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Electricity Supply and Demand Side Management Options

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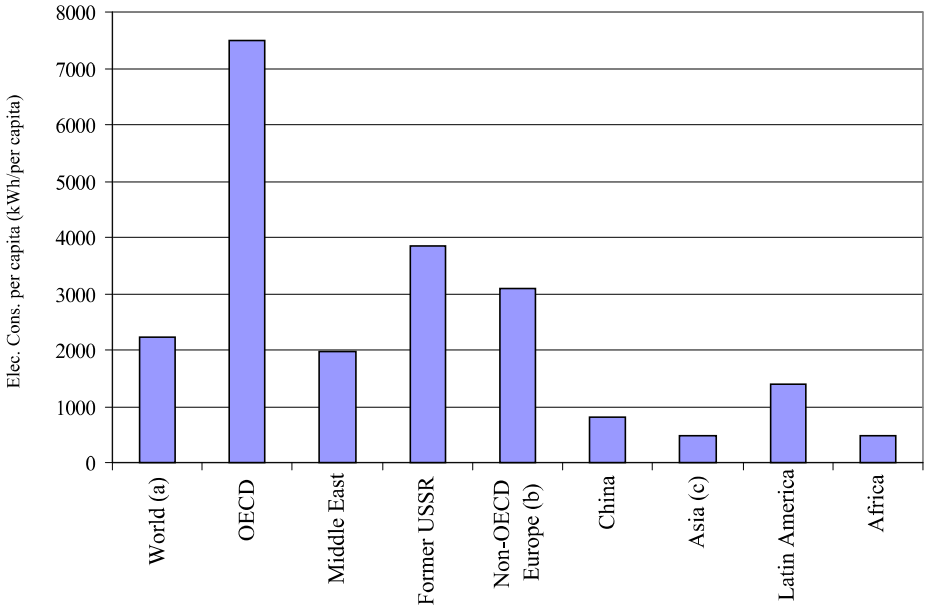
(SOURCE: International Energy Agency (IEA) Energy data.)

Global and regional statistics indicate the average per capita consumption of electricity is 7500 kWh/year in OECD counties as compared to 482 kWh/year in Asia (excluding China, which is 822 kWh/year), 490 kWh/year in Africa, and 1402 kWh/year in Latin America. However, these figures mask variations in the number of people in a particular society with electricity access, and actual use per person, household or industry. This has implications for supply and demand side management strategies and potential in the different settings.

Figure 2.1 Variations in Electricity Consumption per Capita by World Regions (1996)



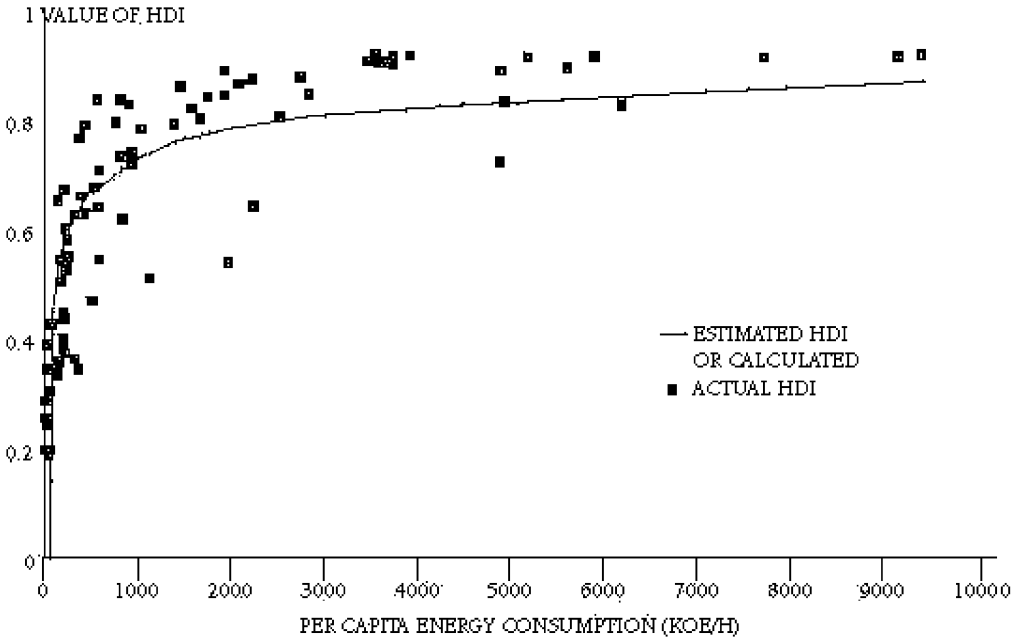
(a) World excludes Albania, DPR of Korea and Vietnam.
(b) Non-OECD Europe excludes Albania.
(c) Asia excludes China, DPR of Korea and Vietnam.

*Gross production + exports – transmission /distribution losses.
**CO2 emissions from fuel combustion only. Emissions are calculated using IEA's energy balances and the Revised 1996 IPCC Guidelines.
(SOURCE: IEA Energy data.)

2.2.2 Energy and Electricity Consumption and Social and Economic Development

The vast majority of the world's population live in poverty, in developing countries that are characterised by low levels of social and economic development, as well as inadequate infrastructure and institutions for the provision of energy services. During this century, the most important way in which countries have increased energy availability for their economies has been to invest in electricity supply. Thus, while commercial energy consumption is not equivalent to the availability of electricity services, in the absence of adequate data it may serve as an approximate measure of the latter. Figure 2.2 shows the relationship between per capita energy consumption (commercial and traditional energy) and the Human Development Index (HDI) for 100 developed and developing countries. The graph suggests that for countries with low levels of energy services, even small inputs of energy are associated with
significant welfare improvements. At higher energy consumption levels, further increases do not seem to impact greatly on human development.

Figure 2.2 Relationship Between per Capita Energy Consumption and HDI



Note: Data for 100 developed and developing countries.

(SOURCE: Suarez, 1995.)

The decreasing marginal benefits of energy supply on human development parallels GDP-energy de-coupling that has taken place in various countries during the 20th century. Historical trends of the "energy intensity"– or the ratio of energy consumption to GDP – of several developed economies are remarkably similar. They show rising energy intensity during early industrialisation, followed by a decline during periods of further industrialisation, this being associated with improved energy conversion efficiency, improved processes and, to a lesser extent, a general shift from manufacturing to service sectors. While this pattern of de-coupling between energy and GDP growth is most pronounced in the examples of the USA, Germany, UK, France and Japan, even a developing country, like China, and countries in transition like Poland, follow these trends, both having recently passed a peak of high energy intensity. Also, since many developing countries are entering periods of industrialisation at a stage when there are already significant opportunities for energy-efficiency, it is conceivable that they could "leap-frog" sooner than developed countries to locations on the map with low energy intensity.

Apart from their direct economic impacts, improved efficiency in energy production and use generate collateral benefits such as reduced pollution, which reduces health costs, improves productivity and reduces damage to productive assets.

2.2.2 Share of Electricity in Total Energy Consumption

The increase in fuel consumption as well the relative contribution of electricity as an energy source since the early 1970s is depicted in Figure 2.3 and Table 2.2. The evolution of final consumption of fuels since 1971 is shown in Figure 2.3. Electricity consumption has increased from 9.4 to 14.3% of total energy consumption, during the period 1973–1996 (Table 2.2).