

Oil Crises and Climate Challenges: 30 Years of Energy Use in IEA Countries

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ABSTRACT

This paper presents key findings from a new IEA study that examines how energy efficiency and factors such as economic structure, income, lifestyle, climate, prices and fuel mix have shaped developments in energy use and CO₂ emissions in IEA countries since the organisation was founded 30 years ago. The study applies a Laspeyres decomposition approach to isolate the impact changes each factor has had on changes in energy use and CO₂ emissions both at an economy-wide level as well as sector by sector covering manufacturing, households, services, passenger and freight transport.

IEA countries have significantly reduced the need for energy to fuel economic growth. Compared to 1973, it now takes one third less energy to produce a unit of GDP in IEA economies. A main reason behind this development is that energy efficiency has led to energy savings in all sectors. However and alarming finding is that energy savings rates across all sectors and in almost all countries included in this study have slowed since the late 1980s, as has the decline in CO₂ emissions relative to GDP. This shows that the oil price shocks in the 1970s and the resulting energy policies did considerably more to control growth in energy demand and CO₂ emissions than energy efficiency and climate policies implemented in the 1990s.

Energy price developments offer some explanation of these long-term trends. Before 1973 prices were generally low. So, when prices surged after 1973, there was ample scope for improving energy efficiency as a response. But as prices fell after the mid-1980s, there was less incentive to sustain energy savings rates. The lower prices, combined with the fact that energy intensities were already significantly reduced, resulted in considerably lower energy expenditures for both industry and private consumers from the mid 1980s. The energy share of total production cost in some industries fell by as much as 50% from the early 1980s until the late 1990s. Similarly, the share of energy costs for stationary uses in IEA household budgets fell by 20-50% over the same period, while the fuel cost per kilometre driven by private cars fell between 20% and 60%, depending on the country.

Most IEA countries enjoyed significant reductions in CO₂ emissions per unit of GDP between 1973 and 1990, but after 1990 only a few saw a continued strong decoupling. While total emissions from IEA countries in 1990 were only marginally higher than in 1973, they increased 13% between 1990 and 2001, a development that is in stark contrast to what is required to meet the Kyoto targets.

The slowing rates of energy savings are the primary reason for the weaker decoupling of CO₂ emissions from GDP growth since 1990. In addition, fuel switching towards lower carbon fuels in electricity generation contributed less to overall CO₂ emission reduction in most countries after 1990 than before.

The recent low rate of energy savings poses a concern from both an environment and an energy security perspective. Oil and electricity demand is rapidly growing. Oil consumption is driven by strong growth in transport, while the ownership and use of various electric appliances and equipment in household and commercial buildings is propelling demand for electricity.

The increase in electricity demand will greatly add to the burden of controlling CO₂ emissions in IEA countries. Although renewables have started to make inroads for electricity generation, the bulk of new generation capacity over the next few years will, in many IEA Member countries, be met by new coal or gas based power plants.