

PERU
ENERGY BALANCE TABLES

2002	Mtoe								
	Coal	Oil	Gas	Hydro	Nuclear	NRE	Electricity	Heat	Total
Production		4.8	0.5	1.6		2.4			9.3
Net Imports	0.7	2.8							3.4
TPED	0.6	7.6	0.5	1.6		2.4			12.7
Electricity and Heat Generation	- 0.1	- 0.6	- 0.2	- 1.6		- 0.1	1.7		- 0.8
Petroleum Refineries		- 0.3	- 0.3						- 0.6
Others						- 0.2			- 0.2
TFED	0.5	6.1				2.1	1.7		10.5
Industry	0.5	1.9				0.2	1.0		3.6
Transport		3.0							3.0
Residential		1.0				1.9	0.4		3.3
Commercial		0.2					0.3		0.5

2010	Mtoe								
	Coal	Oil	Gas	Hydro	Nuclear	NRE	Electricity	Heat	Total
Production		3.6	6.6	1.7		2.3			14.3
Net Imports	0.8	5.2	- 4.5				- 0.1		1.5
TPED	0.8	8.7	2.2	1.7		2.3	- 0.1		15.7
Electricity and Heat Generation	- 0.1	- 0.7	- 1.7	- 1.7		- 0.1	2.5		- 1.8
Petroleum Refineries		- 0.4	- 0.3						- 0.7
Others						- 0.2			- 0.2
TFED	0.7	7.7	0.2			2.0	2.5		13.0
Industry	0.7	2.2	0.1			0.2	1.3		4.4
Transport		4.0							4.0
Residential		1.3	0.1			1.8	0.7		3.9
Commercial		0.2					0.5		0.7

2020	Mtoe								
	Coal	Oil	Gas	Hydro	Nuclear	NRE	Electricity	Heat	Total
Production		5.2	9.0	2.1		2.3			18.6
Net Imports	1.4	5.5	- 4.6				- 0.1		2.2
TPED	1.4	10.7	4.4	2.1		2.3	- 0.1		20.7
Electricity and Heat Generation	- 0.3	- 0.5	- 3.8	- 2.1		- 0.1	3.8		- 3.0
Petroleum Refineries		- 0.4	- 0.3						- 0.8
Others						- 0.2			- 0.2
TFED	1.1	9.7	0.3			2.0	3.7		16.8
Industry	1.1	2.6	0.1			0.2	1.8		5.8
Transport		5.3							5.3
Residential		1.5	0.2			1.8	0.9		4.5
Commercial		0.3					0.9		1.2

2030	Mtoe								
	Coal	Oil	Gas	Hydro	Nuclear	NRE	Electricity	Heat	Total
Production		5.4	11.7	2.5		2.3			21.9
Net Imports	2.1	7.6	- 4.8				- 0.1		4.8
TPED	2.1	13.0	6.8	2.5		2.3	- 0.1		26.7
Electricity and Heat Generation	- 0.5	- 0.4	- 6.1	- 2.5		- 0.1	5.3		- 4.2
Petroleum Refineries		- 0.4	- 0.3						- 0.8
Others						- 0.2			- 0.2
TFED	1.6	12.2	0.4			2.0	5.2		21.5
Industry	1.6	3.1	0.1			0.3	2.5		7.5
Transport		7.1							7.1
Residential		1.7	0.4			1.8	1.2		5.1
Commercial		0.3					1.5		1.8

PERU

MACRO ASSUMPTIONS

	1980	2002	2010	2020	2030	Growth Rate (% per annum)				
						80-02	02-10	10-20	20-30	02-30
GDP (2000 PPP US\$ billion)	91	128	180	269	396	1.5	4.4	4.1	3.9	4.1
Population (million)	17.3	26.7	30.0	33.9	37.4	2.0	1.4	1.3	1.0	1.2
GDP per capita (2000 PPP US\$)	5 274	4 789	6 021	7 940	10 580	- 0.4	2.9	2.8	2.9	2.9
GDP in Services (2000 PPP US\$ billion)	56	72	107	173	273	1.2	5.1	4.9	4.7	4.9
GDP in Industry (2000 PPP US\$ billion)	25	35	49	72	104	1.5	4.3	4.0	3.8	4.0
Urbanisation level (%)	65	74	76	80	83	0.6	0.5	0.4	0.4	0.4

ENERGY PROJECTIONS

	1980	2002	2010	2020	2030	Growth rate (% per annum)				
						80-02	02-10	10-20	20-30	02-30
Production	14.5	9.3	14.3	18.6	21.9	- 2.0	5.5	2.7	1.7	3.1
Coal										
Oil	10.0	4.8	3.6	5.2	5.4	- 3.2	- 3.8	3.8	0.5	0.4
	(69%)	(52%)	(25%)	(28%)	(25%)					
Gas		0.5	6.6	9.0	11.7	0.5	38.0	3.1	2.6	11.9
		(5%)	(47%)	(48%)	(53%)					
Hydro	0.6	1.6	1.7	2.1	2.5	4.4	1.5	1.9	1.6	1.7
	(4%)	(17%)	(12%)	(11%)	(11%)					
NRE	3.4	2.4	2.3	2.3	2.3	- 1.7	- 0.4		0.1	- 0.1
	(24%)	(26%)	(16%)	(12%)	(11%)					
Nuclear										
Net Imports	- 2.9	3.4	1.5	2.2	4.8	- 10.1	4.0	8.2	1.2	
Coal	0.1	0.7	0.8	1.4	2.1	7.9	2.8	5.3	4.3	4.2
Oil	- 3.0	2.8	5.2	5.5	7.6		8.1	0.6	3.3	3.7
Gas			- 4.5	- 4.6	- 4.8			0.3	0.5	
Electricity			- 0.1	- 0.1	- 0.1			3.1	- 1.7	
Total Primary Energy Demand	11.6	12.7	15.7	20.7	26.7	0.4	2.7	2.8	2.5	2.7
Coal	0.1	0.6	0.8	1.4	2.1	7.1	3.4	5.3	4.3	4.4
	(1%)	(5%)	(5%)	(7%)	(8%)					
Oil	6.9	7.6	8.7	10.7	13.0	0.4	1.7	2.0	2.0	1.9
	(60%)	(60%)	(56%)	(51%)	(49%)					
Gas	0.4	0.5	2.2	4.4	6.8	0.5	20.0	7.3	4.5	9.8
	(4%)	(4%)	(14%)	(21%)	(26%)					
Hydro	0.6	1.6	1.7	2.1	2.5	4.4	1.5	1.9	1.6	1.7
	(5%)	(12%)	(11%)	(10%)	(9%)					
NRE	3.4	2.4	2.3	2.3	2.3	- 1.7	- 0.4		0.1	- 0.1
	(30%)	(19%)	(15%)	(11%)	(9%)					
Nuclear										
Input for Electricity and Heat Generation	- 1.5	- 2.5	- 4.3	- 6.8	- 9.5	2.3	6.8	4.6	3.5	4.8
Coal		- 0.1	- 0.1	- 0.3	- 0.5		0.7	9.3	5.2	5.3
		(5%)	(3%)	(5%)	(5%)					
Oil	- 0.9	- 0.6	- 0.7	- 0.5	- 0.4	- 1.8	1.9	- 2.5	- 3.0	- 1.4
	(56%)	(23%)	(16%)	(8%)	(4%)					
Gas	- 0.05	- 0.2	- 1.7	- 3.8	- 6.1	7.2	28.8	8.2	4.9	12.5
		(9%)	(40%)	(56%)	(64%)					
Hydro	- 0.6	- 1.6	- 1.7	- 2.1	- 2.5	4.4	1.5	1.9	1.6	1.7
	(39%)	(61%)	(40%)	(31%)	(26%)					
NRE	- 0.03	- 0.1	- 0.1	- 0.1	- 0.1	4.0	- 1.4	1.1	1.1	0.4
		(3%)	(1%)	(1%)	(1%)					
Nuclear										
Other Transformation	- 0.7	- 0.8	- 0.9	- 1.0	- 1.0	0.5	0.9	1.1	- 0.2	0.6
Coal										
Oil	- 0.4	- 0.3	- 0.4	- 0.4	- 0.4	- 0.8	1.5	1.5	- 0.2	0.9
	(55%)	(41%)	(43%)	(45%)	(45%)					
Gas	- 0.3	- 0.3	- 0.3	- 0.3	- 0.3	- 1.0	1.5	1.4	- 0.2	0.9
	(45%)	(32%)	(33%)	(34%)	(34%)					
NRE		- 0.2	- 0.2	- 0.2	- 0.2					
		(25%)	(23%)	(21%)	(21%)					
Electricity										
Heat										

PERU

	Mtoe					Growth rate (% per annum)				
	1980	2002	2010	2020	2030	80-02	02-10	10-20	20-30	02-30
Total Final Energy Demand	9.2	10.5	13.0	16.8	21.5	0.6	2.8	2.5	2.5	2.6
Coal	0.1 (1%)	0.5 (5%)	0.7 (5%)	1.1 (6%)	1.6 (7%)	8.3	4.8	4.4	4.0	4.4
Oil	5.0 (55%)	6.1 (59%)	7.7 (59%)	9.7 (58%)	12.2 (57%)	0.9	2.8	2.3	2.3	2.5
Gas	0.1 (1%)	0.01 (0%)	0.2 (1%)	0.3 (2%)	0.4 (2%)	- 11.4	54.2	5.8	4.2	17.2
NRE	3.2 (35%)	2.1 (20%)	2.0 (16%)	2.0 (12%)	2.0 (10%)	- 1.9	- 0.4		0.1	- 0.1
Electricity	0.8 (8%)	1.7 (16%)	2.5 (19%)	3.7 (22%)	5.2 (24%)	3.8	4.6	4.1	3.5	4.0
Heat										
Industry	2.9	3.6	4.4	5.8	7.5	1.0	2.6	2.8	2.6	2.7
Coal	0.1 (3%)	0.5 (14%)	0.7 (16%)	1.1 (19%)	1.6 (21%)	8.3	4.8	4.4	4.0	4.4
Oil	1.8 (63%)	1.9 (53%)	2.2 (49%)	2.6 (44%)	3.1 (41%)	0.2	1.6	1.7	1.8	1.7
Gas	0.04	0.005	0.1 (1%)	0.1 (1%)	0.1 (1%)	- 8.7	34.6	1.6	0.8	9.8
NRE	0.5 (16%)	0.2 (5%)	0.2 (4%)	0.2 (4%)	0.3 (4%)	- 4.2	1.1	1.6	1.5	1.4
Electricity	0.5 (17%)	1.0 (29%)	1.3 (29%)	1.8 (32%)	2.5 (33%)	3.5	2.8	3.6	3.1	3.2
Heat										
Transport	2.3	3.0	4.0	5.3	7.1	1.3	3.8	2.8	2.8	3.1
Coal										
Oil	2.3 (100%)	3.0 (100%)	4.0 (100%)	5.3 (100%)	7.1 (100%)	1.3	3.8	2.8	2.8	3.1
Gas										
NRE										
Electricity										
Residential	3.9	3.3	3.9	4.5	5.1	- 0.7	1.8	1.5	1.4	1.5
Coal										
Oil	0.9 (24%)	1.0 (31%)	1.3 (33%)	1.5 (34%)	1.7 (34%)	0.5	2.5	1.8	1.5	1.9
Gas			0.1 (3%)	0.2 (5%)	0.4 (7%)			7.5	5.0	
NRE	2.8 (72%)	1.9 (58%)	1.8 (48%)	1.8 (40%)	1.8 (35%)	- 1.6	- 0.6	- 0.2	- 0.1	- 0.3
Electricity ¹	0.2 (4%)	0.4 (11%)	0.7 (17%)	0.9 (21%)	1.2 (24%)	4.3	7.0	3.6	2.7	4.2
Heat										
Commercial	0.2	0.5	0.7	1.2	1.8	5.7	4.7	4.6	4.4	4.5
Coal										
Oil ¹	0.04 (26%)	0.2 (42%)	0.2 (32%)	0.3 (24%)	0.3 (18%)	7.9	1.3	1.5	1.2	1.3
Gas										
NRE										
Electricity ¹	0.1 (73%)	0.3 (58%)	0.5 (68%)	0.9 (76%)	1.5 (82%)	4.6	6.8	5.8	5.2	5.9
Heat										

Note: 1 Historical data prior to 2002 are from national sources.

ENERGY SECURITY

	1980	2002	2010	2020	2030
Diversity of Primary Energy Demand (Rated between 1 and 100)	55	58	67	73	75
Net Energy Import Ratio (%)	-25	27	9	10	18
Net Oil Import Dependency (%)	-43	36	59	52	58

PERU
ELECTRICITY GENERATION

	1980	2002	2010	2020	2030	Growth rate (% per annum)				
						80-02	02-10	10-20	20-30	02-30
Total Electricity Generation (TWh)	10	22	32	47	66	3.6	4.7	4.1	3.4	4.0
Coal		0.5 (2%)	1 (2%)	1 (3%)	2 (4%)		1.1	9.7	5.5	5.7
Oil	3 (27%)	2 (10%)	3 (9%)	2 (5%)	2 (2%)	-0.9	2.2	-2.2	-2.7	-1.2
Gas		1 (4%)	8 (25%)	19 (40%)	33 (50%)	7.8	29.9	9.0	5.6	13.3
Hydro	7 (70%)	18 (82%)	20 (64%)	24 (52%)	29 (43%)	4.4	1.5	1.9	1.6	1.7
NRE	0.1 (1%)	0.2 (1%)	0.2 (1%)	0.3 (1%)	0.4 (1%)	3.8	-0.1	3.9	2.9	2.4
Nuclear										
Total Installed Generation Capacity (GW)	3	6	8	11	13	3.0	3.8	2.8	2.2	2.9
Thermal	1 (40%)	3 (49%)	4 (55%)	6 (60%)	8 (62%)	3.9	5.4	3.6	2.6	3.8
Coal		0.15 (3%)	0.15 (2%)	0.30 (3%)	0.43 (3%)			7.2	3.5	3.8
Oil		2 (41%)	2 (30%)	2 (21%)	2 (15%)			-0.8	-1.0	-0.6
Gas		0.3 (6%)	2 (23%)	4 (36%)	6 (44%)		23.7	7.3	4.2	10.6
Hydro	2 (60%)	3 (50%)	4 (44%)	4 (39%)	5 (37%)	2.2	2.1	1.8	1.5	1.8
NRE		0.05 (1%)	0.06 (1%)	0.11 (1%)	0.14 (1%)		2.9	5.1	2.7	3.6
Nuclear										

ENERGY INTENSITY & CO₂ EMISSIONS

	1980	2002	2010	2020	2030	Growth Rates (% per annum)				
						80-02	02-10	10-20	20-30	02-30
Energy Intensity (toe per US\$ million GDP)	127	99	87	77	67	- 1.1	- 1.6	- 1.2	- 1.3	- 1.4
Industry (toe per US\$ million GDP in Industry)	115	103	91	81	72	- 0.5	- 1.6	- 1.2	- 1.1	- 1.3
Commercial (toe per US\$ million GDP in Services)	3	7	7	7	7	4.5	- 0.4	- 0.3	- 0.3	- 0.3
Energy Intensity (kgoe per capita)	668	475	525	611	712	- 1.5	1.3	1.5	1.5	1.5
Industry	167	135	147	171	201	- 1.0	1.1	1.5	1.6	1.4
Transport	131	112	134	157	188	- 0.7	2.3	1.6	1.8	1.9
Residential	224	125	129	131	136	- 2.6	0.4	0.2	0.4	0.3
Commercial	9	19	25	34	48	3.6	3.3	3.3	3.3	3.3
CO₂ Emissions (million tonnes)	19.0	24.3	34.5	47.4	62.9	1.1	4.5	3.2	2.9	3.5
Electricity Generation	0.7	2.7	6.5	11.6	17.4	6.1	11.6	6.0	4.1	6.9
Transformation other than Electricity Generation	1.7	1.7	2.6	2.8	2.8		5.5	0.7		1.8
Industry	6.5	7.7	9.3	12.0	15.6	0.8	2.4	2.6	2.7	2.6
Transport	6.8	9.0	12.1	16.1	21.3	1.3	3.8	2.9	2.8	3.1
Residential	2.8	3.1	3.8	4.6	5.3	0.5	2.6	1.9	1.4	1.9
Commercial	0.6	0.1	0.2	0.3	0.5	- 8.0	9.1	4.1	5.2	5.9
CO₂ Emissions Intensity										
CO ₂ emissions per GDP (tonnes per US\$ million)	208.4	189.7	191.3	176.0	158.8	- 0.4	0.1	- 0.8	- 1.0	- 0.6
CO ₂ emissions per capita (tonnes per capita)	1.1	0.9	1.2	1.4	1.7	- 0.9	3.0	2.0	1.9	2.2

ENERGY INVESTMENT REQUIREMENTS

(Cumulative from 2003 -)	2010	2020	2030
Total (2000 US\$ billion)	10.4 - 12.6	19.2 - 24.4	28.9 - 37.5
Coal Production & Transportation			
Oil & Gas Production & Processing	2.65 - 3.18	4.90 - 6.54	6.68 - 9.12
Oil & Gas International Trade	2.54 - 2.67	2.58 - 2.71	2.65 - 2.79
Oil & Gas Domestic Pipeline	1.29 - 1.84	2.03 - 2.89	3.39 - 4.84
Electricity Generation & Transmission	3.90 - 4.90	9.66 - 12.25	16.20 - 20.73