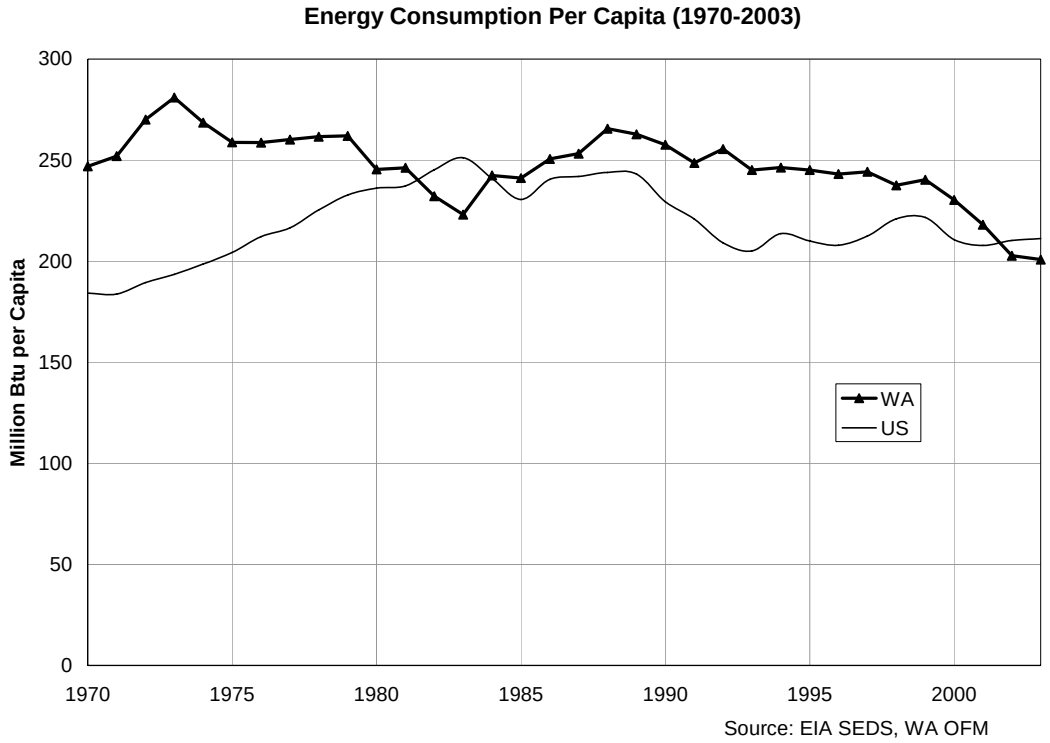
2007 Energy Intensity Indicators

Washington's per capita energy consumption has stayed fairly close to 250 million Btu during the last 20 years, which is the energy equivalent of about 2000 gallons of gasoline per person per year (Figure 18). This indicates growth in energy use has been similar to growth in population. However, there have been a few notable relative drops in per capita energy consumption from 1973 to 1975, 1979 to 1983, and 1999 to 2002 largely due to economic downturns during these periods. Per capita energy consumption dropped to 200 million Btu in 2002, about 20% lower than the average during the last 20 years. This decline mostly reflects the reduction in industrial energy use from the shut down of aluminum smelters in Washington. Until this decline, Washington's per capita energy consumption has usually been greater than the national average.

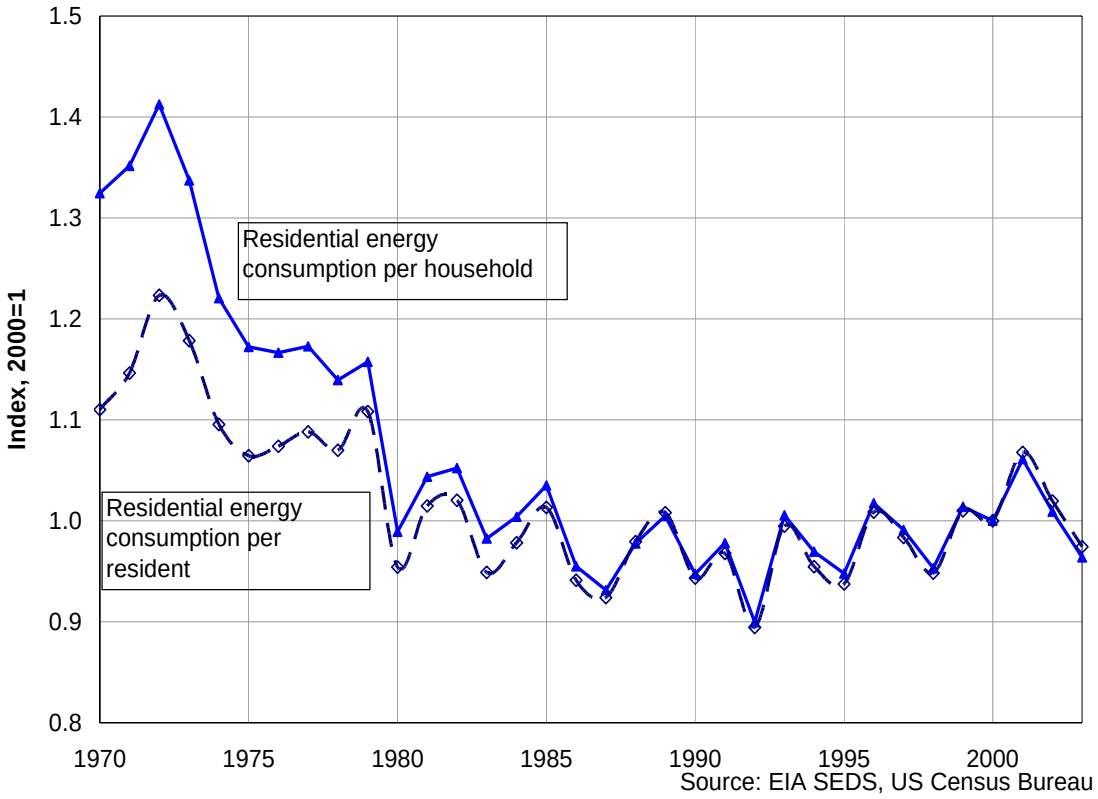
Figure 18 Washington and U.S. End-Use Energy Consumption per Capita (1970-2003)



Washington households became less energy intensive during the 1970s and 1980s as shown in Figure 19. On a per household basis the decline in energy intensity since the early 1970's is striking, but when factoring in the decrease in the number of residents in the average household the energy intensity decline is less pronounced. The long-term decline in household energy intensity was likely due to gains in efficiency (e.g. adding insulation), conservation in response to higher prices, and fuel switching. Concerted efforts to improve residential efficiency in Washington through building standards and codes began in earnest in the mid-80s. However, there is little evidence of further declines in household energy use in the last 15 years. Presumably gains in efficiency due to building standards and codes are being offset by larger homes, more widespread use of air conditioning, and the proliferation of electricity-using appliances, computers, and entertainment systems. Without the codes and standards, household energy use would

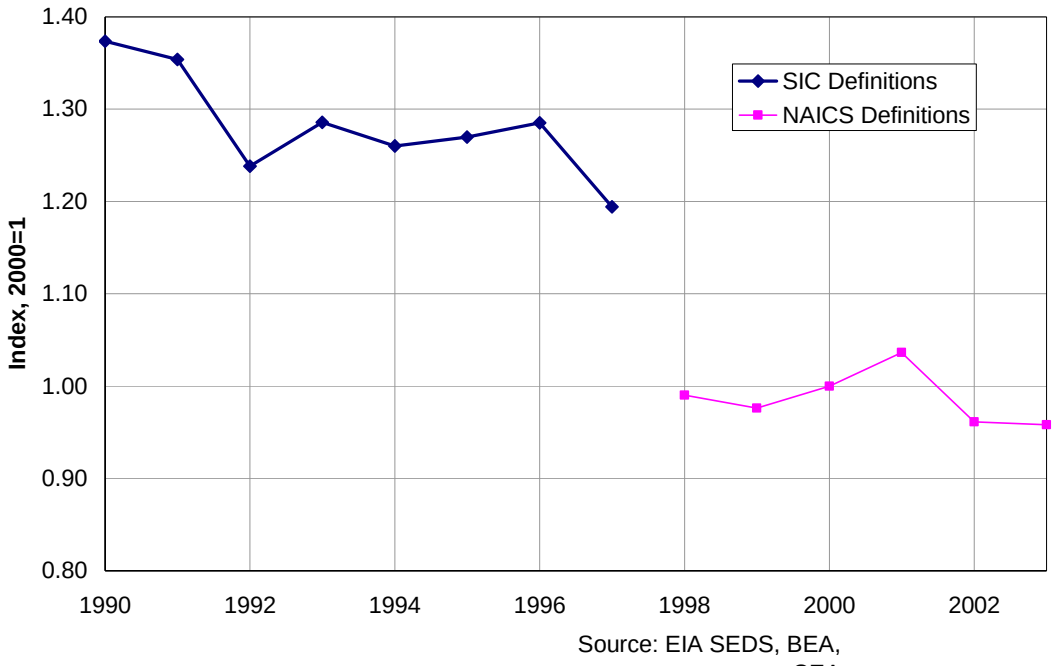
be higher. Note that these data do not include energy used for personal transportation, which has increased markedly during the last fifteen years.

Figure 19 Washington Residential Energy Use per Household and per Resident (excluding transportation energy use) (1970-2003)



Washington's commercial sector became less energy intensive from 1990 to 1997 when commercial sector energy consumption grew only 13% while the value of all goods and services produced by the commercial sector grew 30% (Figure 20). This decline in commercial sector energy intensity can be attributed to growth in the economy, shifts to less energy intensive businesses, increased productivity, and improvements in the efficiency of buildings, lighting, and equipment. Since 1998 commercial sector energy intensity has changed very little.

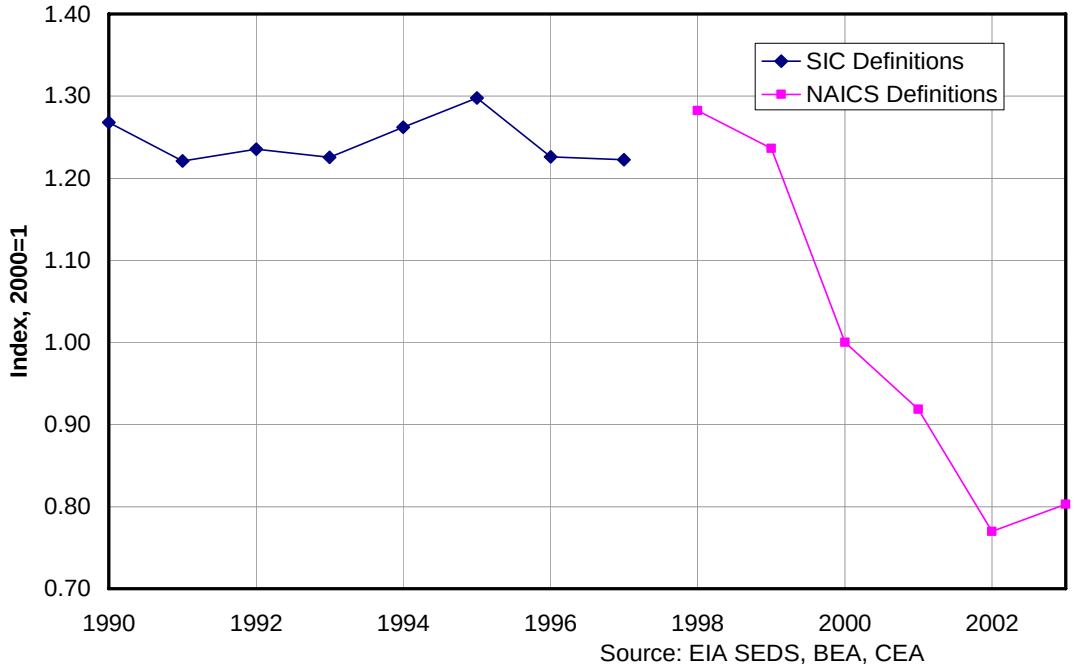
Figure 20 Washington Commercial Sector Energy Use per Commercial Sector Gross State Product (excluding transportation energy use) (1990-2003)



Note: Beginning in 1998 the U.S. Department of Commerce, Bureau of Economic Analysis changed the industrial classification system they use for calculating gross state product, which creates the discontinuity in the chart.

Washington's industrial sector energy intensity was relatively constant during much of the 1990's (Figure 21). However, since 1998 the industrial sector has become significantly less energy intensive. During this period, industrial sector energy use dropped by almost a third while industrial gross state product grew 2 percent. High electricity prices along with low aluminum prices contributed to a significant decline in Washington's aluminum production. Aluminum production is energy intensive (high energy use relative to product value) and relies on low-cost electricity in the production process. At the same time, natural gas prices rose. High energy prices impact energy intensive industries the most and can contribute to declines in production, particularly when it is not possible to switch to a less expensive fuel source. The slight increase in energy intensity in 2003 suggests that some of these industries may be recovering.

Figure 21 Washington Industrial Sector Energy Use per Industrial Sector Gross State Product (excluding transportation energy use) (1990-2003)



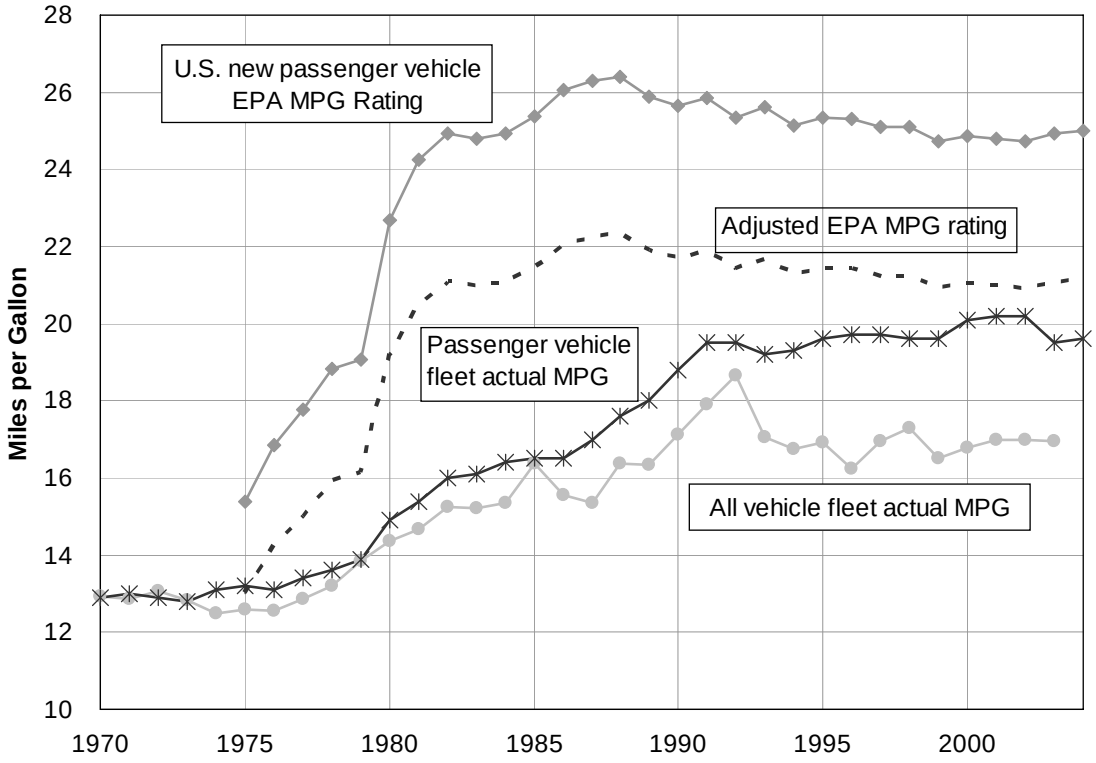
Note: Beginning in 1998 the U.S. Department of Commerce, Bureau of Economic Analysis changed the industrial classification system they use for calculating gross state product, which creates the discontinuity in the chart.

The average efficiency of Washington's vehicle fleet, based on total miles driven divided by fuel use, grew from 12.6 miles per gallon (MPG) in 1975 to 18.7 MPG in 1992. However, since 1992 Washington's vehicle fleet efficiency declined by 1.7 miles per gallon.

Gains in the efficiency of Washington's vehicle fleet through the 1980s were due to the replacement of old vehicles with more efficient models. However, new vehicle fuel efficiency standards have changed little from the mid 1980's, when Congress last increased Corporate Average Fuel Economy (CAFE) standards[5]. It is important to note that the actual on-road fuel efficiency of new vehicles is less than the EPA-rated fuel efficiency value shown in the figure: compare adjusted EPA MPG with on-road passenger vehicle fuel efficiency. The all vehicle fuel efficiency line includes heavy trucks, which dramatically lowers the fuel efficiency of the entire vehicle fleet. Figure 22 suggests that the actual on-road efficiency of new cars and trucks purchased in Washington for the last ten years was not better than the existing vehicle fleet.

[5] CAFE standards require automakers to maintain the average fuel efficiency of new vehicles at 27.5 MPG for cars and at a new increased level for 2007 of 22.2 MPG for light trucks (which includes minivans, pickups, and sport-utility vehicles). Light trucks with gross vehicle weights greater than 8,500 lb are not required to meet CAFE requirements. CAFE has no mandates about how many vehicles may be sold in each category, and the increasing popularity of light trucks has caused the fuel efficiency of the average new vehicle to drop by almost two miles per gallon since 1988.

Figure 22 Average Efficiency of Highway Travel in Washington



Implications of Washington's Energy Trends

There are several key conclusions that follow from the preceding data.

- Energy demand in Washington declined from 1999 to 2002, mostly as a result of the closure of electric intensive industrial plants (primarily aluminum smelters). However, recent data suggest this was a short-term decline and that electricity and other energy consumption may be growing again. Although it is too early to determine for certain, long-term high petroleum prices may moderate some this growth trend through increase purchases of more fuel efficient vehicles and changes in travel patterns. Nonetheless, the overall renewed growth in energy demand will have implications for energy supply, price, environmental impacts, and infrastructure needs.

- Energy prices in Washington, like other parts of the U.S., have gone up significantly in the last several years. Natural gas prices have increased the most and recent data suggest prices will stay high. While electricity prices seem to have stabilized and gasoline and diesel prices have recently declined, our experience in the last five years has shown that any interruption in supply or increase in demand can cause prices to increase in tight energy markets. The State should continue to develop policies that address the risk of exposure to higher, more volatile energy prices need to be considered. In particular, these should include efforts to capture all cost effective energy conservation opportunities for all fuels, to defend the state's recently adopted California vehicle emissions standards, and to expand support for and development of in-state energy resources.

- While energy use per capita in Washington has declined in the last several years, this is largely due to the closure of electric intensive aluminum smelters. The energy intensity of the industrial sector (dollars of industrial state product per energy consumption) has improved significantly. However there has been no reduction in the energy use of Washington households or improvement in the efficiency of Washington's vehicle fleet in the last ten to fifteen years. While energy policies to improve energy efficiency in homes and buildings have helped reduce growth in energy demand, it is clear that more aggressive action is needed to overcome other societal trends that push energy use higher (for example larger homes, demand for trucks and SUVs, increases in the type and number of new energy using products). This is particularly true for the transportation sector, which accounts for the largest share of energy use in Washington.

- The mix of sources used to generate the electricity consumed in Washington has changed very little in the last six years. Hydroelectricity accounts for two-thirds, followed by coal and natural gas-fired generation, and nuclear power. Washington's dependence on hydroelectricity was clear during 2001 when drought conditions limited production and wholesale electricity prices increased dramatically. Other renewable electricity sources account for less than 2 percent of production. While wind generation increased from zero to over 400 MWh in 2005, this is still only one half of a percent of total electricity use in Washington. The recent passage Initiative 937 energy portfolio standard requirements will encourage more electricity generation from renewable sources as well as ensure that the state's major utilities maintain a long term commitment to cost-effective electricity efficiency. CTED and other state agencies need to ensure that the provisions of I-937 are effectively implemented.

- Energy consumption accounts for 85 percent of the greenhouse gas emissions in Washington. Except for several brief declines greenhouse gas emissions have grown steadily over the last 25 years and in 2004 were 14 percent greater than in 1990. The majority of greenhouse gas emissions occur in the transportation sector followed by the electric power sector. Over the last two year, the state has adopted a number of major climate friendly policies – California vehicle emissions standards, "green" public buildings requirements, appliance efficiency standards, biofuels content standards, etc. The state should continue to look toward additional policies that reduce greenhouse gas emissions, offer economic development opportunities, and, in particular, address transportation emissions.

Regional, national, and international growth in energy consumption has eliminated much of the surplus energy supply in markets and this has led to higher, more volatile energy prices. While higher prices will encourage development of new sources and make energy efficiency improvements more cost-cost effective, energy markets are likely to remain volatile. There is growing awareness of the implications of greenhouse gas emissions on our climate and our quality of life. Energy consumption accounts for most of the greenhouse gas emissions in Washington. While the closure of aluminum smelters and other energy intensive industries led to a reduction in energy consumption in Washington from 1999 to 2002 and a significant decline in the energy intensity of the industrial sector, the energy intensity of the other sectors (residential, commercial, transportation) has not declined. These trends suggest that continued attention must be given to energy policies that reduce the risk to Washington consumers of higher energy prices, supply disruptions, and the environmental consequences of energy consumption.