IV

Units, Conversion Factors, and GDP Deflators

Units

SI (Systeme Internationale) Units

Physical Quanitty	Name of Unit	Symbol
length	metre	m
mass	kilogram	kg
time	second	s
thermodynamic temperature	kelvin	K
amount of substance	mole	mol

Fraction	Prefix	Symbol	Multiple	Prefix	Symbol
10^{-1}	deci	d	10	deca	da
10^{-2}	cent	c	10^{2}	hecto	h
10^{-3}	milli	m	10^{3}	kilo	k
10^{-6}	micro	μ	10^{6}	mega	M
10^{-9}	nano	n	10^{9}	giga	G
10^{-12}	pico	p	10^{12}	tera	T
10^{-15}	femto	f	10^{15}	peta	P
			10^{18}	eta	E
			10^{21}	zeta	Z

Special Names and Symbols for Certain SI-Derived Units

Physical Quantity	Name of SI Unit	Symbol for SI Unit	Definition of Unit
force	newton	N	kg m s^{-2}
pressure	pascal	Pa	kg m^{-1} s^{-2} (=N m^{-2})
energy	joule	J	kg m^{2} s^{-2}
power	watt	W	kg m^{2} s^{-3} (=J s^{-1})
frequency	hertz	Hz	s^{-1} (cycles per second)

Decimal Fractions and Multiples of SI Units Having Special Names

Physical Quantity	Name of Unit	Symbol for Unit	Definition of Unit
length	ångstrom	Å	10^{-10} m = 10^{-8} cm
length	micron	μm	10^{-6} m
area	hectare	ha	10^{4} m^{2}
force	dyne	dyn	10^{-5} N
pressure	bar	bar	10^{5} N m^{-2} = 10^{5} Pa
pressure	millibar	mb	10^{2} N m^{-2} = 1 hPa
mass	tonne	t	10^{3} kg
mass	gram	g	10^{-3} kg
column density	Dobson units	DU	2.687×10^{16} molecules cm^{-2}
Stream function	Sverdrup	Sv	10^{6} m^{3} s^{-1}

Non-SI Units

°C	degree Celsius (0 °C = 273 K approximately) Temperature differences are also given in °C (=K) rather than the more correct form of "Celsius degrees".
ppmv	parts per million (10^6) by volume
ppbv	parts per billion (10^9) by volume
pptv	parts per trillion (10^{12}) by volume
yr	year
Btu	British Themal Unit
MWe	megawatts of electricity
tce	tonnes of coal equivalent
toe	tonnes of oil equivalent
boe	barrels of oil equivalent

The units of mass adopted in this report are generally those which have come into common usage and have deliberately not been harmonized, e.g.,

kt	kilotonnes (10^3 tonnes)
GtC	gigatonnes of carbon (1 GtC = (10^9 tonnes C = 3.67 Gt carbon dioxide)
PgC	petagrams of carbon (1 PgC = 1 GtC)
MtN	megatonnes (10^6 tonnes) of nitrogen
TgC	teragrams of carbon (1 TgC = 1 MtC)
$TgCH_4$	teragrams of methane
TgN	teragrams of nitrogen
TgS	teragrams of sulphur

Conversion Factors[1]

C - CO_2 Conversion Factor
$C/CO_2 = 1/3.67$

General Conversion Factors for Energy

To:	**TJ**	**Gcal**	**Mtoe**	**MBtu**	**GWh**
From:	*multiply by:*				
TJ	1	238.8	2.388×10^{-5}	947.8	0.2778
Gcal	4.1868×10^{-3}	1	10^{-7}	3.968	1.163×10^{-3}
Mtoe	4.1868×10^{4}	10^{7}	1	3.968×10^{7}	11630
Mbtu	1.0551×10^{-3}	0.252	2.52×10^{-8}	1	2.391×10^{-4}
GWh	3.6	860	8.6×10^{-5}	3412	1

[1] Energy related conversion factors are taken from *World Energy Outlook 2000*, International Energy Agency, Paris.

Conversion Factors for Mass

To:	kg	t	lt	st	lb
From:	*multiply by:*				
kilogram (kg)	1	0.001	9.84×10^{-4}	1.102×10^{-3}	2.2046
tonne (t)	1000	1	0.984	1.1023	2204.6
long ton (lt)	1016	1.016	1	1.120	2240.0
short ton (st)	907.2	0.9072	0.893	1	2000.0
Pound (lb)	0.454	4.54×10^{-4}	4.46×10^{-4}	5.0×10^{-4}	1

Conversion Factors for Volume

To:	gal US	gal UK	bbl	ft^3	l	m^3
From:	*multiply by:*					
US Gallon (gal)	1	0.8327	0.02381	0.1337	3.785	0.0038
UK Gallon (gal)	1.201	1	0.02859	0.1605	4.546	0.0045
Barrel (bbl)	42.0	34.97	1	5.615	159.0	0.159
Cubic foot (ft^3)	7.48	6.229	0.1781	1	28.3	0.0283
Litre (l)	0.2642	0.220	0.0063	0.0353	1	0.001
Cubic metre (m^3)	264.2	220.0	6.289	35.3147	1000.0	1

Specific Net Calorific Values

Crude Oil*

	toe/tonne
Saudi Arabia	1.0160
United States	1.0286
Former USSR	1.0050
Iran	1.0190
Venezuela	1.0685
Mexico	1.0115
Norway	1.0260
People's Rep. of China	1.0000
United Kingdom	1.0415
UAE	1.0180

* for selected countries

Petroleum Products*

	toe/tonne
Refinery gas	1.150
LPG	1.130
Ethane	1.130
Motor Gasoline	1.070
Jet Fuel	1.065
Kerosene	1.045
Naphtha	1.075
Gas/Diesel Oil	1.035
Fuel Oil	0.960
Other Products	0.960

* selected products – average values

Coal*

	toe/tonne
Peoples's Rep. of China	0.500
United States	0.646
India	0.477
South Africa	0.564
Australia	0.597
Russia	0.444
Poland	0.543
Kazakhstan	0.444
Ukraine	0.516
Germany	0.604

* steam coal production for selected countries

Gross Caloric Values

Natural Gas*

	kJ/m^3
Russia	37579
United States	38416
Canada	38130
Netherlands	38220
United Kingdom	39518
Indonesia	40600
Algeria	42000
Uzbekistan	37889
Saudi Arabia	38000
Norway	40460

* for selected countries (production).
Note: to calculate the net heat content, the gross heat content is multiplied by 0.9.

Conventions for Electricity

Figures for electricity production, trade and final consumption are calculated using the energy content of the electricity (i.e. at a rate of 1TWh = 0.086Mtoe). Hydro-electricity production (excluding pumped storage) and electricity produced by other non-thermal means (wind, tide, photovoltaic, *etc*.) are accounted for similarly using 1TWh = 0.086 Mtoe. However, the primary energy equivalent of nuclear electricity is calculated from the gross generation by assuming a 33% conversion efficiency, i.e. 1TWh = (0.086 / 0.33) Mtoe. In the case of electricity produced from geothermal heat, if the actual geothermal efficiency is not known, then the primary equivalent is calculated assuming an efficiency of 10%, so 1TWh = (0.086 / 0.1) Mtoe.

GDP Deflators and Changes in Consumer Prices

(Per cent)

	1982-1991	1992-2001	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
GDP deflators												
Advanced economies	**4.8**	**2.0**	**3.2**	**2.7**	**2.2**	**2.2**	**1.8**	**1.7**	**1.4**	**1.0**	**1.5**	**1.9**
United States	3.7	2.0	2.4	2.4	2.1	2.2	1.9	1.9	1.2	1.5	2.0	2.3
Japan	5.8	2.5	4.3	3.5	2.7	3.0	2.5	1.9	2.0	1.6	1.7	1.7
European Union	1.8	-	1.7	0.6	0.2	-0.6	-1.4	0.3	0.3	-0.9	-0.8	0.9
Other advanced economies	8.7	2.4	3.8	3.8	3.3	3.4	2.9	2.1	1.5	0.3	1.3	2.2
Consumer prices												
Advanced economies	**4.9**	**2.3**	**3.5**	**3.1**	**2.6**	**2.6**	**2.4**	**2.1**	**1.5**	**1.4**	**1.9**	**2.0**
United States	4.1	2.5	3.0	3.0	2.6	2.8	2.9	2.3	1.6	2.2	2.5	2.5
European Union	5.7	2.5	4.6	3.8	3.0	2.9	2.5	1.8	1.4	1.4	1.8	1.8
Japan	1.9	0.7	1.7	1.2	0.7	-0.1	0.1	1.7	0.6	-0.3	0.1	0.9
Other advanced economies	8.8	2.8	3.8	3.4	3.3	3.8	3.2	2.4	2.6	1.0	2.5	2.4
Developing countries	**45.7**	**20.3**	**36.1**	**49.8**	**55.1**	**22.9**	**15.1**	**9.5**	**10.1**	**6.5**	**5.7**	**4.7**
Regional groups												
Africa	19.6	24.4	47.1	38.7	54.8	35.5	30.0	13.6	9.2	11.0	9.6	6.1
Asia	9.7	7.6	8.6	10.8	16.0	13.2	8.2	4.7	7.6	2.5	2.6	3.0
Middle East and Europe	21.2	24.7	26.5	26.6	33.3	38.9	26.6	25.3	26.0	20.3	16.2	9.4
Western Hemisphere	166.9	47.4	109.1	202.6	202.5	34.4	21.4	13.0	9.8	8.8	7.7	6.4
Analytical groups												
By source of export earnings												
Fuel	13.7	21.4	22.1	26.2	31.8	43.2	31.9	16.1	15.6	12.0	10.5	8.8
Nonfuel	51.2	20.3	38.0	53.0	58.0	20.8	13.5	8.9	9.6	6.0	5.2	4.3
By external financing source												
Net creditor countries	2.8	3.6	4.3	5.5	4.0	5.8	3.9	1.9	1.8	1.4	3.3	4.1
Net debtor countries	47.7	20.9	37.4	51.6	57.2	23.5	15.5	9.8	10.4	6.7	5.8	4.7
Official financing	34.3	24.0	59.3	37.4	64.8	30.9	22.4	11.2	8.2	10.4	7.6	4.4
Private financing	54.6	21.0	38.0	57.1	61.4	21.4	13.9	9.2	10.0	5.7	5.1	4.3
Diversified financing	22.5	19.2	24.6	28.5	26.2	33.0	26.1	13.3	12.5	11.5	10.7	8.6
Net debtor countries by debt-servicing experience												
Countries with arrears and/or rescheduling during 1994-1998	100.1	49.8	113.6	204.3	219.9	38.7	19.8	10.4	16.6	11.6	8.1	6.0
Other net debtor countries	27.5	11.0	14.0	14.1	18.6	18.0	13.9	9.6	8.3	5.0	5.0	4.3
Countries in transition	**15.5**	**118.4**	**788.9**	**634.3**	**273.3**	**133.5**	**42.4**	**27.3**	**21.8**	**43.7**	**19.5**	**14.2**
Central and eastern Europe	…	74.8	278.3	366.8	150.4	72.2	32.1	38.4	18.7	20.5	19.4	12.3
Excluding Belarus and Ukraine	…	34.0	104.8	85.1	47.5	24.8	23.3	41.4	17.0	10.9	10.7	7.1
Russia	…	156.1	1,734.7	874.7	307.4	197.4	47.6	14.7	27.7	85.9	20.5	15.9
Transcaucasus and Central Asia	…	193.8	949.2	1,428.7	1,800.7	265.4	80.8	33.0	13.1	15.5	16.3	17.9
Memorandum												
Median inflation rate												
Advanced economies	5.4	2.2	3.2	3.0	2.4	2.4	2.1	1.7	1.6	1.4	2.1	2.0
Developing countries	9.5	7.0	9.9	9.3	10.6	10.1	7.1	6.3	5.7	4.0	4.0	3.6
Countries in transition	11.9	155.2	839.1	472.3	131.6	39.2	24.1	14.8	10.0	8.1	7.9	5.2

Source: IMF (2000) *World Economic Outlook*, International Monetary Fund, Washington DC.