check)		
Fraction of passenger-km on diesel rail	34.35%	Implied Diesel Intensity		0.0006059	GJ/pass-km
Fraction of passenger-km on electric rail	65.65%	Implied Electric Intensity		0.0002669	GJ/pass-km
Implied Diesel Use	7.99E+07	GJ	(check)		
Implied Electricity Use	6.72E+07	GJ	(check)		

Estimate of Road Transport Fuel Use

Total 1990 Road Passenger km	8.53E+11			
Fraction of total road pass-km in private cars (1993)		88.24%	*(Source 2)*	
Adjustment for difference in fraction, 1990 to 1993		-2.00%	*Assumption*	
Total Gasoline and LPG Use for passenger road		1.38E+09	GJ	
Implied passenger-km in private vehicles		7.36E+11		
Implied use of diesel fuel in passenger vehicles		5.53E+07	GJ *(Note 7)*	
Implied passenger-km in buses		1.17E+11		
Implied diesel fuel use in buses		8.51E+07	GJ	Method 1

Calculations below included as a rough consistency check for car/bus transport						
Fraction of total transport energy use (1993) in buses			2.00%		*(Source 2)*	
Implied total energy use (assumed diesel) in buses			5.98E+07	GJ	Method 2	
Ratio of buses to passenger cars, 1987			0.794%		*(Source 5)*	
Implied number of buses, 1990			277,390			
Implied passenger km per bus			423,307		Method 1	
Annual km per year, 1987 (buses)			27,838		*(Source 5)*	
Implied average passengers per bus			15.21		Method 1	
Reasonableness check:	8	miles/gal is				
(for diesel bus intensity)	3.3862	km/liter or				
	0.2953	liter/km or				
	0.0108	GJ/km, so	7.24E-04	GJ/passenger-km		
implies an average passenger load of		14.95	or so			
Reasonableness check:	30	miles/gal is				
(for pass. car intensity)	12.6984	km/liter or				
	0.0788	liter/km or				
	0.0026	GJ/km, so	2.29E-03	GJ/passenger-km		
implies an average passenger load of		1.15	or so			
Total 1990 Road Freight Tonne-km		2.74E+11	(Japan in Figures)			
Implied Road Freight in "private" trucks (assumed gasoline)				2.452E+10	tonne-km	
Implied fraction of total tonne-km in diesel ("business") trucks			91.06%			
Implied Road Freight in "business" trucks (assumed diesel)				2.4972E+11	tonne-km	
Implied diesel fuel use for road freight transport			7.96E+08	GJ *(Note 8)*		

Information for comparison purposes only--not used directly in June, 1998 version of Japan Energy Paths Analysis.

Estimate of Ship Transport Fuel Use					
Fract. of total transport energy use (1993) in Marine transp			6.0%	*(from Source 2)*	
Implied total energy use in Coastal transport (1990)			1.79E+08	GJ (Method 1)	
Sum of all residual oil use in transport			1.443E+08	(Detailed Balances)	
Sum of all residual oil use in freight transport			1.441E+08	(Detailed Balances)	
Total Marine Tonne-km (Coastal Transport)			2.34E+11	(Japan in Figures)	
Implied total energy use, Coastal freight transp. (1990)			1.19E+08	GJ (Method 2--based on published intensity)	
Implied Coastal transport diesel use			3.51E+07	GJ	
Fraction of coastal diesel used in passenger ships			20%	Assumption	
Implied Coastal passenger transport diesel fuel use (total)			7.02E+06	GJ	
Implied Coastal freight transport diesel fuel use (total)			2.81E+07	GJ	
Coastal passenger transport residual oil use			2.39E+05	GJ	
Assuming 1993 fract. of energy use by pass. ships,			5.17%	holds for 1990, implied energy use in	
passenger ships in 1990 is	9.25E+07	GJ, so diesel use in passenger ships is		9.22E+07	GJ
this seems much too high, however. There may be some overlap between freight and passenger transport in ships.					

INTENSITY AND ACTIVITY DATA FOR ENTRY INTO LEAP

	Activity Data		Energy Intensities (GJ per activity Unit)		
	Value	Units	Fuel	Value	
Air passenger transport	51,623,000	th. pass-km	Jet Fuel	2.194	
Air freight transport	635,000	th. tonne-km	Jet Fuel	25.997	
Road passenger--all	8.5306E+08	th. pass-km			
Road passenger-bus	13.76%	th. pass-km	Diesel	0.724	
Road passenger--auto	86.24%	th. pass-km	all autos		
Gasoline autos	77.44%	fract. of total	Gasoline	1.955	(Assumes average intensities
LPG autos	5.48%	fract. of total	LPG	1.955	of autos using different
Diesel autos	3.31%	fract. of total	Diesel	1.955	fuels are similar)
Road freight	2.7424E+08	th. tonne-km	all trucks		
"Private" gasoline trucks	8.94%	fract. of total	Gasoline	8.336	
"Business" diesel trucks	91.06%	fract. of total	Diesel	3.187	
Rail Passenger	3.8370E+08	th. pass-km			
Electric Trains	65.65%	fract. of total	Electric	0.269	
Diesel Trains	34.35%	fract. of total	Diesel	0.611	
Rail Freight	2.6700E+07	th. tonne-km			
Electric Trains	62.95%	fract. of total	Electric	0.267	
Diesel Trains	37.05%	fract. of total	Diesel	0.606	
Coastal Passenger Transport	6.44E+06	th. pass-km			*(From Source 4)*
	96.704%	fract. of total	Diesel	1.127	(Assumes average int. of
	1.648%	fract. of total	Residual "A"	1.127	ships fueled with diesel and different
	1.648%	fract. of total	Residual "C"	1.127	residual oils are similar--*See Note 6*)
Coastal Freight Transport	2.3395E+08	th. tonne-km			
	16.31%	fract. of total	Diesel	0.736	
	40.90%	fract. of total	Residual "A"	0.736	(Assumes average int. of
	5.53%	fract. of total	Residual "B"	0.736	ships fueled with diesel and different
	37.26%	fract. of total	Residual "C"	0.736	residual oils are similar)
Marine Transport (bunkers)	795,900	th. te shipped	Residual "C"	269.862	

TRANSPORT STATISTICS FROM LBNL *(Source 9)*
Used as input data for calculation of LEAP inputs used in June, 1998 Paths analysis.

	1990	1991	1992	1993	1994	1995	Ann. Growth 1990 - 1995
PASSENGER VEHICLE STOCK (thousand vehicles)							
All Cars (priv+comm)	35,155.63	37,314.05	39,168.08	41,063.77	42,958.82	45,073.00	5.10%
Gasoline	29,144.00	30,183.00	31,003.00	31,914.00	32,833.00	33,895.00	3.07%
Gasoline (II)	32,436.50	33,950.58	35,234.47	36,508.84	37,754.52	-	-100.00%
Standard sized car	1,933.53	2,816.75	3,948.64	5,252.41	6,715.02		-100.00%
Small sized car	30,502.96	31,133.83	31,285.83	31,256.44	31,039.51		-100.00%
Mini	2,715.33	3,360.05	3,930.08	4,551.77	5,201.82	5,966.00	17.05%
Diesel	2,994.40	3,471.00	3,936.00	4,302.00	4,632.00	4,924.00	10.46%
LPG	301.90	300.00	299.00	296.00	292.00	288.00	-0.94%
Private Cars	34,896.03	37,057.45	38,912.48	40,811.17	42,710.22	44,828.40	5.14%
Gasoline	29,140.00	30,179.00	30,999.00	31,910.00	32,829.00	33,891.00	3.07%
Mini ("Kei" vehicle)	2,715.33	3,360.05	3,930.08	4,551.77	5,201.82	5,966.00	17.05%
Diesel	2,981.80	3,458.40	3,923.40	4,289.40	4,619.40	4,911.40	10.50%
LPG	58.90	60.00	60.00	*60.00*	*60.00*	*60.00*	0.37%
Commercial Cars	259.60	256.60	255.60	252.60	248.60	244.60	-1.18%
Gasoline	4.00	4.00	4.00	4.00	4.00	*4.00*	0.00%
Gasoline (II)	3,296.50	3,771.58	4,235.47	4,598.84	4,925.52	(33,891)	-259.37%
Diesel	12.60	12.60	12.60	12.60	*12.60*	*12.60*	0.00%
LPG	243.00	*240.00*	*239.00*	236.00	232.00	228.00	-1.27%
Motorcycles	2,741.40	2,816.89	2,884.78	2,951.03	3,000.68	3,035.64	2.06%
'small 2 wheelers'	999.85	1,022.60	1,070.00	1,127.82	1,177.23	1,209.01	3.87%
'light 2 wheelers'	1,741.55	1,794.29	1,814.78	1,823.22	1,823.45	1,826.63	0.96%
Bicycles with motors	14,553.80	14,001.31	13,460.72	12,983.68	12,586.42	12,226.26	-3.43%
'type 1'	13,048.14	12,520.84	11,998.94	11,521.89	11,165.39	10,835.93	-3.65%
'type 2'	1,505.67	1,480.48	1,461.78	1,461.78	1,421.03	1,390.33	-1.58%
All Buses	245.81	247.10	248.39	247.10	244.58	243.00	-0.23%
Gasoline	7.61	6.45	5.30	4.46	3.80	3.00	-16.99%
Diesel	238.20	240.64	243.09	242.64	240.79	240.00	0.15%
Private Buses	151.00	151.60	152.20	150.90	148.83	146.67	-0.58%
Gasoline	7.60	6.44	5.28	4.43	3.77	3.00	-16.96%
Diesel	143.40	145.16	146.93	146.47	145.06	*143.67*	0.04%
Commercial Buses	94.81	95.49	96.19	96.20	95.75	96.36	0.32%
Gasoline	*0.01*	0.01	0.03	0.03	0.03	0.03	15.74%
Diesel	94.80	95.48	96.16	96.17	95.72	*96.33*	0.32%
Private Trucks	20,238.50	20,136.10	19,916.47	19,677.82	19,459	*19,210*	-1.04%
Gasoline	2,854.50	*2,662.55*	2,485.92	2,371.56	2,269.88	*2,172.56*	-5.31%
Mini (1995 value from EDMC, 1997)	12,311.00	*12,146.00*	11,961.00	*11,773.41*	*11,593*	11,377.0	-1.57%
Diesel	5,057.00	*5,311.55*	5,454.55	5,518.82	5,581.64	*5,645.17*	2.22%
LPG	16.00	*16.00*	15.00	6.26	6.58	*6.93*	-15.41%
Other				7.77	7.87	*7.98*	N/A
Commercial Trucks	907.90	*910.38*	957.09	974.51	1,011.39	*1,050.02*	2.95%
Gasoline	89.60	*82.00*	90.00	6.23	6.31	*6.39*	-41.02%
Mini							
Diesel	818.30	*828.38*	867.09	874.63	902.31	*930.87*	2.61%
LPG				0.05	0.05	*0.05*	N/A
Other				93.60	102.71	*112.71*	N/A

TRANSPORT STATISTICS FROM LBNL *(Source 9)*

Used as input data for calculation of LEAP inputs used in June, 1998 Paths analysis.

VEHICLE ACTIVITY (Billion Vehicle-km)						
Autos	380.88	407.74	431.36	442.70	459.49	485.79
Private	346.25	367.26	386.52	394.38	407.34	428.65
Non-mini	330.97	346.53	360.90	364.70	373.40	389.25
Passenger				364.70	373.40	
Freight				123.01	120.19	
(Private and commercial--1992)			380.10			407.00
Mini-car (Kei)				111.95	114.88	39.40
Passenger	15.28	20.73	25.63	29.67	33.95	39.40
Freight				82.28	80.94	
Commercial	19.35	19.76	19.20	18.65	18.20	17.75
Bus	7.11	7.19	7.07	6.93	6.81	6.77
private	2.50	2.57	2.51	2.41	2.29	*2.17*
Commercial	4.61	4.62	4.56	4.53	4.52	4.53
Scheduled	3.04	3.04		2.99	2.97	2.96
Chartered	1.57	1.58		1.53	1.55	1.58
Truck	255.87	251.25	253.32	249.21	246.81	250.90
Private (own-account)	204.68	202.52	202.87	198.92	194.72	196.44
non-mini	122.07	120.08	119.56	116.64	113.78	115.43
"normal"		28.82		28.52	29.31	29.91
"small		91.27		88.12	84.47	85.53
("special use")				6.37	6.40	6.82
mini (kei)	82.61	82.44	83.31	82.28	80.94	81.01
Commercial	51.19	48.74	50.45	50.30	52.09	54.46
non-mini	48.46	45.70	47.45	46.99	48.77	50.94
"normal"		43.13		44.54	46.37	48.54
"small		2.57		2.45	2.40	2.40
("special use")				8.21	8.77	9.41
mini	2.73	3.03	3.00	3.30	3.32	3.53

PASSENGER VEHICLE Ridership (Billion Passenger-km)						
Autos: Total (Billion Passenger-km)	667.57	705.79	740.08	752.95	775.10	846.63
Private Including Mini	651.93	689.74	724.44	737.78	760.76	832.84
registerd ex. mini	536.77	658.41	685.71	692.93	709.45	773.30
(Mini Cars)	23.10	31.32	38.73	44.85	51.30	59.54
Commercial	15.64	16.06	15.65	15.17	14.34	13.79
Buses	110.37	108.21	106.64	102.91	99.78	97.29
Private	33.03	31.35	29.07	26.74	25.03	23.37
Commercial	77.34	76.86	77.56	76.16	74.75	73.91

FREIGHT VEHICLE Haulage (Billion tonne-km)						
Private Trucks	80.023	79.578	76.754	71.023	70.888	71.558
Commercial Trucks	194.221	204.198	204.844	204.862	209.699	223.09

CALCULATION OF IMPLIED VEHICLE USE INTENSITIES

Implied average annual vehicle-km/vehicle						
Private Cars	9,922	9,911	9,933	9,663	9,537	9,562
Commercial Cars	74,530	76,988	75,135	73,848	73,218	72,567
Private Bus	16,570	16,926	16,471	15,957	15,372	14,820
Commercial Bus	48,611	48,380	47,417	47,052	47,198	47,022
Private Truck	10,113	10,057	10,186	10,109	10,006	10,226
Commercial Truck (all)	56,383	53,534	52,715	51,613	51,507	51,869
Commercial Truck (diesel est.)	59,222	55,171	54,727	53,730	54,052	54,719
Commercial Truck (gasol. est.)	30,458	36,988	33,333	33,092	30,466	29,619

Implied average passengers/vehicle						
Private Cars	1.883	1.878	1.874	1.871	1.868	1.943
Commercial Cars	0.808	0.813	0.815	0.813	0.788	0.777
Private Bus	13.202	12.218	11.597	11.105	10.942	10.754
Commercial Bus	16.780	16.637	17.006	16.826	16.540	16.313

Implied average tonne-km/vehicle						
Private Truck	3,954	3,952	3,854	3,609	3,643	3,725
Commercial Truck	213,923	224,299	214,028	210,220	207,338	212,462
Assuming that average load for commercial gasoline truck is roughly the same as for private trucks						
Gasoline Commercial Truck	11,908	14,534	12,611	11,816	11,091	10,789
Diesel Commercial Truck	236,043	245,064	234,934	234,142	232,324	239,584

Implied average load/vehicle (tonnes)						
Private Truck	0.391	0.393	0.378	0.357	0.364	0.364
Commercial Truck	3.794	4.190	4.060	4.073	4.025	4.096
Assuming that average load for commercial gasoline truck is roughly the same as for private trucks						
Gasoline Commercial Truck	0.391	0.393	0.378	0.357	0.364	0.364
Diesel Commercial Truck	3.986	4.442	4.293	4.358	4.298	4.378
Implied Freight Haulage by Type of Truck (million freight tonne-km)						
Gasoline Commercial Truck	1,067	1,192	1,135	1,180	1,209	1,285
Diesel Commercial Truck	193,154	203,006	203,709	204,788	209,629	223,021
All Commercial Trucks	194,221	204,198	204,844	205,968	210,838	224,306
Implied Fraction Commercial Truck Freight Haulage by Type of Truck						
Gasoline Commercial Truck	0.55%	0.58%	0.55%	0.57%	0.57%	0.57%
Diesel Commercial Truck	99.45%	99.42%	99.45%	99.43%	99.43%	99.43%
All Commercial Trucks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

TRANSPORT STATISTICS FROM LBNL *(Source 9)*

Used as input data for calculation of LEAP inputs used in June, 1998 Paths analysis.

ENERGY USE (MOT) (million liters)							
Private Cars	36,163	39,187	42,003	43,324	45,123	47,895	
Gasoline	32,863	35,172	37,252	37,981	39,286	41,394	
Diesel	3,300	4,015	4,751	5,343	5,837	6,502	
LPG							
mini							
Commercial Cars	2,983	3,064	3,028	2,991	2,985	3,003	
Gasoline	34	37	39	40	43	45	
Diesel	76	74	71	67	64	61	
LPG	2,873	2,953	2,918	2,884	2,878	2,897	
Buses			2,120	2,095			
Private Buses	413	425	420	409	392	382	
Gasoline	18	14	11	9	7	6	
Diesel	396	411	409	400	385	375	
Commercial Buses	1,450	1,415	1,448	1,479	1,487	1,504	
Gasoline	-	-	-	-	-	-	
Diesel	1,450	1,415	1,448	1,479	1,487	1,504	
Private Trucks	24,348	25,008	25,337	25,054	24,712	25,134	
(Gasoline: standard and mini)	11,310	11,203	11,125	10,975	10,656	10,656	
Gasoline	4,276	4,004	3,668	3,775	3,456	3,236	
Diesel	13,038	13,805	14,212	14,079	14,056	14,478	
mini	7,033	7,199	7,457	7,200	7,200	7,420	
Commercial Trucks	12,867	14,149	14,778	15,172	15,803	16,570	
(Gasoline: standard and mini)	278	309	332	348	355	381	
Gasoline	38	34	31	28	25	42	
Diesel	12,829	14,115	14,747	15,144	15,778	16,528	
mini	240	275	301	320	330	339	
Passenger Rail							
Diesel, kl	330	327	324	357	300	293	
Electricity, GWh	16,065	16,545	16,497	16,906	17,168	17,528	
Rail Freight							
Diesel, kl	26	25	25	26	21	21	
Electricity, GWh	1,254	1,271	1,284	1,243	1,190	1,227	
Passenger Air (10^{10} kcal)	2,840	2,935	3,041	3,129	3,417	3,703	
Freight Air (10^{10} kcal)	414	426	440	468	495	527	
Pass. Boats, Diesel (PJ NHV)	6.420			6.898		6.181	
Pass. Boats, Hvy Oil "A" (PJ NHV)	0.120			0.120		0.120	
Pass. Boats, Hvy Oil "C" (PJ NHV)	0.120			0.159		0.120	
Pass. Boats, "Diesel" (10^{10} kcal)	167	203	188	180	158	161	*(see Note 10)*
Freight Ships Diesel (PJ NHV)	30.444			30.645		28.848	
Frt. Ships, Hvy Oil "A" (PJ NHV)	70.42			68.22		72.97	
Frt. Ships, Hvy Oil "B" (PJ NHV)	9.53			1.48		0.76	
Frt. Ships, Hvy Oil "C" (PJ NHV)	64.16			76.84		76.76	
Frt. Ships, "Diesel" (10^{10} kcal)	4,378	4,564	4,497	4,444	4,537	4,497	*(see Note 10)*

CALCULATION OF IMPLIED VEHICLE ENERGY INTENSITIES

Implied annual average fuel consumption/vehicle (liters/vehicle)

	1990	1991	1992	1993	1994	1995	Ann. Growth 1990 - 1995	
Private Cars, Gasoline	1,032	1,049	1,067	1,042	1,033	1,039	0.13%	
Priv. Cars, Gas, less Motorcyc.	988	1,008	1,028	1,005	998	1,006	0.36%	*Note 11*
Private Cars, Diesel	1,102	1,157	1,207	1,242	1,260	1,320	3.68%	
Commercial Cars, Gasoline	8,440	9,250	9,750	10,000	10,750	11,310	6.03%	
Commercial Cars, Diesel	6,032	5,873	5,635	5,317	5,079	4,825	-4.37%	
Commercial Cars, LPG	11,823	12,304	12,209	12,220	12,405	12,708	1.45%	
Private Buses, Gasoline	2,324	2,174	2,084	2,033	1,858	2,029	-2.67%	
Private Buses, Diesel	2,758	2,831	2,784	2,731	2,654	2,613	-1.07%	
Commercial Buses, Gasoline	-	-	-	-	-	-	N/A	
Commercial Buses, Diesel	15,293	14,820	15,058	15,379	15,534	15,608	0.41%	
Private Trucks, Gasoline	746	757	770	776	769	786	1.07%	
Private Trucks, Diesel	2,578	2,599	2,606	2,551	2,518	2,565	-0.11%	
Commercial Trucks, Gasoline	3,103	3,768	3,689	3,486	3,256	3,197	0.60%	
Commercial Trucks, Diesel	15,678	17,039	17,007	17,315	17,486	17,756	2.52%	

Implied annual average fuel consumption/vehicle (GJ NHV/vehicle)

	1990	1991	1992	1993	1994	1995	Ann. Growth 1990 - 1995	
Private Cars, Gasoline	34.531	35.102	35.698	34.866	34.577	34.762	0.13%	
Priv. Cars, Gas, less Motorcyc.	33.075	33.738	34.407	33.644	33.417	33.668	0.36%	*Note 11*
Private Cars, Diesel	40.402	42.406	44.251	45.531	46.197	48.405	3.68%	
Commercial Cars, Gasoline	282.502	309.614	326.350	334.718	359.822	378.558	6.03%	
Commercial Cars, Diesel	221.126	215.307	206.578	194.940	186.211	176.898	-4.37%	
Commercial Cars, LPG	305.297	317.709	315.257	315.545	320.317	328.131	1.45%	
Private Buses, Gasoline	77.778	72.776	69.759	68.032	62.182	67.926	-2.67%	
Private Buses, Diesel	101.118	103.796	102.052	100.115	97.296	95.809	-1.07%	
Commercial Buses, Gasoline	-	-	-	-	-	-	N/A	
Commercial Buses, Diesel	560.655	543.292	552.022	563.799	569.496	572.186	0.41%	
Private Trucks, Gasoline	24.962	25.322	25.775	25.971	25.729	26.324	1.07%	
Private Trucks, Diesel	94.518	95.282	95.520	93.524	92.320	94.020	-0.11%	
Commercial Trucks, Gasoline	103.852	126.132	123.474	116.685	108.995	106.998	0.60%	
Commercial Trucks, Diesel	574.747	624.664	623.499	634.761	641.048	650.928	2.52%	

Implied average (or estimated) GJ NHV/thousand vehicle-km

	1990	1991	1992	1993	1994	1995	Ann. Growth 1990 - 1995
Private Cars, Gasoline	3.480	3.542	3.594	3.608	3.625	3.635	0.88%
Priv. Cars, Gas, less Motorcyc.	3.333	3.404	3.464	3.482	3.504	3.521	1.10%
Private Cars, Diesel	4.072	4.279	4.455	4.712	4.844	5.062	4.45%
Commercial Cars, Gasoline	3.790	4.022	4.344	4.533	4.914	5.217	6.60%
Commercial Cars, Diesel	2.967	2.797	2.749	2.640	2.543	2.438	-3.85%
Commercial Cars, LPG	4.096	4.127	4.196	4.273	4.375	4.522	2.00%
Private Buses, Gasoline	4.694	4.300	4.235	4.263	4.045	4.583	-0.48%
Private Buses, Diesel	6.103	6.132	6.196	6.274	6.330	6.465	1.16%
Commercial Buses, Gasoline	-	-	-	-	-	-	N/A
Commercial Buses, Diesel	11.533	11.230	11.642	11.982	12.066	12.168	1.08%
Private Trucks, Gasoline	2.468	2.518	2.530	2.569	2.571	2.574	0.84%
Private Trucks, Diesel	9.346	9.474	9.377	9.252	9.226	9.194	-0.33%
Commercial Trucks, Gasoline	3.410	3.410	3.704	3.526	3.578	3.612	1.16%
Commercial Trucks, Diesel	9.705	11.322	11.393	11.814	11.860	11.896	4.15%

Implied average (or estimated) GJ NHV/thousand passenger-km, Road Vehicles

	1990	1991	1992	1993	1994	1995	Ann. Growth 1990 - 1995
Private Cars, Gasoline	1.848	1.886	1.917	1.929	1.941	1.871	0.25%
Priv. Cars, Gas, less Motorcyc.	1.770	1.813	1.848	1.861	1.876	1.812	0.47%
Private Cars, Diesel	2.163	2.278	2.377	2.519	2.594	2.605	3.80%
Commercial Cars, Gasoline	4.689	4.948	5.332	5.575	6.239	6.715	7.44%
Commercial Cars, Diesel	3.671	3.441	3.375	3.247	3.229	3.138	-3.09%
Commercial Cars, LPG	5.068	5.078	5.151	5.256	5.554	5.820	2.81%
Private Buses, Gasoline	0.356	0.352	0.365	0.384	0.370	0.426	3.69%
Private Buses, Diesel	0.462	0.502	0.534	0.565	0.578	0.601	5.40%
Commercial Buses, Gasoline	-	-	-	-	-	-	N/A
Commercial Buses, Diesel	0.687	0.675	0.685	0.712	0.729	0.746	1.65%

Implied average (or estimated) GJ NHV/thousand tonne-km, Road Vehicles

Commercial Trucks, Gasoline	8.721	8.678	9.791	9.875	9.827	9.917	2.60%
Commercial Trucks, Diesel	2.435	2.549	2.654	2.711	2.759	2.717	2.22%

Reconciliation of Gasoline Use	1990	1991	1992	1993	1994	1995
Implied total Gasoline Cons based on MOT (via LBNL) statistics, TJ NHV						
	1,489,569	1,564,306	1,632,053	1,651,936	1,685,207	1,756,661
Implied total Gasoline Cons based on Detailed Balances, TJ NHV						
	1,496,043			1,611,679		1,723,925

Estimate of Fuel Used by Motorcycles						
Assumed Average Annual Travel						
Motorcycles	4,000	4,000	4,000	4,000	4,000	4,000
"Bicycles with Motors"	2,500	2,500	2,500	2,500	2,500	2,500
Assumed Average Fuel use, kilometer per liter (gasoline)						
Motorcycles	21.05	21.05	21.05	21.05	21.05	21.05
"Bicycles with Motors"	42.11	42.11	42.11	42.11	42.11	42.11
Implied gasoline use, TJ NHV						
Motorcycles	17,434	17,914	18,346	18,768	19,083	19,306
"Bicycles with Motors"	28,924	27,826	26,752	25,804	25,014	24,298
TOTAL Motorcycles	46,358	45,740	45,098	44,571	44,097	43,604
Implied fraction of gasoline use	3.11%	2.92%	2.76%	2.70%	2.62%	2.48%

	1990	1991	1992	1993	1994	1995	Ann. Growth 1990 - 1995
Summary of Passenger Kilometers by Type of Transit (billions) ***(Note 12)***							
Private Autos	651.93	689.74	724.44	737.78	760.76	832.84	5.02%
Commercial Autos	15.64	16.06	15.65	15.17	14.34	13.79	-2.49%
Private Buses	33.03	31.35	29.07	26.74	25.03	23.37	-6.68%
Commercial Buses	77.34	76.86	77.56	76.16	74.75	73.91	-0.90%
Passenger Rail	387.48	400.08	402.26	402.73	396.33	400.06	0.64%
Passenger Air	51.62	55.35	56.68	57.12	61.29	65.01	4.72%
Passenger Boats	6.28	6.47	6.08	6.06	5.95	5.53	-2.51%
TOTAL OF ABOVE	1,223.32	1,275.90	1,311.74	1,321.75	1,338.45	1,414.52	2.95%
Pass-km per capita	9,897	10,290	10,540	10,602	10,711	11,265	2.62%
Fractions of Passenger Kilometers by Type of Transit							
Private Autos	53.29%	54.06%	55.23%	55.82%	56.84%	58.88%	2.01%
Commercial Autos	1.28%	1.26%	1.19%	1.15%	1.07%	0.97%	-5.28%
Private Buses	2.70%	2.46%	2.22%	2.02%	1.87%	1.65%	-9.35%
Commercial Buses	6.32%	6.02%	5.91%	5.76%	5.58%	5.23%	-3.74%
Passenger Rail	31.67%	31.36%	30.67%	30.47%	29.61%	28.28%	-2.24%
Passenger Air	4.22%	4.34%	4.32%	4.32%	4.58%	4.60%	1.72%
Passenger Boats	0.51%	0.51%	0.46%	0.46%	0.44%	0.39%	-5.30%
TOTAL OF ABOVE	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	

Estimate of Fraction of Freight and Passengers on diesel and electric rail							
Relative energy intensity, diesel versus electric rail			2.270	*(Source 3)*			
	1990	1991	1992	1993	1994	1995	Ann. Growth 1990 - 1995
Impl. ratio pass-km elect/diesel	10.8436	11.2815	11.3561	10.5622	12.7473	13.3133	4.19%
Implied fract. pass-km, diesel	8.44%	8.14%	8.09%	8.65%	7.27%	6.99%	-3.72%
Implied fract. pass-km, elect.	91.56%	91.86%	91.91%	91.35%	92.73%	93.01%	0.32%
Impl. ratio pass-km elect/diesel	10.8436	11.2815	11.3561	10.5622	12.7473	13.3133	4.19%
Implied fract. tonne-km, diesel	8.44%	8.14%	8.09%	8.65%	7.27%	6.99%	-3.72%
Implied fract. tonne-km, elect.	91.56%	91.86%	91.91%	91.35%	92.73%	93.01%	0.32%

	1990	1991	1992	1993	1994	1995	Ann. Growth 1990 - 1995
Summary of Freight Tonne-Kilometers by Type of Transit (billions) (from *Source 9*)							
Private Trucks	80.02	79.58	76.75	71.02	70.89	71.56	-2.21%
Commercial Trucks	194.22	204.20	204.84	204.86	209.70	223.09	2.81%
Rail Freight	27.20	27.16	26.67	25.43	24.49	25.10	-1.59%
Air Freight	0.80	0.812	0.804	0.818	0.871	0.92	2.95%
Water Freight	244.55	248.20	248.00	233.53	238.54	238.33	-0.51%
TOTAL OF ABOVE	546.79	559.95	557.07	535.66	544.49	559.00	0.44%
tonne-km per capita	4,424	4,516	4,476	4,297	4,357	4,452	0.13%
tonne-km per th. '85 Yen GDP	1.370	1.346	1.324	1.276		1.296	-1.11%
Fractions of Tonne Kilometers by Type of Transit							
Private Trucks	14.635%	14.212%	13.778%	13.259%	13.019%	12.801%	-2.64%
Commercial Trucks	35.521%	36.467%	36.772%	38.245%	38.513%	39.909%	2.36%
Rail Freight	4.974%	4.850%	4.787%	4.748%	4.498%	4.490%	-2.02%
Air Freight	0.146%	0.145%	0.144%	0.153%	0.160%	0.165%	2.50%
Water Freight	44.724%	44.326%	44.519%	43.596%	43.810%	42.635%	-0.95%
TOTAL OF ABOVE	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	

DERIVATION OF DATA FOR ENTRY INTO LEAP: DRIVERS AND INTENSITIES

			Growth Rate (%/yr) From			Implied Values for		
TAXIS AND MASS TRANSIT	1990	1995	95 - 2000	2000-2010	2010-2020	2000	2010	2020
Total Pass-km (billion)	1,223	1,415	1.793%	1.737%	0.840%	1,546	1,836	1,997
Passenger-km/capita	9,897	11,265	1.50%	1.50%	1%	12,135	14,084	15,557
Fraction of Passenger-km as:								
Commercial Autos	1.278%	0.975%	-3%	-1.50%	0%	0.837%	0.720%	0.720%
--Fraction as Gasoline-fueled	1.541%	1.635%	0.00%	0.00%	0.00%	1.635%	1.635%	1.635%
--Fraction as Diesel-fueled	4.854%	5.151%	0.00%	0.00%	0.00%	5.151%	5.151%	5.151%
--Fraction as LPG-fueled	93.606%	93.213%	0.00%	0.00%	0.00%	93.213%	93.213%	93.213%
Private Buses	2.700%	1.652%	-5%	-1.50%	0%	1.279%	1.099%	1.099%
--Fraction as Gasoline-fueled	5.033%	2.045%	-3.072%	-1.530%	0.000%	1.750%	1.500%	1.500%
--Fraction as Diesel-fueled	94.967%	97.955%	0.060%	0.025%	0.000%	98.250%	98.500%	98.500%
Commercial Buses	6.322%	5.225%	-3%	-1.50%	0%	4.487%	3.858%	3.858%
--Fraction as Gasoline-fueled	0.014%	0.028%	0.000%	0.000%	0.000%	0.028%	0.028%	0.028%
--Fraction as Diesel-fueled	99.986%	99.972%	0%	0%	0%	99.972%	99.972%	99.972%
Passenger Rail	31.674%	28.282%	-2%	-1%	0%	25.565%	23.120%	23.120%
--Fraction of Rail on Electric	91.557%	93.014%	0.30%	0.20%	0%	94.417%	96.323%	96.323%
--Fraction of Rail on Diesel	8.443%	6.986%	-4.386%	-4.089%	0.000%	5.583%	3.677%	3.677%
Passenger Air	4.220%	4.596%	1.50%	1.00%	0.75%	4.951%	5.469%	5.894%
Passenger Boats	0.513%	0.391%	-3.00%	-2.00%	-1.00%	0.336%	0.274%	0.248%
--Fraction as Diesel-fueled	96.407%	96.273%	0.000%	0.000%	0.000%	96.273%	96.273%	96.273%
--Fraction as Hvy "A"-fueled	1.796%	1.863%	0%	0%	0%	1.863%	1.863%	1.863%
--Fraction as Hvy "C"-fueled	1.796%	1.863%	0%	0%	0%	1.863%	1.863%	1.863%
Sum of non-private road modes	46.708%	41.122%	-1.851%	-0.807%	0.115%	37.455%	34.541%	34.939%
Index of International Air pass-km	72.3%	100.0%	3.0%	2.0%	1.5%	115.9%	141.3%	164.0%
GJ NHV/thousand passenger-kilometers								
Commercial Autos, Gasoline	4.689	6.715	0%	-0.30%	-0.30%	6.715	6.516	6.323
Commercial Autos, Diesel	3.671	3.138	0%	-0.30%	-0.30%	3.138	3.045	2.955
Commercial Autos, LPG	5.068	5.820	0%	-0.30%	-0.30%	5.820	5.648	5.481
Private Buses, Gasoline	0.356	0.426	2%	0%	0%	0.471	0.471	0.471
Private Buses, Diesel	0.462	0.601	2%	0%	0%	0.664	0.664	0.664
Commercial Buses, Diesel	0.687	0.746	1%	0%	0%	0.784	0.784	0.784
Passenger Rail--electric	0.163	0.170	0%	0%	0%	0.170	0.170	0.170
Passenger Rail--diesel	0.370	0.385	0%	0%	0%	0.385	0.385	0.385
Passenger Air	2.194	2.271	0%	0%	0%	2.271	2.271	2.271
Passenger Ships (all fuels)	1.061	1.162	2%	1%	0%	1.282	1.417	1.417

			Growth Rate (%/yr) From			Implied Values for		
	1990	1995	95 - 2000	2000-2010	2010-2020	2000	2010	2020
Private Road Vehicles (except Buses)								
Fraction of Total Vehicles as:								
Gasoline Autos	43.98%	50.26%	0.756%	0.224%	-0.024%	52.190%	53.370%	53.244%
Diesel Autos	4.12%	6.19%	5%	3%	2%	7.905%	10.623%	12.949%
LPG Autos	0.081%	0.076%	0%	0%	0%	0.076%	0.076%	0.076%
Motorcycles	3.78%	3.83%	0%	0%	0%	3.828%	3.828%	3.828%
"Bicycles with Motors"	20.09%	15.42%	-3%	-2%	-1.50%	13.240%	10.818%	9.300%
Private Gasoline Trucks	20.94%	17.09%	-2%	-1%	-0.50%	15.445%	13.968%	13.285%
Private Diesel Trucks	6.98%	7.12%	0.50%	0%	0%	7.299%	7.299%	7.299%
Private LPG Trucks	0.022%	0.019%	0%	0%	0%	0.019%	0.019%	0.019%
Reconciliation and Estimate of Passenger-km and Vehicle km per vehicle type for Autos and cycles								
Billion Pass-km, cycles	47.35	42.71	-0.641%	-0.340%	-0.439%	41.36	39.97	38.25
Implied Billion Pass-km, Autos	604.58	790.13	3.214%	2.303%	0.818%	925.5	1,162.2	1,260.9
Assuming Ave passeng./auto of	1.883	1.943	0.000%	0.000%	0.000%	1.943	1.943	1.943
Total number of Autos (thous.)	34,896	44,828	2.775%	1.636%	0.840%	51,402	60,459	65,734
Implied Veh-km per Auto	9,202	9,072	0.428%	0.656%	-0.022%	9,267	9,893	9,872
Impl. GJ/kveh-km, Gas/LPG Autos	3.59	3.71	-0.426%	-0.652%	0.022%	3.63	3.40	3.41
Impl. GJ/kveh-km, Diesel Autos	4.39	5.34	2.064%	-0.652%	0.022%	5.91	5.54	5.55
GJ NHV/Vehicle-yr								
Gasoline Autos	33.075	33.668	0.00%	0.00%	0.00%	33.668	33.668	33.668
Diesel Autos	40.402	48.405	2.50%	0.00%	0.00%	54.766	54.766	54.766
LPG Autos	*33.075*	*33.668*	0.00%	0.00%	0.00%	33.668	33.668	33.668
Motorcycles	6.360	6.360	0.00%	0.00%	0.00%	6.360	6.360	6.360
"Bicycles with Motors"	1.987	1.987	0.00%	0.00%	0.00%	1.987	1.987	1.987
Private Gasoline Trucks	24.962	26.324	1.00%	0.50%	0.00%	27.667	29.081	29.081
Private Diesel Trucks	94.518	94.020	-0.10%	-0.10%	0.00%	93.551	92.620	92.620
Private LPG Trucks	*24.962*	*26.324*	1.00%	0.50%	0.00%	27.667	29.081	29.081

FREIGHT TRANSPORT (except Private Trucks)			Growth Rate (%/yr) From			Implied Values for		
			95 - 2000	2000-2010	2010-2020	2000	2010	2020
Total tonne-km (billion)	546.79	559.00	0.75%	0.65%	0.50%	580.28	619.12	650.79
Fraction of tonne-km by:								
Commercial Trucks	35.52%	39.91%	1.500%	0.750%	0.300%	42.993%	46.328%	47.737%
--Fr. te-km as Gasoline-fueled	0.549%	0.573%	2.000%	1.000%	0.000%	0.633%	0.699%	0.699%
--Fr. te-km as Diesel-fueled	99.451%	99.427%	-0.012%	-0.007%	0.000%	99.367%	99.301%	99.301%
--Fr te-km as LPG-fueled	0.000%	0.00028%	0.000%	0.000%	0.000%	0.00028%	0.00028%	0.00028%
Rail Freight	4.97%	4.49%	-1%	-0.50%	0%	4.270%	4.061%	4.061%
--Fraction of Rail as Electric	91.56%	93.01%	0.30%	0.20%	0.00%	94.417%	96.323%	96.323%
--Fraction of Rail as Diesel	8.44%	6.99%	-4.386%	-4.089%	0.000%	5.583%	3.677%	3.677%
Air Freight	0.146%	0.165%	2%	1.50%	1.50%	0.182%	0.212%	0.246%
Water Freight	44.72%	42.63%	-0.75%	-0.50%	-0.30%	41.060%	39.052%	37.897%
--Fraction as Diesel-fueled	17.44%	16.09%	0.134%	0.062%	0.000%	16.194%	16.294%	16.294%
--Fraction as Hvy "A"-fueled	40.34%	40.69%	0.00%	0.00%	0.00%	40.689%	40.689%	40.689%
--Fraction as Hvy "B"-fueled	5.46%	0.42%	-25.038%			0.10%	0.00%	0.00%
--Fraction as Hvy "C"-fueled	36.76%	42.80%	0.10%	0.00%	0.00%	43.016%	43.016%	43.016%
Sum of non-private frt. modes	85.36%	87.20%	0.298%	0.129%	0.032%	88.51%	89.65%	89.94%
GJ NHV/thousand tonne-kilometers								
Commercial Gasoline Trucks	8.721	9.917	0.00%	0.00%	0.00%	9.917	9.917	9.917
Commercial Diesel Trucks	2.435	2.717	0.00%	0.00%	0.00%	2.717	2.717	2.717
Commercial LPG Trucks	8.721	9.917	0.000%	0.000%	0.000%	9.917	9.917	9.917
Electric Rail Freight	0.181	0.189	0.00%	0.00%	0.00%	0.189	0.189	0.189
Diesel Rail Freight	0.412	0.430	0.00%	0.00%	0.00%	0.430	0.430	0.430
Air Freight	20.661	22.742	0.00%	0.00%	0.00%	22.742	22.742	22.742
Water Freight--all fuels	0.714	0.752	0.00%	0.00%	0.00%	0.752	0.752	0.752

Sources/Notes

1 The Energy Conservation Center, Japan (1996), Japan Energy Conservation Handbook, 1996/7 Pages 60-61)

2 Japan Ministry of Transport (1995) Japan's Sustainable Transport Policy: Toward the 21st Century.

3 Derived from technology data from Japan MARKAL data set as obtained from ETL/AIST/MITI WWW site (1996).

4 Estimated based on information in WWW page "Domestic Passenger Transport by Mode", part of the Toyota Motor Company World-wide Web site at http://www.toyota.co.jp/Data_center/Databank1. (1997)

5 International Road Federation (IRF, 1989?) World Road Statistics, 1984-1988. IRF, Geneva, Switzerland.

6 These intensities should be revisited when better data are available.

7 Based on total diesel for passenger transport less diesel used by other passenger transport modes.

8 Based on total diesel for freight transport less diesel used by other freight transport modes.

9 From spreadsheet JAPTP90.XLS, as obtained from Lee Schipper and Mike Ting of the International Energy Studies Group, Lawrence Berkeley National Laboratory (1/98). Original Data probably from EDMC compendium.

10 As LBNL reports (in Source 9), two different Japanese data sources for marine fuel consumptions EDMC version makes the most sense to me (on a per-pass-km and per tonne-km basis), although the true figure may well be in between. I assume that the figures reported as "diesel" are actually for a combination of diesel and heavy oil products, thus the EDMC figures represent the total fuel used by passenger and freight ships.

11 Assumes that gasoline use statistics for private passenger cars include gasoline use by motorcycles, and that motorcycles (and "bicycles with motors" have approximately the usage and efficiencies assumed)

12 From LBNL spreadsheet (in Source 9). Data may not be fully consistent with figures for vehicle-km and vehicle stocks.

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

Derivation of LEAP Demand Data

Services/Commercial/General Sector

DATA FROM DETAILED BALANCES **UNIT: 10^{10} kcal GHV fuel used**

	Bituminous				Residual Oils				Natural	Munic.		
Year	Coal	Coke	Kerosene	Diesel Oil	"A"	"B"	"C"	LPG	Gas	Gas	Electricity	Heat
1990	44	701	3926	76	7170	244	3947	1739	88	3515	14301	171
1993	24	712	4861	53	8589	59	1981	2119	61	4023	16046	251
1995	6	1077	5110	69	9127	38	1714	2609	53	4644	18302	345

Activity Data: Services GDP (1985 billion yen: from LBNL data "Total Services GDP")

1989	1990	1991	1992	1993	1994	1995	Growth: '89 to '95	Growth: '93 to '95
220,361	229,708	234,716	237,771	237,335	240,903	243,601	1.69%	1.31%

Energy Intensity in GJ (NHV) per million 1985 yen Wholesale/Retail, Finance Etc., and Other Services GDP

	Bituminous				Residual Oils				Natural	Munic.		
Year	Coal	Coke	Kerosene	Diesel Oil	"A"	"B"	"C"	LPG	Gas	Gas	Electricity	Heat
1990	7.638E-06	0.000	0.001	1.32E-05	0.001	########	0.001	0.000	1.5E-05	0.001	0.003	0.0000
1993	4.03E-06	0.000	0.001	8.90E-06	0.001	9.91E-06	0.000	0.000	9.8E-06	0.001	0.003	0.0000
1995	9.82E-07	0.000	0.001	0.000	0.001	0.000	0.000	0.000	8.3E-06	0.001	0.003	0.0001

Building Floor Area by Building Type Thousand Square Meters *(Source 1)*

	1989	1990	1991	1992	1993	1994	1995	Growth: '89 to '95	Growth: '93 to '95
OFFICE	300,000	313,000	329,000	346,000	362,000	379,200	394,000	4.65%	4.33%
MERC&SERV	291,000	299,000	309,000	320,000	331,000	344,250	355,890	3.41%	3.69%
FOOD SERVICE*	49,000	50,000	52,000	53,000	54,470	55,740	56,920	2.53%	2.22%
EDUC&LAB	307,000	311,000	315,000	317,000	320,000	324,800	328,300	1.12%	1.29%
LODGING*	74,000	77,000	79,000	82,000	84,360	86,840	88,760	3.08%	2.57%
HEALTH	63,000	65,000	66,000	67,000	69,280	71,620	73,760	2.66%	3.18%
THEATRE&AMUS*	23,700	24,000	25,000	26,000	27,060	28,340	29,350	3.63%	4.15%
SERVICE (*SUBTOT)	146,700	151,000	156,000	161,000	165,890	170,920	175,030	2.99%	2.72%
OTHER	144,000	146,000	151,000	154,000	158,000	161,800	166,100	2.41%	2.53%
TOTAL	1,251,700	1,285,000	1,326,000	1,365,000	1,406,170	1,452,590	1,493,080	2.98%	3.04%
FLOOR AREA/SERV GDP (m^2/M Yen)	5.680	5.594	5.649	5.741	5.925	6.030	6.129	1.28%	1.71%

Energy Intensity in GJ (NHV) per thousand square meters services building floor area

	Bituminous		All Oil			Residual Oils				Natural	Munic.		
Year	Coal	Coke	Products	Kerosene	Diesel Oil	"A"	"B"	"C"	LPG	Gas	Gas	Electricity	Heat
1990	1.365E+00	21.752	530.685	121.826	2.36E+00	222.489	7.57E+00	122.478	53.962	2.6E+00	104.115	465.957	5.5715
1993	6.81E-01	20.190	500.835	137.842	1.50E+00	243.555	1.67E+00	56.175	60.088	1.7E+00	108.893	477.762	7.4734
1995	1.60E-01	28.762	498.522	136.468	1.843	243.746	1.015	45.774	69.676	1.4E+00	118.386	513.213	9.6743
Growth (%/yr)													
90 to '95	-34.85%	5.75%	-1.24%	2.30%	-4.81%	1.84%	-33.10%	-17.87%	5.24%	-12.32%	2.60%	1.95%	11.67%
93 to '95	-38.25%	12.52%	-0.15%	-0.33%	7.03%	0.03%	-15.35%	-6.60%	5.06%	-6.47%	2.83%	2.41%	8.98%

1990 SERVICES ENERGY by bldg type & fuel (incl. electric end-uses) *(Data from Source 1)*								
		Retail & Wholesale	Hotels & Restaurants	Offices	Education	Health	Miscellaneous	TOTAL
Gas	kWh/m^2	88.51	221.78	40.48	12.88	84.68	54.06	66.58
Oil	kWh/m^2	35.61	110.40	46.86	64.50	215.30	56.26	59.63
Other Fuels	kWh/m^2	-	2.75	0.12	1.28	38.28	0.35	1.44
District Heat	kWh/m^2	2.09	32.22	3.36	-	-	-	4.72
Electric Heating (HVAC & WH)	kWh/m^2	2.90	13.85	4.18	1.39	4.64	2.78	4.00
Cooling (HVAC)	kWh/m^2	34.57	33.85	12.99	2.44	16.01	14.50	18.01
Lighting & Plug Loads (other)	kWh/m^2	252.76	191.44	155.21	47.79	126.32	90.71	147.32
SUM OF ELECTRIC	kWh/m^2	290.23	239.14	172.38	51.62	146.97	108.00	169.34

Total Listed Electricity Consumption for Services, 1990	5.99E+08	GJ
Total Listed Electricity Consumption for Services, 1990	166,321	GWh
Implied Electricity Consumption for Services per sq. meter, 1990	129.4324	kWh

DERIVATION OF DATA FOR ENTRY INTO LEAP

			Growth Rate (%/yr) From			Implied Values for		
DRIVERS	1990	1995	95 - 2000	2000-2010	2010-2020	2000	2010	2020
Services GDP (trillion 1985 Yen)	229.71	243.60	2.8%	2.2%	2.0%	279.67	347.66	423.79
Bldg Floor Area/GDP (m^2/M Yen)	5.59	6.13	0.000%	0.000%	0.000%	6.129	6.129	6.129
Services Bldg Floor Area (M sq. m.)	1,285.00	1,493.08	2.800%	2.200%	2.000%	1,714.15	2,130.87	2,597.52
ENERGY INTENSITIES (GJ/thousand sq. meters Services Floor Area) *(Note 2)*								
Bituminous Coal	1.365	0.160	-8.999%			0.10	-	-
Coke	21.75	28.762	0%	0%	0%	28.762	28.762	28.762
Kerosene	121.83	136.468	0%	0%	0%	136.468	136.468	136.468
Diesel	2.358	1.843	0%	0%	0%	1.843	1.843	1.843
Residual Oil "A"	222.49	243.746	0%	0%	0%	243.746	243.746	243.746
Residual Oil "B"	7.571	1.015	-13.201%	-8.756%		0.50	0.20	-
Residual Oil "C"	122.478	45.774	-5.00%	-5.00%	-3.00%	35.419	21.207	15.638
LPG	53.962	69.676	5.00%	3.00%	1.50%	88.926	119.510	138.696
Natural Gas	2.607	1.351	-5.00%	-5.00%		1.045	0.626	0.626
Municipal Gas	104.115	118.386	2.50%	2.00%	1.50%	133.942	163.275	189.487
District Heat	5.5715	9.6743	7.50%	5.00%	3.50%	13.889	22.623	31.912
Electric Heating (HVAC & WH)	11.011	12.127	1%	0.50%	0%	12.746	13.398	13.398
Cooling (HVAC)	49.565	54.592	1%	0.50%	0%	57.377	60.311	60.311
Lighting & Plug Loads (other)	405.381	446.494	2%	1.50%	1%	492.965	572.106	631.961
Sum of Electric	465.96	513.21	1.872%	1.380%	0.890%	563.09	645.81	705.67
Sum of Non-Electric	666.10	656.86	0.832%	0.757%	0.644%	684.64	738.26	787.18

Sources/Notes

1 From spreadsheet JAPSERV.XLS, as obtained from Lee Schipper and Mike Ting of the International Energy Studies Group, Lawrence Berkeley National Laboratory (1/98). Original Data probably from EDMC compendium.

2 For different types of electric end-uses, assumes that ratio of electricity use between end-uses is the same in 1995 as in 1990, based on 1990 "snapshot" end-use breakdown provided above (also from Source 1).

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

Derivation of LEAP Demand Data
Household Sector

Household Sector

Fuel Use Data from Detailed Balance **UNIT: 10^{10} kcal GHV fuel used**

Year	Bituminous Coal	Kerosene	LPG	Municipal Gas	Biomass Fuel	Electricity	Heat
1990	12	10925	6526	7764	106	16353	31
1993	6	12797	6974	8987	92	18108	33

Activity Data: Number of Households

1990	40,670,475	(From 1995 Census Results--See "Japan in Figures" Sheet in this Workbook
1993	42,608,144	(interpolated from 1990 and 1995 data)

Energy Intensity in GJ (NHV) per household

Year	Bituminous Coal	Kerosene	LPG	Municipal Gas	Biomass Fuel	Electricity	Heat
1990	1.1765E-02	10.711	6.398	7.266	0.104	16.83	0.0319
1993	5.62E-03	11.976	6.527	8.028	0.086	17.79	0.0324

Data from LBNL *(Source 1)*

	1990	1991	1992	1993	1994	1995	Growth, '90 to '95
POPULATION, 10e6	123.60	124.00	124.45	124.67	124.96	125.57	0.32%
Households, 10e6	41.20	41.80	42.46	43.08	43.67	44.24	1.43%
Occupied Dwellings, 10e6	38.97	39.76	40.17	40.77	41.45	41.90	1.46%
People/Household	3.00	2.97	2.93	2.89	2.86	2.84	-1.10%
Households/Dwelling	1.06	1.05	1.06	1.06	1.05	1.06	-0.03%
People/Dwelling	3.171	3.119	3.098	3.058	3.015	2.997	-1.13%

Energy Data ("from Red Book"--same as detailed balances in this workbook), 10^{10} kcal

	1990	1991	1992	1993	1994	1995	Growth, '90 to '95
OIL (LPG)	6526	6558	6757	6914	6935	7198	1.98%
OIL (KEROSENE)	10925	10837	11844	12797	12033	13312	4.03%
GAS	7764	8163	8492	8987	8398	9035	3.08%
Coal and Coke (solids)	85	74	69	67	55	48	-10.80%
Other (wood and charcoal)	106	103	97	92	88	76	-6.44%
ELECTRIC	16353	17033	17614	18108	19546	20351	4.47%
DH	31	32	33	33	32	33	1.26%
Solar	1124	1080	1036	1011	992	970	-2.90%

END-USE Estimates from LBNL Spreadsheet

	1990	1991	1992	1993	1994	Growth, '90 to '94
HEAT: Uncorrected 10^{10} kCAL						
OIL (LPG)	891	744	781	788	956	1.78%
OIL (KEROSENE)	7,732	7,875	8,318	8,637	8,742	3.12%
GAS	2,013	1,918	1,843	1,805	2,389	4.37%
SOLIDS (incl. wood & charcoal, and DH)	45.00	37.62	33.97	30.15	17.47	-21.07%
SOLIDS (coal, coke, est.)	14.70	11.01	9.45	8.28	4.06	-27.52%
Wood & charcoal, est.	18.33	15.32	13.28	11.37	6.49	-22.86%
ELECTRIC	965	861	1,121	1,590	1,148	4.45%
DH	11.97	11.29	11.23	10.50	6.92	-12.81%

HEAT: "Climate Corrected" 10^{10} kCAL	1990	1991	1992	1993	1994	Growth, '90 to '94
OIL (LPG)	1,118	1,035	962	863	992	-2.94%
OIL (KEROSENE)	9,706	10,952	10,246	9,459	9,072	-1.67%
GAS	2,527	2,668	2,270	1,977	2,479	-0.48%
Coal and Coke	18.4	15.3	11.6	9.1	4.2	-30.88%
Wood & charcoal	23.0	21.3	16.4	12.5	6.7	-26.44%
ELECTRIC	1,211	1,198	1,381	1,741	1,192	-0.41%
DH	15.0	15.7	13.8	11.5	7.2	-16.86%

USE OF NON-ELECTRIC HEATING FUELS

	1990	1991	1992	1993	1994	1995	Growth, '90 to '94
TOTAL FUEL USE (10^{10} kcal, GHV)							
Non-climate Corrected	10,681.0	10,574.6	10,975.4	11,260.3	12,104.2		3.18%
Climate Corrected	13,407.8	14,707.7	13,519.6	12,332.2	12,561.8		-1.62%
CLIMATE DATA (from *Source 1*)							Ave, 90-95
Htg Degree Days, 14°C, Cal Yr	891.5	1101.4	969.8	1000.7	1045.9	1110.7	1020
Cooling Degree Days, 18°C	922	824	725	593	Ave, 90-93	766	
FUEL USE per dwelling (GJ/yr, NHV)							
Non-climate Corrected	12.2	11.8	12.1	12.2	13.0		1.61%
Climate Corrected	15.3	16.4	14.9	13.4	13.4		-3.11%
FRACTION OF NON-ELECTRIC FUELS USE (by Net Heating Value)							
OIL (LPG)	8.27%	6.98%	7.06%	6.95%	7.83%		-1.36%
OIL (KEROSENE)	71.75%	73.83%	75.19%	76.12%	71.55%		-0.07%
GAS	19.57%	18.84%	17.45%	16.67%	20.48%		1.14%
Coal and Coke	0.14%	0.10%	0.09%	0.07%	0.03%		-29.76%
Wood & charcoal	0.17%	0.14%	0.12%	0.10%	0.05%		-25.24%
DH	0.11%	0.10%	0.10%	0.09%	0.05%		-15.51%

	1990	1991	1992	1993	1994	1995	Growth, '90 to '94
Diffusion of Electric Heating Appliances							
Hot Air Heater	45.9%	47.7%	50.7%	52.0%	52.0%		3.17%
Foot warmer ("Kotatsu")	111.6%	110.9%	109.8%	108.7%	108.7%		-0.66%
Heat pump	59.7%	71.2%	81.4%	86.5%	89.1%		10.51%
El. blanket	96.0%	95.1%	93.8%	92.4%	92.4%		-0.95%
El Carpet	45.0%	50.0%	54.4%	58.2%	61.5%	63.1%	8.12%
Unit Usage Estimates for Electric Heating Appliances (kWh/unit-yr)							Growth, '90 to '94
Hot Air Heater	75.89	72.80	79.88	81.13	82.41	*83.71*	2.08%
Foot warmer ("Kotatsu")	156.68	158.00	159.79	158.78	158.78		0.33%
Heat pump	460.82	445.83	436.05	443.40	447.07		-0.75%
El. blanket	45.68	47.22	49.04	45.66	45.66		-0.01%
El Carpet	209.95	217.12	220.59	224.51	228.43	*232.42*	2.13%
Implied Total Electricity Use per Appliance Type (GWh)							Growth, '90 to '94
Hot Air Heater	1,358	1,381	1,627	1,720	1,776		6.95%
Foot warmer ("Kotatsu")	6,815	6,966	7,048	7,037	7,154		1.22%
Heat pump	10,722	12,620	14,258	15,638	16,502		11.38%
El. blanket	1,709	1,785	1,848	1,720	1,749		0.58%
El Carpet	3,682	4,316	4,820	5,328	5,823		12.14%
TOTAL	24,286	27,068	29,600	31,443	33,003		7.97%
Uncorrected Elect. Htg Est	11,221	10,012	13,034	18,483	13,354		4.45%
Clim. Corrected Elect. Htg Est	14,086	13,925	16,055	20,243	13,858		-0.41%

HOT WATER: Uncorrected 10^{10} Kcal (*From Source 1*)

	1990	1991	1992	1993	1994
OIL, LPG	4,223.00	4,196.42	4,398.65	4,393.85	4,414.63
OIL, KEROSENE	3,069.00	2,846.38	3,388.15	3,997.55	3,165.79
GAS	4,528.00	4,906.97	5,235.07	5,656.01	4,733.39
SOLIDS	143.00	137.93	131.62	129.23	126.63
coal and coke	55.17	49.01	45.66	44.97	39.06
wood and charcoal	68.80	68.22	64.19	61.76	62.49
DH	19.03	20.71	21.77	22.50	25.08
ELECTRIC	1,163.00	1,157.78	1,150.61	1,176.00	1,061.08
SOLAR	993.00	986.41	1,035.98	934.77	991.22
Water Heat by Type: Estimates of Fractions of Households (LBNL)					
LPG and Kerosene	70.6%	67.3%	68.5%	68.5%	60.1%
Gas	10.6%	14.4%	12.8%	14.1%	22.8%
Solar	11.9%	11.5%	12.0%	10.7%	11.1%
Electric	6.9%	6.8%	6.7%	6.7%	6.0%
IMPLIED Water Heating Energy Use per Dwelling (10,000 kcal/dwelling GHV)					
Implied electric per dwelling	429.90	429.90	429.90	429.90	429.90
Implied solar per dwelling	214.95	214.95	214.95	214.95	214.95
Impl. solar/dw to use all solar	243.31	235.35	214.96	232.48	215.12
Implied oil or gas per dwelling	373.47	367.98	398.55	416.98	358.28
If ratio of solid fuel efficiency to liquid/gas fuel effic. is			0.55	to	0.66
Then use of solid fuel/dwelling	448.16	441.58	478.26	500.37	429.93
And implied fractions of dwellings using solid fuels are:					
coal and coke	0.32%	0.28%	0.24%	0.22%	0.22%
wood and charcoal	0.39%	0.39%	0.33%	0.30%	0.35%
Assuming that use of district heat per household is the same as for electricity, implied					
Fraction of dwellings using DH	0.11%	0.12%	0.13%	0.13%	0.14%

I think that the division between LPG/Kero and Gas water heat here, as derived by LBNL, may have some problems, so I'm using the solar and electric WH fractions to derive an overall estimate for gas and oil fuels

	0.00%
	0.00%
	-3.03%
	-1.03%
Based on LBNL assumption in Source 1	
	-1.03%
	-8.73%
	-2.86%
	5.52%

Estimate of Fractions of Households Using Different Oil or Gas water Heating Fuels, Assuming that Average per Dwelling Consumption of Each Fuel is Roughly the Same						Growth, '90 to '94
OIL, LPG	29.01%	28.68%	27.48%	25.84%	29.73%	0.61%
OIL, KEROSENE	21.08%	19.46%	21.16%	23.51%	21.32%	0.28%
GAS	31.11%	33.54%	32.70%	33.27%	31.87%	0.61%

COOKING: Uncorrected (10^{10} Kcal)	1990	1991	1992	1993	1994	1995	Growth, '90 to '93	Growth, '90 to '94
OIL, LPG	1,980.00	1,880.87	1,855.41	1,792.00	1,567.61		-3.27%	-5.67%
OIL, KEROSENE	124.00	104.49	135.87	163.69	126.63		9.70%	0.53%
GAS	1,224.00	1,329.14	1,413.85	1,529.23	1,279.41		7.70%	1.11%
SOLIDS	36.00	33.44	33.97	30.15	30.57		-5.74%	-4.01%
coal and coke	16.02	13.98	14.12	12.71	11.76		-7.44%	-7.45%
wood and charcoal	19.98	19.46	19.85	17.45	18.81		-4.42%	-1.50%
ELECTRIC	564.00	593.52	619.89	641.85	654.99		4.40%	3.81%

	1990	1991	1992	1993	1994	1995	Growth, '90 to '93	Growth, '90 to '94
Saturation of Electric Cooking Appliances *(Note 2)*								
Rice Cooker	73.8%	74.8%	77.0%	79.8%	77.2%		2.64%	1.13%
Microwave Oven	69.7%	75.6%	79.2%	81.3%	84.3%	87.2%	5.27%	4.87%

	1990	1991	1992	1993	1994	1995	Growth, '90 to '93	Growth, '90 to '94
Unit Usage Estimates for Electric Cooking Appliances (kWh/unit-yr)								
Rice Cooker	190.22	191.52	193.49	196.53	196.53		1.09%	0.82%
Microwave Oven	101.02	98.43	101.91	100.79	100.79		-0.08%	-0.06%
Unit Usage Estimates for Electric Cooking Appliances (GJ/unit-yr)								
Rice Cooker	0.68	0.69	0.70	0.71	0.71		1.09%	0.82%
Microwave Oven	0.36	0.35	0.37	0.36	0.36		-0.08%	-0.06%

Implied GWh used for Electric Cooking based on Dwelling, Saturation, and Unit Usage Figures Above

Rice Cooker	5,471	5,695	5,985	6,395	6,289
Microwave Oven	2,744	2,958	3,242	3,341	3,522
TOTAL	8,215	8,654	9,227	9,736	9,811
Electric GWh based on Electric Cooking Total from "Red Book"					
	6,558	6,901	7,208	7,463	7,616
Ratio of El. Cooking Estimates	1.253	1.254	1.280	1.304	1.288

Cooking with Solid or Liquid Fuels--GJ GHV/yr Usage per Dwelling (average over all dwellings)						Growth, '90 to '93	Growth, '90 to '94
OIL, LPG	2.127	1.981	1.934	1.840	1.583	-4.71%	-7.11%
OIL, KEROSENE	0.133	0.110	0.142	0.168	0.128	8.06%	-1.01%
GAS	1.315	1.400	1.474	1.570	1.292	6.10%	-0.43%
coal and coke	0.017	0.015	0.015	0.013	0.012	-8.82%	-8.86%
wood and charcoal	0.021	0.020	0.021	0.018	0.019	-5.84%	-3.00%
TOTAL	3.614	3.526	3.585	3.609	3.035	-0.04%	-4.27%

Cooking with Solid or Liquid Fuels--Fract. of Usage per Dwelling (ave. over all dwellings)						Growth,	Growth,
OIL, LPG	58.86%	56.18%	53.95%	50.98%	52.18%	-4.68%	-2.97%
OIL, KEROSENE	3.69%	3.12%	3.95%	4.66%	4.22%	8.10%	3.41%
GAS	36.39%	39.70%	41.11%	43.50%	42.59%	6.14%	4.01%
coal and coke	0.48%	0.42%	0.41%	0.36%	0.39%	-8.78%	-4.79%
wood and charcoal	0.59%	0.58%	0.58%	0.50%	0.63%	-5.81%	1.33%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	0.00%

SUM OF ABOVE END-USES

FUEL	1990	1991	1992	1993	1994	1995	Growth, '90 to '94
OIL, LPG	7,094	6,821	7,035	6,974	6,939		-0.55%
OIL, KEROSENE	10,925	10,825	11,842	12,798	12,034		2.45%
GAS	7,765	8,155	8,492	8,990	8,401		1.99%
coal and coke	85.89	73.99	69.23	65.96	54.87		-10.60%
wood and charcoal	107.11	102.99	97.32	90.58	87.79		-4.85%
DH	31.00	32.00	33.00	33.00	32.00		0.80%
ELECTRIC	2,692	2,612	2,891	3,407	2,864		1.56%
SOLAR	993	986	1,036	935	991		-0.04%

FRACTION OF LISTED ENERGY CONSUMPTION BY FUEL ACCOUNTED FOR BY HEATING, WH, COOKING					
OIL, LPG	1.087	1.040	1.041	1.009	1.001
OIL, KEROSENE	1.000	0.999	1.000	1.000	1.000
GAS	1.000	0.999	1.000	1.000	1.000
coal and coke	1.010	1.000	1.003	0.985	0.998
wood and charcoal	1.010	1.000	1.003	0.985	0.998
DH	1.000	1.000	1.000	1.000	1.000
ELECTRIC	0.165	0.153	0.164	0.188	0.147
SOLAR	0.883	0.913	1.000	0.925	0.999

Estimates of Diffusion and Usage of Other Electric Appliances

Diffusion (number per dwelling) (from *Source 1*)							
	1990	1991	1992	1993	1994	1995	Growth, '90 to '94
Heat Pump Cooler	59.7%	71.2%	81.4%	86.5%	89.1%		10.51%
Room Cooler	63.3%	64.1%	63.8%	64.6%	64.3%		0.39%
Fan	154.4%	154.5%	154.4%	154.4%	154.4%		0.00%
Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.00%
Refrigerator w/ freezer	109.9%	110.0%	110.1%	110.1%	110.1%		0.05%
Clothes washer	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	0.00%
Dryer	16.3%	18.1%	19.1%	20.5%	20.3%	19.6%	5.64%
TVC,1st	98.5%	98.6%	98.6%	98.6%	98.6%		0.03%
TVC,2nd	74.1%	76.6%	79.5%	81.0%	81.0%		2.25%
Vacuum	98.1%	98.2%	98.2%	98.2%	98.2%		0.03%
other	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.00%

Usage (kWh per unit-yr) (from *Source 1*)							
APPLIANCE	1990	1991	1992	1993	1994	1995	Growth, '90 to '94
Heat Pump Cooler	149.87	135.50	108.33	66.53	140.63		-1.58%
Room Cooler	331.67	337.45	342.01	346.64	351.33		1.45%
Fan	14.06	14.34	14.67	14.90	15.49		2.45%
Lighting	611.76	620.10	634.36	648.18	662.30		2.00%
Refrigerator w/ freezer	714.75	708.01	703.06	700.19	697.33		-0.61%
Clothes washer	44.01	44.88	45.91	46.63	46.63		1.46%
Dryer	458.52	487.50	497.43	487.37	490.77		1.71%
TVC,1st	308.70	310.71	314.03	315.08	316.13		0.60%
TVC,2nd	83.05	86.74	85.49	89.97	93.32		2.96%
Vacuum	110.70	109.00	111.51	113.26	117.69		1.54%
other	459.72	431.85	415.36	398.88	368.42		-5.38%

Implied GWh Electricity Use by Other Electric Appliances							
APPLIANCE	1990	1991	1992	1993	1994	1995	Growth, '90 to '94
Heat Pump Cooler	3,487	3,835	3,542	2,346	5,191		10.46%
Room Cooler	8,183	8,599	8,765	9,131	9,364		3.43%
Fan	846	881	910	938	991		4.04%
Lighting	23,843	24,653	25,482	26,428	27,452		3.59%
Refrigerator w/ freezer	30,615	30,963	31,094	31,432	31,823		0.97%
Clothes washer	1,693	1,761	1,820	1,877	1,908		3.03%
Dryer	2,913	3,508	3,816	4,074	4,129		9.12%
TVC,1st	11,851	12,180	12,438	12,667	12,920		2.18%
TVC,2nd	2,398	2,641	2,730	2,971	3,133		6.91%
Vacuum	4,232	4,256	4,399	4,535	4,790		3.14%
other	17,917	17,169	16,684	16,264	15,271		-3.92%
TOTAL OF ABOVE	107,978	110,445	111,680	112,663	116,972		2.02%
ELECT. WATER HEATING GWh	13,523	13,463	13,379	13,674	12,338		-2.27%
ELECT. SPACE HEATING GWh	24,286	27,068	29,600	31,443	33,003		7.97%
ELECT COOKING GWh	8,215	8,654	9,227	9,736	9,811		4.54%
OVERALL EST ELECT USE	154,002	159,629	163,886	167,516	172,124		2.82%
ELECT USE FROM BALANCE	190,151	198,058	204,814	210,558	227,279		4.56%
Ratio of Estimate to Total	81.0%	80.6%	80.0%	79.6%	75.7%		-1.66%
Remainder of Electricity Use	36,149	38,429	40,928	43,042	55,156		11.14%
Implied Add'l kWh/dwelling	928	967	1,019	1,056	1,331		9.44%
Implied total "Other" kWh/dw.	1,387	1,398	1,434	1,455	1,699		5.20%

DERIVATION OF ACTIVITY AND INTENSITY DATA FOR ENTRY INTO LEAP

			Growth Rate (%/yr) From			Implied Values for		
HOUSING DRIVERS	1990	1995	95 - 2000	2000-2010	2010-2020	2000	2010	2020
Population (million)	123.60	125.57	0.288%	0.234%	-0.158%	127.39	130.4	128.35
Persons per occupied dwelling	3.17	2.997	-1.0%	-0.50%	-0.20%	2.850	2.710	2.657
Occupied Dwellings (million)	38.97	41.90	1.301%	0.737%	0.042%	44.702	48.110	48.311

SPACE HEATING END-USE

Fraction of Non-Electric Heating Fuel by Fuel Type								
OIL (LPG)	8.268%	7.200%	-0.50%	-0.50%	0%	7.022%	6.678%	6.678%
OIL (KEROSENE)	71.750%	72.891%	-0.224%	-0.254%	-0.168%	72.080%	70.267%	69.094%
GAS	19.569%	19.750%	1%	1%	0.50%	20.757%	22.929%	24.102%
Coal	0.136%	0.026%	-10%			0.015%	0.000%	0.000%
Wood & charcoal	0.170%	0.033%	-5%	0%	0%	0.026%	0.026%	0.026%
District Heat	0.106%	0.100%	0%	0%	0%	0.100%	0.100%	0.100%
Non-El. Htg Int., GJ NHV/dw.	12.155	12.958	0%	0%	0%	12.96	12.96	12.96
Diffusion of Electric Heating Appliances (units per dwelling)								
Hot Air Heater	45.90%	52.00%	0.00%	-0.50%	-0.50%	52.00%	49.46%	47.04%
Foot warmer ("Kotatsu")	111.60%	108.70%	0.00%	0.00%	0.00%	108.70%	108.70%	108.70%
Heat pump	59.70%	91.68%	1.00%	0.50%	0.20%	96.35%	101.28%	103.32%
El. blanket	96.00%	92.40%	0.00%	0.00%	0.00%	92.40%	92.40%	92.40%
El Carpet	45.00%	63.10%	1.00%	0.50%	0.30%	66.32%	69.71%	71.83%
Unit Usage Estimates for Electric Heating Appliances (GJ/unit-yr)								
Hot Air Heater	0.273	0.301	1%	0.50%	0.30%	0.317	0.333	0.343
Foot warmer ("Kotatsu")	0.564	0.572	0%	0%	0%	0.572	0.572	0.572
Heat pump	1.659	1.609	-0.50%	-0.35%	-0.20%	1.570	1.516	1.486
El. blanket	0.164	0.164	0%	0%	0%	0.164	0.164	0.164
El Carpet	0.756	0.837	1%	0.50%	0.30%	0.879	0.924	0.952

WATER HEATING END-USE								
Fraction of Water Heating Fuel by Fuel Type								
OIL (LPG)	29.01%	29.90%	-0.50%	-0.50%	0.00%	29.16%	27.73%	27.73%
OIL (KEROSENE)	21.08%	21.85%	-0.80%	-1.01%	-1.03%	20.99%	18.96%	17.09%
GAS	31.11%	31.42%	1.00%	1.00%	0.50%	33.02%	36.48%	38.34%
Coal	0.32%	0.18%	-5.00%	-5.00%	0.00%	0.14%	0.08%	0.08%
Wood & charcoal	0.39%	0.29%	0.00%	0.00%	0.00%	0.29%	0.29%	0.29%
Electric	6.94%	5.95%	0.00%	0.00%	0.00%	5.95%	5.95%	5.95%
Solar	11.85%	10.88%	0.00%	0.00%	0.00%	10.88%	10.88%	10.88%
District Heat	0.11%	0.11%	0.00%	0.00%	0.00%	0.11%	0.11%	0.11%
Kero/LPG WH Int., GJ NHV/dw.	14.89	14.17	-0.50%	-0.25%	-0.10%	13.820	13.478	13.344
City Gas WH Int., GJ NHV/dw.	14.21	13.53	-0.50%	-0.25%	-0.10%	13.192	12.866	12.738
Solid Fuels WH Int., GJ NHV/dw.	17.87	17.14	0.00%	0.00%	0.00%	17.143	17.143	17.143
Solar WH Int., GJ NHV/dw.	10.19	8.91	0.00%	0.00%	0.00%	8.913	8.913	8.913
Electric, DH WH Int., GJ NHV/dw.	18.00	17.85	-0.50%	-0.25%	-0.10%	17.412	16.982	16.813
COOKING END-USE								
Fraction of Cooking Fuel by Fuel Type								
OIL, LPG	58.86%	52.34%	-0.81%	-0.95%	-0.57%	50.24%	45.67%	43.14%
OIL, KEROSENE	3.69%	4.22%	0.00%	0.00%	0.00%	4.22%	4.22%	4.22%
GAS	36.39%	42.59%	1.00%	1.00%	0.50%	44.76%	49.44%	51.97%
coal	0.48%	0.34%	-5.00%	-5.00%	0.00%	0.26%	0.16%	0.16%
wood and charcoal	0.59%	0.52%	0.00%	0.00%	0.00%	0.52%	0.52%	0.52%
Electric Rice Cooker	73.8%	78.07%	0.70%	0.20%	0.00%	80.85%	82.48%	82.48%
Electric Microwave Oven	69.7%	87.20%	1.08%	0.32%	0.16%	92%	95%	96.5%
Kero/LPG cook Int., GJ NHV/dw.	3.442	3.252	0.00%	0.00%	0.00%	3.252	3.252	3.252
City Gas cook Int., GJ NHV/dw.	3.285	3.285	0.00%	0.00%	0.00%	3.285	3.285	3.285
Solid Fuels cook Int., GJ NHV/dw.	3.442	3.442	0.00%	0.00%	0.00%	3.442	3.442	3.442
El. Rice Cooker Int., GJ NHV/dw.	0.685	0.713	0.00%	0.00%	0.00%	0.713	0.713	0.713
Microwave Int., GJ NHV/dw.	0.364	0.363	0.00%	0.00%	0.00%	0.363	0.363	0.363

OTHER ELECTRIC APPLIANCES								
			Growth Rate (%/yr) From			Implied Values for		
Number of Units per Dwelling	1990	1995	95 - 2000	2000-2010	2010-2020	2000	2010	2020
Heat Pump Cooler	59.7%	91.7%	2%	1%	0.50%	101.22%	111.81%	117.52%
Room Cooler	63.3%	64.3%	0.00%	0.00%	0.00%	64.30%	64.30%	64.30%
Fan	154.4%	154.4%	0.00%	0.00%	0.00%	154.40%	154.40%	154.40%
Lighting	100.0%	100.0%	0.00%	0.00%	0.00%	100.00%	100.00%	100.00%
Refrigerator w/ freezer	109.9%	109.9%	0.00%	0.00%	0.00%	109.90%	109.90%	109.90%
Clothes washer	98.7%	98.7%	0.00%	0.00%	0.00%	98.70%	98.70%	98.70%
Dryer	16.3%	19.6%	0.50%	0.50%	0.00%	20.09%	21.12%	21.12%
TVC,1st	98.5%	98.6%	0.00%	0.00%	0.00%	98.60%	98.60%	98.60%
TVC,2nd	74.1%	82.5%	1%	0.50%	0.00%	86.74%	91.17%	91.17%
Vacuum	98.1%	98.2%	0.00%	0.00%	0.00%	98.20%	98.20%	98.20%
other	100.0%	100.0%	0.00%	0.00%	0.00%	100.00%	100.00%	100.00%

Unit Usage Estimates for Other Electric Appliances (GJ/unit-yr)								
			Growth Rate (%/yr) From			Implied Values for		
	1990	1995	95 - 2000	2000-2010	2010-2020	2000	2010	2020
Heat Pump Cooler	0.540	0.439	0.00%	0.00%	0.00%	0.439	0.439	0.439
Room Cooler	1.194	1.282	0.00%	0.00%	0.00%	1.282	1.282	1.282
Fan	0.051	0.058	1%	0.50%	0.00%	0.061	0.064	0.064
Lighting	2.202	2.436	1%	0.50%	0.00%	2.560	2.691	2.691
Refrigerator w/ freezer	2.573	2.500	-0.50%	-0.30%	0.00%	2.438	2.366	2.366
Clothes washer	0.158	0.168	1%	0.50%	0.00%	0.176	0.185	0.185
Dryer	1.651	1.779	1%	0.50%	0.00%	1.870	1.965	1.965
TVC,1st	1.111	1.142	0.50%	0.30%	0.00%	1.171	1.206	1.206
TVC,2nd	0.299	0.348	1.50%	0.50%	0.00%	0.375	0.395	0.395
Vacuum	0.399	0.440	1%	0.50%	0.00%	0.463	0.486	0.486
other	4.994	6.602	3%	1.50%	0.50%	7.654	8.883	9.337

CALCULATIONS/FACTORS TO "TRUE UP" 1995 VALUES BASED ON TOTALS FROM DETAILED ENERGY BALANCE FOR 1995 (BY FUEL)			
Implied LPG Use (PJ NHV)	287.954	**Implied coal Use (PJ NHV)**	1.914
1995 LPG Use from Balance	287.015	**1995 Coal Use from Balance**	1.914
Implied Kerosene Use (PJ NHV)	531.286	**Implied Wood/Biomass Use (PJ NHV)**	3.030
1995 Kerosene Use from Balance	530.806	**1995 Wood/Biomass Use from Balance**	3.030
Implied City Gas Use (PJ NHV)	343.959	**Implied Electricity Use (PJ NHV)**	852.00
1995 City Gas Use from Balance	343.889	**1995 Electricity Use from Balance**	852.06
Implied District Heat Use (PJ NHV)	1.393	**Implied Solar Use (PJ NHV)**	40.63
1995 District Heat Use from Balance	1.382	**1995 District Heat Use from Balance**	40.612
True-up factor, coal use:	0.861		
True-up factor, wood/biomass use:	0.8325		
True-up factor, solar use:	0.875		
True-up factor, other elect. appliance use:	0.924		

Sources/Notes

1 From spreadsheet JAPRES.XLS, as obtained from Lee Schipper and Mike Ting of the International Energy Studies Group, Lawrence Berkeley National Laboratory (1/98). Original Data probably from EDMC compendium.

2 Figures for microwave and rice cooker diffusion are lower than for saturation in the spreadsheet in Source 1. We use the higher saturation figures here as representative of cooking appliance diffusion.

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Estimates of Future Activities

Alternative Estimates of Future Annual Real GDP Growth in Japan

Source	Interval	Rate	Interval	Rate
Fujime et al (1996) *(1)*	1993 to 2000	3.50%	2000 to 2010	2.50%
WWF 1997 *(2)*	1994 to 2000	2.90%	2000 to 2010	2.30%
Advisory Committee for Energy (1994) *(3)*				
--"Base Case"	1994 to 2000	3.50%	2000 to 2010	2.50%
--"Economic Growth Sensitivity Case"	1994 to 2000	2.50%	2000 to 2010	2.00%
--"Crude Oil Price Sensitivity Case"	1994 to 2000	3.50%	2000 to 2010	2.50%
IEEJ "Standard Case" (1995) *(3)*	1994 to 2005	2.50%	2005 to 2015	1.90%
IEEJ "High-growth Case" (1995) *(3)*	1994 to 2005	3.00%	2005 to 2015	2.50%
IEEJ "Low-growth Case" (1995) *(3)*	1994 to 2005	1.80%	2005 to 2015	0.90%

Estimates of Future GDP by Sector for Use in LEAP

Estimates of Future GDP by Sector

(Trillion 1985 Yen)

	Historical/Estimated Values			Annual Growth Rates			Estimated Values		
	1990	1992	1993	1993-2000	2000-2010	2010-2020	2000	2010	2020
Total GDP	399.09	420.83	425.74	2.5%	2.2%	1.9%	506.08	629.08	759.36
Manufacturing GDP	116.04	117.55	114.15	2.4%	2.4%	1.9%	134.77	170.84	206.22
Transport/Communic GDP	25.48	26.35	26.32	2.8%	2.2%	2.0%	31.93	39.69	48.39
Sum of Commercial Sect	218.46	230.33	235.09	2.8%	2.2%	2.0%	285.22	354.56	432.20
Mining and Quarrying	1.2023	1.208	1.2132	-1.0%	-1.0%	0.0%	1.1308	1.0227	1.0227
Construction	39.60	42.60	43.74	1.1%	1.6%	1.2%	47.22	55.34	62.36
Sum of Listed Subsectors	400.78	418.05	420.51	2.51%	2.19%	1.90%	500.27	621.46	750.19

	Historical/Estimated Values			Estimated Values		
Fraction of GDP As:	1990	1992	1993	2000	2010	2020
Total GDP	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Manufacturing GDP	29.08%	27.93%	26.81%	26.63%	27.16%	27.16%
Transport/Communic GDP	6.38%	6.26%	6.18%	6.31%	6.31%	6.37%
Sum of Commercial Sect	54.74%	54.73%	55.22%	56.36%	56.36%	56.92%
Mining and Quarrying	0.30%	0.29%	0.28%	0.22%	0.16%	0.13%
Construction	9.92%	10.12%	10.27%	9.33%	8.80%	8.21%
Sum of Listed Subsectors	100.42%	99.34%	98.77%	98.85%	98.79%	98.79%

Approach used: Starting with GDP growth estimates to 2015 from IEEJ "Standard Case" *(Source 3)* , subsectoral GDP growth was estimated based on recent trends in the Japanese economy, with the goal of creating a total of subsectors roughly consistent with the estimate for overall GDP.

Other Estimates of Future Industrial Activity by Subsector

		Historical/Est. Values		Annual Growth Rates			Estimated Values		
Subsector	Units	1990	1993	1993-2000	2000-2010	2010-2020	2000	2010	2020
Food Products	Million te	51.31	53.42	1.30%	0.75%	0.00%	58.478	63.015	63.015
Textile and Fiber	Mil.sq.m.	2100	1492	-5.00%	-2.50%	0.00%	1,041.92	808.873	808.873
Paper and Pulp	Million te	28.086	29.0298	1.00%	0.50%	0.00%	31.124	32.716	32.716
Chemicals	Mte 7 Chem.	19.816	20.47075	1.00%	0.50%	0.00%	21.947	23.070	23.070
Ceramics*	Mte Cement	84.445	82.106	1.00%	0.75%	0.50%	86.294	92.989	97.745
Steel	Mte Ingots	109.548	99.623	-1.50%	-1.00%	-0.50%	89.622	81.052	77.090

*For Ceramics, value in 1993 column is actually estimate for 1994, as 1995 was a high year and 1993 a low year for production.

Estimates of Future Transport Activity by Type

(NOTE: As of 3/3/98, these values have been superseded by data in the "Transport" worksheet)

		Historical/Est. Values		Annual Growth Rates			Estimated Values		
Activity	Units	1990	1995	1995-2000	2000-2010	2010-2020	2000	2010	2020
Air freight	Million te-km	635.00	762.00	2.80%	2.20%	2.00%	874.82	1,087.50	1,325.66
Air passenger transport	Bil. pass-km	51.62	65.01	5.00%	3.50%	2.00%	82.98	117.046	142.679
Rail Freight	Bil. te-km	27.20	25.10	0.00%	0.00%	0.00%	25.101	25.101	25.101
Rail passenger transport	Bil. pass-km	387.48	400.06	1.00%	0.50%	0.50%	420.46	441.97	464.57
Road freight*	Bil. te-km	274.24	*285.00*	2.00%	1.50%	1.00%	314.66	365.18	403.39
Road passenger transport*	Bil. pass-km	853.06	*910.00*	1.50%	1.00%	0.50%	980.33	1,082.89	1,138.27
Coastal shipping freight	Bil. te-km	233.95	229.41	0.00%	0.00%	0.00%	229.411	229.411	229.411
Coastal passenger trans.	Bil. pass-km	6.44	*6.28*	-0.50%	-0.50%	-0.50%	6.123	5.824	5.539
Marine Transport (bunkers)^	Bte shipped	0.7959	*0.847*	2.50%	2.20%	1.90%	0.958	1.191	1.438

*1995 values for road freight and passenger traffic are rough estimates based on 1990 and 1994 values.

^1995 value for international marine goods loaded plus unloaded is an estimate based on trends from 1989 to 1993.

Sources/Notes

1 from K. Fujime, 1996 "Energy Situations in the 21st Century", Energy In Japan No. 138, March, 1996. Institute of Energy Economics, Japan. Page 7

2 WWF Climate Change Campaign (WFF, 1997), Key Technology Policies to Reduce CO2 Emissions in Japan: An Indicative Survey for 2005 and 2010. Prepared by H. Tsuchiya, Y. Masuoka, J.M. van Wijk, and G.J.M Phylipsen for WWF, Tokyo, Japan.

3 Economic Data and Modeling Center (EDMC, 1997), EDMC '97 Handbook of Energy and Economic Statistics in Japan. Edited by EDMC and The Institute of Energy Economics, Japan, and Published by The Energy Conservation Center, Tokyo, Japan. Data from Chapter V: "Outlooks".

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Derivation of LEAP Demand Data
Other Sectors

Agriculture, Forestry, and Fishing

Fuel Use Data from Detailed Balance **UNIT: 10^{10} kcal GHV fuel used**

			Residual Oils			
Year	Kerosene	Diesel Oil	"A"	"B"	"C"	Electricity
1990	2840	1922	2133	20	136	273
1993	3096	2184	2431	0	43	274
1995	3158	2288	2708	0	56	306

Index of agricultural production *(Source 2)*

1990	1993	1994	1995	1996	1997
100.8	94.7	99.9	97.9	96.1	95.7

Activity Data (billion yen)	Current Yen		1985 Yen		
(Source 1) 1995 values rough estimates	1990	1993	1990	1993	1995
Gross Agricultural Output	11,492.7	10,447.2	10,803.9	9,356.7	*9,673*
Total Forestry Income	702.5	619.0	660.4	554.4	*573*
Total Value of Fish Production	2,722.5	2,488.8	2,559.4	2,229.0	*2,304*
TOTAL Agriculture/Forestry/Fisheries Output	14,917.7	13,555.0	14,023.6	12,140.1	*12,550*

Energy Intensity in GJ (NHV) per million 1985 yen Agriculture/Forestry/Fisheries Output

			Residual Oils			
Year	Kerosene	Diesel Oil	"A"	"B"	"C"	Electricity
1990	8.075	5.465	6.065	5.687E-02	0.387	0.776
1993	10.169	7.173	7.985	0.00E+00	0.141	0.900
Assuming that growth in fuels except Residual "B" and "C" is				0.50%	per year from 1995 to 2000:	
1995	10.033	7.269	8.604	0.000	0.178	0.972
2000	10.287	7.453	8.821	0.000	0.000	0.997

Non-Fuel Products

			Driving Activity			**Energy Intensity in**		
	10^{10} kcal GHV fuel used			Value		**GJ (NHV)/mil. 1985 yen**		
Product	1990	1995	Units (Billion '85 Yen)	1990	1995	1990	1995	
Lubricants	2340	2241	Overall GDP	399,069	431,431	0.234	0.207	
Other Oil Products	6432	5897	Construction GDP	39,602	41,505	6.476	5.665	

Sources/Notes

1 Japan Ministry of Agriculture, Forestry, and Fisheries (MAFF, 1996), Abstract of Statistics of Agriculture Forestry and Fisheries. Available on MAFF WWW site, http://www.maff.go.jp/abst.

2 UN Food and Agriculture Organization (UNFAO, 1998), FAOSTAT Database Available on UN FAO WWW site, http://www.fao.org.

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Preparation of LEAP "Alternative" Scenario

HOUSEHOLD SECTOR

The WWF-Japan Report *(Source 1)* includes the following savings estimates (Table 6 of English version)
Billion kcal of savings

Technology	2000	2005	2010
Solar Heat Systems [Assumed for water heat]	342	608	1081
Photovoltaics	0	300	2396
High efficiency gas water heaters	145	381	999
TVs (liquid crystal displays)	0	100	323
High efficiency heat pumps [Assumed for space heat]	761	1700	3798
Compact fluorescent light bulbs	3088	3178	3270

Assumptions for Alternative Scenario to be entered into LEAP: HOUSEHOLDS

	1995	2000	2010	2020	
INSULATION AND RELATED MEASURES (NOT ENTERED DIRECTLY)					
Fraction of Dwellings with improved bldg. envelope		3%	25%	40%	
Fract. heating/cooling energy saved in impr. dwellings		30%	30%	30%	
Overall Impact on Heating and Cooling Energy Use		0.90%	7.50%	12.00%	
ELECTRIC COOLING					
Number of Units per Dwelling					
Std. Heat Pump Cooler	0.917	0.962	0.112	0.000	e
Std. Room Cooler	0.643	0.611	0.064	0.000	e
High-Eff. Heat Pump Cooler	0.000	0.051	1.006	1.175	e
High-Eff. Room Cooler	0.000	0.032	0.579	0.643	e
Unit Usage Estimates (GJ/unit-yr)					
Savings through Reduction of Standby-mode power		0.0230	0.1842	0.2072	*Note 10*
Std. Heat Pump Cooler	0.439	0.430	0.365	0.339	e
Std. Room Cooler	1.282	1.247	1.002	0.921	e
High-Eff. Heat Pump Cooler		0.348	0.309	0.280	e
High-Eff. Room Cooler		0.993	0.718	0.609	e
SPACE HEATING					
Fraction of Non-Electric Heating Fuel by Fuel Type					
OIL (KEROSENE)	72.89%	70.84%	61.20%	48.20%	e
GAS	19.75%	22.00%	32.00%	45.00%	e
Number of Units per Dwelling					
Std. Heat Pump Heater	0.917	0.915	0.101	-	e
High-Eff. Heat Pump Heater	-	0.048	0.912	1.033	e
Gas Heating Intensity, GJ NHV/dw.	12.958	12.713	11.287	10.213	e
Unit Usage Estimates (GJ/unit-yr)					
Std. Heat Pump Heater	1.609	1.538	1.259	1.147	e
High-Eff. Heat Pump Heater		1.226	0.979	0.886	e
COOKING					
Fraction of Non-Electric Cooking Fuel by Fuel Type					
OIL, LPG	52.34%	49.22%	41.32%	32.32%	e
OIL, KEROSENE	4.22%	4%	3%	2%	e
GAS	42.59%	46%	55%	65%	e
Savings, Red'n of Standby-mode Losses, Microwaves		0.0173	0.1388	0.1561	*Note 12*
Implied Net Energy Intensity, Microwave Ovens	0.3628	0.3455	0.2241	0.2067	e
WATER HEATING					
Fraction of Water Heating Fuel by Fuel Type					
OIL (LPG)--Standard Type	29.90%	28%	16%	8.43%	e
OIL (LPG)--High-efficiency (condensing) type		2%	8%	5.62%	e
OIL (KEROSENE)	21.85%	20%	13%	7%	e
GAS--Standard	31.42%	30%	31%	33%	e
GAS--High-efficiency (condensing) type		2.50%	12%	22%	e
Electric--Standard Resistance Type	5.95%	5.85%	5.20%	4.47%	e
Electric--Heat-Pump Type		0.10%	0.75%	1.49%	e
Solar Thermal	10.88%	11.50%	14%	18%	e
Intensity: GJ NHV/dwelling					
Condensing LPG Water Heater		10.365	10.109	10.008	e
Condensing City Gas Water Heater		9.894	9.649	9.553	e
Electric--Heat-Pump Type		5.804	5.661	5.604	e

LIGHTING					
Fraction of lighting energy used in Incandescent bulbs	37%				*Note 9*
Fraction of Incandescent bulbs replaced by CFL		10%	80%	90%	
Fraction of total lighting energy saved via CFLs		2.59%	20.72%	23.31%	
Fract. total lighting energy saved, other improvements		1.5%	15%	30%	
Implied GJ/dwelling-yr lighting electricity use	2.436	2.457	1.814	1.445	e
REFRIGERATION					
Average energy intensity of refrigerator-freezers	2.500	2.217	1.075	0.946	e
TELEVISION					
Number of Units per Dwelling					
TVC,1st--CRT	0.986	0.981	0.956	0.690	e
TVC,2nd--CRT	0.825	0.867	0.884	0.638	e
TVC,1st--LCD		0.0049	0.0296	0.2958	e
TVC,2nd--LCD			0.0274	0.2735	e
Unit Usage Estimates (GJ/unit-yr)					
Savings through Reduction of Standby-mode power		0.0060	0.0479	0.0539	*Note 11*
TVC,1st--CRT	1.142	1.165	1.158	1.152	e
TVC,2nd--CRT	0.348	0.369	0.347	0.341	e
TVC,1st--LCD	0.228	0.233	0.232	0.230	e
TVC,2nd--LCD	0.070	0.074	0.069	0.068	e
OTHER INDIVIDUALLY LISTED APPLIANCES					
GJ/unit-yr, Other Electric Appliances (with	0.50%	per year efficiency improvement)			
Fans	0.0579	0.0603	0.0603	0.0573	e
Clothes Washer	0.1679	0.1747	0.1746	0.1661	e
Clothes Dryer	1.7791	1.8512	1.8507	1.7602	e
Vacuum	0.4403	0.4581	0.4580	0.4356	e
OTHER USES OF ELECTRICITY					
Savings through Reduction of Standby-mode power		2%	21%	45%	*Note 13*
Implied GJ/dwelling-yr "other" electricity use	6.602	7.501	7.017	5.135	e

SERVICES AND INDUSTRIAL SECTOR COGENERATION

Most Assumptions for services and industrial efficiency improvements have been entered directly into LEAP, and are described in the text of Chapter 6 of the PARES Report. What follows are specific assumptions for the use of cogenerated heat in these Sectors

Estimate of Total Heat from New Cogen Available

			2000	2010	2020	
Total New Cogen Capacity (MW electric)			1,300	13,000	22,000	
Fraction of Total New Cogen Capacity in Industrial			55%	55%	55%	
Fraction of Total New Cogen Capacity in Services			45%	45%	45%	
Average Capacity Factor of New Industrial Cogen			52%	52%	52%	
Average Capacity Factor of New Services Cogen			42%	42%	42%	
Fraction of Total New Capacity as Fuel Cells			1%	20%	40%	
Fraction of fuel input produced as heat, non-fuel cells			52%	52%	53%	
Fraction of fuel input produced as heat, -fuel cells			40%	40%	40%	
Fraction of fuel input produced as electricity, non-fuel cells			28%	30%	32%	
Fraction of fuel input produced as electricity, fuel cells			45%	46%	47%	
Implied Cogen heat available, Industrial Sector (GJ)			2.17E+07	1.83E+08	2.65E+08	
Implied Cogen heat available, Services Sector (GJ)			1.43E+07	1.21E+08	1.75E+08	
Implied Total Cogen heat available (GJ)			3.60E+07	3.04E+08	4.40E+08	
Implied Cogen power generation, Industrial Sector (GJ)			1.17E+07	1.17E+08	1.98E+08	
Implied Cogen power generation, Services Sector (GJ)			7.75E+06	7.75E+07	1.31E+08	
Implied Total Cogen power generation (GJ)			1.95E+07	1.95E+08	3.30E+08	
Implied Cogen fuel consumption, Industrial Sector (GJ)			4.16E+07	3.53E+08	5.22E+08	
Implied Cogen fuel consumption, Services Sector (GJ)			2.75E+07	2.33E+08	3.45E+08	
Implied Total Cogen fuel consumption (GJ)			6.91E+07	5.87E+08	8.67E+08	
To generate same elect. at	40%	efficiency implies (GJ)	4.87E+07	4.87E+08	8.24E+08	fuel use
To generate same heat at	85%	efficiency implies (GJ)	4.23E+07	3.58E+08	5.17E+08	fuel use
For total non-cogeneration fuel consumption of (GJ)			9.10E+07	8.44E+08	1.34E+09	
So implied savings of fuel via cogeneration would be (GJ):			2.19E+07	2.58E+08	4.74E+08	

Calculation of implied energy intensities for use of cogenerated heat by subsector

Assumes that the average efficiency of heat production via boilers and furnaces is 80%

Sector/Subsector	Total of BAU non-electric intensity 2000	2010	2020	Implied intensity of cogen heat 2000	2010	2020	Units
Services/All	684.64	738.26	787.18	547.7131	590.6078	629.7431	GJ/th sq.m.

		1995*			1995*		
Industrial/Food Processing		22.326			17.861		GJ/tonne
Industrial/Textiles		92.818			74.254		GJ/th sq.m. cloth
Industrial/Paper&Pulp		10.737			8.589		GJ/tonne
Industrial/Chemicals		77.487			61.990		GJ/tonne
Industrial/Other Manufact.		4315.509			3452.407		GJ/billion Yen GDP

*Used for 2000 through 2020

TRANSPORT SECTOR

The WWF-Japan report (Source 1) includes specific incorporation of hybrid cars and trucks as follows:

Vehicle Type	% of stock by year 2000	2005	2010	Ave. HB Efficiency* 2000	2005	2010
Gasoline Hybrid Cars	0.86	32.29	74.29	2.08	2.33	2.5
Diesel Hybrid Trucks	0.36	10.64	38.57	1.2	1.43	1.57

* For passenger cars, this seems to be defined relative to the efficiency of a "conventional 1500 cc car", which is assumed to be 14 km per liter of gasoline, or about 2.391 GJ/thousand vehicle-km

The WWF scenario, based on Environmental Agency results, includes modal shifts as follows:

Measure	Mtonne or Mpassenger-km/year 2000	2005	2010
Commercial freight vehicles [trucks] to railway	4500	8050	11600
Commercial freight vehicles [trucks] to ships	1663	3482	5456
Small passenger cars to commercial buses	1643	2738	5475
Small passenger cars to Railways	4575	9125	18250
Assumed Passenger Transport (billion pass-km)	1500		1755
Assumed Freight Transport (billion tonne-km)	583		654
Telecommuting and use of satellite offices			
--People telecommuting (thousand)	(either 5660 or 11320, not entirely clear which)		
--Rail Pass-km saved (million)			23684
--Auto Pass-km saved (million)			7258
Reduction of Transport through use of TV Conferences			
--Number of communications terminals by 2010			500,000
Traffic reduction, person-km/yr for each terminal			
--Small private passenger cars			11,300
--Rail Travel			157,000
--Airplane Travel			83,000
Implied billion total pass-km reduction			
--Small private passenger cars			5.65
--Rail Travel			78.50
--Airplane Travel			41.50
Traffic reduction, billion person-km/yr as implied by figures on page 18 of WWF-Japan report			
--Private passenger car traffic reduction from video conferencing			26.826
--"Private Railways" Travel reduction from video conferencing			1.311
--Airplane Travel reduction from video conferencing			13.488
--National Railways reduction from Satellite Office use			32.526
For the purposes of this exercise, assume the following reductions in 2010 (billion pass-km/yr):			
--Small private passenger cars			26.826
--Rail Travel			10.153
--Airplane Travel			13.488

Note: There seems to be an internal contradiction in the WWF-Japan report (or at least something I'm not understanding) between these figures from page 49--which seem too high--and figures on page 18 (Table 12).

Note 8

Introduction of "Hypercars™"

RMI literature *(2)* lists "hypercars" as having efficiencies of 2.6 liters/100 km in the near term, and 1.2 liters/100 km in the longer term

Assumptions for Introduction of Private Vehicles in "Alternative" LEAP Path

Fraction of Vehicle Stocks	2000	2005	2010	2015	2020	
Gasoline Hybrid Cars	0.86%	32.29%	74.29%	70.00%	60.00%	Fraction of Gasoline Cars
Diesel Hybrid Cars	0.30%	16.15%	37.15%	50.00%	60.00%	Fraction of Diesel Cars
Gasoline Hybrid Trucks	0.30%	16.15%	37.15%	50.00%	60.00%	Fraction of Gasoline Trucks
"Mini" CNG Hybrid Trucks		0.10%	0.30%	1.00%	2.00%	Fraction of (formerly) Gasoline Trucks
Diesel Hybrid Trucks	0.36%	10.64%	38.57%	55.00%	75.00%	Fraction of Diesel Trucks
CNG Hybrid Trucks	0.20%	1.50%	4.50%	7.00%	10.00%	Fraction of (formerly) Diesel Trucks
Hypercars--gasoline		0.50%	5.00%	12.00%	20.00%	Fraction of Gasoline Cars
Hypercars--CNG			1.00%	5.00%	10.00%	Fraction of (formerly) Gasoline Cars
Hypercars--Hydrogen				1.00%	3.00%	Fraction of (formerly) Gasoline Cars
Private Vehicle Energy Intensities	2000	2005	2010	2015	2020	**(GJ per thousand veh-km)**
Gasoline Hybrid Cars	1.149	1.026	0.956	0.891	0.831	
Diesel Hybrid Cars	2.434	2.173	2.025	1.887	1.759	*Note 3*
Gasoline Hybrid Trucks	1.238	1.105	1.030	0.960	0.894	*Note 3*
"Mini" CNG Hybrid Trucks	1.238	1.105	1.030	0.960	0.894	
Diesel Hybrid Trucks	7.662	6.429	5.856	5.334	4.858	*Note 4*
CNG Hybrid Trucks	7.662	6.429	5.856	5.334	4.858	
Hypercars™--gasoline		0.870	0.748	0.625	0.502	*Note 5*
Hypercars--CNG		0.870	0.748	0.625	0.502	*Note 5*
Hypercars--Hydrogen				0.502	0.402	*Note 6*

Based on the WWF scenario, there will be a reduction in auto passenger-km through telecommuting and video conferencing equal to about 1.00% of the total passenger-km assumed by WWF for 2010.
Given our assumption that private cars will carry 65.46% of total pass-km by 2010, this implies an average decrease in passenger car intensity of 1.527% by 2010. If we assume that this transport savings increases by a factor of 3.00 by 2020, that implies a reduction in passenger car energy intensity reduction of 4.581% by 2020, which would apply to all private passenger vehicles. In addition, the WWF scenario includes modal shifts from auto passenger transport that reduce auto passenger km by 0.415% in 2000 and by 1.352% in 2010
If we assume that these modal shifts also increase by a factor of 3.00, in percentage terms, by 2020.
Then these modal shifts will reduce auto use intensities in total by:

	2000	2010	2020
Total reduction in private auto use via telecommuting/video conf./modal shifts	0.415%	2.879%	8.637%

Thus, the following intensities (GJ/veh-yr) are implied:

Private Vehicle Energy Intensities	2000	2010	2020	
Assuming Annual Vehicle-km per private car	9,522	9,287	8,736	(reflects impacts of telecommuting/modal shifts)
Existing Gasoline Cars	33.668	32.835	30.889	(GJ NHV per vehicle-yr)
Existing Diesel Vehicles	54.766	53.411	50.244	(GJ NHV per vehicle-yr)
Gasoline Hybrid Cars	10.945	8.881	7.257	(GJ NHV per vehicle-yr)
Diesel Hybrid Cars	23.175	18.805	15.366	(GJ NHV per vehicle-yr)
Hypercars--gasoline	-	6.942	4.386	(GJ NHV per vehicle-yr)
Hypercars--CNG	-	6.942	4.386	(GJ NHV per vehicle-yr)
Hypercars--Hydrogen		-	3.509	(GJ NHV per vehicle-yr)
Assuming Annual Vehicle-km per private truck	10,113	10,113	10,113	
Gasoline Hybrid Trucks	12.516	10.413	9.045	(GJ NHV per vehicle-yr)
"Mini" CNG Hybrid Trucks	12.516	10.413	9.045	(GJ NHV per vehicle-yr)
Diesel Hybrid Trucks	77.486	59.225	49.134	(GJ NHV per vehicle-yr)
CNG Hybrid Trucks	77.486	59.225	49.134	(GJ NHV per vehicle-yr)

Assumptions for Changes in Passenger Mass Transit

Fraction of Vehicle Stocks		2000	2005	2010	2015	2020	
Private Buses							
Gasoline Hybrid Buses		0.30%	16.15%	37.15%	50.00%	60.00%	Fraction of Gasoline Buses
		0.0053%		0.5572%		0.900%	Fraction of All Private Buses
CNG Hybrid Buses		0.00%	0.10%	0.30%	1.00%	2.00%	Fraction of (formerly) Gasoline Buses
		0.0000%		0.005%		0.030%	Fraction of All Private Buses
Diesel Hybrid Buses		0.36%	10.64%	38.57%	55.00%	75.00%	Fraction of Diesel Buses
		0.3537%		37.991%		73.875%	Fraction of All Private Buses
CNG Hybrid Buses		0.20%	1.50%	4.50%	7%	10%	Fraction of (formerly) Diesel Buses
		0.1965%		4.433%		9.850%	Fraction of All Private Buses
Commercial Buses			0.50%	5%	12%	20%	
Diesel Hybrid Buses		0.36%	10.64%	38.57%	55.00%	75.00%	Fraction of Diesel Buses
CNG Hybrid Buses		0.20%	1.50%	4.50%	7.00%	10.00%	Fraction of (formerly) Diesel Buses
Commercial Autos							
LPG Hybrid Cars		0.30%	20.00%	40.00%	60.00%	70.00%	Fraction of LPG Autos

Bus Energy Intensities		2000	2005	2010	2015	2020	**(GJ per thousand pass-km)**
Private Buses							All private and commercial bus intensities assume efficiency improvement ratios as for diesel hybrid trucks (WWF figures) for 2000 and 2010, extrapolating efficiency trends to 2020. GNG vehicles are assumed to have similar performance to diesel hybrids. For LPG Hybrids (for Taxis) we assume efficiency improvement ratios as for Gasoline Autos
Gasoline Hybrid Buses		0.392	0.329	0.300	0.273	0.249	
CNG Hybrid Buses (replacing gasol.)		0.392	0.329	0.300	0.273	0.249	
Diesel Hybrid Buses		0.553	0.464	0.423	0.385	0.351	
CNG Hybrid Buses (replacing diesel)		0.553	0.464	0.423	0.385	0.351	
Commercial Buses							
Diesel Hybrid Buses		0.653	0.548	0.499	0.455	0.414	
CNG Hybrid Buses		0.653	0.548	0.499	0.455	0.414	
Commercial Autos							
LPG Hybrid Cars		2.798	2.461	2.259	2.074	1.904	

Passenger Transport Fractions Recalculated to Include Mode Shifting, Telecommuting, Video Conferencing

(Assumes that the pass-km shifted in 2020 via video conferencing is 2.00 times the volume shifted in 2010)

		2000	2010	2020	
Total Passenger-km before Mode Shifting and other measures (Billion Pass-km, including private cars/cycles)		1,546	1,836	1,997	
Billion Pass-km removed FROM rail via telecommuting		2.4	23.7	77.3	*Note 7*
Billion Pass-km removed FROM rail via video conferencing		1.0	10.2	20.3	*Note 7*
Billion Pass-km removed FROM planes via video conferencing		1.3	13.5	27.0	*Note 7*
Billion Pass-km shifted TO rail from passenger cars		4.6	18.3	59.5	
Billion Pass-km shifted TO comm'l buses from pass. cars		1.6	5.5	17.9	
Recalculated Future Fractions of Pass-km by Mode					
Commercial Autos	Note: These fractions, plus the fraction of pass-km carried in private cars and cycles, will sum to less than 100% due to telecommuting and video conferencing.	0.837%	0.720%	0.720%	
Private Buses		1.279%	1.099%	1.099%	
Commercial Buses		4.593%	4.156%	4.752%	
Passenger Rail		25.642%	22.272%	21.216%	
Passenger Air		4.864%	4.735%	4.543%	
Passenger Boats		0.336%	0.274%	0.248%	
TOTAL OF ABOVE		37.551%	33.256%	32.577%	

Assumptions for Changes in Freight Transportation

Fraction of Vehicle Stocks		2000	2005	2010	2015	2020	
Commercial Trucks							
Gasoline Hybrid Trucks		0.30%	16.15%	37.15%	50.00%	60.00%	Fraction of Comm'l Gasoline Trucks
		0.002%		0.260%		0.419%	Fraction of All Commercial Trucks
Diesel Hybrid Trucks		0.36%	10.64%	38.57%	55.00%	75.00%	Fraction of Comm'l Diesel Trucks
		0.36%		38.30%		74.48%	Fraction of All Commercial Trucks
CNG Hybrid Trucks		0.20%	1.50%	4.50%	7%	10%	Fract. of Comm'l (formerly) Diesel Trucks
		0.20%		4.47%		9.93%	Fraction of All Commercial Trucks

Improvements in Commercial Freight Management

Assume, as in WWF-Japan report, that improvements in the efficiency of Commercial Freight Management results in an average efficiency improvement of 0.80% by 2010 for "mini-sized" Commercial freight vehicles, and by 0.30% for other commercial freight vehicles. Assume that these efficiency improvements increase by a factor of 2.00 by 2020.

Commercial Truck Energy Intensities	2000	2005	2010	2015	2020	**(GJ per thousand tonne-km)**
Standard Gasoline Trucks	9.917		9.838		9.758	
Gasoline Hybrid Trucks	8.264	6.907	6.266	5.684	5.156	
Standard Diesel Trucks	2.717		2.709		2.701	
Diesel Hybrid Trucks	2.264	1.900	1.725	1.569	1.427	
CNG Hybrid Trucks	2.264	1.900	1.725	1.569	1.427	

Freight Transport Fractions Recalculated to Include Mode Shifting

(Assumes that the freight shifted in 2020 is 3.00 times the freight shifted in 2010)

		2000	2010	2020
Total tonne-km before Mode Shifting (Billion tonne-km, including private trucks)		580	619	651
Billion tonne-km shifted TO rail from trucks		8.05	11.60	34.80
Billion tonne-km shifted TO water freight from trucks		3.48	5.46	16.37
Recalculated Future Fractions of Pass-km by Mode				
Commercial Trucks	Note: These fractions, plus the fraction of pass-km carried in private trucks, should add to 100%.	41.006%	43.573%	39.875%
Rail Freight		5.658%	5.935%	9.409%
Air Freight		0.182%	0.212%	0.246%
Water Freight		41.660%	39.934%	40.412%
TOTAL OF ABOVE		88.505%	89.654%	89.941%

Sources/Notes

1 WWF Climate Change Campaign (WFF, 1997), Key Technology Policies to Reduce CO_2 Emissions in Japan: An Indicative Survey for 2005 and 2010. Prepared by H. Tsuchiya, Y. Masuoka, J.M. van Wijk, and G.J.M Phylipsen for WWF, Tokyo, Japan.

2 Rocky Mountain Institute (RMI, 1997), Frequently Asked Questions (FAQ) :Hypercars™. From RMI World-wide Web site, www.rmi.org.

3 Assumes efficiency ratios as stated in WWF report for gasoline cars, but applies ratios to 1995 average stock intensities for private diesel cars and gasoline trucks, respectively. After 2010, trends in efficiency from 2000 to 2010 are assumed to continue.

4 Assumes efficiency ratios as stated in WWF report for diesel, and applies ratios to 1995 average stock intensities for private and commercial diesel trucks, respectively. After 2010, trends in efficiency from 2000 to 2010 are assumed to continue.

5 Assumes that "hypercars™" will have initial efficiencies (2000 to 2005) on the order of 2.6 liters (gasoline equivalent)/100 km ramping up to an average stock (of gasoline or CNG hypercars) efficiency of 1.5 liters/100 km by 2020.

6 Assumes that hydrogen-fueled "hypercars™" will have initial efficiencies (2010 to 2015) on the order of 1.5 liters (gasoline equivalent)/100 km ramping up to an average stock (of hydrogen hypercars) efficiency of 1.2 liters/100 km by 2020.

7 Year 2000 shift in passenger volume is assumed to be 10% of year 2010 shift.

8 Since there are no data entered for TV conference system savings of national railways transit in Table 12 of the WWF-Japan report (source 1), and since the reduction in 2010 railway traffic implied by the figure in Table 12 is greater than that indicated on page 48 of the same document, we have as an order of magnitude "guess" assumed that rail use reduction through video conferencing is roughly equal to the difference between 3 times the number in Table 12 (which the authors state was their assumption) and the number on page 48, plus 3 times the number for "private railways" given in Table 12.

9 Value from Source 1, page 45. Note that it is unclear from the source whether the 37 percent of lighting provided by incandescent lights as of 1994 is intended to pertain to the fraction of light produced or to the fraction of the energy used in household lighting. We have assumed the latter.

10 Assumes that average stand-by mode power of 7.3 W/unit (Source 1) is reduced by 10, 80, and 90 percent by 2000, 2010, and 2020, respectively. For heat-pump heaters and coolers, reduction applied proportionately to heating and cooling end-uses.

11 Assumes that average stand-by mode power of 1.9 W/unit (Source 1) is reduced by 10, 80, and 90 percent by 2000, 2010, and 2020, respectively.

12 Assumes that average stand-by mode power of 5.5 W/unit (Source 1) is reduced by 10, 80, and 90 percent by 2000, 2010, and 2020, respectively.

13 Estimated starting with 10% reduction in sectoral electricity use by 2010 (Source 1) due to reduction in standby power use in various appliances, less savings due to standby electricity use in appliances explicitly listed.

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

Initial Estimates of Per Unit Costs for Transformation Infrastructure

MONETARY CONVERSION

Approximately 135 1990 Yen per 1990 US Dollar (*Source 1*)

ELECTRICITY GENERATION (*Note 2*)

(Costs for electricity plant types whose capacities differ between the BAU and Alternative Paths)
N/A = Not Applicable

Type of Generation	Capital $/kW	Fixed O&M $/kW	Non-Fuel O&M $/kWh	Capital Y/kW	Fixed O&M Y/kW	Non-Fuel O&M Y/kWh
Nuclear--New BWRs	3,000	25	0.015	405,000	3,375	2.025
Nuclear--New ABWRs	3,300	25	0.015	445,500	3,375	2.025
Existing Coal Steam Plants	N/A	23	0.007	N/A	3,105	0.945
Existing Coal/Coke Gas Steam Plants	N/A	9	0.002	N/A	1,215	0.27
Coal Steam Plants, New	1,300	23	0.007	175,500	3,105	0.945
Existing Natural Gas Steam Plants	N/A	9	0.001	N/A	1,215	0.135
New Natural Gas Steam Plants	800	9	0.001	108,000	1,215	0.135
New Natural Gas Comb. Cycle Plants	450	20	0.0025	60,750	2,700	0.3375
New Cogeneration, Services	900	20	0.007	121,500	2,700	0.945
New Cogeneration, Services, Fuel Cell	1,200	20	0.015	162,000	2,700	2.025
New Cogeneration, Industrial	600	20	0.005	81,000	2,700	0.675
New Cogeneration, Industrial, Fuel Cell	800	20	0.012	108,000	2,700	1.62
Existing Steam Oil Plants	N/A	9	0.001	N/A	1,215	0.135
New Oil-Fired Combined Cycle	500	20	0.0025	67,500	2,700	0.3375
Wind Power	1,000	0	0.015	135,000	-	2.025
Solar Photovoltaic--Residential Appl.	2,000	20	0	270,000	2,700	0
Solar Photovoltaic--Services Appl.	1,800	15	0	243,000	2,025	0
Solar Photovoltaic--Utilities Appl.	1,500	10	0	202,500	1,350	0
Biomass-fired (BIG/STIG)	1200	40	0.001	162,000	5,400	0.135

Costs of Nuclear Power Plants Recovered over 30 years, interest rate = 4%
Costs of Other Utility Power Plants Recovered over 25 years, interest rate = 4%
Costs of Services and Industrial Sector Power Recovered over 20 years, interest rate = 5%

COSTS OF LNG SYSTEM EXPANSION

The USDOE EIA (*Source 3*) lists a representative cost of a plant ofr regasification of LNG as
$ 700 million in 1988 dollars for a plant producing
500 million cubic feet per day, or about
5.17 billion cubic meters per year, for an ultimate cost of
$ 135.45 million dollars per billion cubic meters of capacity
An alternative estimate, provided by *Source 4*, is for about
$ 550 million in 1998 dollars (exclusive of land costs) for a plant receiving
3 million tonnes per year of LNG. At approximately
1,375 normal cubic meters of gas per tonne of LNG, this is
$ 4.13 billion cubic meters per year, for an ultimate cost of
$ 133.33 million dollars per billion cubic meters of capacity
Some of the capacity expansion in Japan, however, will occur by adding storage facilities at existing terminals, or by adding de-facto storage through the construction of pipelines to gas consumers. These types of capacity additions will make the effective cost of LNG terminal and regasification facilities lower, but land costs will be a countervailing factor. In short, costs of LNG terminals are likely to be very case-specific. For the purposes of modeling, however, assume that the average expansion of LNG import capability costs
$ 150 million dollars per billion cubic meters/yr of capacity
assuming an exchange rate of 135 Yen per dollar (approximately the prevailing rate as of end 1990 and also April 1998), this is about $ 20,250 million Yen per billion cubic meters/yr of capacity
Source 3 also indicates that the average amount of gas used in regasification plants is 2.50% of throughput

COST OF GAS PIPELINE FROM SAKHALIN ISLAND

Source 5 lists a cost for a 2,700 km pipeline from Sakhalin to the Tokyo area of 500 billion Yen
We have found no definitive statement of the projected throughput of the pipeline, but assume that it is
about 50 billion cubic meters per year,
for a unit cost of about $ 10 billion Yen per billion cubic meters/yr of capacity
Source 11 lists a cost for a 2,950 km pipeline from Sakhalin to the Tokyo area of 1,300 billion Yen
for a pipeline carrying about 20 billion cubic meters per year, suggesting a
unit cost of about $ 65 billion Yen per billion cubic meters/yr of capacity
Information from Dr. James Dorian (*Source 12*) suggests that the capacity/cost estimate from Source 11 is reasonable.
Source 11 also suggests a wellhead price of gas of about $0.50 per MMBtu.

RESOURCE COSTS

LNG

Source 3 also indicates that the average cost of LNG delivered to regasification plants (per MMBtu) is about $3.75 with costs to plants in Japan in about the range from $3.00 to $4.00 per MMBtu. Other analysts suggest that gas costs will remain stable for the foreseeable future.

Assume that gas costs in Japan will be about 534 Yen per GJ (delivered) through 2020.

Based on a conversion factor of 49.45 GJ/tonne cost per tonne in Yen is 26,411

Source 3 indicates that regasification plants consume an average of 2.50% of delivered LNG (modelled as an auxiliary fuel use in LEAP)

PIPELINE GAS

Assume that the resource costs (payments to Russia) for pipeline gas are about $ 1.00 per GJ (payments do not include pipeline costs). Based on a conversion factor of 0.03545 GJ/cubic meter this implies an import cost of 4.79 Yen per cubic meter

Assume that pipelines consume an average of 1 percent of delivered gas in compressors and other equipment.

DOMESTIC NATURAL GAS

Assume that the resource cost of domestic natural gas is similar to that for pipeline gas from Russia, about 4.79 Yen per cubic meter

CRUDE OIL

Assume that crude oil costs are also stable through 2020, at a delivered cost of about $20 per bbl, or about 2700 Yen per bbl This assumption is roughly in the middle of the range of forecasts by different groups, as presented in the USDOE/EIA Annual Energy Outlook, 1997 (*Source 6*).

This cost estimate is equilivant to 19,982 Yen per tonne

COAL

The USDOE/EIA Annual Energy Outlook, 1997 (*Source 6*) suggest that real coal prices (minemouth) in the U.S. will drift downward slightly over the next 15 to 20 years. IEA Data (*Source 7*) indicates that average import coal prices in Japan were on the order of $50 per tonne steam coal as of about late 1997. Assume that, on average, coal prices will remain at that level, in real terms--about 6750 Yen/tonne, delivered to Japan, through 2020.

Assume that the value of domestic Japanese coal is similar to that of import coal

PETROLEUM PRODUCTS

Assume, based on IEA statistics, that import and export prices for the major petroleum products remain at approximately their end-1996 levels (from Source 8), namely:

Gasoline	225 $/tonne, or	30,375 Yen/tonne
Diesel	225 $/tonne, or	30,375 Yen/tonne
Heavy Fuel Oil (B and C)	125 $/tonne, or	16,875 Yen/tonne
LPG	Assume price per tonne similar to Diesel	
Kerosene, Heavy Oil A, Jet Fuel:	Assume price for diesel applies	

NUCLEAR FUEL

Based on a nuclear fuel cost of $260 per kg Uranium (*Note 9*), and an assumed average fuel burnup rate of 43,000 kW-days thermal per kg of U consumed (*Source 10*), an average nuclear fuel cost of 9.45 Yen per GJ thermal energy produced

Sources/Notes:

1 Rate as of December 31, 1990, obtained from World-wide Web (WWW) site http://www.oanda.com/cgi-bin/ncc, visited 5/20/98.

2 Costs shown here are rough estimates based on a variety of sources, including:
Page 67 of Johansson, T.B., H. Kelly, A.K.N. Reddy, and R.H. Williams, "Renewable Fuels and Electricity for a Growing World: Defining and Achieving the Potential", Chapter 1 in Renewable Energy: Sources for Fuels and Electricity, edited by T.B. Johansson, H. Kelly, A.K.N. Reddy, and R.H. Williams, Island Press, Washington, D.C., USA; and
California Energy Commission (1991), Energy Technology Status Report, Appendix A: Detailed Electric Generation Technology Evaluations, California Energy Commission, Sacramento, CA, USA, Report # P500-90-003A.

3 US Department of Energy, Energy Information Administration (USDOE/EIA, 1997a), "Worldwide Natural Gas Supply and Demand and the Outlook for Global LNG Trade", in Natural Gas Monthly, August, 1997. USDOE/EIA, Washington, DC, USA.

4 Conversation on 5/26/98 with Douglas Quillen of Texaco.

5 Alexander's Gas & Oil Connections (1996), "Study for gas link from Japan to Sakhalin gas fields", dated 11/21/96. Obtained from World-wide Web site http://www.gasandoil.com/goc/company/cns64808.htm, visited 3/30/98.

6 US Department of Energy, Energy Information Administration (USDOE/EIA, 1997b), Annual Energy Outlook 1997 With Projections to 2015. Report No. DOE/EIA-0383(97), December, 1996.

7 International Energy Agency (IEA, 1998), Graph of Steam Coal Import Costs from IEA WWW site: http://www.iea.org:80/stats/files/keystats/nfp_0503.htm.

8 International Energy Agency (IEA, 1998), Graph of Rotterdam Oil Product Spot Prices from IEA WWW site: http://www.iea.org:80/stats/files/keystats/nfp_0502.htm.

9 US Department of Energy, Energy Information Administration (USDOE/EIA, 1996), Nuclear Power Generation and Fuel Cycle Report, 1996. Report No. DOE/EIA-0436(96), October, 1996. Estimated US contract prices for fabricated BWR fuel.

10 Source 9 (page 81) lists an average burnup for 2006 for Far East BWRs of 43,000 MW-days thermal per metric tonne initial heavy metal in reactor fuel. This figure was taken to be a rough average for 1990 to 2020.

11 Asakura, Ken (1997), "Northeast Asian Pipeline Grids: Options and Issues". Paper presented at The Seventh Meeting of the Northeast Asia Economic Forum, Ulaan Baatar, Mongolia, 17-21 August, 1997. Meeting co-sponsored by the East-West Center and the Tottori Prefecture Government.

12 Dr. James Dorian (formerly of the East-West Center), personal communication, 6/1/98.

LEAP DATA PREPARATION WORKBOOK:
DATA SET FOR JAPAN:
Back-up Calculations, Data Preparation, and Reference Citations

Estimates of Emission Factors for Advanced Road Vehicles

California Air Resources Board Proposed LEV-II Standards, 120,000 Mile Vehicle Durability Basis

		Grams per mile				
		NMOG	CO	NO_x	Formald.	Diesel Partic.
Passenger Vehicles	LEV	0.09	4.2	0.07	0.018	0.01
and Light-Duty Trucks	ULEV	0.055	2.1	0.07	0.011	0.01
	SULEV	0.01	1	0.02	0.004	0.01
Medium Duty Vehicles	LEV	0.23	6.4	0.2	0.032	0.12
(8500-10,000 lbs GVW)	ULEV	0.143	6.4	0.2	0.016	0.06
	SULEV	0.072	3.2	0.07	0.008	0.06
Medium Duty Vehicles	LEV	0.28	7.3	0.5	0.04	0.12
(10,000-14,000 lbs GVW)	ULEV	0.167	7.3	0.5	0.021	0.06
	SULEV	0.084	3.7	0.2	0.01	0.06

Estimated Emission Factors for Advanced Road Vehicles Used in Alternative Scenario

	MJ/km	MJ/kg*	Grams per kg (liquid fuels) or cubic meter (gases)					
Vehicle Type	(*Note 1*)	(*Note 4*)	NMOG	CO	NOx	Formald.	Diesel Partic.	
Gasoline Hybrid Cars	1.0261	45.2	1.5142	57.8152	1.9272	0.3028	N/A	
Hypercars(TM)--Gasoline	0.8703	45.2	0.3246	32.4613	0.6492	0.1298	N/A	
Hypercars(TM)--CNG	0.8703	35.45	0.2546	25.4591	0.5092	0.1018	N/A	
Hypercars(TM)--Hydrogen	0.5021	10.8	N/A	N/A	0.2689	N/A	N/A	
Diesel Hybrid Cars	2.1726	42.14	0.6667	25.4569	0.8486	0.1333	0.1212	
Hybrid Gasoline Trucks	1.1048	45.2	1.4064	53.6978	1.7899	0.2813	N/A	
Mini Hybrid Gasoline Trucks	1.1048	45.2	1.4064	53.6978	1.7899	0.2813	N/A	
Hybrid Diesel Trucks	6.4294	42.14	0.6841	29.9037	2.0482	0.0860	0.2458	
Hybrid CNG Trucks	6.4294	35.45	0.5755	25.1563	1.7230	0.0724	N/A	
Hybrid LPG Cars	1.9688	47.82	0.8349	31.8794	1.0626	0.1670	N/A	
Diesel Hybrid Bus		42.14	0.6841	29.9037	2.0482	0.0860	0.2458	*Note 2*
CNG Hybrid Bus		35.45	0.5755	25.1563	1.7230	0.0724	N/A	*Note 2*
Gasoline Hybrid Bus	3.5388	45.2	1.1416	51.0910	1.5966	0.1277	N/A	*Note 3*

*MJ per standard cubic meter for CNG, Hydrogen
LEV = "Low Emission Vehicles"
ULEV = "Ultra Low Emission Vehicles"
SULEV = "Super Ultra Low Emission Vehicles"

Sources/Notes:

1 Vehicle efficiency as of 2005 or the first year in which vehicles are introduced in the Alternative scenario.

2 Assumes that the emissions performance of buses, per unit fuel consumed, is similar to CARB regulations for ULEV Medium-duty trucks (10,000 to 14,000 lbs GVW) using similar fuels.

3 Assumes that the emissions performance of buses, per unit fuel consumed, is similar to CARB regulations for ULEV Medium-duty trucks (8,500 to 10,000 lbs GVW) using gasoline.

4 Energy contents as in LEAP data set for Japan.