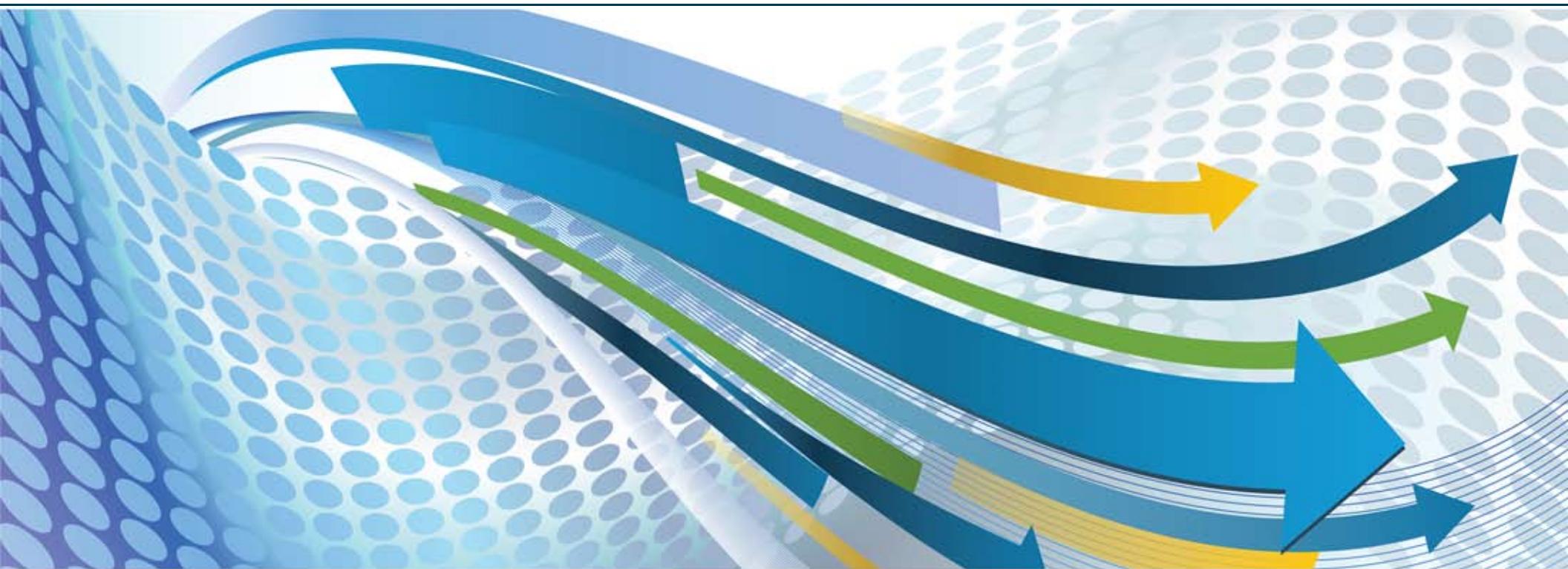


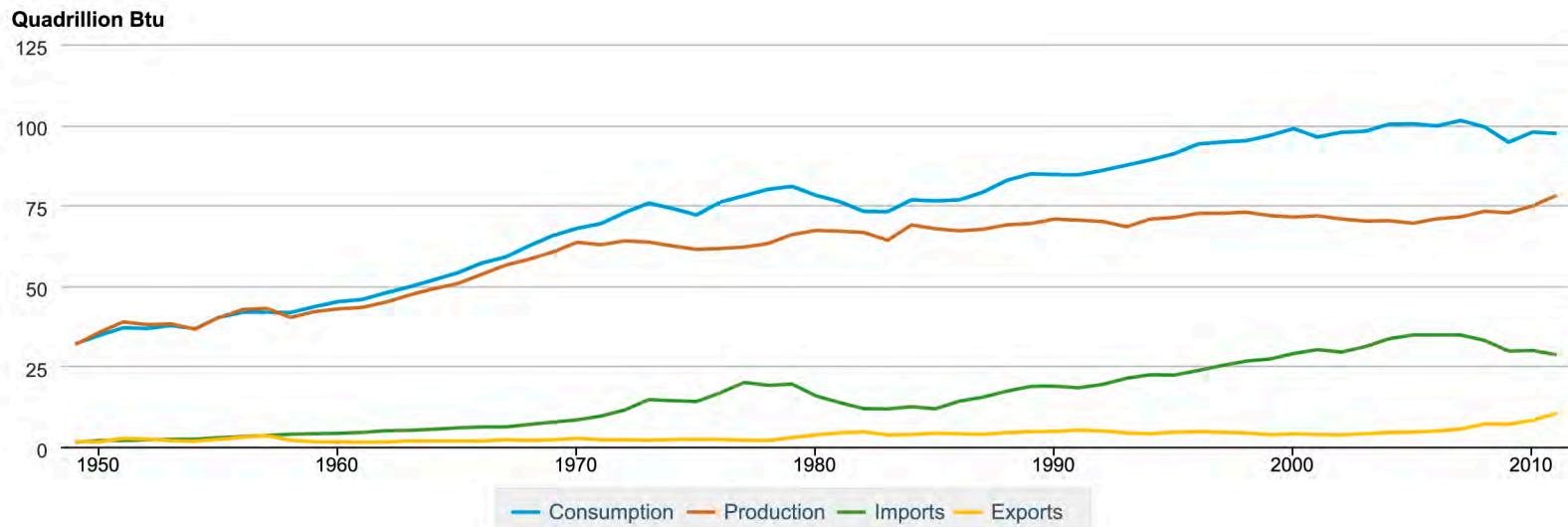
# Energy Perspectives 2011



*Independent Statistics & Analysis*  
U.S. Energy Information  
Administration

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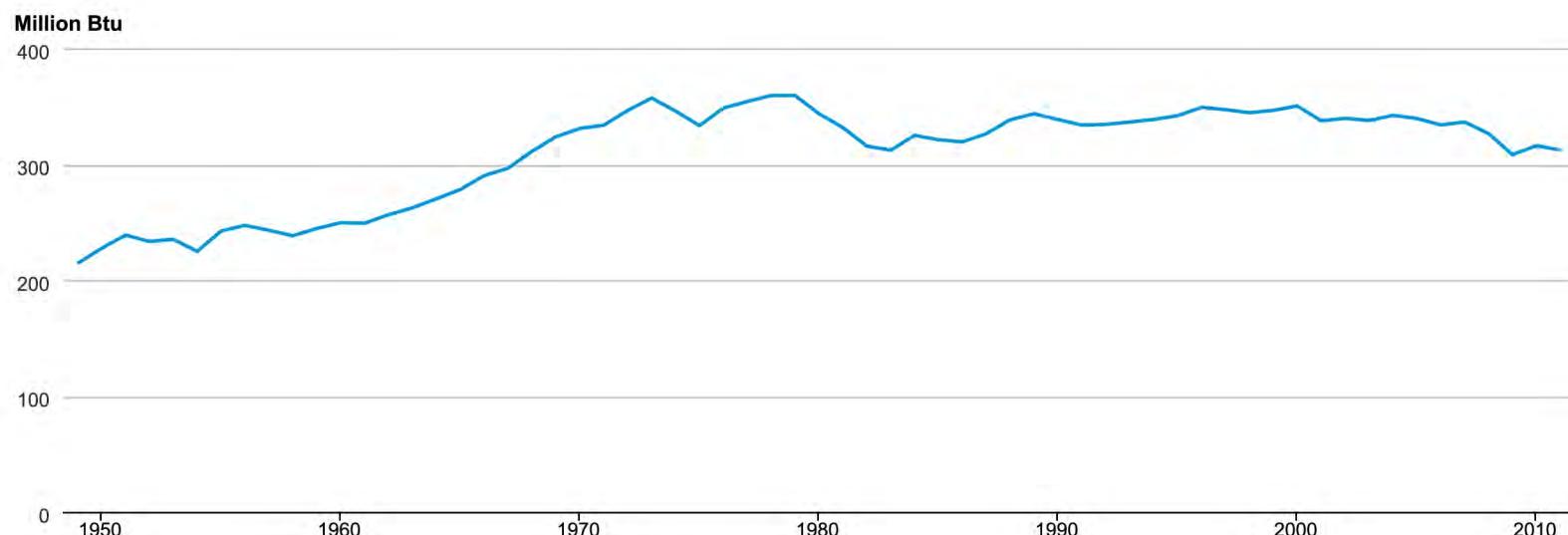
## 1. U.S. Primary Energy Production, Consumption, Imports, and Exports, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 1.1.

The United States was self-sufficient in energy until the late 1950s when energy consumption began to outpace domestic production. At that point, the Nation began to import more energy to meet its needs. Since 2007, energy imports have declined each year, except for a slight increase in 2010. Most of the imported energy was petroleum. In 2011, net imports (imports minus exports) accounted for 19 percent of all primary energy consumed.

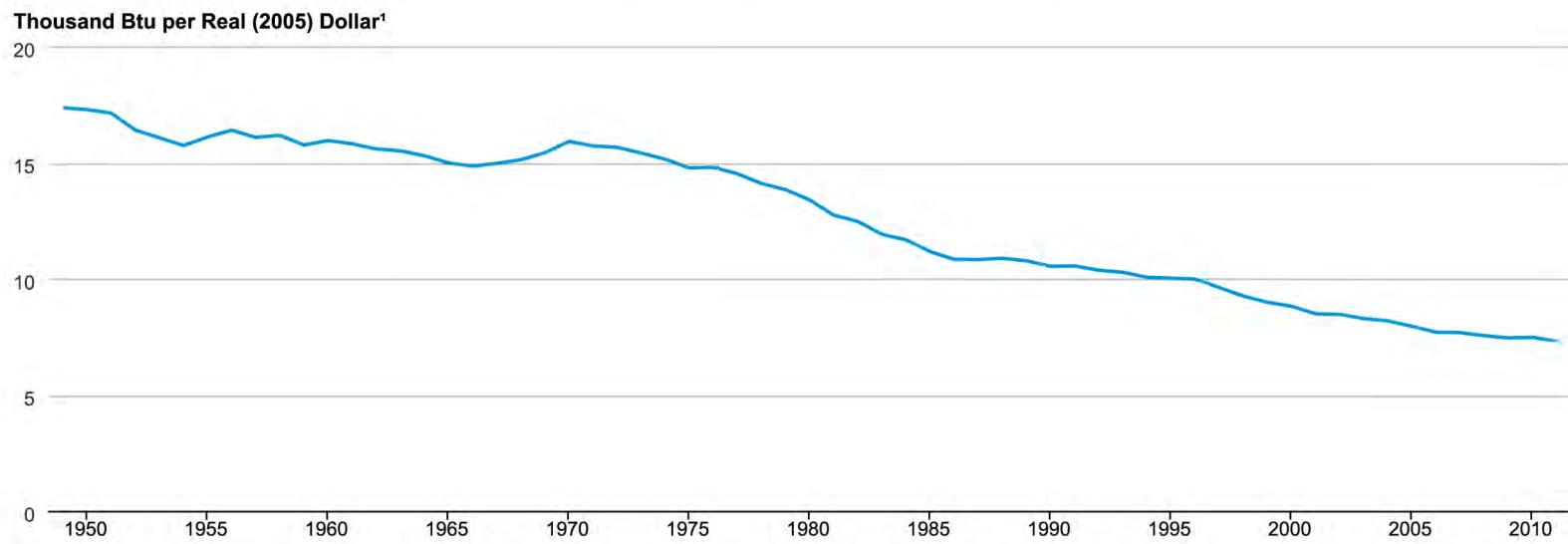
## 2. U.S. Primary Energy Consumption per Capita, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 1.5.

Energy use per capita was 214 million British thermal units (Btu) in 1949. The measure generally increased until the oil price shocks of the mid-1970s and early 1980s, when the trend reversed for a few years. Energy use per capita held fairly steady from 1988 until the 2008-2009 economic downturn. In 2011, per capita consumption of energy averaged 312 million Btu, 46 percent above the 1949 level.

### 3. U.S. Primary Energy Consumption per Real Dollar of Gross Domestic Product, 1949-2011

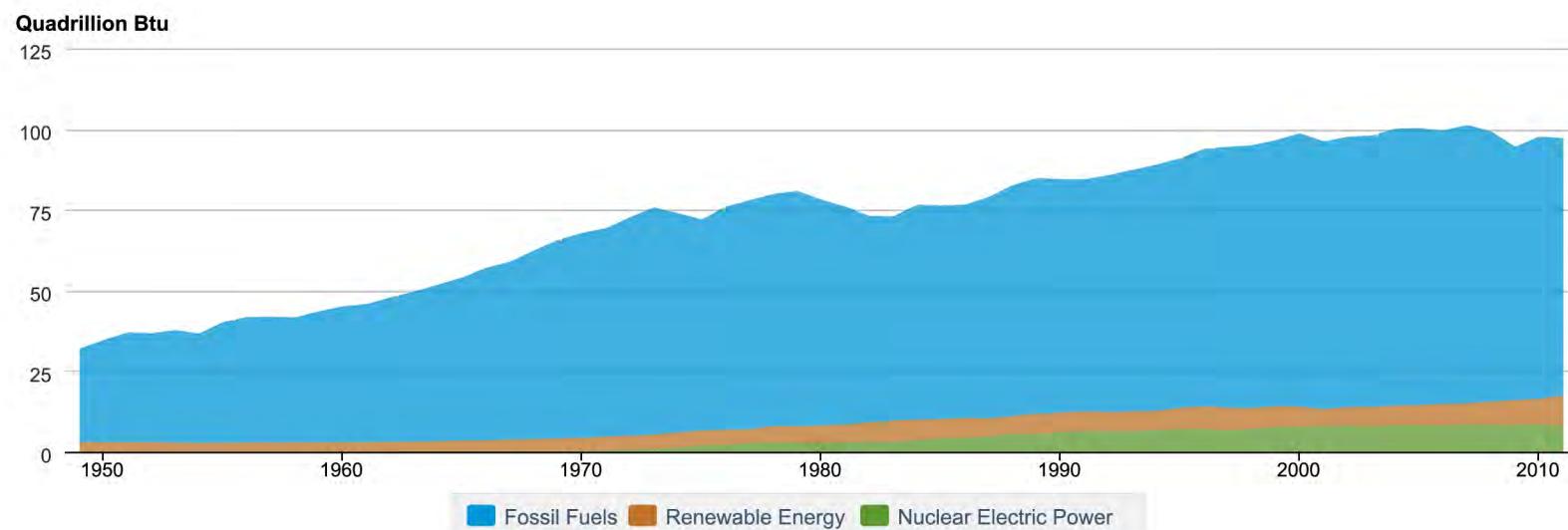


U.S. Energy Information Administration, *Annual Energy Review*, Table 1.5.

<sup>1</sup> In chained (2005) dollars, calculated by using gross domestic product implicit price deflators. See "Chained Dollars" in Glossary

After 1970, the amount of energy consumed to produce a dollar's worth of the Nation's output of goods and services trended down. The decline resulted from efficiency improvements and structural changes in the economy. The level in 2011 was 54 percent below that of 1970.

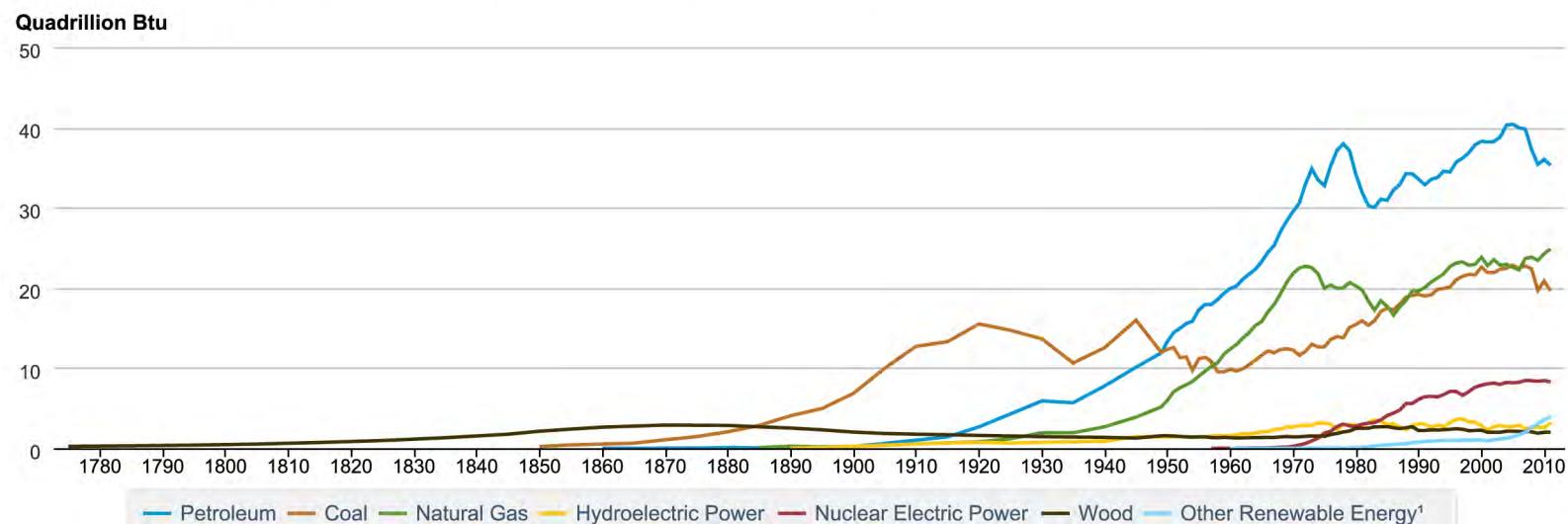
#### 4. U.S. Primary Energy Consumption Estimates by Major Source, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 1.3.

Most energy consumed in the United States comes from fossil fuels, with petroleum accounting for 36 percent of primary energy consumption in 2011, natural gas for 26 percent, and coal for 20 percent. Nuclear electric power accounted for 8 percent and renewable energy accounted for 9 percent.

## 5. U.S. Primary Energy Consumption Estimates by Source, 1775-2011

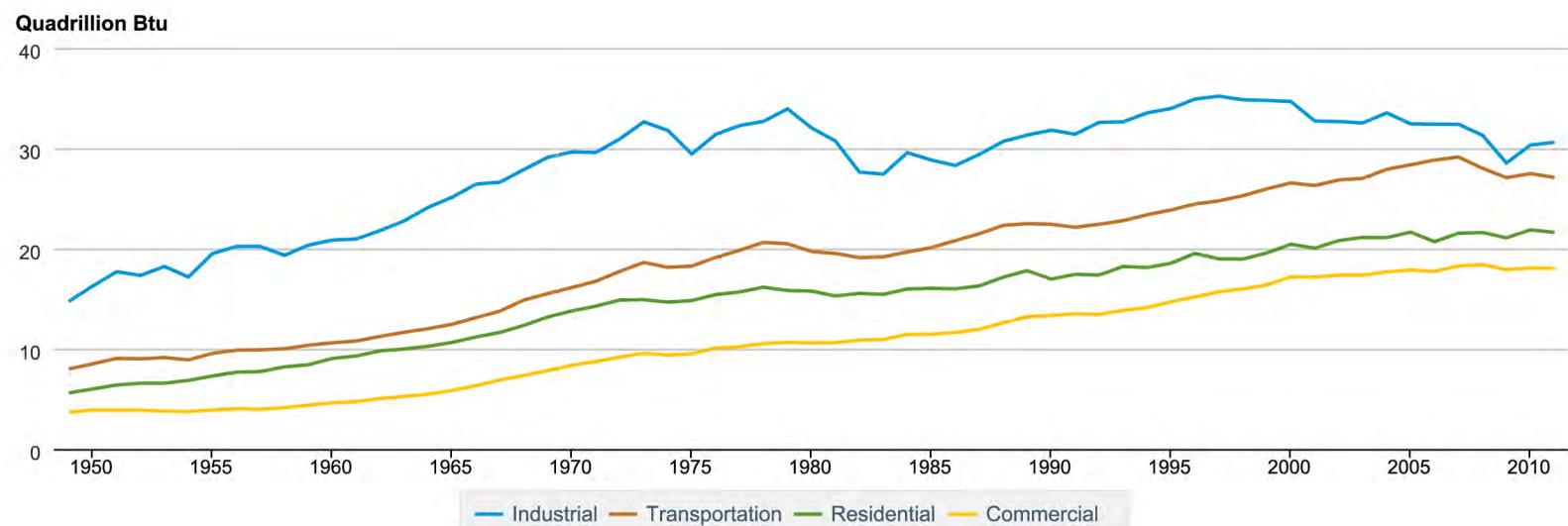


U.S. Energy Information Administration, *Annual Energy Review*, Tables 1.3, 10.1, and E1.

<sup>1</sup> Geothermal, solar/PV, wind, waste, and biofuels.

The Nation's energy history is one of large-scale change as new forms of energy were developed. Wood served as the primary form of energy until about 1885, when it was surpassed by coal. Despite its rapid expansion, coal was in turn overtaken by petroleum and natural gas in the 1950s. In the second half of the 20th century, natural gas experienced rapid development, and coal began to expand again. Late in the century, nuclear electric power and other renewable energy were developed and supplied significant amounts of energy. In recent years, natural gas consumption again surpassed coal, petroleum consumption declined, and consumption of other renewable energy grew rapidly.

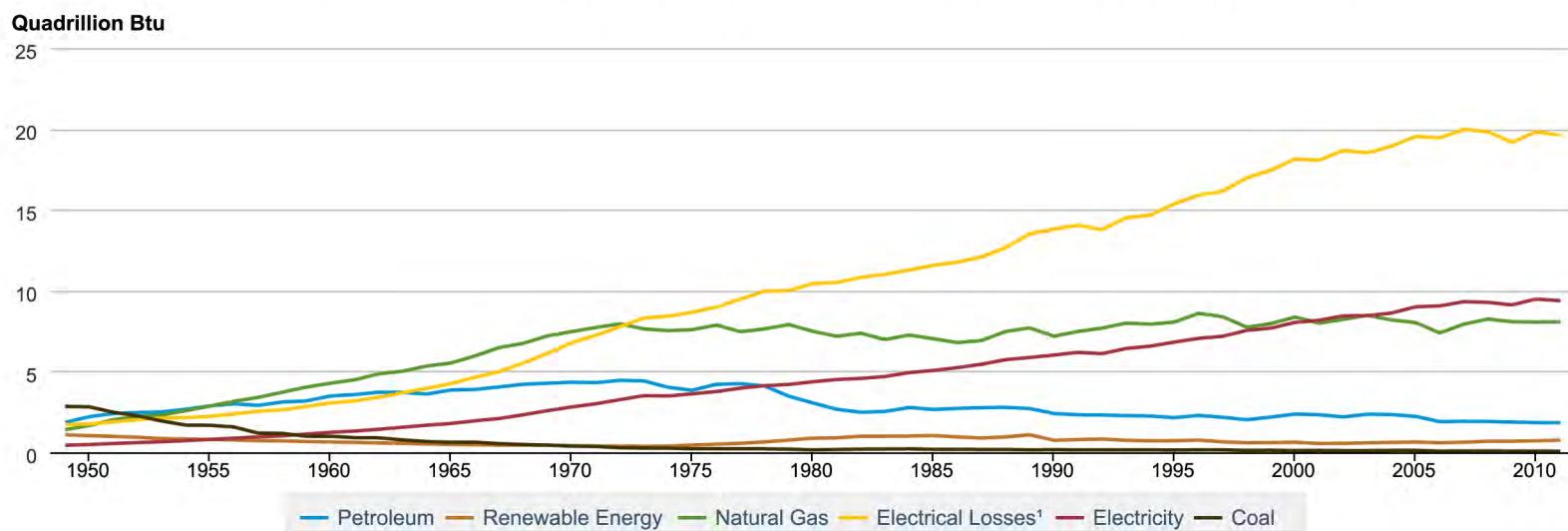
## 6. U.S. Total Energy Consumption Estimates by End-Use Sector, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 2.1a.

Energy use in all four major end-use sectors of the economy grew fairly rapidly from 1949 until the early 1970s. Since then, industrial use has fluctuated but has not shown a continuing long-term increase. The other sectors have continued to grow, although transportation use declined in the last few years.

## 7. U.S. Residential and Commercial Sector Total Energy Consumption Estimates by Major Source, 1949-2011

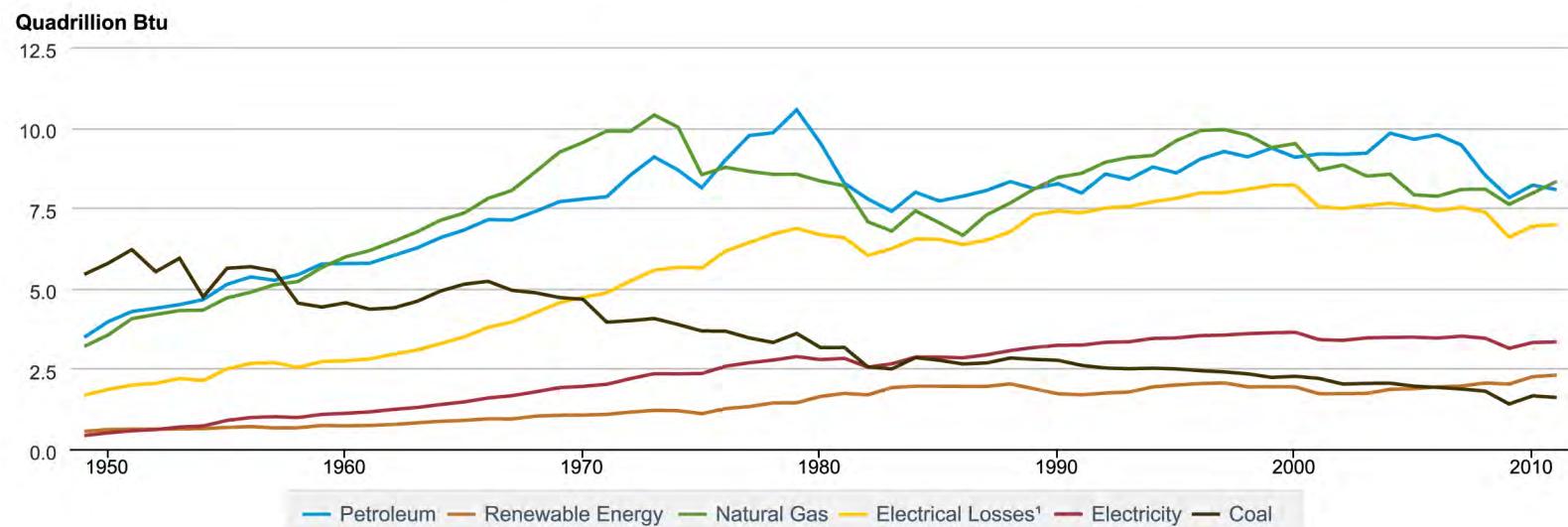


U.S. Energy Information Administration, *Annual Energy Review*, Tables 2.1b and 2.1c.

<sup>1</sup> Electrical system energy losses associated with the generation, transmission, and distribution of energy in the form of electricity. Total electrical system energy losses are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales.

In the 1950s and 1960s, coal, which had been an important energy source for residential and commercial consumers, was gradually replaced by other forms of energy. Petroleum consumption in those sectors peaked in the early 1970s. Natural gas consumption in those sectors grew rapidly until the early 1970s, and then, with mild fluctuations, held fairly steady in the following years. Throughout most of the 1949-to-2011 period, electricity use (and related losses) expanded rapidly.

## 8. U.S. Industrial Sector Total Energy Consumption Estimates by Major Source, 1949-2011

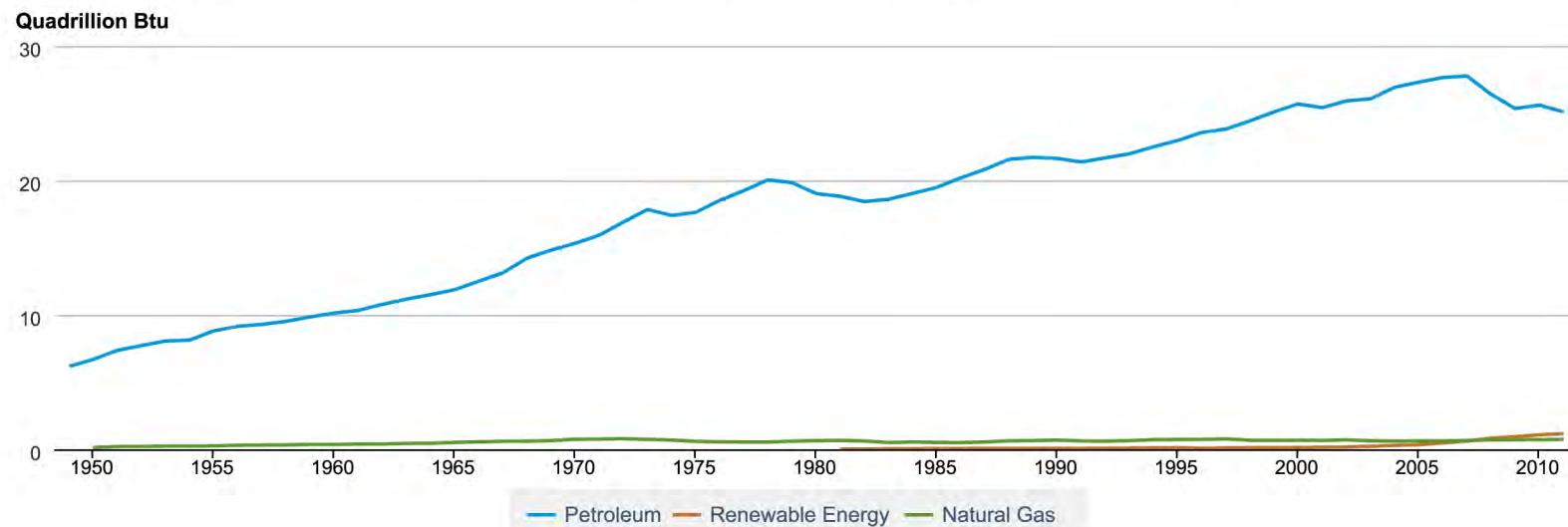


U.S. Energy Information Administration, *Annual Energy Review*, Table 2.1d.

<sup>1</sup> Electrical system energy losses associated with the generation, transmission, and distribution of energy in the form of electricity. Total electrical system energy losses are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales.

Petroleum and natural gas were the predominant forms of energy used in the industrial sector from 1958 (when they both surpassed coal) to 2011. Both natural gas and petroleum use expanded rapidly until the early 1970s, and then fluctuated over the following decades. Electricity consumption in the industrial sector exceeded coal consumption beginning in 1983, and renewable energy (primarily biomass) overtook coal in 2007.

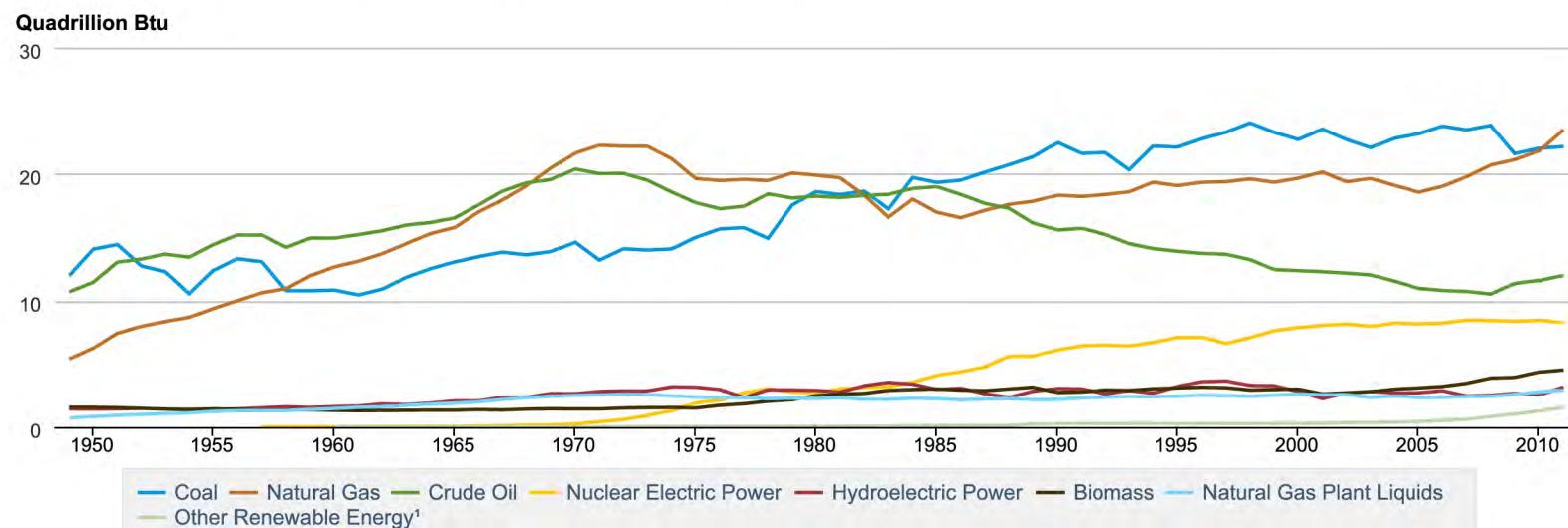
## 9. U.S. Transportation Sector Total Energy Consumption Estimates by Major Source, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 2.1e.

Transportation sector use of energy experienced strong growth overall through 2007; however, there were year-to-year declines, particularly in the early 1980s. Transportation energy use has remained well below its 2007 peak level over the last four years. Throughout the 1949-to-2011 period, petroleum supplied most of the demand for transportation energy; in 2011, petroleum accounted for 93 percent of the transportation sector's total use of energy. Natural gas and renewable energy (fuel ethanol and biodiesel) accounted for most of the remainder.

## 10. U.S. Primary Energy Production by Major Source, 1949-2011

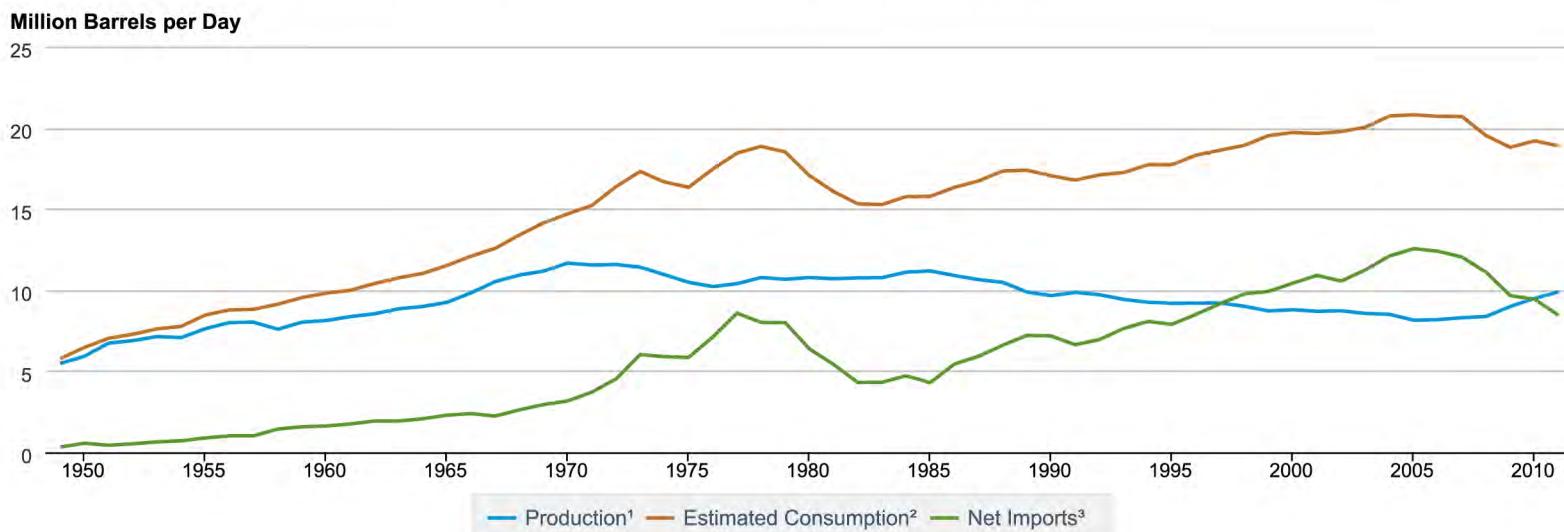


U.S. Energy Information Administration, *Annual Energy Review*, Table 1.2.

<sup>1</sup> Geothermal, solar/PV, and wind.

Since 1949, most energy produced in the United States has come from fossil fuels—coal, natural gas, and crude oil. Coal, the leading energy source at the middle of the 20th century, was surpassed by crude oil and then by natural gas. By the mid-1980s, coal again became the leading energy source produced in the United States, and crude oil declined sharply. In the 1970s, electricity produced from nuclear fuel began to make a significant contribution and expanded rapidly in the following decades. From 2001 to 2011, biomass production rose 72 percent. In 2011, natural gas production exceeded coal production for the first time since 1981.

## 11. U.S. Petroleum and Other Liquids Production, Estimated Consumption, and Net Imports, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 5.1a.

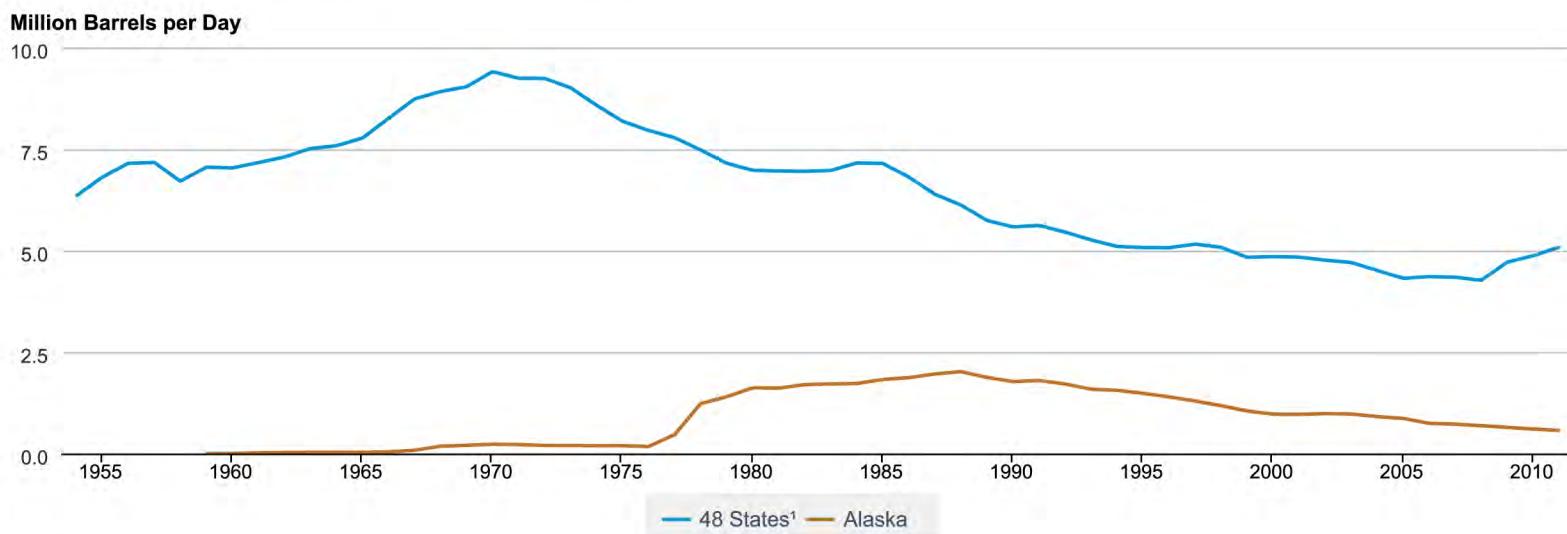
<sup>1</sup> Crude oil (including lease condensate) production; natural gas plant liquids production; processing gain (refinery and blender net production minus refinery and blender net inputs); fuel ethanol (minus denaturant) production; and biodiesel production.

<sup>2</sup> Includes estimated consumption of petroleum, fuel ethanol, and biodiesel. For petroleum, product supplied is used as an approximation of consumption.

<sup>3</sup> Includes net imports of petroleum (excluding biofuels), fuel ethanol (minus denaturant), biodiesel, and a small amount of other biofuels.

Estimated U.S. consumption of petroleum and other liquids more than tripled from 1949 through 2011. From 1970 through 2005, U.S. production fell or remained relatively flat, leading to increased net import levels; production rose each year from 2006 to 2011. Over the 1949-through-2011 period, net imports of petroleum and other liquids rose from 0.3 million barrels per day to a peak of 12.5 million barrels per day in 2005, but have declined since that time as production has risen and consumption has declined.

## 12. 48 States<sup>1</sup> and Alaskan Crude Oil Production, 1954-2011

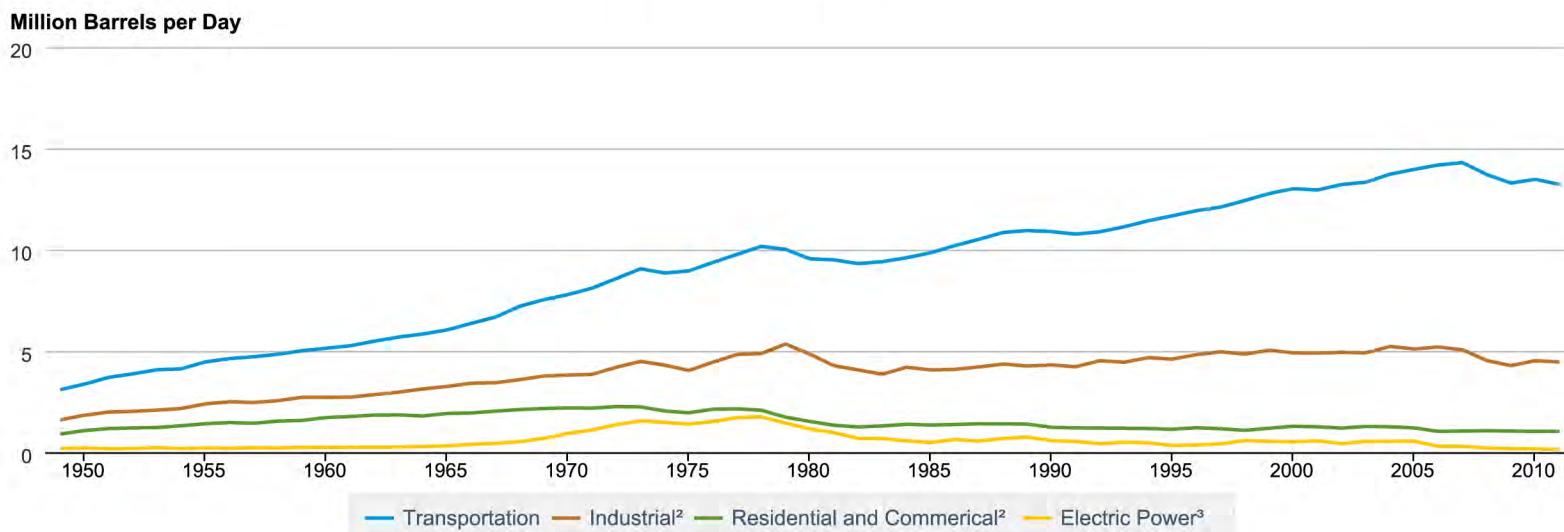


U.S. Energy Information Administration, *Annual Energy Review*, Table 5.2.

<sup>1</sup> United States excluding Alaska and Hawaii.

Crude oil production peaked in the lower 48 States at 9.4 million barrels per day in 1970. As production fell in the lower 48 States, Alaska's production came online and helped supply U.S. needs, although it did not stem the downward trend in overall production. In 2011, Alaska's production was 0.6 million barrels per day, less than one third of its highest level in 1988. Production in the lower 48 States rose for the third year in a row and totaled 5.1 million barrels per day in 2011.

### 13. U.S. Petroleum Consumption<sup>1</sup> Estimates by Sector, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Tables 5.13a , 5.13b , 5.13c , 5.13d.

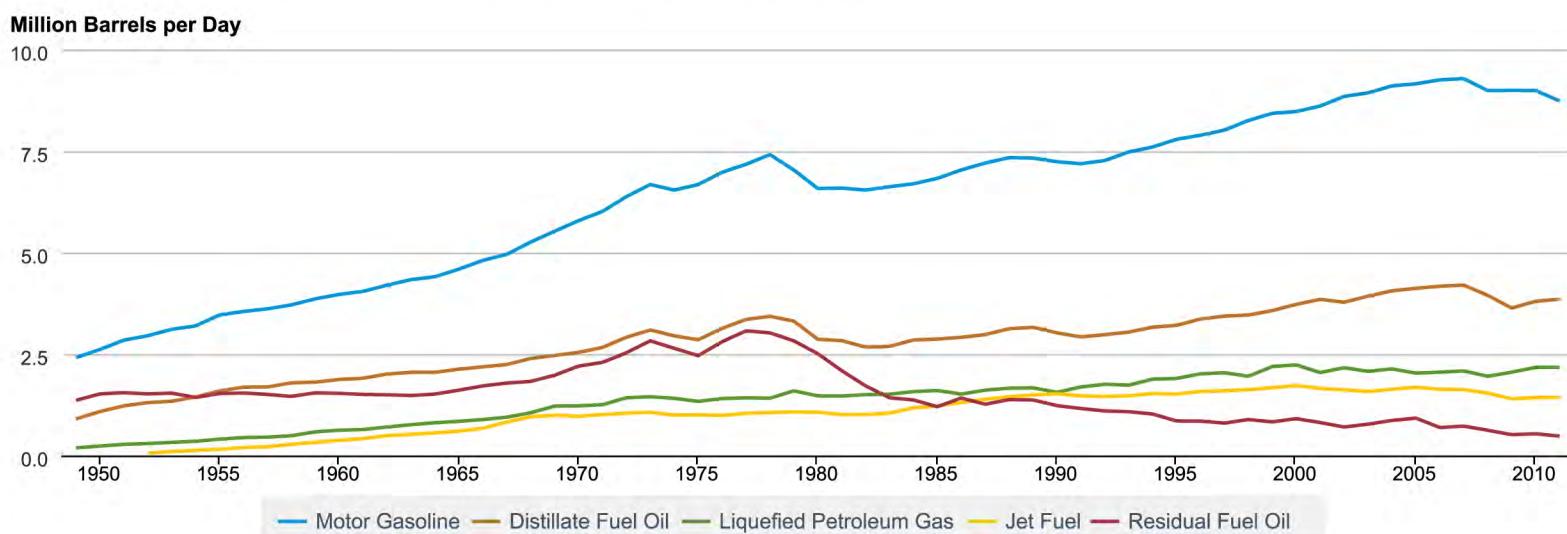
<sup>1</sup> For petroleum, product supplied is used as an approximation of petroleum consumption, which includes fuel ethanol, biodiesel, and other renewable fuels blended into petroleum.

<sup>2</sup> Includes combined-heat-and-power plants and a small number of electricity-only plants.

<sup>3</sup> Electricity-only and combined-heat-and-power plants whose primary business is to sell electricity, or electricity and heat, to the public.

Since 1949, transportation has been the largest consuming sector for petroleum and has shown the most growth. In 2011, 13.2 million barrels per day of petroleum were consumed for transportation purposes, accounting for 70 percent of estimated petroleum consumption.

#### 14. U.S. Petroleum Consumption<sup>1</sup> Estimates by Selected Product, 1949-2011

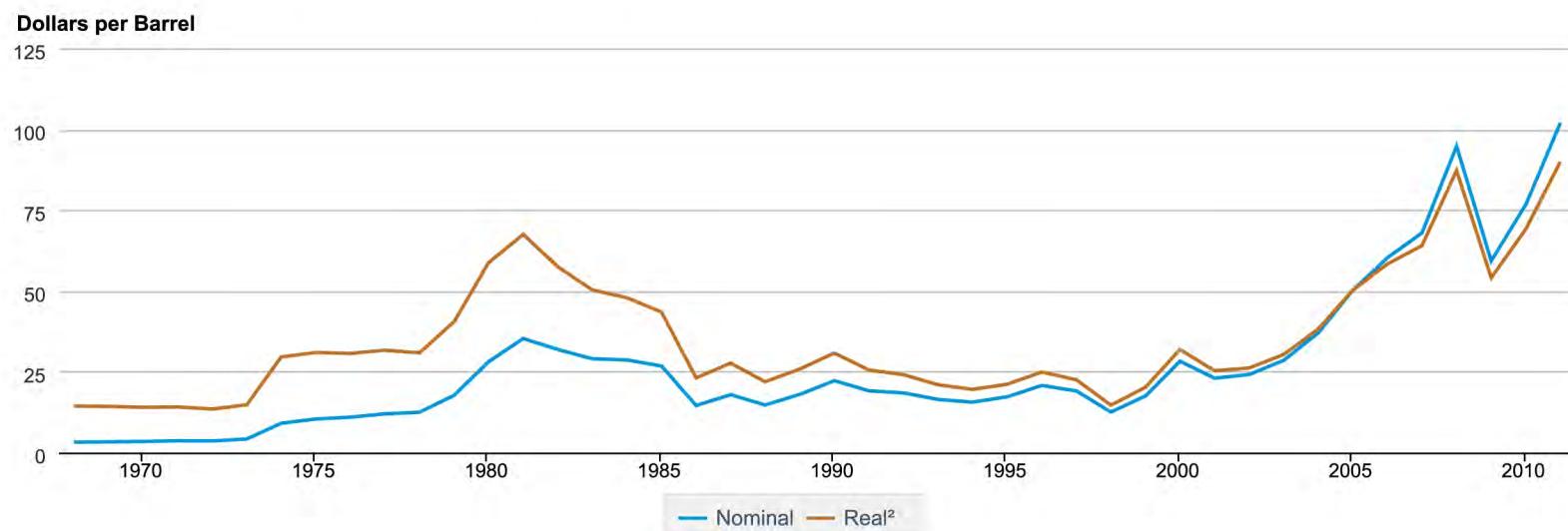


U.S. Energy Information Administration, *Annual Energy Review*, Table 5.11.

<sup>1</sup> For petroleum, product supplied is used as an approximation of petroleum consumption, which includes fuel ethanol, biodiesel, and other renewable fuels blended into petroleum.

Motor gasoline is the single largest petroleum product consumed in the United States. Its consumption, including volumes of blended ethanol, was 8.7 million barrels per day in 2011, 46 percent of all petroleum consumption. Distillate fuel oil (including diesel fuel), liquefied petroleum gases (LPG), and jet fuel together accounted for 40 percent of petroleum consumption in 2011. Although residual fuel oil made up a larger share in earlier years, its use fell sharply from 1977 to 1985 and, in 2011, it accounted for less than 3 percent of petroleum consumption.

## 15. U.S. Refiner Acquisition Cost<sup>1</sup> of Crude Oil, 1968-2011



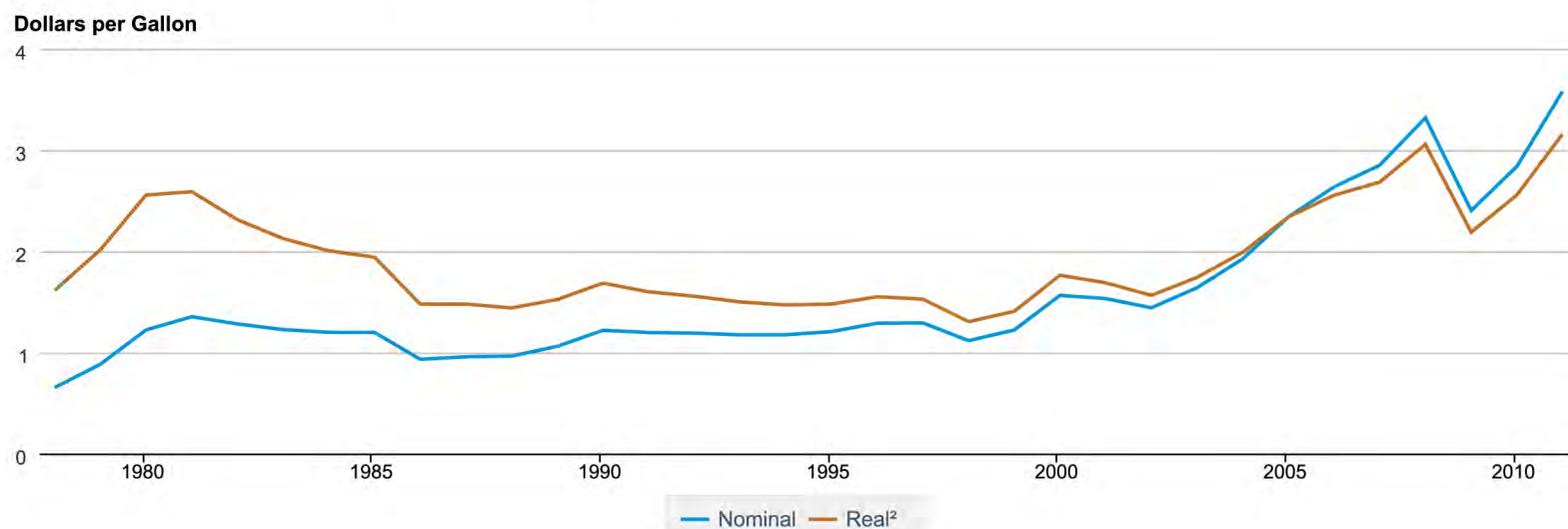
U.S. Energy Information Administration, *Annual Energy Review*, Table 5.21.

<sup>1</sup> Composite of domestic and imported crude oil.

<sup>2</sup> In chained (2005) dollars, calculated by using gross domestic product implicit price deflators. See "Chained Dollars" in Glossary.

In 1981, the crude oil composite refiner acquisition cost in real dollars (adjusted for inflation) reached \$67.42 per barrel. Over the years that followed, the real cost fell dramatically to a low of \$14.63 per barrel in 1998 before rising again. The preliminary real cost reported for 2011 was \$89.92 per barrel, an increase of 30 percent from the previous year.

## 16. Motor Gasoline<sup>1</sup> Retail Prices, U.S. City Average, 1978-2011



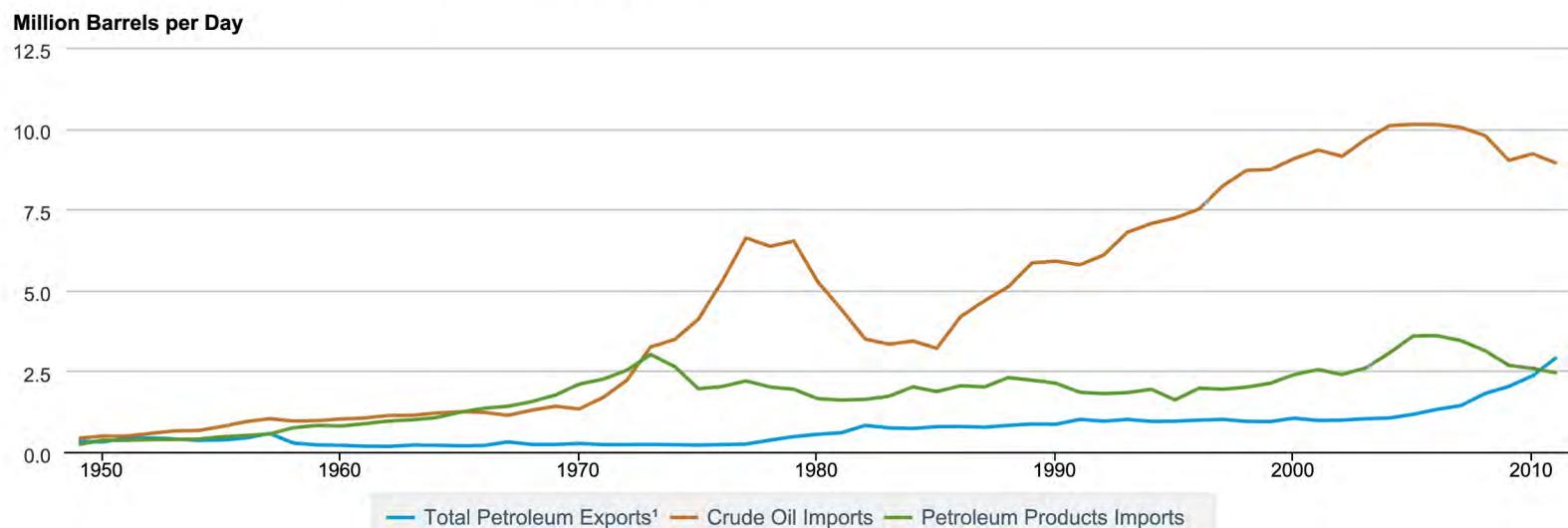
U.S. Energy Information Administration, *Annual Energy Review*, Table 5.24.

<sup>1</sup> All grades.

<sup>2</sup> In chained (2005) dollars, calculated by using gross domestic product implicit price deflators. See "Chained Dollars" in Glossary.

In 1978, the motor gasoline price in real dollars (adjusted for inflation) reached an average of \$1.61 per gallon. The 2011 average real price of \$3.16 was 96 percent higher. In nominal dollars (unadjusted for inflation), Americans paid an average of 65 cents per gallon for motor gasoline in 1978 and \$3.58 in 2011.

## 17. U.S. Petroleum Imports and Exports, 1949-2011

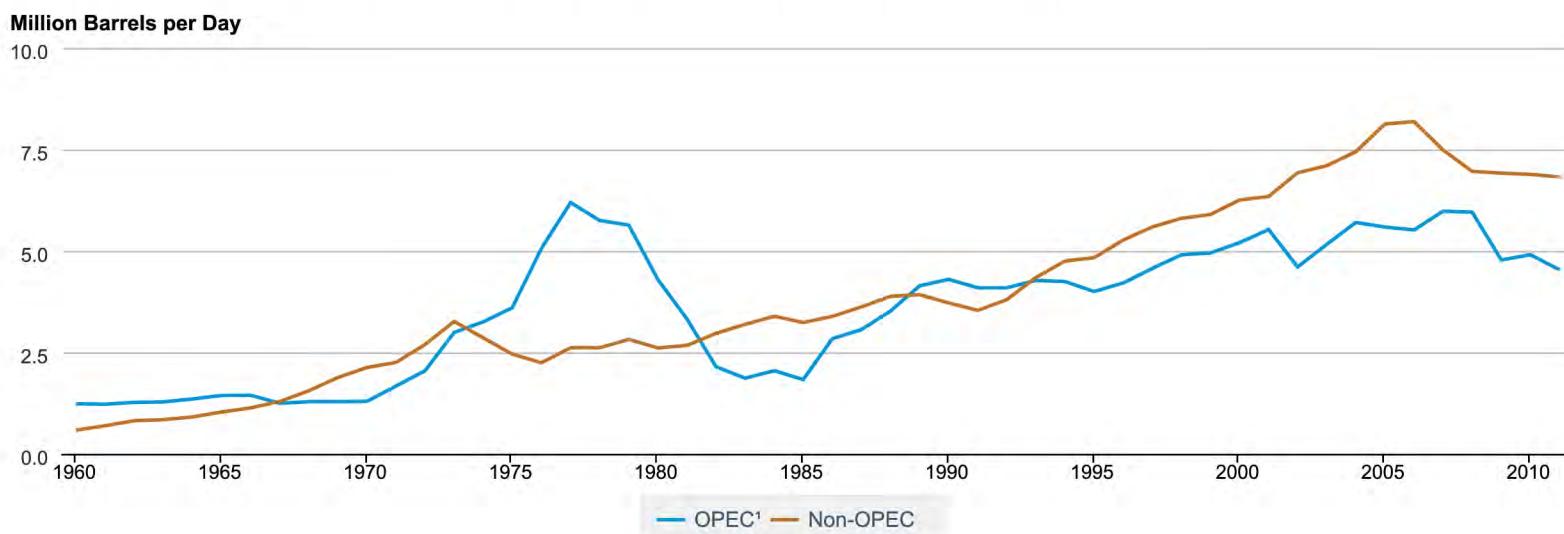


U.S. Energy Information Administration, *Annual Energy Review*, Tables 5.3 and 5.5.

<sup>1</sup> Crude oil and petroleum products.

U.S. crude oil imports grew rapidly from the mid-20th century until the late 1970s but fell sharply from 1979 to 1985. Crude oil imports more than tripled from 1985 to 2005, reaching an all-time high of 10.1 million barrels per day in 2005. In 2011, crude oil imports were 8.9 million barrels per day, 3 percent below the 2010 level, and petroleum product imports were 2.4 million barrels per day. Total petroleum exports (crude oil and petroleum products) increased 24 percent to 2.9 million barrels per day, led by a 62-percent increase in motor gasoline exports. In 2011, the United States was a net exporter of petroleum products for the first time since 1949.

## 18. U.S. Petroleum Imports From OPEC<sup>1</sup> and Non-OPEC Countries, 1960-2011

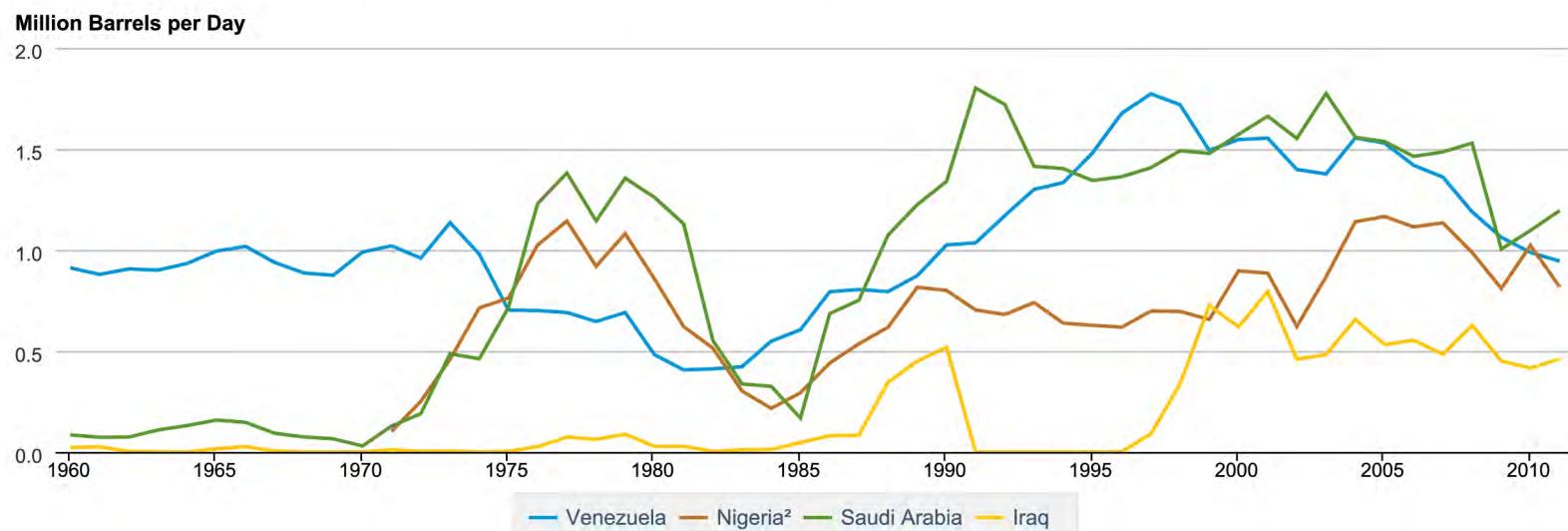


U.S. Energy Information Administration, *Annual Energy Review*, Table 5.4.

<sup>1</sup> OPEC = Organization of the Petroleum Exporting Countries.

U.S. petroleum imports rose sharply in the 1970s, and reliance on petroleum from the Organization of the Petroleum Exporting Countries (OPEC) grew. In 2011, 40 percent of U.S. petroleum imports came from OPEC countries, down from 70 percent in 1977. After 1992, more petroleum came into the United States from non-OPEC countries, primarily Canada and Mexico, than from OPEC countries.

## 19. U.S. Petroleum Imports From Selected OPEC<sup>1</sup> Countries, 1960-2011



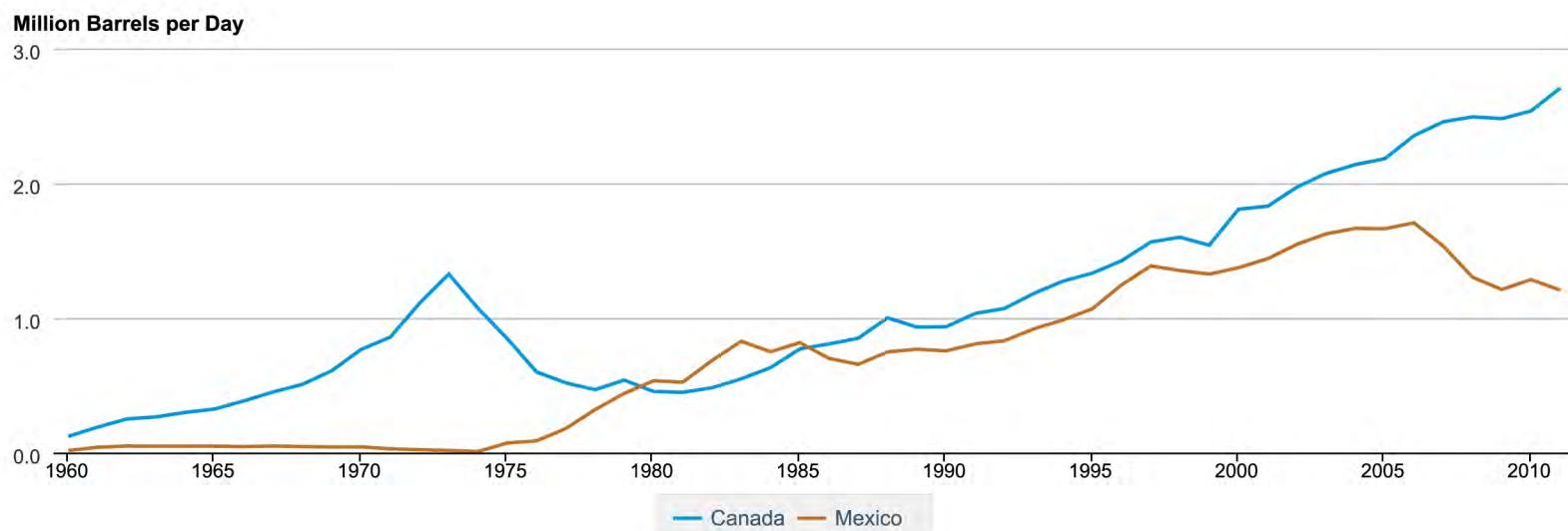
U.S. Energy Information Administration, *Annual Energy Review*, Table 5.4.

<sup>1</sup> OPEC = Organization of the Petroleum Exporting Countries.

<sup>2</sup> On this graph, imports from Nigeria are shown beginning in 1971, when Nigeria joined OPEC.

Among OPEC countries, Saudi Arabia, Venezuela, and Nigeria—nations from three different continents—were key suppliers of petroleum to the U.S. market. Each experienced wide fluctuations in the amount of petroleum it sold to the United States over time. Over the last 15 years, Iraq has also been a significant OPEC supplier of petroleum to the United States. In 2011, imports from those four OPEC countries made up 30 percent of petroleum imports into the United States.

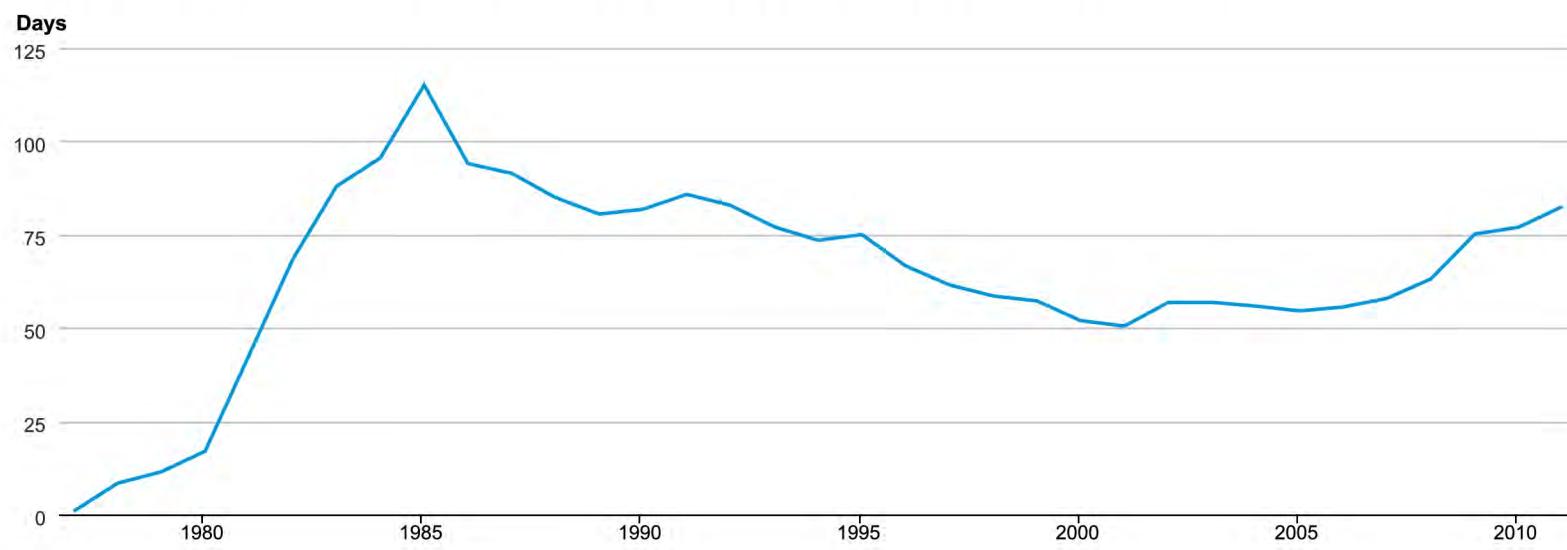
## 20. U.S. Petroleum Imports From Canada and Mexico, 1960-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 5.4.

In 2011, Canada and Mexico were the two largest suppliers of petroleum to the United States; imports from Canada reached a new high of 2.7 million barrels per day. Imports from Mexico began to play a key role in U.S. supplies in the mid-1970s. Canadian and Mexican petroleum imports together accounted for 34 percent of all U.S. petroleum imports in 2011.

## 21. U.S. Strategic Petroleum Reserve Stocks as Days of Petroleum Net Imports,<sup>1</sup> 1977-2011

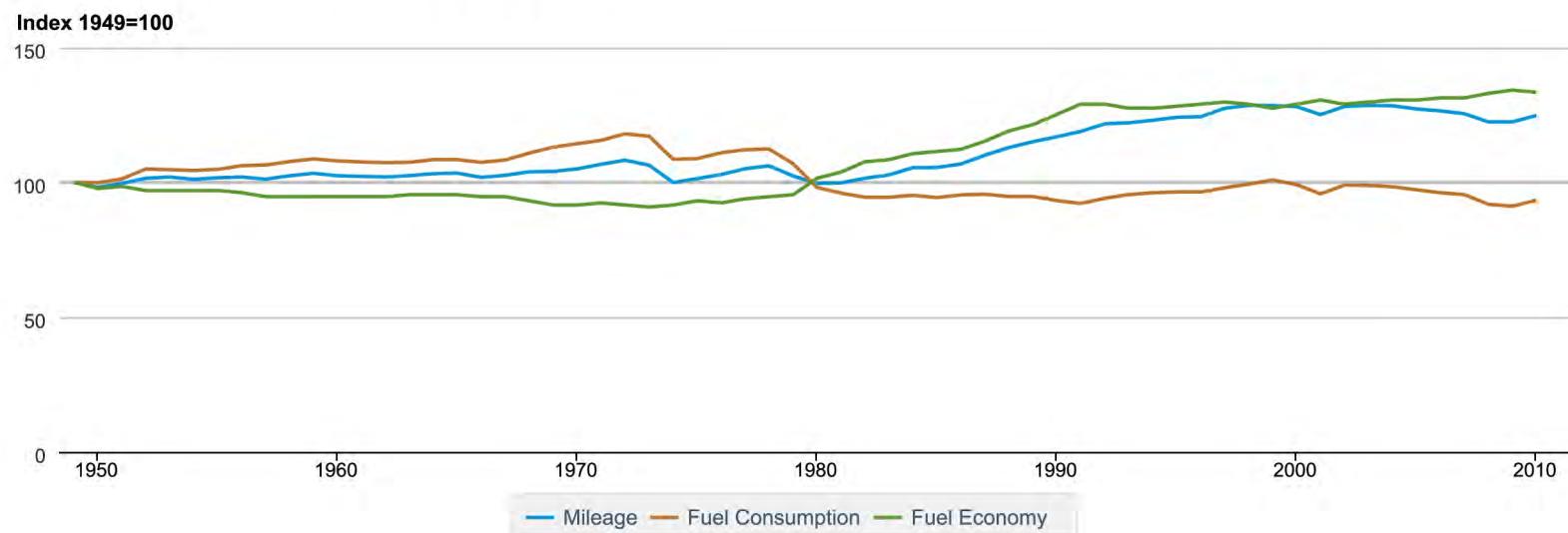


U.S. Energy Information Administration, *Annual Energy Review*, Table 5.17.

<sup>1</sup> Derived by dividing end-of-year Strategic Petroleum Reserve stocks by annual average daily net imports of all petroleum.

A common way of measuring the stocks of petroleum held in the U.S. Strategic Petroleum Reserve (SPR) is by equivalent days of net petroleum imports. The peak level occurred in 1985 when the SPR stocks were equivalent to 115 days of petroleum net imports at the 1985 level. Subsequently, the rate trended downward to a low of 50 days in 2001. At the end of 2011, the SPR held the equivalent of 82 days of net petroleum imports.

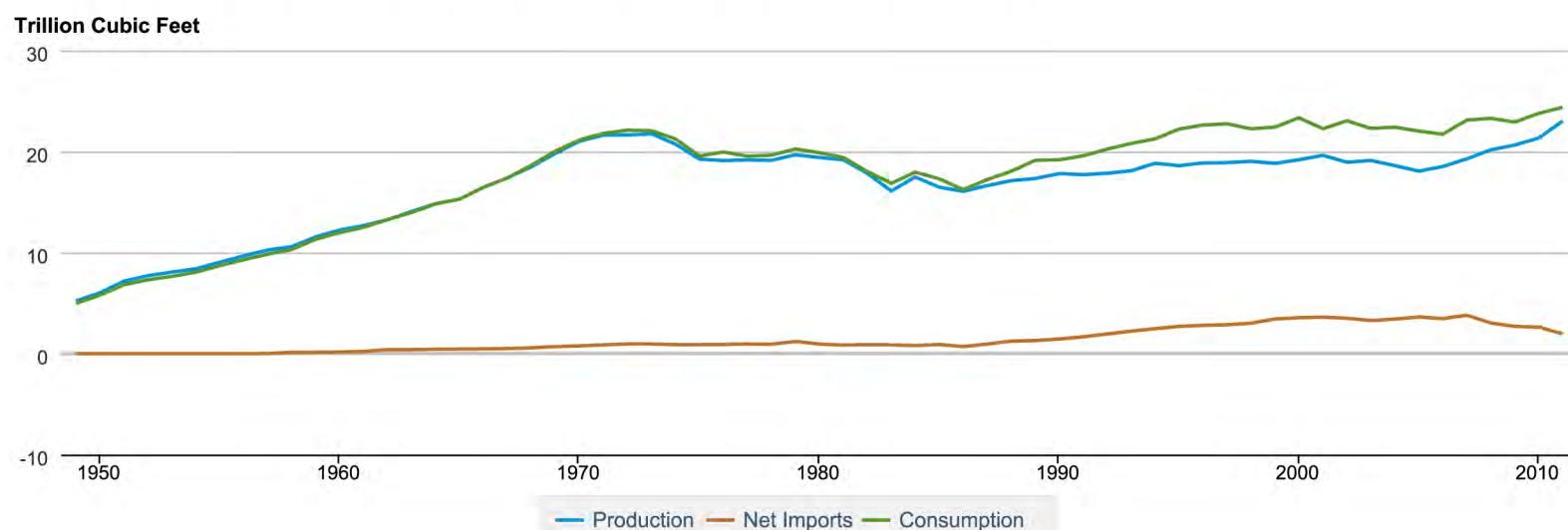
## 22. U.S. Motor Vehicle Indicators, 1949-2010



U.S. Energy Information Administration, *Annual Energy Review*, Table 2.8.

The average fuel economy (miles per gallon) for all motor vehicles rose 42 percent from 1973 to 1991, when it reached 16.9 miles per gallon (mpg). It grew modestly in subsequent years, reaching 17.5 mpg in 2010. Mileage (annual miles traveled per vehicle) grew steadily from an average of 9,500 miles per vehicle in 1980 to 12,200 miles per vehicle in 1998, and then remained near 12,000 miles per vehicle per year through 2010. Average annual fuel consumption for all motor vehicles fell during the 1970s and 1980s, increased slightly through the 1990s, and trended downward from 2003 to 2009, when it fell to 661 gallons per vehicle, the lowest level during the 1949-to-2010 period.

### 23. U.S. Natural Gas Production, Consumption, and Net Imports, 1949-2011

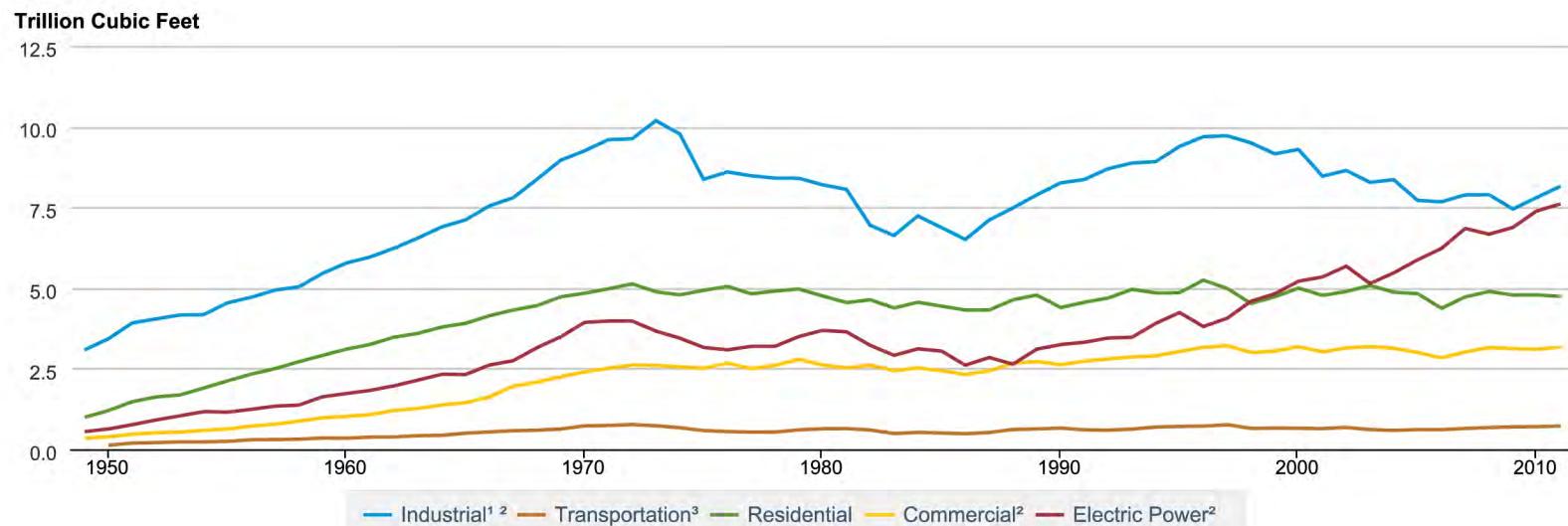


U.S. Energy Information Administration, *Annual Energy Review*, Table 6.1.

Note: All volumes are dry natural gas.

U.S. natural gas production and consumption were nearly equal through 1986. After that, consumption began to outpace production, and imports of natural gas rose to meet U.S. demand. More recently, net imports have declined as natural gas production increased by 24 percent from 2006 through 2011. In 2011, production was 23.0 trillion cubic feet, net imports 1.9 trillion cubic feet, and consumption 24.4 trillion cubic feet.

## 24. U.S. Natural Gas Consumption by Sector, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 6.5.

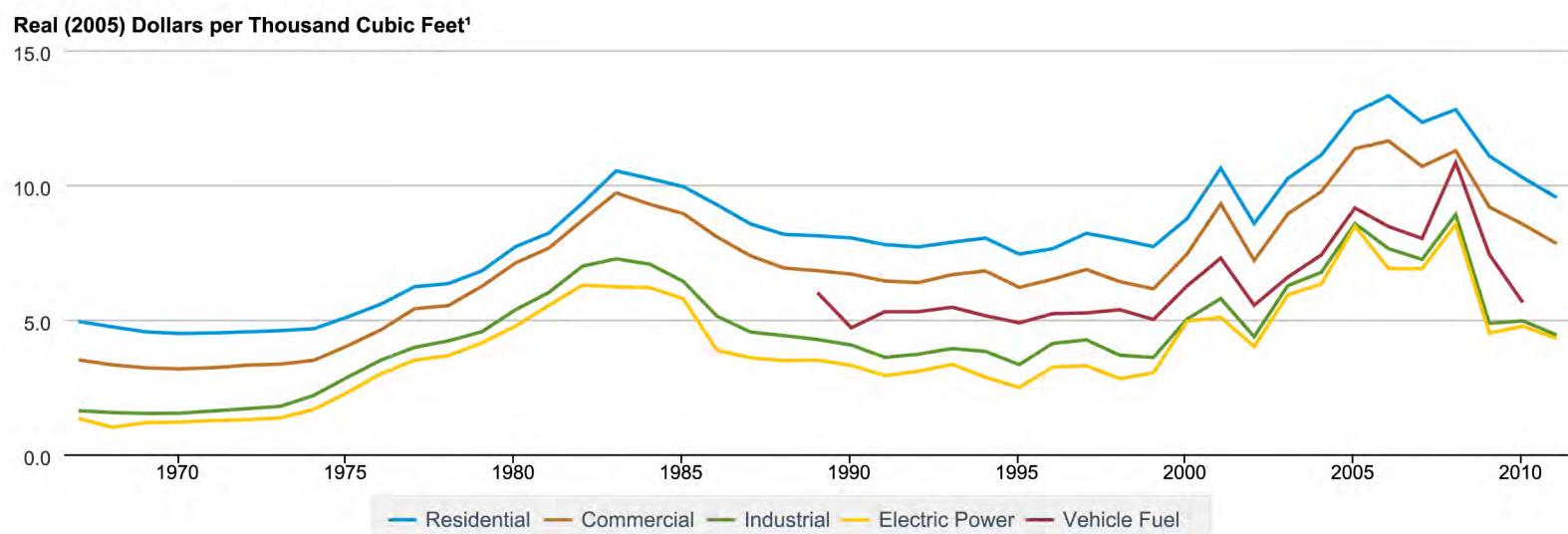
<sup>1</sup> Lease and plant fuel, and other industrial.

<sup>2</sup> The commercial and Industrial sectors include combined-heat-and-power plants and a small number of electricity-only plants, whereas the Electric Power sector is electricity-only and combined-heat-and-power plants whose primary business is to sell electricity, or electricity and heat, to the public.

<sup>3</sup> Natural gas consumed in the operation of pipelines (primarily in compressors), and as fuel in the delivery of natural gas to consumers; plus a small quantity used as vehicle fuel.

Natural gas consumption by the electric power sector rose 188 percent from 1988 to 2011, making electric power the second largest natural gas consuming sector by 1998. Throughout the 1949-2011 period, however, the industrial sector consumed more natural gas than any other sector. Industrial consumption varied according to several factors, including overall industrial output, the price of substitute fuels, and gains in process efficiencies. In 2011, the industrial sector accounted for 33 percent of natural gas consumption, and the electric power sector accounted for 31 percent.

## 25. U.S. Natural Gas Real Prices by Sector, 1967-2011

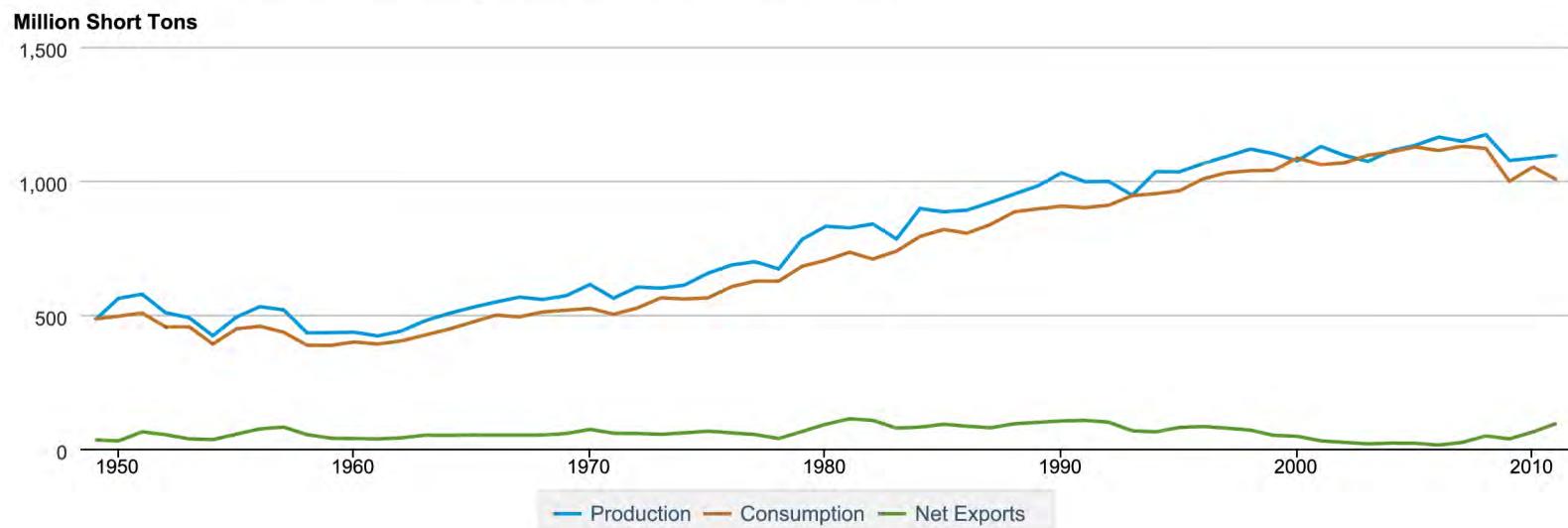


U.S. Energy Information Administration, *Annual Energy Review*, Table 6.8.

<sup>1</sup> In chained (2005) dollars, calculated by using gross domestic product implicit price deflators. See "Chained Dollars" in Glossary.

Adjusted for inflation, natural gas prices in the different sectors of the economy generally rose and fell in unison. Because residential and commercial natural gas prices were based on higher per unit charges for lower usage, they were higher than industrial and electric power sector prices in every year from 1967 to 2011. From 2008 to 2011, real prices fell 25 percent in the residential sector, 31 percent in the commercial sector, and 50 percent in the industrial and electric power sectors.

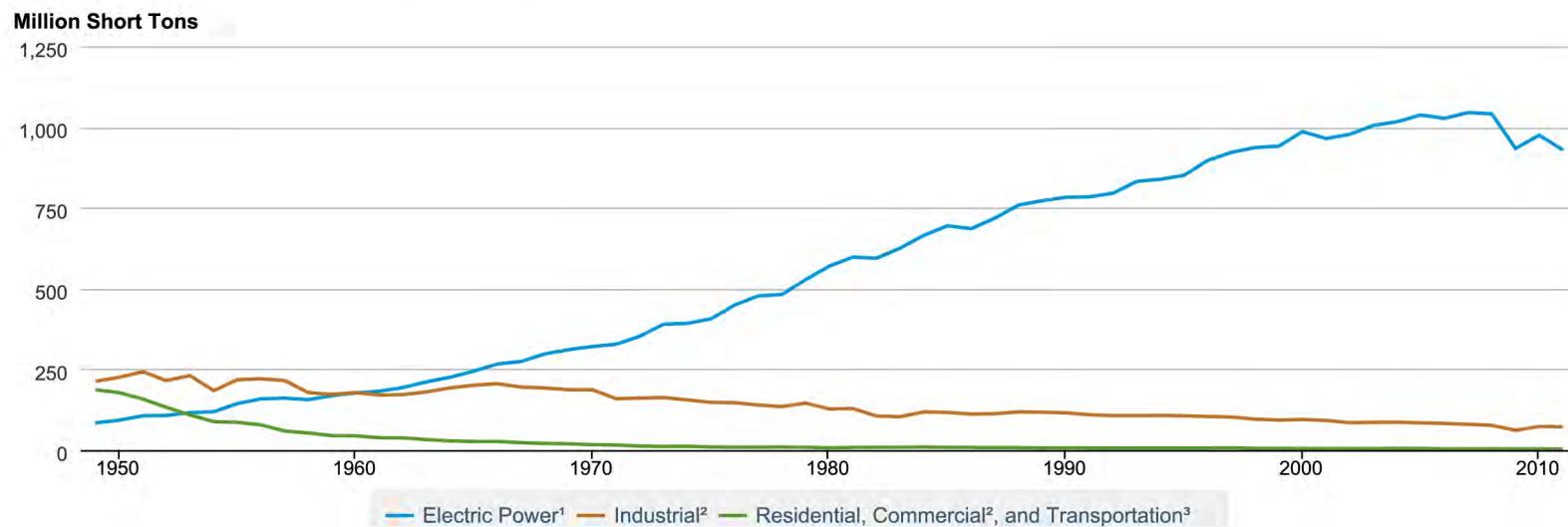
## 26. U.S. Coal Production, Consumption, and Net Exports, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 7.1.

Historically, U.S. coal production usually surpassed U.S. coal consumption. In 2004 and 2005, however, production and consumption were essentially in balance at 1.11 billion short tons and 1.13 billion short tons, respectively. From 2006 through 2011, coal production again exceeded consumption. In 2006, coal net exports reached their lowest level in the 1949-2011 period. Net exports were 94 million short tons in 2011, the highest they have been since 1992.

## 27. U.S. Coal Consumption by Sector, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 7.3.

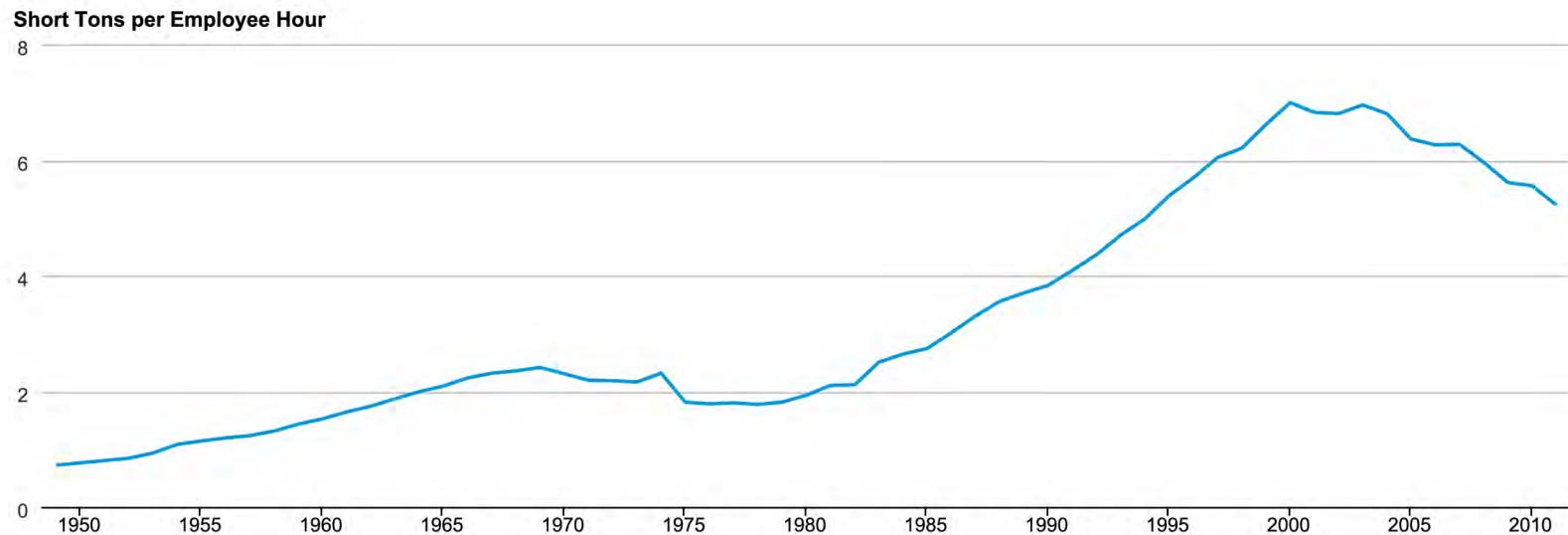
<sup>1</sup> Electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public.

<sup>2</sup> Includes combined-heat-and-power (CHP) plants and a small number of electricity-only plants.

<sup>3</sup> For 1978 forward, small amounts of transportation sector use are included in "Industrial."

In the 1950s, most coal was consumed in the industrial sector, many homes were still heated by coal, and the transportation sector consumed coal in steam-driven trains and ships. By the 1960s, most coal was used to generate electricity and that use expanded rapidly until 2007. In 2011, the electric power sector accounted for 93 percent of all U.S. coal consumption.

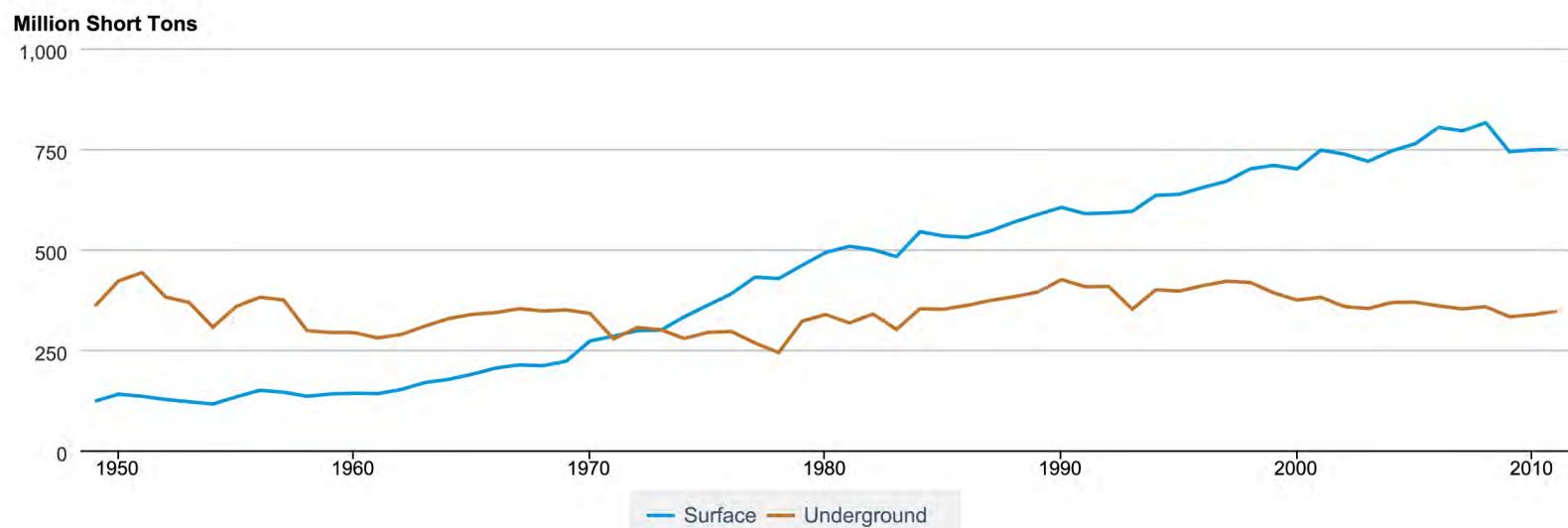
## 28. U.S. Coal Mining Productivity, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 7.7.

Improved mining technology and the shift toward more surface-mined coal led to dramatic improvements in productivity from the Nation's mines during the 1980s and 1990s. This trend was particularly apparent west of the Mississippi River, where more surface mines are located. However, mining productivity declined in all but 2 years from 2000 through 2011, reflecting decreases in both underground and surface productivity.

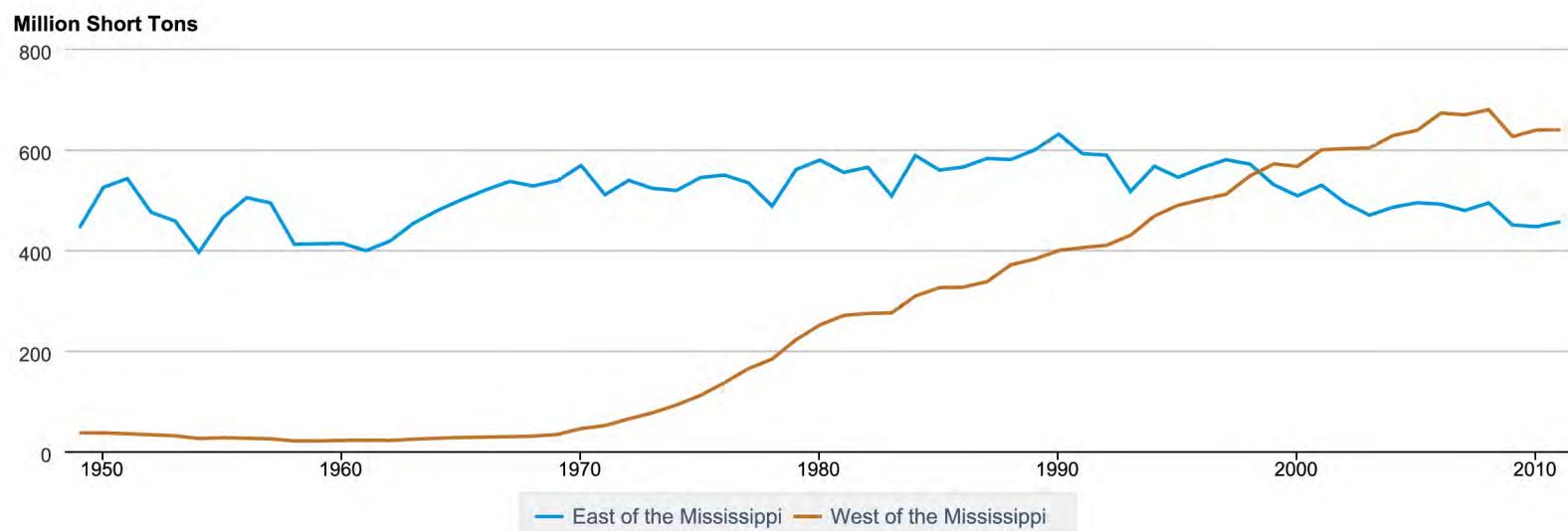
## 29. U.S. Coal Production by Mining Method, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 7.2.

The share of coal produced from surface mines increased significantly: from 25 percent in 1949 to 51 percent in 1971 to 68 percent in 2011.

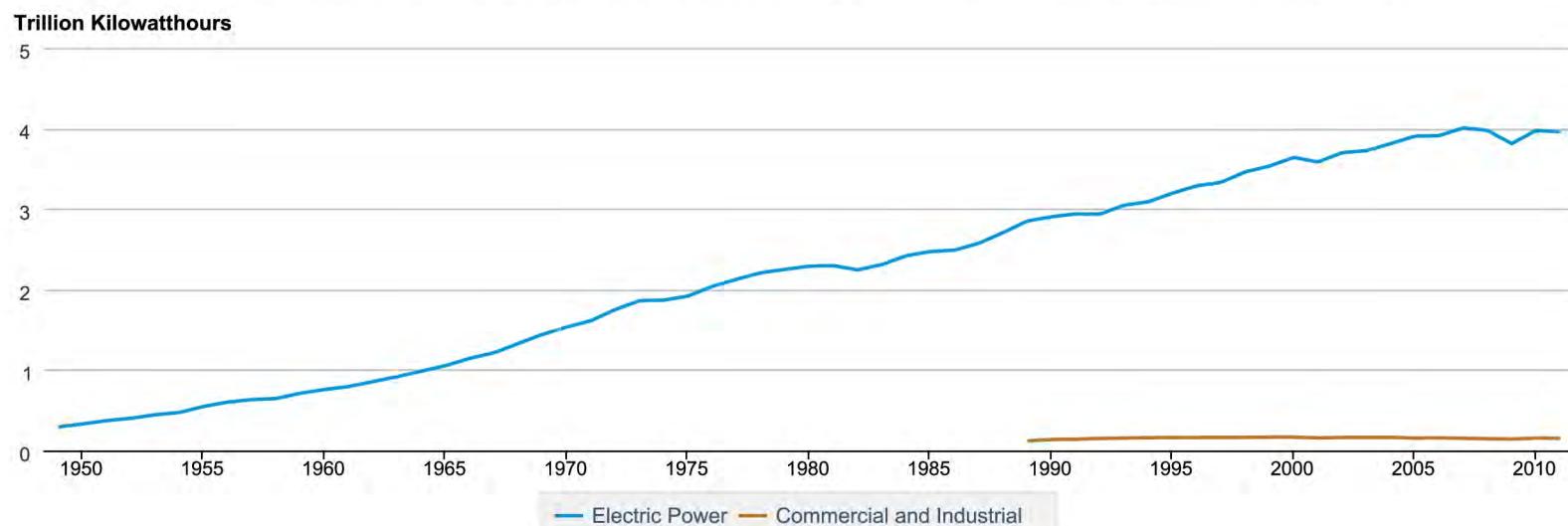
### 30. U.S. Coal Production by Location, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 7.2.

Western coal production expanded rapidly after 1969 and surpassed Eastern production beginning in 1999. In 2011, an estimated 58 percent of U.S. coal came from West of the Mississippi.

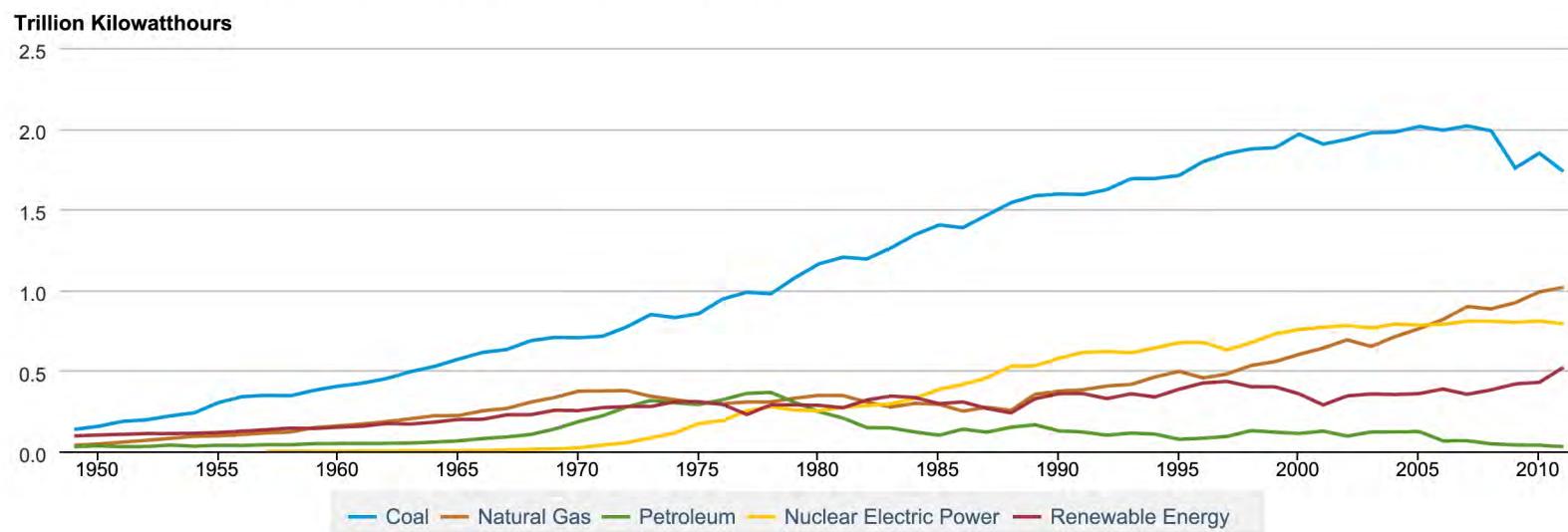
### 31. U.S. Electricity Net Generation by the Electric Power and Commercial and Industrial Sectors, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Tables 8.2a, 8.2b, and 8.2d.

The electric power sector accounted for most electricity generation. A much smaller amount came from commercial and industrial combined-heat-and-power and electricity-only plants, for which data were first collected in 1989. Electricity net generation in the electric power sector increased nearly every year from 1949 to 2007, when it reached 4.0 trillion kilowatthours. From 2008 to 2011, generation remained at that level except for a decline in 2009.

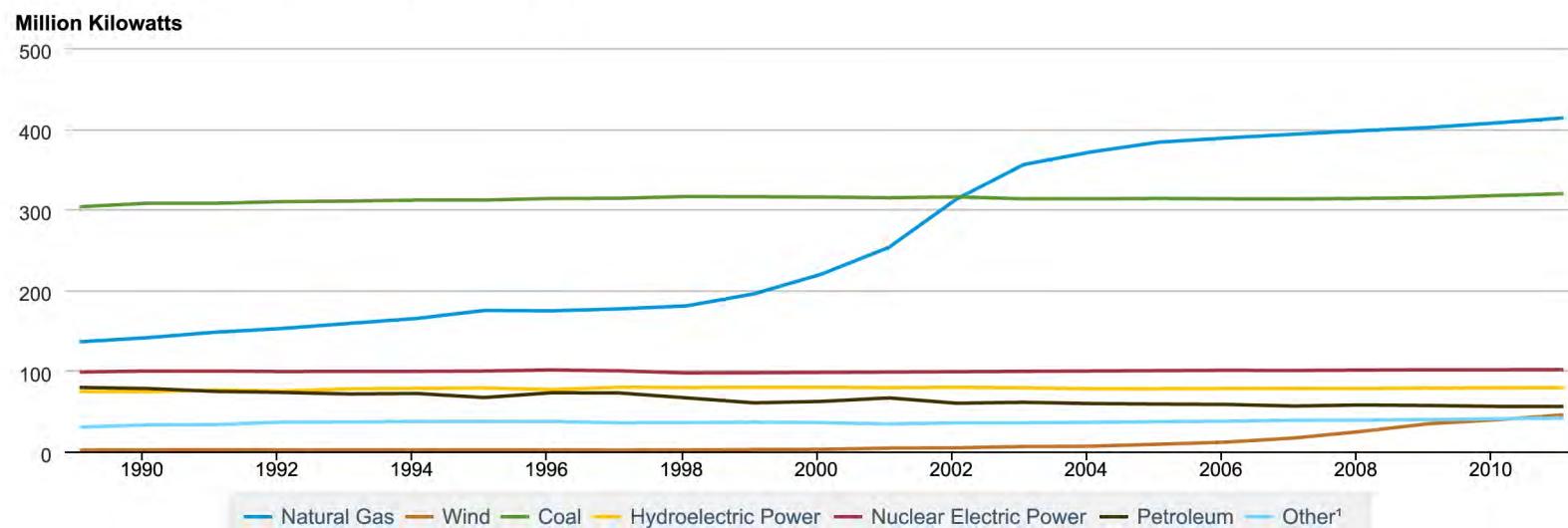
### 32. U.S. Electricity Net Generation by Source, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 8.2a.

Electricity net generation from coal declined 14 percent from 2007 to 2011, but coal remained the largest source of electricity generation from 1949 through 2011. Natural gas became the second largest source of generation in 2006. In 2011, fossil fuels (coal, petroleum, natural gas, and other gases) accounted for 68 percent of all net generation, nuclear electric power 19 percent, and renewable energy 13 percent. In 2011, 63 percent of the net generation from renewable energy resources was conventional hydroelectric power.

### 33. U.S. Electric Net Summer Capacity by Source, 1989-2011

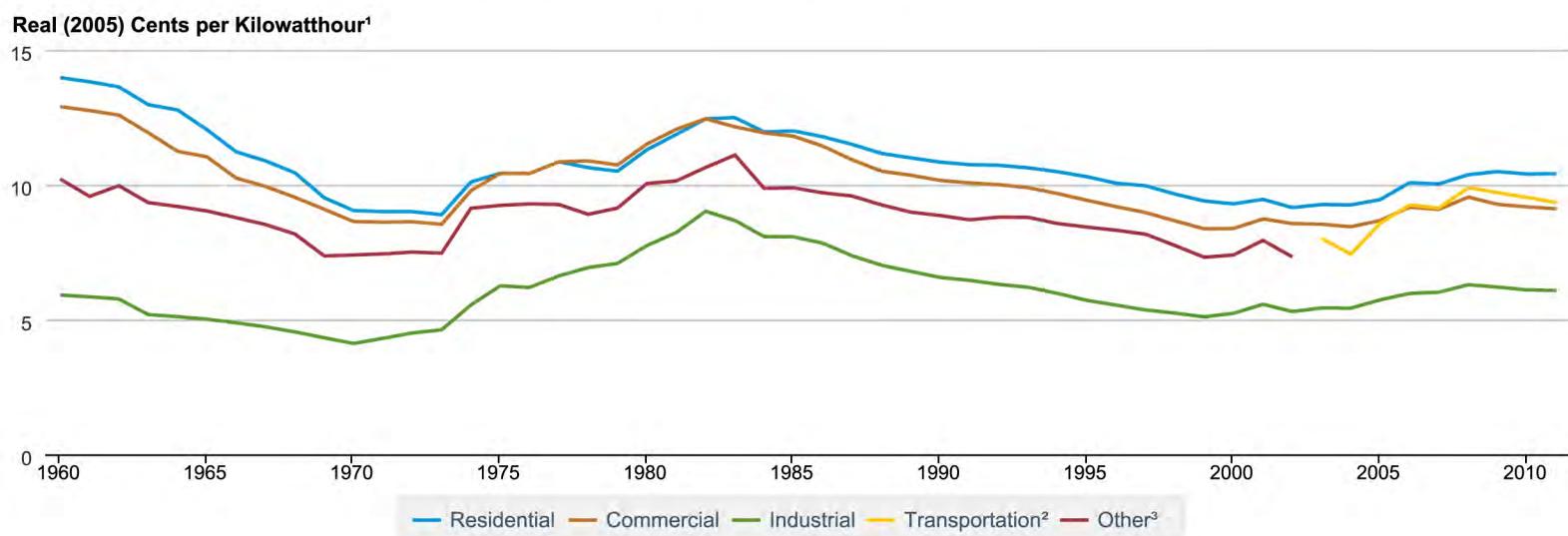


U.S. Energy Information Administration, *Annual Energy Review*, Table 8.11a.

<sup>1</sup> Hydroelectric pumped storage, wood, waste, geothermal, solar/PV, blast furnace gas, propane gas, other manufactured and waste gases derived from fossil fuels, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.

Electric net summer capacity increased 46 percent from 1989 through 2011. The largest contributor to the increase was capacity at natural gas plants, which more than tripled over that period. Capacity at plants using renewable energy rose 63 percent, but from a small base. Capacity at coal and nuclear power plants was comparatively stable. Petroleum was a minor contributor to U.S. electric power, and petroleum-fired capacity declined 30 percent from 1989 through 2011.

### 34. U.S. Average Real Retail Prices of Electricity by Sector, 1960-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 8.10.

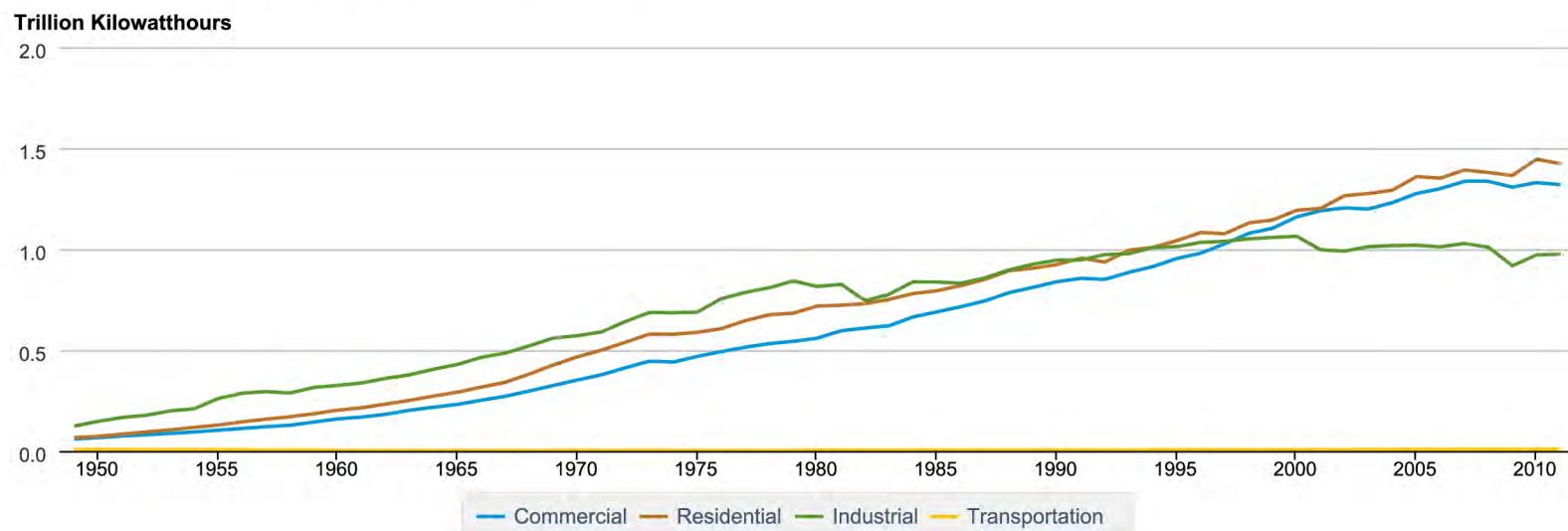
<sup>1</sup> In chained (2005) dollars, calculated by using gross domestic product implicit price deflators. See "Chained Dollars" in Glossary.

<sup>2</sup> Prior to 2003, transportation is included in "Other."

<sup>3</sup> Public street and highway lighting, interdepartmental sales, other sales to public authorities, agriculture and irrigation, and transportation including railroads and railways.

Historically, industrial consumers have paid the lowest prices for electricity; residential consumers have usually paid the highest prices. Inflation-adjusted prices rose in all sectors from 2005 to 2011 but remained well below the peak levels.

### 35. U.S. Electricity Retail Sales<sup>1</sup> by Sector, 1949-2011

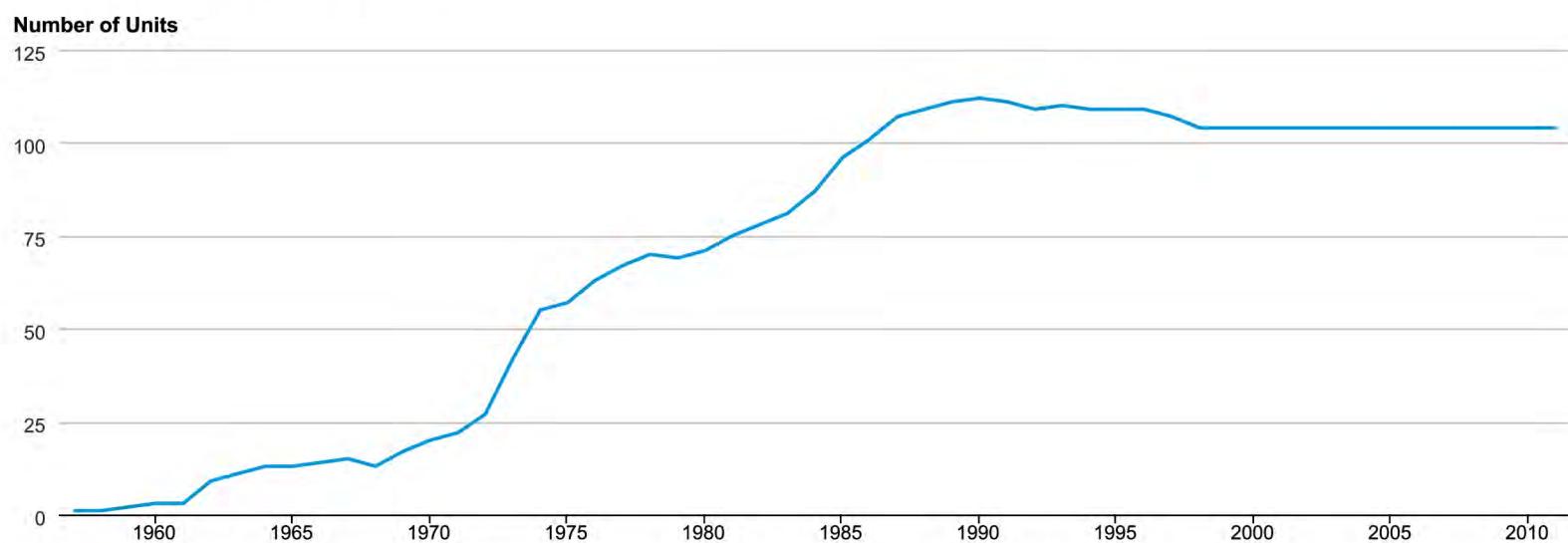


U.S. Energy Information Administration, *Annual Energy Review*, Table 8.9.

<sup>1</sup> Electricity retail sales to ultimate customers reported by electric utilities and, beginning in 1996, other energy service providers.

Electricity retail sales to two of the three major sectors—residential and commercial—grew almost continuously from 1949 through 2011. Initially, sales to the industrial sector were the largest, but sales to the residential and commercial sectors surpassed them in the 1990s, when sales to the industrial sector leveled off.

### 36. U.S. Operable Nuclear Units,<sup>1</sup> 1957-2011

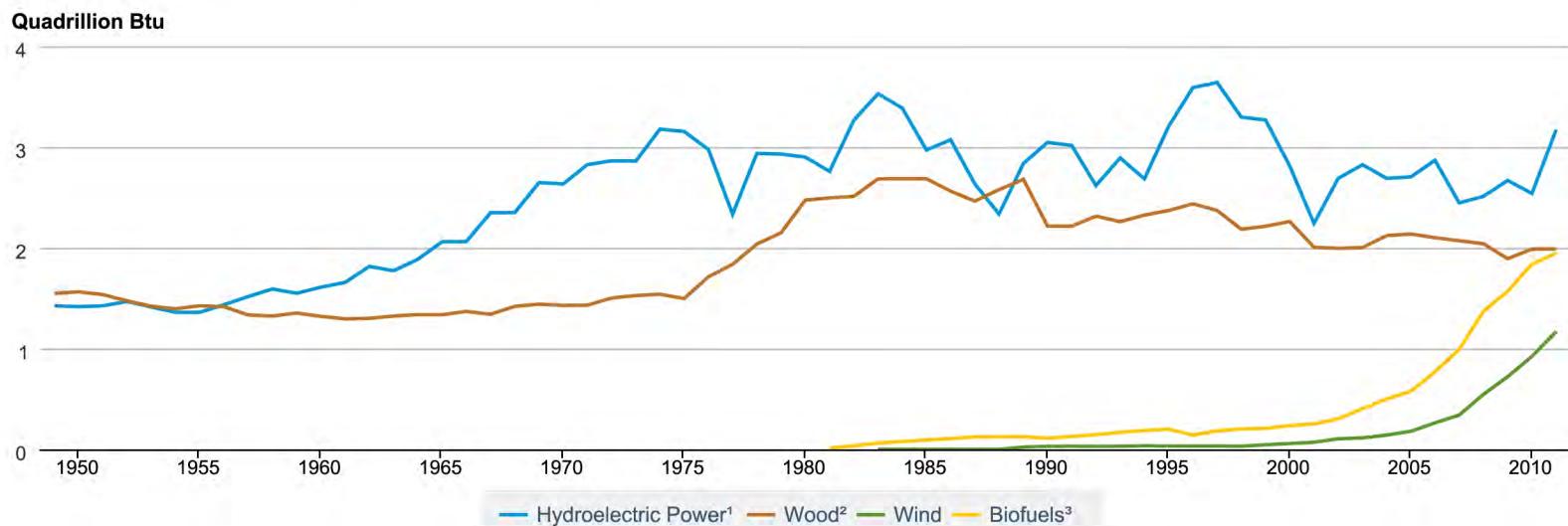


U.S. Energy Information Administration, *Annual Energy Review*, Table 9.1.

<sup>1</sup> Units holding full-power operating licenses, or equivalent permission to operate, at the end of the year.

The number of operable nuclear units in the United States grew from 1 in 1957 to 104 in 1990 and has remained there through 2011. The largest number of units operable in the United States at one time was 112 in 1990. Of the 132 nuclear units that were granted full-power operating licenses (or the equivalent) from 1957 to 1996, 28 have permanently shut down.

### 37. U.S. Renewable Energy Consumption by Major Source, 1949-2011



U.S. Energy Information Administration, *Annual Energy Review*, Table 10.1.

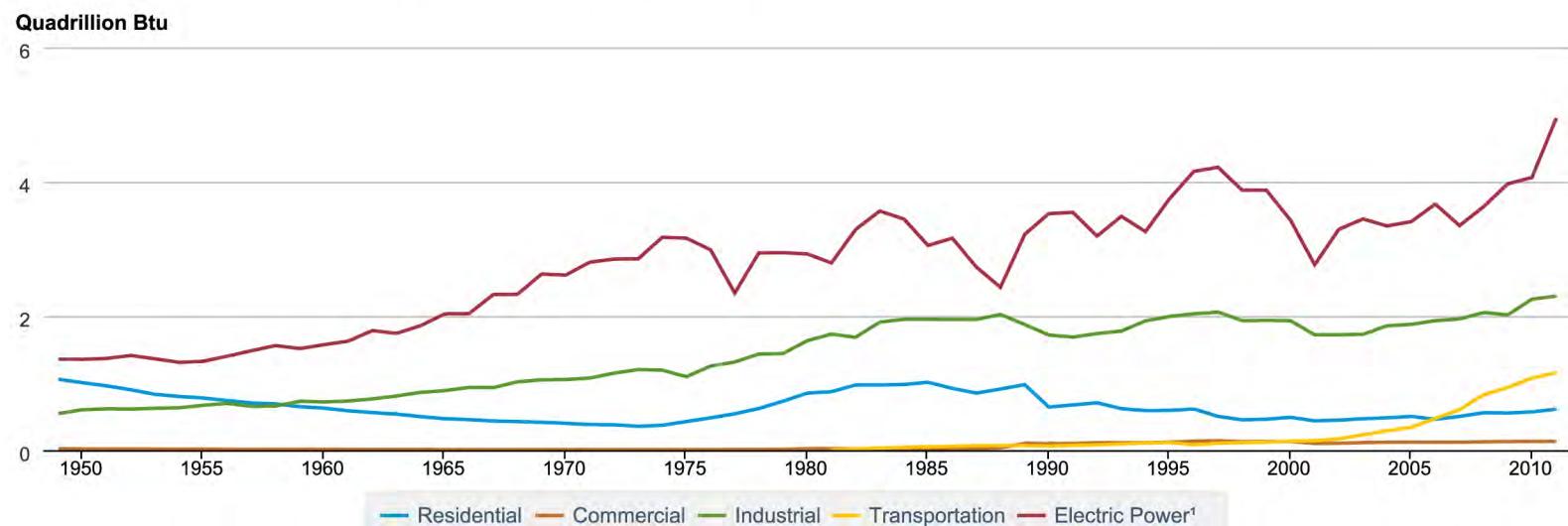
<sup>1</sup> Conventional hydroelectric power.

<sup>2</sup> Wood and wood-derived fuels.

<sup>3</sup> Fuel ethanol (minus denaturant) and biodiesel consumption, plus losses and co-products from the production of fuel ethanol and biodiesel.

Hydroelectric power consumption was the largest component of total renewable energy consumption for most of the 1949-through-2011 period; wood was the next largest source. From 2000 through 2011, consumption of biofuels and wind grew faster than other renewable energy sources. In 2011, total renewable energy consumption reached an all-time high of 9.1 quadrillion Btu.

### 38. U.S. Renewable Energy Consumption by Sector, 1949-2011

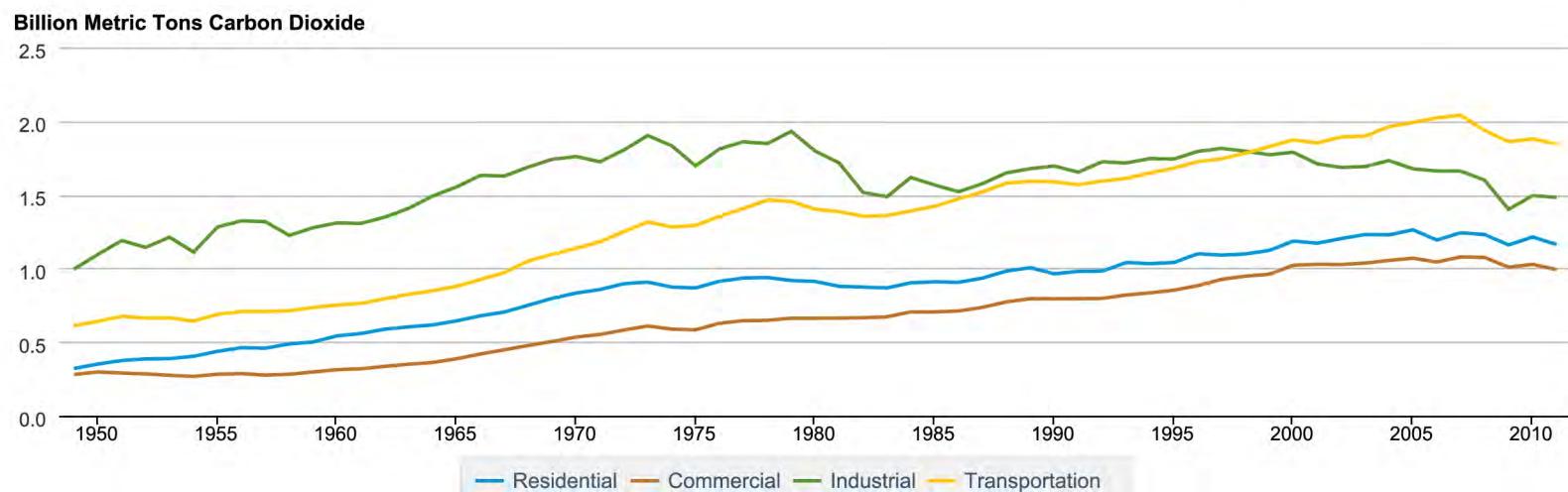


U.S. Energy Information Administration, *Annual Energy Review*, Tables 10.2a, 10.2b, 10.2c.

<sup>1</sup> Through 1988, electric utilities only; beginning in 1989, also includes independent power producers.

The electric power sector accounted for the largest share of renewable energy consumption from 1949 through 2011. For most of the period, the industrial sector was the second largest consumer, and the residential sector was the third largest. In 2006, transportation sector consumption surpassed residential consumption; it more than doubled from 2006 to 2010, due primarily to an increase in fuel ethanol consumption. Fuel ethanol consumption stabilized in 2011, but a large increase in biodiesel consumption led to a 7-percent increase in renewable energy consumed by the transportation sector.

**39. Estimated U.S. Total<sup>1</sup> Carbon Dioxide Emissions From Energy Consumption by End-Use Sector,<sup>2</sup> 1949-2011**



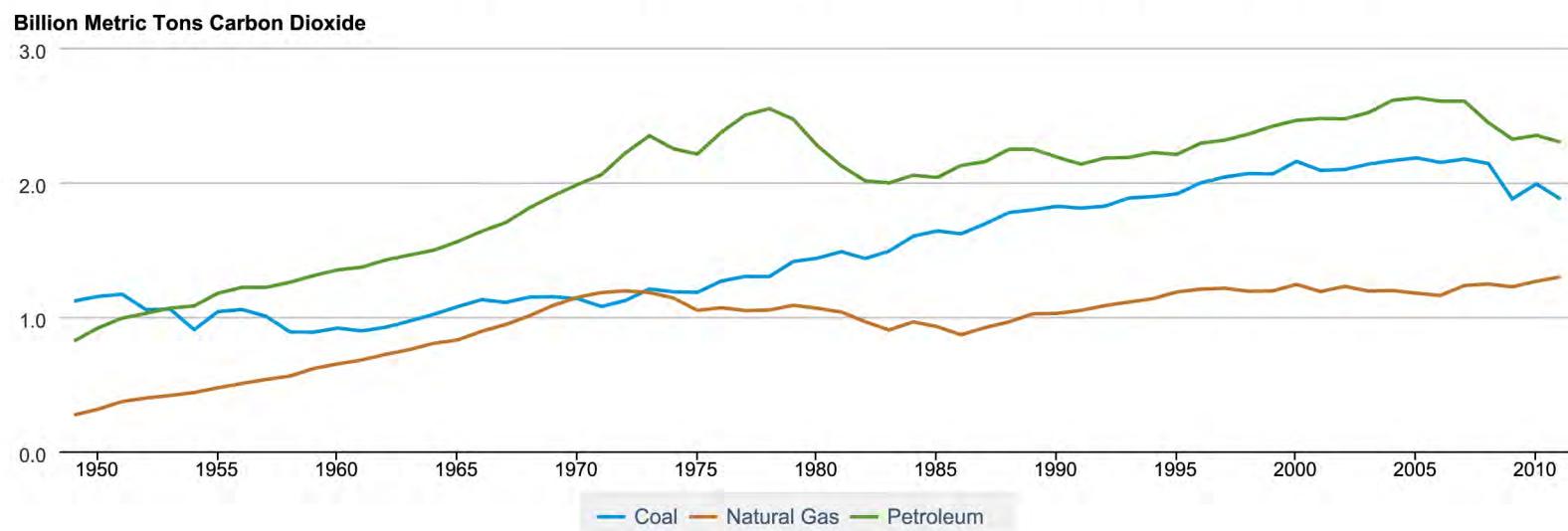
U.S. Energy Information Administration, *Annual Energy Review*, Tables 11.2a, 11.2b, 11.2c, 11.2d.

<sup>1</sup> Excludes emissions from biomass energy consumption.

<sup>2</sup> Emissions from energy consumption in the electric power sector are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales.

The U.S. industrial sector accounted for 18 percent less carbon dioxide (CO<sub>2</sub>) emissions in 2011 than in 1980. By 1999, transportation sector CO<sub>2</sub> emissions exceeded industrial sector emissions, and, in 2011, the transportation sector generated 34 percent of all CO<sub>2</sub> emissions from energy consumption. Of the major end-use sectors, the commercial sector accounted for the least CO<sub>2</sub> emissions but recorded the largest growth (50 percent) during the 1980-through-2011 period.

#### 40. Estimated U.S. Carbon Dioxide<sup>1</sup> Emissions From Energy Consumption by Major Source, 1949-2011

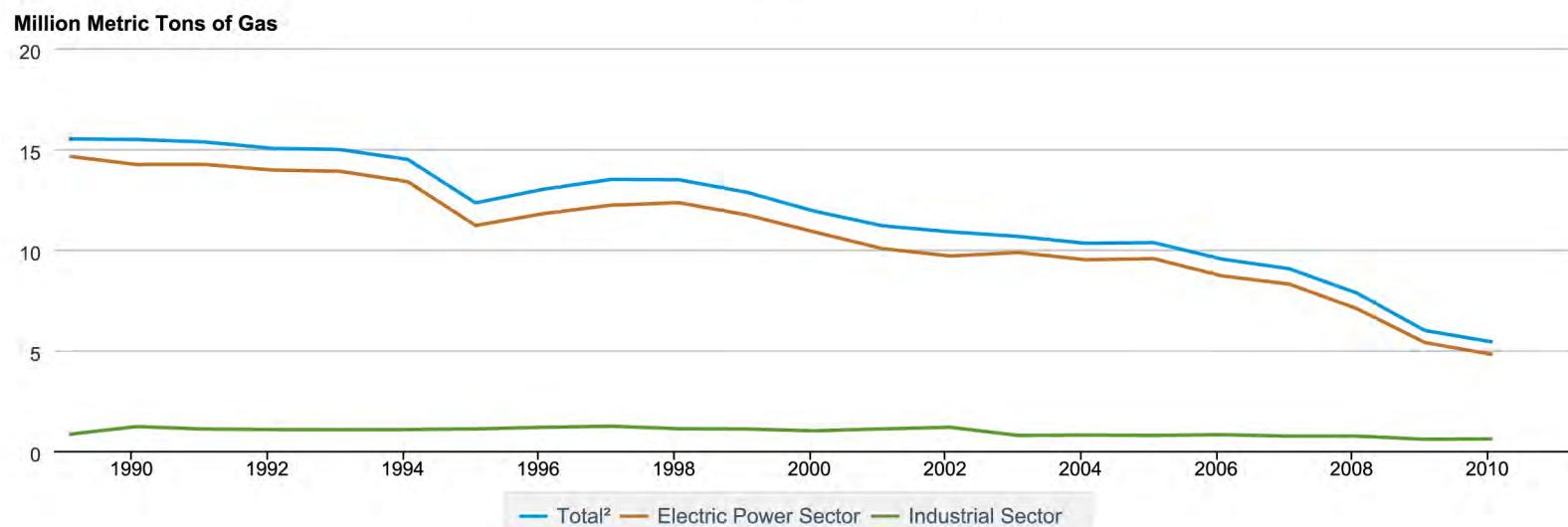


U.S. Energy Information Administration, *Annual Energy Review*, Table 11.1.

<sup>1</sup> Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

Petroleum was the largest source of carbon dioxide (CO<sub>2</sub>) emissions from energy use from the early 1950s through 2011. CO<sub>2</sub> emissions from petroleum consumption reached a record high in 2005, dropped off substantially in 2008 and 2009, and decreased again in 2011. Coal was the second largest energy source of CO<sub>2</sub> emissions from the early 1970s through 2011.

#### 41. Estimated U.S. Sulfur Dioxide Emissions From Energy Consumption,<sup>1</sup> 1989-2010



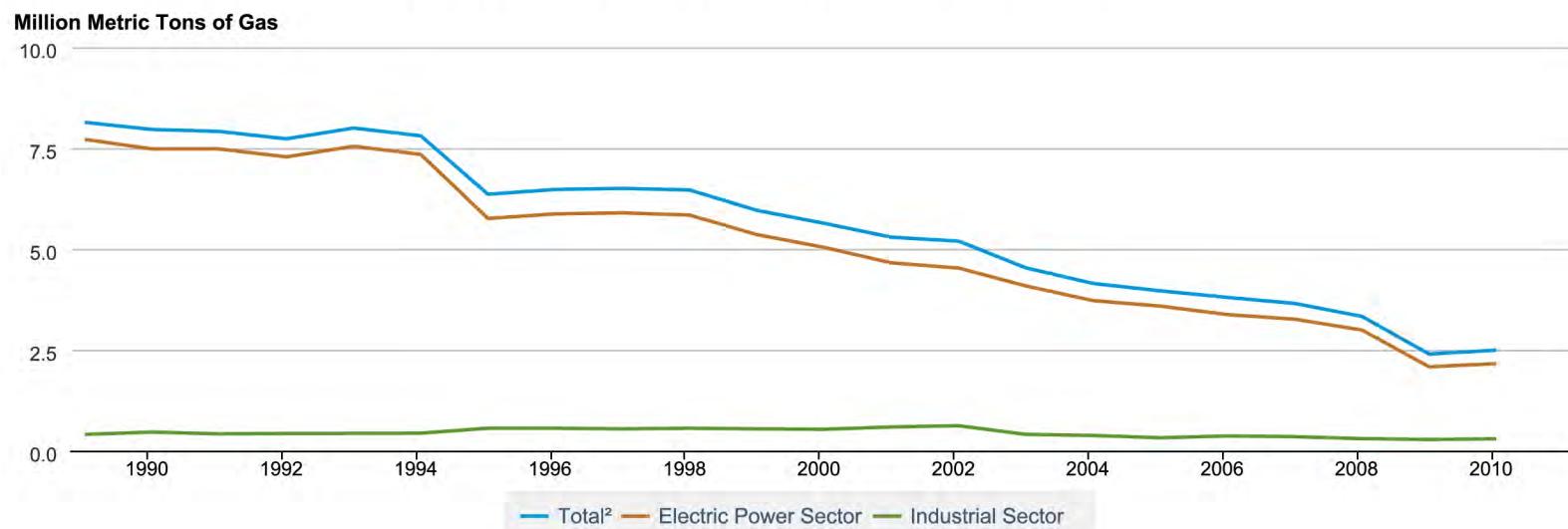
U.S. Energy Information Administration, *Annual Energy Review*, Tables 11.5a, 11.5b, 11.5c.

<sup>1</sup> Data are for emissions from energy consumption for electricity generation and useful thermal output.

<sup>2</sup> Includes Commercial Sector.

Total sulfur dioxide (SO<sub>2</sub>) emitted as a result of energy consumption (for electricity generation and useful thermal output) declined 65 percent from 1989 to 2010, falling in most years except for a brief rise in 1996 and 1997. Of the energy sources, coal accounted for by far the largest share (92 percent) of SO<sub>2</sub> emissions.

## 42. Estimated U.S. Nitrogen Oxide Emissions From Energy Consumption,<sup>1</sup> 1989-2010



U.S. Energy Information Administration, *Annual Energy Review*, Tables 11.5a, 11.5b, 11.5c.

<sup>1</sup> Data are for emissions from energy consumption for electricity generation and useful thermal output.

<sup>2</sup> Includes Commercial Sector.

Total nitrogen oxide ( $\text{NO}_x$ ) emitted as a result of energy consumption (for electricity generation and useful thermal output) declined throughout most of the 1989-through-2010 period. In 2010,  $\text{NO}_x$  emissions from the electric power sector accounted for 87 percent of all  $\text{NO}_x$  emissions.