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The internet and the new energy economy

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Abstract

From 1996 through 2000, the US experienced an unprecedented 2.7% annual reduction in energy intensity. This is three times the rate of the previous 10 years and far higher than the rate projected by traditional energy forecasters. There is increasing data and analysis to support the view that there is a connection between the recent reductions in energy intensity and the astonishing growth in information technology (IT) and the internet economy. Growth in the Internet economy can cut energy intensity in two ways. First, the IT sector is less energy-intensive than traditional manufacturing, so growth in this sector engenders less incremental energy consumption. Second, the internet economy appears to be increasing efficiency in every sector of the economy, which is the primary focus of this paper. The impact of the Internet economy on manufacturing, buildings, and transportation are all explored. The paper also considers the implications for growth in energy consumption and greenhouse gas emissions during the next 10 years. Also, there has been a widely quoted argument put forward by two analysts, Mark Mills and Peter Huber, that the Internet is using a large and rapidly growing share of the nation's electricity, which in turn is supposedly driving an acceleration of overall US electricity demand. That analysis should be rejected as it is based on seriously faulty analysis and is inconsistent with recent data and analyses. Finally, the Bush administration put forward a new approach to US climate change strategy, based on reducing carbon intensity. This paper suggests that such an approach may not lead to reductions in carbon emissions beyond business as usual trends.

Keywords: Internet; E-commerce; Energy; Energy intensity; Environment; Carbon dioxide; Manufacturing; Buildings; Transportation

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1. Introduction

In the era of low-energy prices preceding the early 1970s, the energy efficiency of many household, transportation, and industrial technologies in US improved little. As a result, energy demand and gross domestic product (GDP) in the US historically grew in lockstep: a 3% increase in GDP meant nearly a 3% increase in energy demand. The energy intensity of the economy (energy consumed per dollar GDP) declined only very slowly from 1950 to the early 1970s. There was a widespread view in the country that this linkage was unchangeable, that energy was essential for economic growth. There was little recognition that energy efficiency could break that trend without sacrificing economic growth (Brown et al., 1998).

The inextricable connection between energy and economic growth came to an abrupt end with the Arab oil embargo of 1973–1974. From 1973 to 1986, GDP grew 35% in real terms while the nation's consumption of primary energy remained frozen at about 74 quadrillion BTUs (or quads). One third of the dramatic shift in energy intensity during this period was due to structural changes, such as declining share of economic activity in energy-intensive industries and increasing shares in the less energy-intensive service sector. Two thirds was due to increases in energy efficiency throughout the economy as a whole.

Following the crisis, Americans bought more fuel-efficient cars and appliances, insulated their homes, and adjusted thermostats. Businesses retrofitted their buildings with more efficient heating and cooling equipment and installed energy management systems. Factories adopted more efficient manufacturing processes and purchased more efficient motors. These investments in more efficient technologies were facilitated by higher energy prices, by government policies and programs, and behavioral changes resulting from concerns about availability of energy and dependence on Persian Gulf oil.

The nation's energy intensity routinely declined by 2% per year during the years from 1973 to 1986, and some years intensity even declined by over 3%. Starting in 1986, energy prices began a descent in real terms that has continued to the present, and government investments in energy R&D and deployment programs have declined. These trends have contributed to a growth in energy demand from 74 quads in 1986–94 quads in 1996. Due to the comparable growth in GDP over the same period, the energy intensity of the economy declined less than 1% per year over the 10-year period.

2. Recent drops in energy intensity

In the late 1990s, a startling shift appeared in the statistics. The nation's energy intensity dropped 3.8% in 1997 and 3.8% in 1998. It is unprecedented for the US economy to see such improvements in energy intensity during a period of low energy prices and relatively low public awareness of energy issues. The nation had 2 years of economic growth totaling almost 9%, yet energy use had grown less than 1% in those 2 years. In both 1999 and 2000, energy intensity dropped by nearly 2% (EIA, 2002a).