

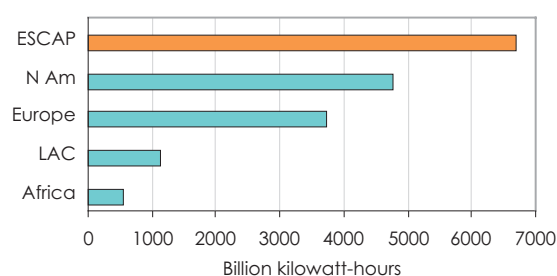
## 27. Energy supply and use

Between 2000 and 2004, electricity production increased in all parts of the world, nowhere faster than in Asia and the Pacific, where it grew at an average annual growth rate of 5.7 per cent.

In the growth rate of electricity production, the Asian and Pacific region is followed by Africa, with 5.5 per cent, and Latin America, with 2.9 per cent. Europe and North America increased electricity generation at an average annual rate of 1.8 and 0.6 per cent, respectively, during the same period. These figures show that the developing regions have increased their electricity production at a much higher rate than the developed regions.

Asia and the Pacific generates more electricity than any other region of the world. It generates about 1.5 times as much electricity as North America, twice as much as Europe, six times as much as Latin America and the Caribbean and ten times as much as Africa.

Figure 27.1 Electricity production in the regions of the world, 2004



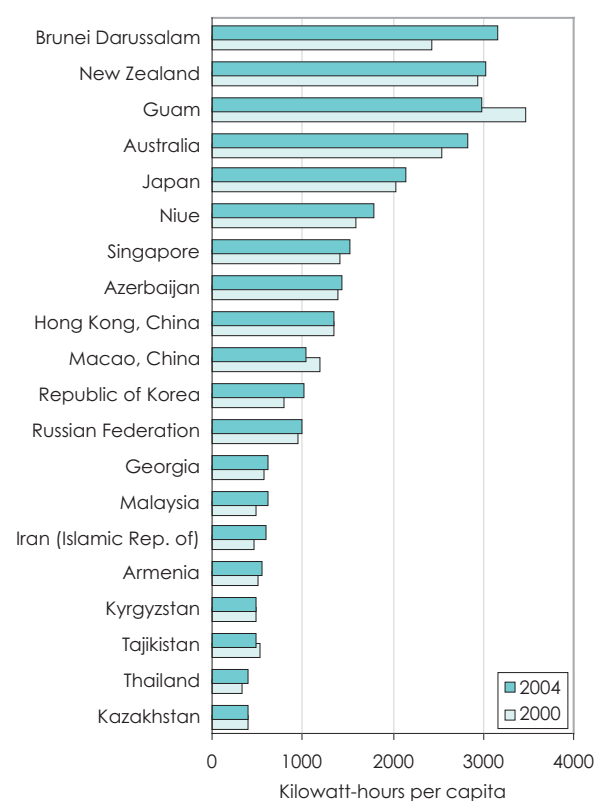
Per capita consumption of electricity in Asia and the Pacific, however, was 291 kilowatt-hours, the lowest except only for Africa. During the period 2000-2004, the Asian and Pacific region also had the highest annual rate of growth in per capita electricity consumption, 3.3 per cent, which is above the world average.

Between 2000 and 2004, per capita electricity consumption increased among all groups of countries within Asia and the Pacific except landlocked developing countries. The least developed countries recorded the highest annual rate of increase, at 8.6 per cent, while Central Asia recorded minor annual growth, at 0.1 per cent. The low- and middle-income countries had nearly 5 per cent annual growth in per capita electricity consumption. The high-income countries, on the other hand, increased consumption at an annual rate of just above 2 per cent.

Per capita electricity consumption varies widely in the countries of Asia and the Pacific. Although

electricity production in China is the highest in the region, per capita consumption in the country is quite low, at 189 kilowatt-hours in 2004. Brunei Darussalam has the highest level of per capita consumption, at 3,167 kilowatt-hours, which is above the level of the developed countries of the region and more than ten times the average consumption level of the region. Other large per capita consumers are Guam; Niue; Singapore; Azerbaijan; Hong Kong, China; and Macao, China.

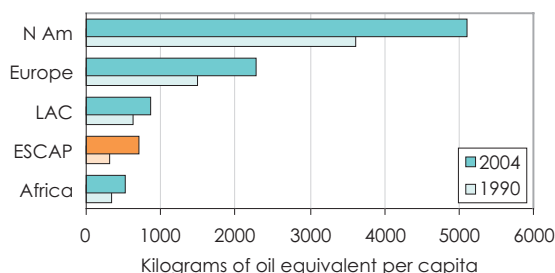
Figure 27.2 The 20 Asian and Pacific countries/areas with the highest per capita electricity consumption, 2000 and 2004



Between 1990 and 2004, total energy consumption per capita increased in all regions of the world. With an annual growth rate of 5.7 per cent, Asia and the Pacific more than doubled its energy consumption per capita, measured in kilograms of oil equivalent, during this period. Africa and Europe increase per capita energy consumption by over 50 per cent, whereas the increase in Latin America and the Caribbean and North America was just over 40 per cent. All of these regions had an annual growth rate of about 3 per cent in per capita energy consumption between 1990 and 2004.

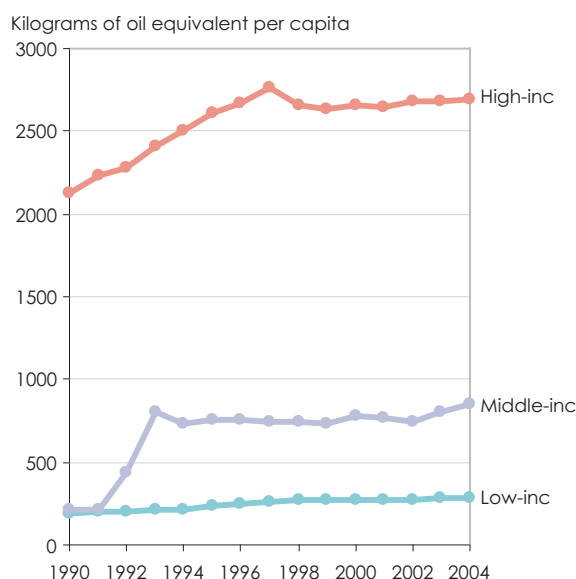
Within Asia and the Pacific, high-income countries consume about ten times as much energy per capita as low-income countries and three times

Figure 27.3 Energy consumption per capita in the regions of the world, 1990 and 2004



as much as middle-income countries. Small island developing States are an exception in the region in that per capital energy consumption decreased between 1990 and 2004.

Figure 27.4 Energy consumption per capita in selected Asian and Pacific country/area groupings, 1990-2004



Between 1990 and 2004, per capita energy consumption in the Republic of Korea and Macao, China, nearly doubled; in China and Hong Kong, China, it almost quadrupled. Mongolia was the only country in East and North-East Asia in which per capita energy consumption fell.

The most dramatic increase took place in the Islamic Republic of Iran, which recorded per capita energy consumption of 26 kilograms of oil equivalent in 1990. With an annual growth rate of over 34.1 per cent, per capita energy consumption in this country had reached 1,604 kilograms of oil equivalent by 2004. Cambodia, Samoa and Viet Nam were the other countries where per capita energy consumption increased at striking rates. In 1990, Cambodia consumed 3 kilograms of oil equivalent per person; by 2004, the consumption level was 165, and the most significant increase took

place between 2000 and 2004, when per capita energy consumption grew at an annual rate of nearly 78 per cent. In the same period, energy consumption increased in Samoa from 8 to 249 kilograms of oil equivalent and in Viet Nam from 15 to 547.

Energy use per unit of GDP indicates the energy intensity of production. A declining trend for this indicator can be due to changes in the structure of the economy or to an increase in energy efficiency. In all regions of the world, energy

Figure 27.5 Average annual growth rate of energy supply, apparent consumption per unit of GDP in the regions of the world, 2000-2004

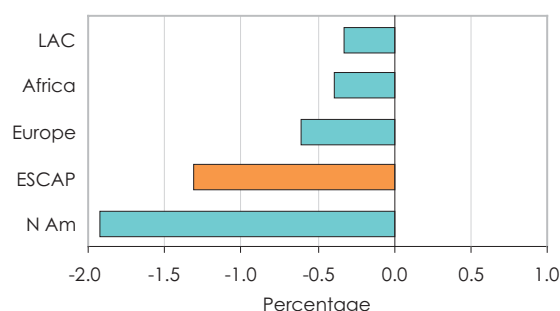
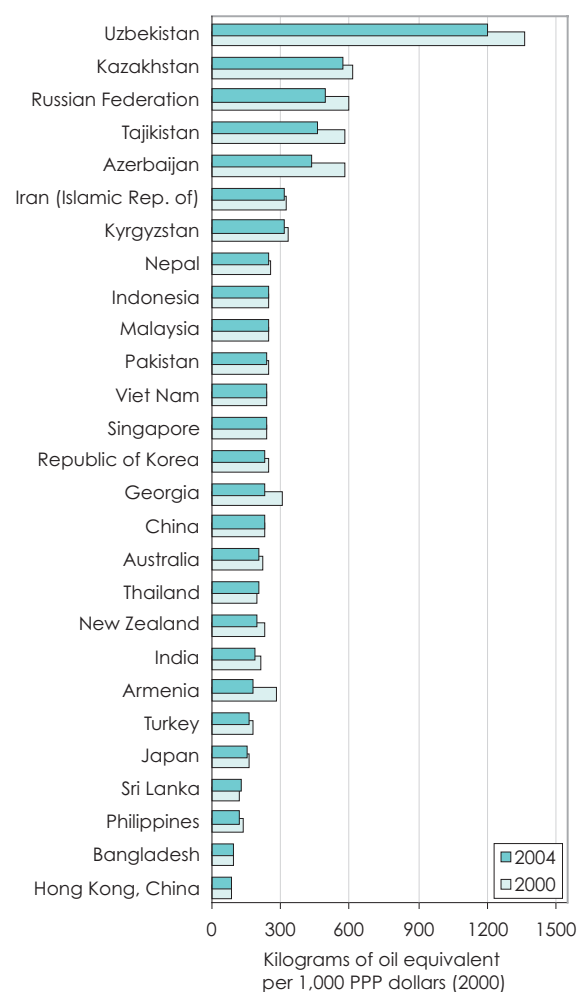


Figure 27.6 Energy supply, apparent consumption per unit of GDP in Asia and the Pacific, 2000 and 2004



intensity declined between 1990 and 2004. Asia and the Pacific experienced the second highest decline in the world, at an annual rate of 1.3 per cent between 2000 and 2004.

During the same period, all groups of countries within Asia and the Pacific reduced energy intensity, with the exception of small island developing States and the ASEAN region. Among Asian and Pacific countries for which energy intensity data is available,

Uzbekistan recorded the highest figures, at 1,203 kilograms of oil equivalent per \$1,000 of GDP in 2004. This figure is about eight times the level of energy intensity in Japan and could be due to low level of economic activity in this country. Hong Kong, China, on the other hand, has the lowest energy intensity figure for 2004, at 85. This reflects the importance of services and the small contribution of industry in Hong Kong, China.

**Energy consumption per capita (kilograms of oil equivalent):** Apparent consumption per capita of commercial energy, derived from the formula “production + imports - exports - bunkers +/- stock changes”. Excludes consumption by the energy sector and all inputs into energy conversion, such as fuels used by industrial/self-producers of thermal electricity. *Aggregates:* Averages are calculated using total population as weight. *Source:* *Energy Statistics Yearbook 2004* (online database, accessed in September 2007) and *World Population Prospects: The 2006 Revision* Population Database (online database, accessed in July 2007).

**Average annual energy consumption per capita growth rate (percentage):** The average rate of change in energy supply, apparent consumption per capita, calculated as an arithmetic mean for a range-year period. Expressed as a percentage. *Source:* Calculated by ESCAP using data from *Energy Statistics Yearbook 2004* (online database, accessed in September 2007) and *World Population Prospects: The 2006 Revision* Population Database (online database, accessed in July 2007).

**Energy supply, apparent consumption per unit of GDP (kilograms of oil equivalent per 1,000 PPP dollars):** Apparent consumption of commercial energy measured in units of oil equivalent per \$1,000 of GDP converted from national currencies using purchasing power parity conversion factors, expressed as kilograms of oil equivalent per GDP in constant 2000 prices expressed in 1,000 PPP dollars. *Aggregates:* Averages are calculated using GDP as weight. *Source:* *Energy Statistics Yearbook 2004* (online database, accessed in September 2007).

**Average annual energy supply, apparent consumption per unit of GDP growth rate (percentage):** The average rate of change in energy supply, apparent consumption per units of

GDP, calculated as an arithmetic mean for a range-year period. Expressed as a percentage. *Source:* Calculated by ESCAP using data from *Energy Statistics Yearbook 2004* (online database, accessed in September 2007).

**Gross electricity production (million kilowatt-hours):** Gross production of electricity, including the consumption by station auxiliaries and any losses in the transformers that are considered integral parts of the station. Included also is total electric energy produced by pumping installations without deduction of electric energy absorbed by pumping. Where reported, includes production from solar, tide, wave, wind, waste, wood and fuel cells. *Aggregates:* Sum of individual country values. *Source:* *Energy Statistics Yearbook 2004* (online database, accessed in September 2007).

**Average annual gross electricity production growth rate (percentage):** The average rate of change in electricity production, calculated as an arithmetic mean for a five-year period. *Source:* Calculated by ESCAP using data from *Energy Statistics Yearbook 2004* (online database, accessed in September 2007).

**Household electricity consumption per capita (kilowatt-hours per capita):** The annual electricity consumption by households per capita. *Aggregates:* Averages are calculated using total population as weight. *Source:* *Energy Statistics Yearbook 2004* (online database, accessed in September 2007) and *World Population Prospects: The 2006 Revision* Population Database (online database, accessed in July 2007).

**Average annual household electricity consumption per capita growth rate (percentage):** The average rate of change in household electricity consumption, calculated as an arithmetic mean for a five-year period. *Source:* Calculated by ESCAP using data from *Energy Statistics Yearbook 2004* (online database, accessed in September 2007).

## 27.1 Energy use

	Energy consumption per capita						Energy supply, apparent consumption per unit of GDP					
	Kilograms of oil equivalent				Average annual growth rate (%)		Kilograms of oil equivalent per 1,000 PPP dollars				Average annual growth rate (%)	
	1990	1995	2000	2004	90-04	00-04	1990	1995	2000	2004	90-04	00-04
<b>East and North-East Asia</b>												
China	167	573	540	653	10.2	4.9	470	320	226	226	-5.1	0.0
DPR Korea			821	823		0.1						
Hong Kong, China	323	505	1 499	1 198	9.8	-5.5	95	94	88	85	-0.8	-0.9
Macao, China	570	688	894	1 112	4.9	5.6						
Mongolia	425	317	335	371	-1.0	2.6						
Republic of Korea	1 932	2 857	3 291	3 519	4.4	1.7	220	241	251	234	0.4	-1.7
<b>South-East Asia</b>												
Brunei Darussalam	1 351	1 989	2 156	2 292	3.8	1.5						
Cambodia	3	3	17	165	31.8	77.7						
Indonesia	299	426	498	461	3.2	-1.9	246	218	244	244	-0.1	0.0
Lao PDR	10	19	28	28	7.4	-0.2						
Malaysia	462	1 044	1 259	1 456	8.5	3.7	228	245	248	243	0.5	-0.5
Myanmar	110	120	401	430	10.3	1.8						
Philippines	300	342	487	404	2.1	-4.6	116	135	139	122	0.4	-3.2
Singapore	1 953	2 764	1 495	1 543	-1.7	0.8	293	308	235	237	-1.5	0.2
Thailand	521	775	793	993	4.7	5.8	175	170	192	204	1.1	1.5
Timor-Leste				22								
Viet Nam	15	202	435	547	29.5	5.9	319	266	236	240	-2.0	0.4
<b>South and South-West Asia</b>												
Afghanistan	24	18	18	19	-1.8	0.6						
Bangladesh	118	199	174	180	3.0	0.8	103	104	94	93	-0.7	-0.3
Bhutan	552	766	1 812	1 718	8.4	-1.3						
India	215	239	231	234	0.6	0.3	257	241	213	186	-2.3	-3.3
Iran (Islamic Rep. of)	26	358	1 401	1 604	34.1	3.4	268	312	321	315	1.2	-0.5
Maldives	23	42	59	80	9.4	7.9						
Nepal	200	268	458	456	6.1	-0.1	293	264	252	249	-1.2	-0.3
Pakistan	196	256	273	296	3.0	2.0	246	246	246	242	-0.1	-0.4
Sri Lanka	185	237	451	501	7.4	2.7	138	114	121	124	-0.8	0.6
Turkey	554	625	779	793	2.6	0.5	173	172	177	163	-0.4	-2.0
<b>North and Central Asia</b>												
Armenia		312	364	505	0.4	8.5	427	288	278	183	-5.9	-9.9
Azerbaijan		862	866	963	9.5	2.7	539	929	578	436	-1.5	-6.8
Georgia		122	495	435	8.9	-3.2		441	307	231	-9.8	-6.9
Kazakhstan		1 874	1 698	2 333	7.6	8.3		914	614	568	-4.7	-1.9
Kyrgyzstan		165	390	456	8.9	4.0		439	332	313	-5.0	-1.5
Russian Federation		2 990	2 918	2 845	3.8	-0.6		664	599	494	-2.0	-4.7
Tajikistan		280	424	475	5.8	2.9		660	581	456	-6.7	-5.9
Turkmenistan		1 864	2 155	2 135	6.5	-0.2		1 105	942			
Uzbekistan		795	1 597	1 559	20.8	-0.6		1 349	1 359	1 203	-1.0	-3.0
<b>Pacific</b>												
American Samoa	155											
Cook Islands			197	366		16.7						
Fiji	318	316	358	450	2.5	5.9						
French Polynesia			283	1 049		38.7						
Guam	781	908	965	823	0.4	-3.9						
Kiribati				100								
Marshall Islands												
Micronesia (F.S.)												
Nauru												
New Caledonia	576	612	1 102	1 026	4.2	-1.8						
Niue			678	762		2.9						
Northern Mariana Is.												
Palau												
Papua New Guinea	454	408	380	367	-1.5	-0.9						
Samoa	8	8	230	249	27.8	2.0						
Solomon Islands	221	111	210	196	-0.9	-1.7						
Tonga		381	389	395	3.3	0.4						
Tuvalu												
Vanuatu				117								
<b>ESCAP Developed Economies</b>												
Australia	3 224	3 342	3 681	3 615	0.8	-0.5	254	233	225	207	-1.5	-2.1
Japan	2 157	2 529	2 394	2 383	0.7	-0.1	152	159	160	154	0.1	-1.0
New Zealand	1 248	2 691	2 570	2 745	5.8	1.7	238	235	227	197	-1.3	-3.5
ESCAP	325	653	670	707	5.7	1.3	253	270	237	225	-0.8	-1.3
LLDC	336 <sup>1</sup>	656	841	903	7.3	1.8		936	673	559	1.7	-4.5
LDC	112	163	223	236	5.5	1.3	129	127	116	113	-0.9	-0.6
SIDS	929	1 191	762	715	-1.9	-1.6	293	308	235	237	-1.5	0.2
ASEAN	276	424	539	567	5.3	1.3	208	203	213	213	0.2	0.0
SAARC	201	234	234	239	1.2	0.5	243	229	206	184	-2.0	-2.8
Central Asia	443 <sup>1</sup>	959	1 258	1 403	8.6	2.8		950	760	629	1.5	-4.6
Low-income	187	236	275	285	3.1	0.9	248	250	224	200	-1.5	-2.8
Middle-income	212	756	776	850	10.4	2.3		342	274	257	-2.1	-1.6
High-income	2 121	2 612	2 662	2 698	1.7	0.3	170	178	181	173	0.1	-1.1
Africa	333	381	519	516	3.2	-0.1	296	310	295	291	-0.1	-0.4
Latin America & Carib.	620	802	856	875	2.5	0.6	169	164	163	161	-0.3	-0.3
North America	3 610	3 903	5 171	5 122	2.5	-0.2	278	268	241	223	-1.6	-1.9
Europe	1 491 <sup>1</sup>	1 997	2 182	2 286	3.1	1.2	190	195	173	168	-0.9	-0.6
Other Asia-Pacific		1 476	1 567	1 705	4.1	2.1						
World	600	950	1 057	1 083	4.3	0.6						

<sup>1</sup> Data refer to 1992

## 27.2 Electricity production and household consumption

	Gross electricity production						Household electricity consumption per capita					
	Million kilowatt-hours					Average annual growth rate (%)	Kilowatt-hours					Average annual growth rate (%)
	2000	2001	2002	2003	2004		2000	2001	2002	2003	2004	
2000	2001	2002	2003	2004	00-04	2000	2001	2002	2003	2004	00-04	
East and North-East Asia												
China	1 355 600	1 471 657	1 640 481	1 907 380	2 193 736	12.8	132	144	155	173	189	9.4
DPR Korea	19 400	20 200	19 777	21 035	21 974	3.2						
Hong Kong, China	31 329	32 429	34 312	35 506	37 129	4.3	1 344	1 351	1 359	1 383	1 358	0.3
Macao, China	1 571	1 604	1 702	1 796	1 973	5.9	1 186	941	975	982	1 037	-3.3
Mongolia	2 930	3 017	3 112	3 138	3 303	3.0	124	191	290	208	222	15.8
Republic of Korea	295 156	313 963	336 237	352 352	371 011	5.9	793	833	894	939	1 020	6.5
South-East Asia												
Brunei Darussalam	2 842	2 910	3 036	3 169	3 236	3.3	2 420	2 633	2 747	2 951	3 167	7.0
Cambodia	155	104	129	130	130	-4.3						
Indonesia	99 511	95 097	113 245	101 381	103 536	1.0	144	135	156	145	143	-0.2
Lao PDR	1 225	1 250	1 290	1 295	1 295	1.4						
Malaysia	69 210	71 384	74 196	78 427	82 282	4.4	487	528	556	587	609	5.8
Myanmar	5 118	4 689	5 864	6 213	6 437	5.9	28	27	42	43	45	12.0
Philippines	45 327	47 059	48 484	52 897	55 957	5.4	169	174	173	202	192	3.2
Singapore	31 665	33 089	34 664	35 331	36 810	3.8	1 425	1 461	1 525	1 542	1 527	1.7
Thailand	101 577	108 420	115 513	116 984	125 727	5.5	321	344	359	378	395	5.3
Timor-Leste			300	300	300	0.0						
Viet Nam	26 594	30 791	35 796	40 925	46 029	14.7	139	160	179	194	217	11.9
South and South-West Asia												
Afghanistan	480	395	696	826	779	12.9	5	5	6	6	5	2.9
Bangladesh	15 771	17 392	18 665	19 712	21 466	8.0	39	44	47	49	55	8.4
Bhutan	1 810	1 896	1 898	1 900	1 952	1.9	54	52	68	69	69	6.5
India	560 842	578 452	596 543	633 275	665 873	4.4	72	73	77	82	86	4.3
Iran (Islamic Rep. of)	121 314	130 029	140 759	152 569	164 481	7.9	473	494	517	556	591	5.7
Maldives	104	116	126	141	160	11.4	161	184	195	210	231	9.4
Nepal	1 659	1 867	2 123	2 267	2 345	9.0	22	24	25	26	26	4.8
Pakistan	65 751	68 117	72 406	75 682	85 699	6.8	149	155	155	155	178	4.6
Sri Lanka	6 844	6 625	6 951	7 711	8 158	4.5	93	96	96	107	116	5.8
Turkey	124 920	122 725	129 400	140 581	150 698	4.8	350	341	336	354	383	2.3
North and Central Asia												
Armenia	5 958	5 745	5 519	5 501	6 030	0.3	506	482	490	527	543	1.8
Azerbaijan	18 699	18 969	19 543	21 285	21 643	3.7	1 385	1 242	1 265	1 461	1 433	0.9
Georgia	7 424	6 937	7 257	7 116	6 924	-1.7	564	552	534	583	625	2.6
Kazakhstan	51 635	55 350	58 331	63 819	66 942	6.7	395	414	364	377	389	-0.3
Kyrgyzstan	14 917	13 667	11 922	14 025	15 145	0.4	475	362	340	473	483	0.4
Russian Federation	877 766	891 284	891 285	916 286	931 865	1.5	955	971	976	978	990	0.9
Tajikistan	14 247	14 382	15 302	16 509	17 277	4.9	527	460	523	471	478	-2.4
Turkmenistan	9 845	10 610	10 700	10 800	11 470	3.9	272	284	282	281	279	0.6
Uzbekistan	46 840	47 502	49 310	49 400	51 030	2.2	292	287	290	286	292	0.0
Pacific												
American Samoa	133	135	135	136	138	0.9						
Cook Islands	25	26	28	29	30	4.7						
Fiji	520	520	520	526	540	0.9	119	123	122	127	134	3.1
French Polynesia	407	496	507	479	485	4.5						
Guam	1 741	1 736	1 603	1 457	1 589	-2.3	3 478	3 390	3 107	2 829	2 987	-3.7
Kiribati	10	10	10	10	10	0.0						
Marshall Islands												
Micronesia (F.S.)												
Nauru	33	30	30	32	32	-0.8						
New Caledonia	1 645	1 729	1 749	1 758	1 678	0.5						
Niue	3	3	3	3	3	0.0	1 598	1 655	1 706	1 753	1 795	2.9
Northern Mariana Is.												
Palau	171	166	166	171	171	0.0						
Papua New Guinea	1 411	1 390	1 390	1 398	1 399	-0.2	23	23	22	22	21	-1.4
Samoa	91	105	105	106	110	4.9	225	224	222	232	258	3.4
Solomon Islands	33	32	32	33	33	0.0						
Tonga	35	36	36	36	36	0.7						
Tuvalu												
Vanuatu	41	43	43	44	44	1.8						
ESCAP Developed Economies												
Australia	207 757	216 845	226 320	228 045	239 497	3.6	2 548	2 561	2 614	2 629	2 834	2.7
Japan	1 062 737	1 044 930	1 064 101	1 051 104	1 080 124	0.4	2 030	2 021	2 085	2 049	2 143	1.4
New Zealand	38 588	38 749	40 346	40 441	41 813	2.0	2 941	2 968	2 965	2 781	3 026	0.7
ESCAP	5 351 417	5 536 704	5 843 998	6 223 472	6 688 534	5.7	255	260	269	277	291	3.3
LLDC	170 245	174 650	179 746	190 765	199 211	4.0	281	264	263	276	276	-0.5
LDC	26 497	27 899	31 281	32 977	35 061	7.3	30	32	37	39	42	8.6
SIDS	38 068	39 662	41 447	41 990	43 568	3.4	497	507	520	518	513	0.7
ASEAN	383 224	394 793	432 217	436 752	461 439	4.8	179	184	200	207	211	4.2
SAARC	5 958	5 745	5 519	5 501	6 030	0.3	75	77	80	84	90	4.6
Central Asia	169 565	173 162	177 884	188 455	196 461	3.7	498	468	464	496	500	0.1
Low-income	777 373	803 247	834 657	886 163	940 514	4.9	81	83	88	92	98	4.9
Middle-income	2 898 545	3 044 918	3 264 703	3 585 807	3 932 610	7.9	233	242	252	267	280	4.7
High-income	1 675 438	1 688 480	1 744 577	1 751 438	1 815 345	2.0	1 779	1 785	1 844	1 831	1 930	2.1
Africa	435 521	450 099	482 953	508 294	538 981	5.5	120	130	130	137	143	4.5
Latin America & Carib.	1 005 013	996 274	1 024 256	1 070 857	1 125 950	2.9	404	396	392	400	411	0.4
North America	4 658 969	4 455 769	4 652 959	4 672 419	4 773 978	0.6	4 216	4 211	4 379	4 386	4 393	1.0
Europe	3 467 227	3 536 046	3 555 651	3 638 887	3 723 524	1.8	1 403	1 430	1 433	1 480	1 503	1.7
Other Asia-Pacific	527 143	555 065	586 568	614 749	643 927	5.1	1 198	1 249	1 289	1 330	1 345	2.9
World	15 474 972	15 564 937	16 181 295	16 763 895	17 533 383	3.2						