

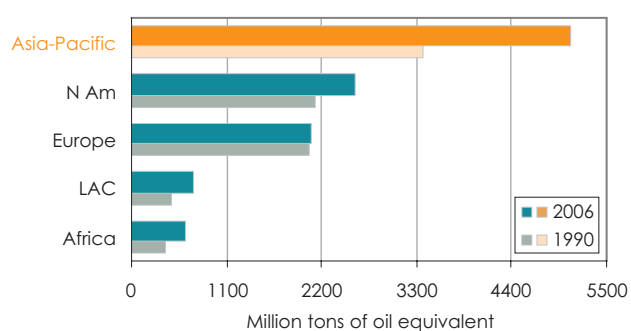
28 Energy supply and use

Despite volatile oil prices, most countries continue to increase their total consumption of primary energy. Only the small island countries and the least developed countries have managed to hold their energy use steady.

Comparable energy statistics are available only for periods up to 2006 – prior to the recent peak in energy prices. At that point, over 80 per cent of the region’s total primary energy supply came from fossil fuels – the remainder coming predominantly from nuclear power, hydropower, and traditional fuels, such as wood and animal dung. Less than one-quarter of one per cent came from geothermal or other new and renewable energy sources. The countries that consumed fossil fuels the least generally had low access to electricity and made more use of traditional fuels.

Figure 28.1

Total primary energy supply, world regions, 1990 and 2006

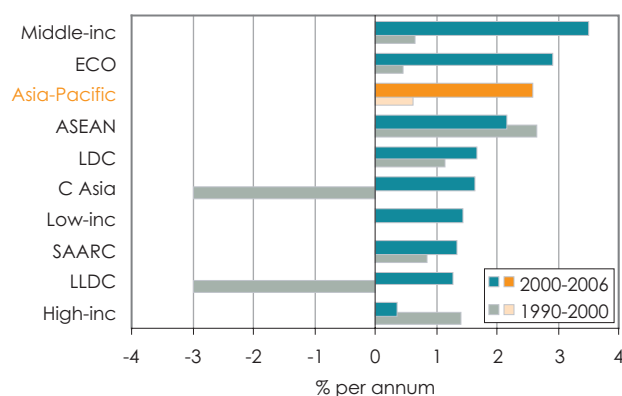


Since 1990, the region’s total energy consumption has increased significantly, especially in China, India and other middle-income economies. This reflects rapid economic development that has been supported by a considerable expansion of electricity capacity.

For poorer countries, in particular LDCs, most energy is consumed in the residential sector. Of this some is supplied commercially, but a considerable amount comes from traditional

Figure 28.2

Average annual growth in per capita energy consumption, Asia and the Pacific, 1990-2000 and 2000-2006



biomass such as wood and animal waste. Other large energy consumers are industry, road transport and commercial and public services.

One of the most important considerations in energy use is the intensity of energy consumption – the amount of energy used to produce one unit of GDP – an important indicator of energy efficiency. Overall the Asia-Pacific region has been becoming more energy-efficient. During 1990-2006, average energy intensity decreased 1.6 per cent per annum. For some countries, particularly in Central Asia, this is probably because after independence they restructured their manufacturing base. In others, these figures cover a period of significant increase in economic output and do not necessarily reflect similar level of improvement in terms of energy efficiency. High-income economies did not improve to the same extent since they were more efficient to begin with.

At the global level, industry has generally become more energy efficient, particularly since 2001. The Asia-Pacific economies followed this trend, pushed by middle-income economies such as China and India. In other subregions and economies industrial energy consumption remained steady.

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Figure 28.3

Apparent energy consumption (supply) per unit of GDP, global regions, 1990 and 2006

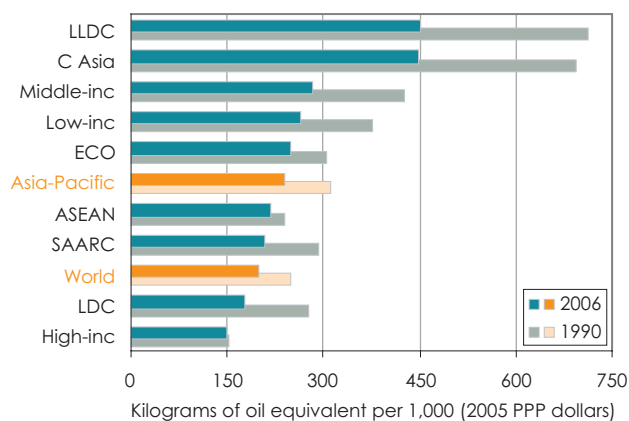
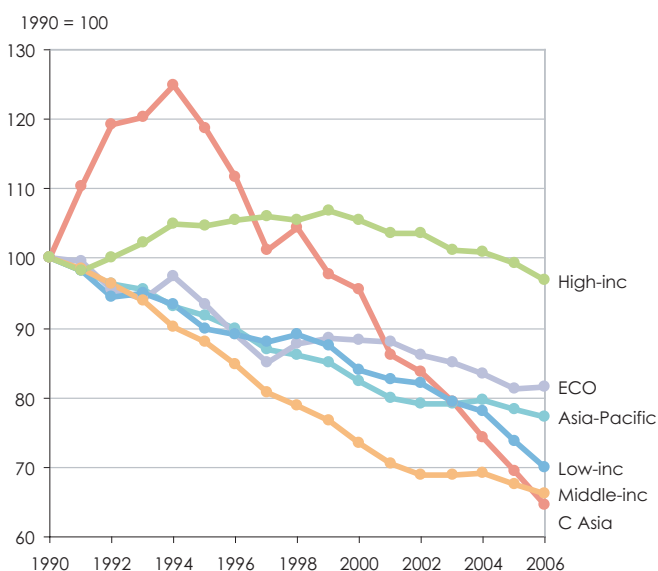


Figure 28.4

Index of apparent energy consumption (supply) per unit of GDP, Asia and the Pacific, 1990-2006

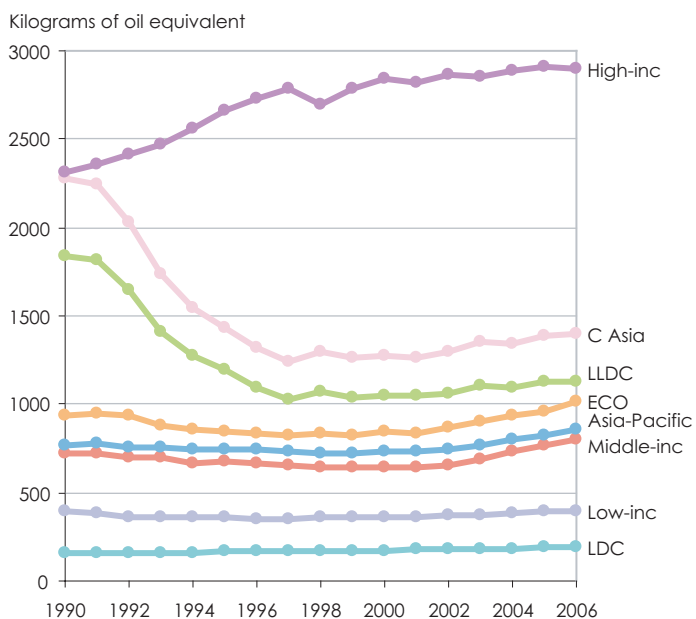


As well as increasing energy efficiency, countries also need to be concerned about per capita consumption. In recent years, the high-income economies actually increased their per capita consumption significantly. Middle-income and low-income economies also increased per capita consumption, though only slightly, and from a much lower base.

The high per capita energy consumption in high-income economies is an indication of generally wasteful lifestyles. Most of these countries have

Figure 28.5

Energy consumption per capita, Asia and the Pacific, 1990-2006



shifted their economic base to less energy-intensive industries but they have still increased overall consumption as a result of urban sprawl and generally inefficient usage. This has also increased emissions of greenhouse gases – an issue discussed further in chapter 26.

Consumption is lower in the developing countries and in the least developed countries because a high proportion of their populations lack access to modern energy services. More than 1.7 billion people in Asia and the Pacific rely for their basic energy needs on traditional biomass. Generally, this is less efficient than other energy sources, though efficiency can be increased using modern technologies, such as better cooking stoves.

The Asia-Pacific region has thus improved energy efficiency over the past 16 years, but some economies need to make greater efforts to reduce consumption of energy and the production of greenhouse gases. Other countries are developing rapidly and have the opportunity to do so in a manner that reduces their long-term dependence on imported fossil fuels. They are now in a position to choose types of infrastructure that will shape energy consumption patterns for decades to come. If they follow a sustainable energy path and consume energy wisely they will save millions of dollars that can be used for other development purposes.

Energy consumption per capita (kilograms of oil equivalent)

The amount of energy used per person. Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport. **Aggregates:** Averages are calculated using total population as weight. **Source:** International Energy Agency (online database, accessed in October 2008), and World Population Prospects: The 2006 Revision Population Database (online database, accessed in July 2008).

Growth rate of energy consumption per capita (% per annum)

The average annual growth rate in per capita energy consumption. **Aggregates:** Averages are calculated using aggregated data within each group of energy consumption per capita. **Source:** Calculated by ESCAP using data from energy consumption per capita.

Energy supply, apparent consumption per unit of GDP (2005 PPP) (kilograms of oil equivalent per 1,000 (2005 PPP dollars))

The use of energy per 1,000 units of GDP in 2005 constant international PPP dollars. Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport. **Aggregates:** Averages are calculated using GDP, PPP (constant 2005) as weight. **Source:** International Energy Agency (online database, accessed in November 2008), and World Bank, World Development Indicators (online database, accessed in July 2008).

Growth rate of energy supply, apparent consumption per unit of GDP (2005 PPP) (% per annum)

The average annual rate of change in apparent energy consumption per unit of GDP (2005 PPP), calculated as an arithmetic mean for a range-year period. **Aggregates:** Averages are calculated using aggregated data within each group of energy supply, apparent consumption per unit of GDP (2005 PPP). **Source:** Calculated by ESCAP using data from energy supply, apparent consumption per unit of GDP (2005 PPP).

Energy consumption, total (thousand tons of oil equivalent)

The sum of the consumption in the end-use sectors. Energy used for transformation and for own use of the energy-producing industries is excluded. Final consumption reflects for the most part deliveries to consumers. **Aggregates:** Sum of individual country values. **Source:** International Energy Agency (online database, accessed in November 2008).

Energy consumption by industry (% of total energy final consumption)

Consumption of energy in the following industry sectors: iron and steel (ISIC group 271 and class 2731); chemical and petrochemical (ISIC division 24); non-ferrous industry (ISIC group 272 and class 2732); non-metallic minerals (ISIC division 26); transport equipment (ISIC divisions 34 and 35); machinery (ISIC division 28, 29, 30, 31, and 32); mining and quarrying (ISIC divisions 13 and 14); food and tobacco (ISIC divisions 15 and 16); paper, pulp and print (ISIC divisions 21 and 22); wood and wood products (ISIC); construction (ISIC division 45); textile and leather (ISIC divisions 17, 18 and 19); any manufacturing industry not included above (ISIC divisions 25, 33, 36 and 37). Energy used for transport by industry is reported under transport. **Aggregates:** Averages are calculated as the sum of individual country values in each group divided by total energy final consumption of each group. **Source:** Calculated by ESCAP using data of energy consumption by industry sector values in thousand tons of oil equivalent from International Energy Agency (online database, accessed in September 2008).

Energy consumption by transport (% of total energy final consumption)

Consumption of energy in the transport sector, which covers all transport activity (in mobile engines) regardless of the economic sector to which it is contributing (ISIC divisions 60, 61 and 62) **Aggregates:** Averages are calculated as the sum of individual country values in each group divided by total energy final consumption of each group. **Source:** Calculated by ESCAP using data of energy consumption by transport values in thousand tons of oil equivalent (see chapter 19).

Energy consumption by households (% of total energy final consumption)

Consumption of energy by households, excluding fuels used for transport. **Aggregates:** Averages are calculated as the sum of individual country values in each group divided by total energy final consumption of each group. **Source:** Calculated by ESCAP using data of energy consumption by household values in thousand tons of oil equivalent from International Energy Agency (online database, accessed in October 2008).

Energy balance: primary production (million tons of oil equivalent)

Production of primary energy, including hard coal, lignite/brown coal, peat, crude oil, NGLs, natural gas, combustible renewables and waste, nuclear, hydro, geothermal, solar and the heat from heat pumps that is extracted from the ambient environment. **Aggregates:** Sum of individual country values. **Source:** International Energy Agency (online database, accessed in October 2008).

Energy balance: imports and exports (million tons of oil equivalent)

The amount of primary energy crossing the national territorial boundaries of the country, whether or not customs clearance has taken place. **Aggregates:** Sum of individual country values. **Source:** International Energy Agency (online database, accessed in October 2008).

Energy supply, total primary (million tons of oil equivalent)

Total primary energy supply, as per formula: (Production + imports - exports - international marine bunkers ± stock changes). **Aggregates:** Sum of individual country values. **Source:** International Energy Agency (online database, accessed on October 2008).

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:** UNDATA Database, Energy Statistics (online database, accessed in June 2008).

Growth rate of gross electricity production (% per annum)

The average rate of change in electricity production, calculated as an arithmetic mean for a range-year period. **Aggregates:** Averages are calculated using sum of individual country values within each group of gross electricity production. **Source:** Calculated by ESCAP using data from gross electricity production.

Household electricity consumption per capita (kilowatt-hours)

The annual electricity consumption by households per capita. **Aggregates:** Averages are calculated using total population as weight. **Source:** UNDATA Database, Energy Statistics (online database, accessed in July 2008), and World Population Prospects: The 2006 Revision Population Database (online database, accessed in July 2008).

Growth rate of household electricity consumption per capita (% per annum)

The average rate of change in household electricity consumption, calculated as an arithmetic mean for a range-year period. **Aggregates:** Averages are calculated using aggregated data within each group of household electricity consumption per capita. **Source:** Calculated by ESCAP using data from household electricity consumption per capita.

