

## ENERGY SUPPLY AND ECONOMIC GROWTH

It is not an easy task to monitor the overall trend in energy efficiency of a country, since there are numerous elements to consider such as climate change, outsourcing of goods produced by energy-intensive industries, etc. A common way to measure progress in energy intensity is to look at the changes in the ratio of energy use to GDP. Indeed, some experts look at energy intensity to derive trends of energy efficiency, but such an analysis has many limitations.

### Definition

The table shows total primary energy supply (TPES) per thousand US dollars of GDP. The ratios are calculated by dividing each country's annual TPES by each country's annual GDP expressed in constant 2000 prices and converted to US dollars using purchasing power parities (PPPs) for the year 2000.

TPES consists of primary energy production adjusted for net trade and stock changes. Production of secondary energy (e.g. oil/coal products, electricity from fossil fuels, etc.) is not included since the "energy equivalent" of the primary fuels used to create the secondary products or electric power has already been counted. TPES is expressed in tonnes of oil equivalent (see the IEA sources below for details on how TPES is calculated).

### Long-term trends

Sharp improvements in the efficiency of key end uses, shifts to electricity, and some changes in manufacturing output and consumer behaviour have occurred in many OECD countries since 1971. As a consequence, energy supply per unit of GDP fell significantly, particularly in the 1979-1990 period.

Contributing to the trend were higher fuel prices, long-term technological progress, government energy efficiency programmes and regulations. Overall growth in per capita GDP, combined with higher living standards and slow population growth, produced steadily rising demand after 1985.

The ratio of energy supply to GDP (TPES/GDP) fell less than the ratio of energy consumption to GDP (TEC/GDP), because of increased use of electricity. The main reason for this is that losses in electricity generating outweighed intensity improvements achieved in end uses such as household appliances.

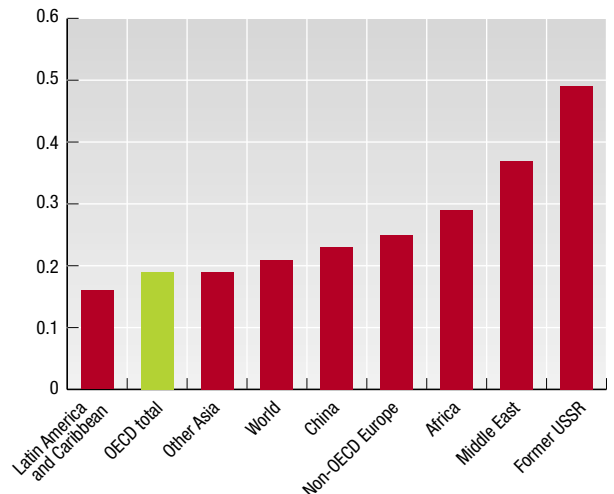
Among OECD countries, the ratio of energy consumption to GDP varies considerably. Apart from energy prices, winter weather is a key element in these variations, as are raw materials processing techniques, the distance goods must be shipped, the size of dwellings, use of private rather than public transport and other lifestyle factors.


### Comparability

Care should be taken when comparing energy intensities between countries and over time. Different national circumstances such as density of population, country size, average temperatures and economic structure will affect the ratios. A decrease in the TPES/GDP ratio may be partly attributable to a restructuring of the economy by transferring energy-intensive industries such as iron and steel out of the country – i.e. by purchasing energy-intensive products from abroad. The harmful effects of such outsourcing may actually increase the damage to the environment if the producers abroad use less energy efficient techniques.

### Total primary energy supply per unit of GDP

Tonnes of oil equivalent (toe) per thousand 2000 US dollar of GDP calculated using PPPs, 2004



StatLink  <http://dx.doi.org/10.1787/107125007052>

### Sources

- IEA (2006), *Energy Balances of OECD Countries*, IEA, Paris.
- IEA (2006), *Energy Balances of Non-OECD Countries*, IEA, Paris.

### Further information

#### Analytical publications

- IEA (2006), *Energy Policies of IEA Countries*, series, IEA, Paris.
- IEA (2006), *World Energy Outlook 2006*, IEA, Paris.

#### Online databases

- *World Energy Statistics and Balances*.

#### Websites

- International Energy Agency, [www.iea.org](http://www.iea.org).



### Total primary energy supply per unit of GDP

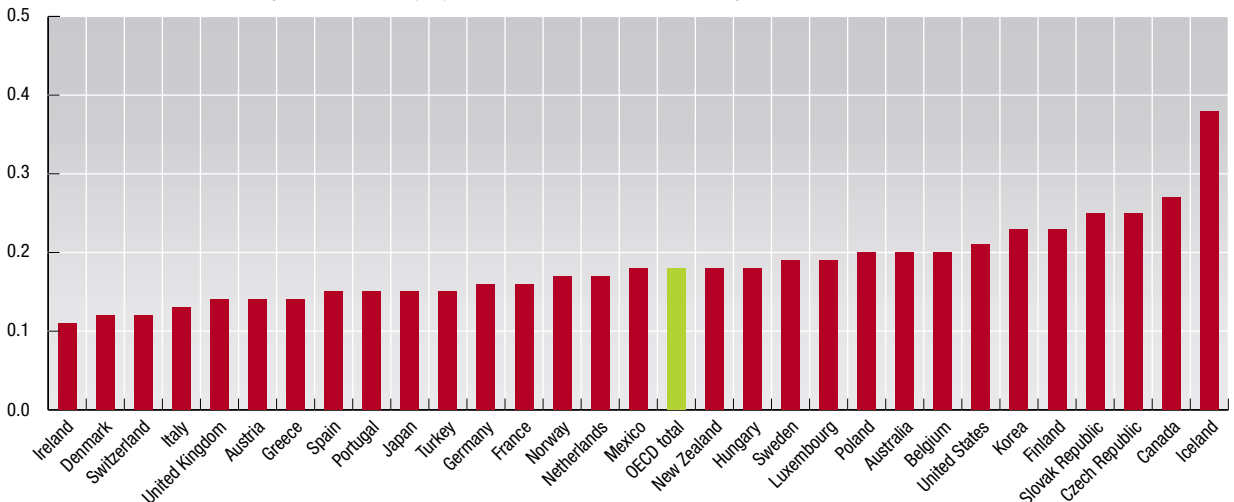
Tonnes of oil equivalent (toe) per thousand 2000 US dollars of GDP calculated using PPPs

	1971	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	0.25	0.24	0.22	0.22	0.22	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.20
Austria	0.18	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.14	0.14	0.14
Belgium	0.30	0.22	0.22	0.23	0.23	0.23	0.22	0.22	0.21	0.20	0.21	0.20	0.20
Canada	0.41	0.33	0.33	0.33	0.32	0.31	0.30	0.29	0.28	0.28	0.29	0.28	0.27
Czech Republic	0.45	0.34	0.30	0.29	0.30	0.29	0.27	0.27	0.27	0.27	0.28	0.27	0.25
Denmark	0.22	0.15	0.15	0.16	0.15	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.12
Finland	0.31	0.26	0.28	0.29	0.28	0.27	0.26	0.25	0.25	0.26	0.27	0.26	0.23
France	0.22	0.18	0.18	0.18	0.18	0.17	0.17	0.16	0.17	0.16	0.17	0.16	0.16
Germany	0.29	0.21	0.18	0.18	0.18	0.18	0.17	0.16	0.17	0.16	0.16	0.16	0.16
Greece	0.10	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.14	0.14
Hungary	0.28	0.25	0.25	0.25	0.24	0.23	0.22	0.20	0.20	0.19	0.19	0.18	0.18
Iceland	0.35	0.35	0.37	0.38	0.36	0.37	0.40	0.40	0.41	0.41	0.40	0.39	0.38
Ireland	0.28	0.19	0.16	0.16	0.15	0.15	0.14	0.13	0.13	0.13	0.12	0.11	0.11
Italy	0.16	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13
Japan	0.20	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.16	0.15
Korea	0.17	0.22	0.24	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.23	0.23	0.23
Luxembourg	0.67	0.28	0.22	0.22	0.20	0.18	0.18	0.17	0.18	0.18	0.19	0.20	0.19
Mexico	0.15	0.20	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.18
Netherlands	0.24	0.20	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.17	0.18	0.18	0.17
New Zealand	0.16	0.23	0.22	0.23	0.23	0.23	0.23	0.22	0.21	0.20	0.19	0.19	0.18
Norway	0.23	0.19	0.18	0.16	0.16	0.17	0.17	0.16	0.16	0.15	0.16	0.16	0.17
Poland	0.41	0.36	0.32	0.32	0.29	0.26	0.24	0.23	0.22	0.22	0.22	0.21	0.20
Portugal	0.10	0.13	0.14	0.14	0.14	0.14	0.15	0.14	0.14	0.15	0.14	0.15	0.15
Slovak Republic	0.39	0.40	0.37	0.35	0.34	0.31	0.31	0.31	0.31	0.30	0.28	0.26	0.25
Spain	0.12	0.14	0.15	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Sweden	0.27	0.24	0.25	0.25	0.24	0.23	0.22	0.20	0.21	0.21	0.21	0.21	0.19
Switzerland	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.12	0.13	0.12	0.12	0.12	0.12
Turkey	0.14	0.16	0.16	0.17	0.16	0.16	0.17	0.17	0.17	0.16	0.16	0.16	0.15
United Kingdom	0.28	0.18	0.17	0.18	0.17	0.16	0.16	0.16	0.15	0.15	0.14	0.14	0.14
United States	0.41	0.27	0.26	0.26	0.25	0.24	0.24	0.24	0.23	0.23	0.22	0.22	0.21
EU 25 total	..	..	0.18	0.18	0.18	0.17	0.17	0.16	0.16	0.16	0.16	0.16	..
OECD total	0.30	0.22	0.21	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.18
Brazil	0.17	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.14	0.15	0.15	0.15	..
China	0.90	0.48	0.32	0.30	0.28	0.26	0.24	0.23	0.21	0.21	0.22	0.23	..
India	0.30	0.25	0.24	0.23	0.23	0.22	0.21	0.21	0.20	0.20	0.19	0.18	..
Russian Federation	..	..	0.67	0.68	0.64	0.64	0.63	0.59	0.58	0.54	0.52	0.49	..
South Africa	0.20	0.26	0.30	0.29	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.28	..
World	0.31	0.26	0.24	0.24	0.23	0.23	0.22	0.22	0.22	0.21	0.21	0.21	..

StatLink <http://dx.doi.org/10.1787/346531608526>

### Total primary energy supply per unit of GDP

Tonnes of oil equivalent (toe) per thousand 2000 US dollars of GDP calculated using PPPs, 2005



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