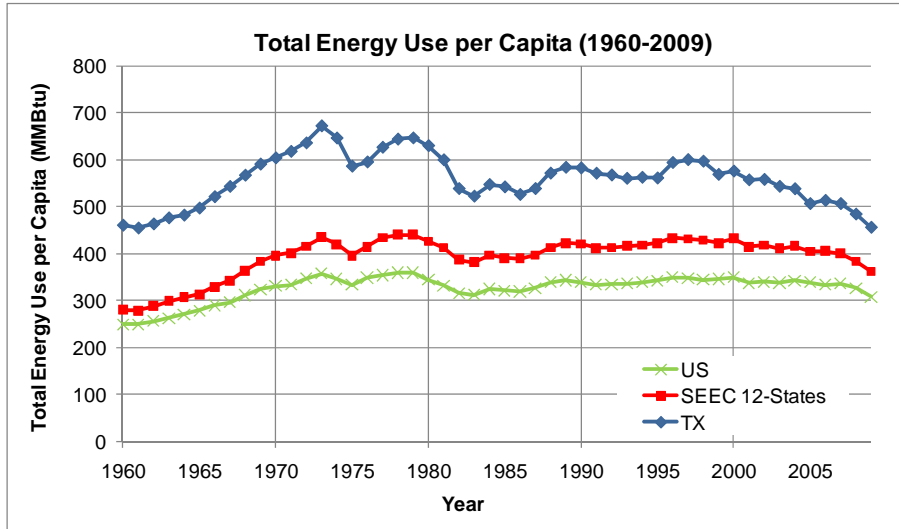
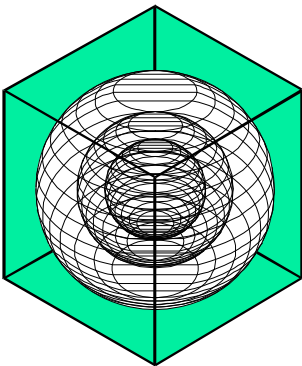


## REGIONAL ENERGY BASELINE (1960 ~ 2009)



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## EXECUTIVE SUMMARY

This report is an update to the previous 2009 regional energy baseline report using the U.S. DOE EIA's 1960-2006 energy data performed for the Southern Energy Efficiency Center (SEEC), which was defined under the SEEC Subtask 3.1 *Define Regional Baselines and Measurement & Verification Protocols*. The primary goal of this subtask is to provide the state energy offices with a comparison tool for energy use either by total or per-capita usage. This tool is expected to allow the state energy offices to compare their energy use pattern against other states' and the national average energy use by end-use sector. In addition, they can use this tool for a comparison of energy use within their states by end-use and by fuel-source.

To define new baseline energy patterns for Texas using the U.S. DOE EIA's 1960-2009 energy data, the raw data have been downloaded from both the U.S. DOE EIA website<sup>1</sup>, and the U.S. Census Bureau website<sup>2</sup>. Appendices A and B present the detailed information of data sets that have been used for this analysis, including the source, selected data codes, and term definitions.

This report consists of three parts:

- Comparison of energy use per capita ranked by state between 2006<sup>3</sup> and 2009 (latest year data available);
- Historical energy use per capita for the 12 SEEC states during 1960-2009; and
- Energy use and energy use per capita by end-use sector and fuel source during 1960-2009 for the U.S. and Texas.

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<sup>1</sup> U.S. DOE, EIA. 2011. *Consumption, Price, and Expenditure Estimates through 2009: Complete Data Files, All States and All Years*, State Energy Data System (SEDS), Energy Information Administration, U.S. Department of Energy, Retrieved from <http://www.eia.doe.gov/emeu/states/seds.html> (accessed February 2, 2009).

<sup>2</sup> U.S. Census Bureau. 2009. *Annual Population Estimates 2000 to 2009: Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009*, National and State Population Estimates, U.S. Census Bureau, Retrieved from <http://www.census.gov/popest/states/NST-ann-est.html> (accessed June 30, 2011).

<sup>3</sup>In this report, the numbers reported in the previous 2009 report were updated based on the new version released by the U.S. DOE EIA using enhanced estimation methodologies.

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## 1 INTRODUCTION

This report is an update to the previous 2009 regional energy baseline report using the U.S. DOE EIA's 1960-2006 energy data performed for the Southern Energy Efficiency Center (SEEC), which was defined under the SEEC Subtask 3.1 *Define Regional Baselines and Measurement & Verification Protocols*. The primary goal of this subtask is to provide the state energy offices with a comparison tool for energy use either by total or per-capita usage. This tool is expected to allow the state energy offices to compare their energy use pattern against other states' and the national average energy use by end-use sector. In addition, they can use this tool for a comparison of energy use within their states by end-use and by fuel-source.

To define new baseline energy patterns for Texas using the U.S. DOE EIA's 1960-2009 energy data, the raw data have been downloaded from both the U.S. DOE EIA website<sup>4</sup>, and the U.S. Census Bureau website<sup>5</sup>. Appendices A and B present the detailed information of data sets that have been used for this analysis, including the source, selected data codes, and term definitions.

This report consists of three parts:

- Comparison of energy use per capita ranked by state between 2006<sup>6</sup> and 2009 (latest year data available);
- Historical energy use per capita for the 12 SEEC states during 1960-2009; and
- Energy use and energy use per capita by end-use sector and fuel source during 1960-2009 for the U.S. and Texas.

Section 2 presents the charts showing the energy use per capita ranked by state for 2006 and 2009, including total use and use by end-use sector. Section 3 presents the charts showing the historical energy use per capita for the Texas during 1960-2009, including total use and use by end-use sector. Section 4 presents the charts showing the energy use and energy use per capita by end-use sector and fuel source during 1960-2009 for the U.S. and Texas.

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<sup>4</sup> U.S. DOE, EIA. 2011. *Consumption, Price, and Expenditure Estimates through 2009: Complete Data Files, All States and All Years*, State Energy Data System (SEDS), Energy Information Administration, U.S. Department of Energy, Retrieved from <http://www.eia.doe.gov/emeu/states/seds.html> (accessed February 2, 2009).

<sup>5</sup> U.S. Census Bureau. 2009. *Annual Population Estimates 2000 to 2009: Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009*, National and State Population Estimates, U.S. Census Bureau, Retrieved from <http://www.census.gov/popest/states/NST-ann-est.html> (accessed June 30, 2011).

<sup>6</sup> In this report, the numbers reported in the previous 2009 report were updated based on the new version released by the U.S. DOE EIA using enhanced estimation methodologies.

## 2 2006 and 2009 ENERGY USE PER CAPITA, RANKED BY STATE

### 2.1 Overview

This section covers the energy use per capita of the 50 states and the District of Columbia for the year of 2006 and 2009, including total energy use per capita (Figure 2.2.1) and energy use per capita by end-use sector (Figure 2.3.1 through Figure 2.6.1): electric power, residential, commercial, residential plus commercial, transportation, and industrial sector. In this report, the numbers reported in the previous 2009 report were updated based on the new version released by the U.S. DOE EIA using enhanced estimation methodologies. Two different scales were selected and used to display data for comparison purposes: 1,200 MMBtu for the charts of total and electric power sector and 600 MMBtu for the charts of other sectors, including residential, commercial, residential plus commercial, transportation, and industrial sector.

Each state's energy use per capita is ranked by state with the U.S. average energy use per capita. The green bar indicates the U.S. average energy use per capita and is displayed with a dotted green line for a better comparison. The red bar indicates Texas energy use per capita, while the 50 blue bars are for the other 49 states and the District of Columbia.

## 2.2 Total Energy Use per Capita, Ranked by State (2006 and 2009)

Figure 2.2.1 shows the total energy use per capita of the 50 states and the District of Columbia for the year of 2006 and 2009. The total energy use per capita for the U.S. and Texas in 2006 and 2009 are as follows:

- U.S. total energy use per capita: 334 MMBtu for 2006 and 308 MMBtu for 2009
- Texas total energy use per capita: 513 MMBtu for 2006 and 456 MMBtu for 2009

Both U.S. and Texas total energy use per capita has decreased since 2006 by 26 and 57 MMBtu, respectively. Texas had a higher total energy use per capita than the U.S. average and ranked in fifth place in 2006 and sixth place in 2009. Texas's high ranking is mainly due to its high industrial energy consumption, which represents about 49% of total energy use per capita.

Wyoming, Alaska, Louisiana, and North Dakota have a distinctly high energy use pattern: about three to five times more energy per capita than the low energy-intensive states. This could be due to their high transportation and industrial energy consumption and low population density of Wyoming, Alaska, and North Dakota. On the contrary, New York State's low energy intensity can be explained with its high population density.



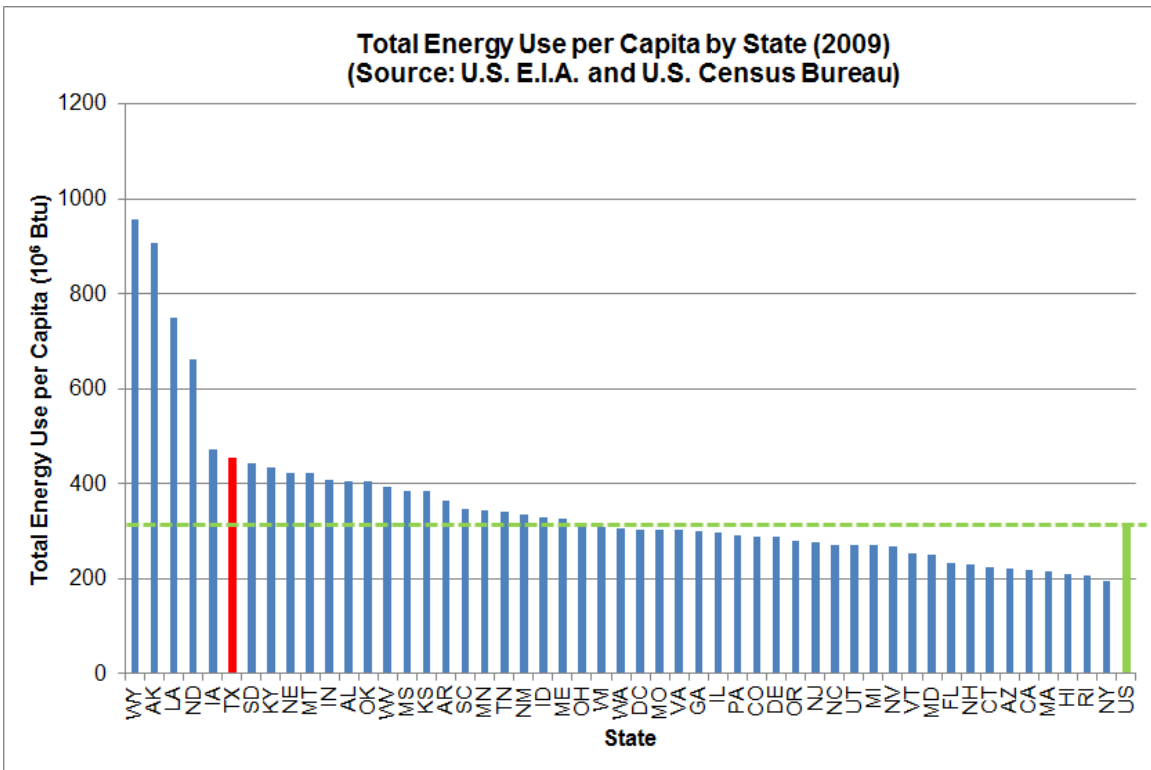
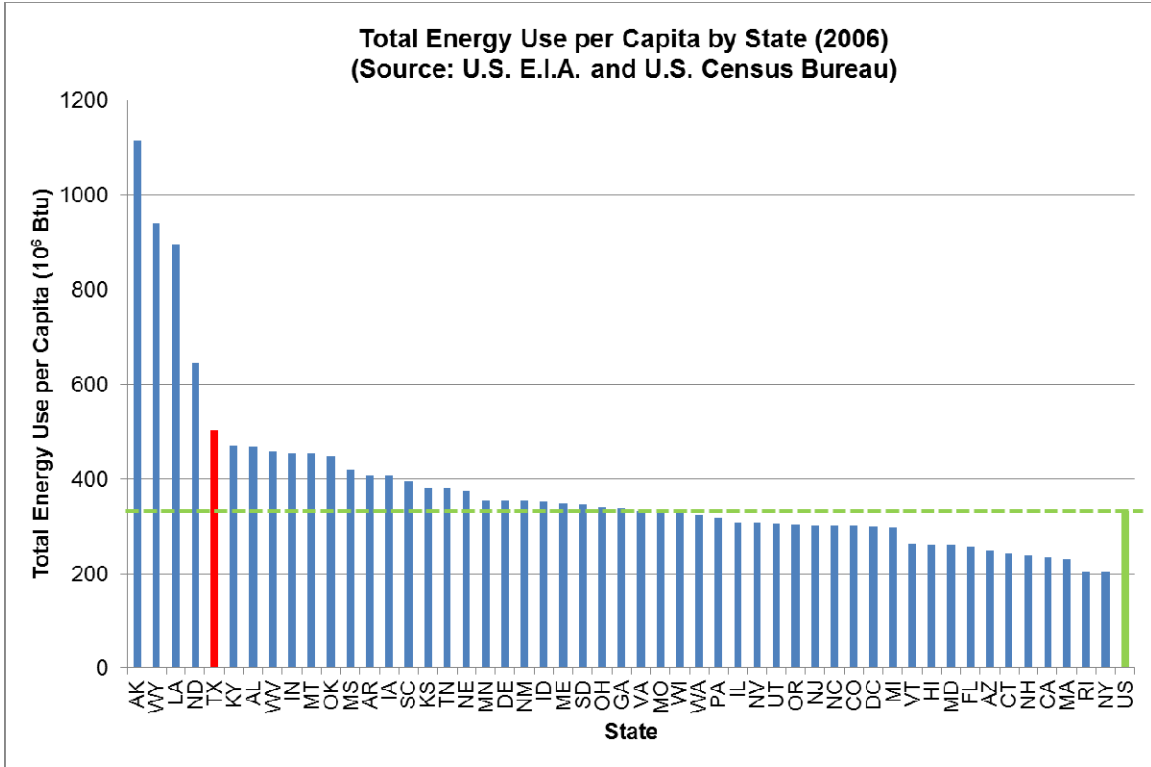


Figure 2.2.1. Total Energy Use per Capita, Ranked by State, 2006 and 2009.

## 2.3 Electric Power Energy Use per Capita, Ranked by State (2006 and 2009)

Figure 2.3.1 shows the electric power energy use per capita of the 50 states and the District of Columbia for the year 2006 and 2009. The electric power energy use consists of the energy consumed by facilities to generate, transmit, and distribute electric energy. The electric power energy use per capita for the U.S. and Texas in 2006 and 2009 are as follows:

- U.S. electric power energy use per capita: 132 MMBtu for 2006 and 124 MMBtu for 2009
- Texas electric power energy use per capita: 153 MMBtu for 2006 and 144 MMBtu for 2009

Both U.S. and Texas electric power energy use per capita has decreased since 2006 by 8 and 9 MMBtu, respectively. Texas had a higher electric power energy use per capita than the U.S. average, and ranked in 25<sup>th</sup> place in 2006 and 24<sup>th</sup> place in 2009.

Wyoming had the highest electric power energy use per capita for 2009 with 874 MMBtu per capita, whereas the District of Columbia had the lowest value with 0.8 MMBtu per capita. Wyoming's high electric power energy intensity, in spite of its very low population density in the U.S., could be due to the massive power facilities in Wyoming that provide electricity to the western United States. On the contrary, the District of Columbia showed abnormally low electric power energy intensity because D.C. relies on imported electricity from the surrounding states. It must be noted that the amount of electricity produced in the state is sometimes different from the amount consumed in the state. North Dakota and West Virginia, as interstate exporters of electricity, also showed distinctly high electric power energy intensity: about three to four times more energy per capita than the U.S. average.

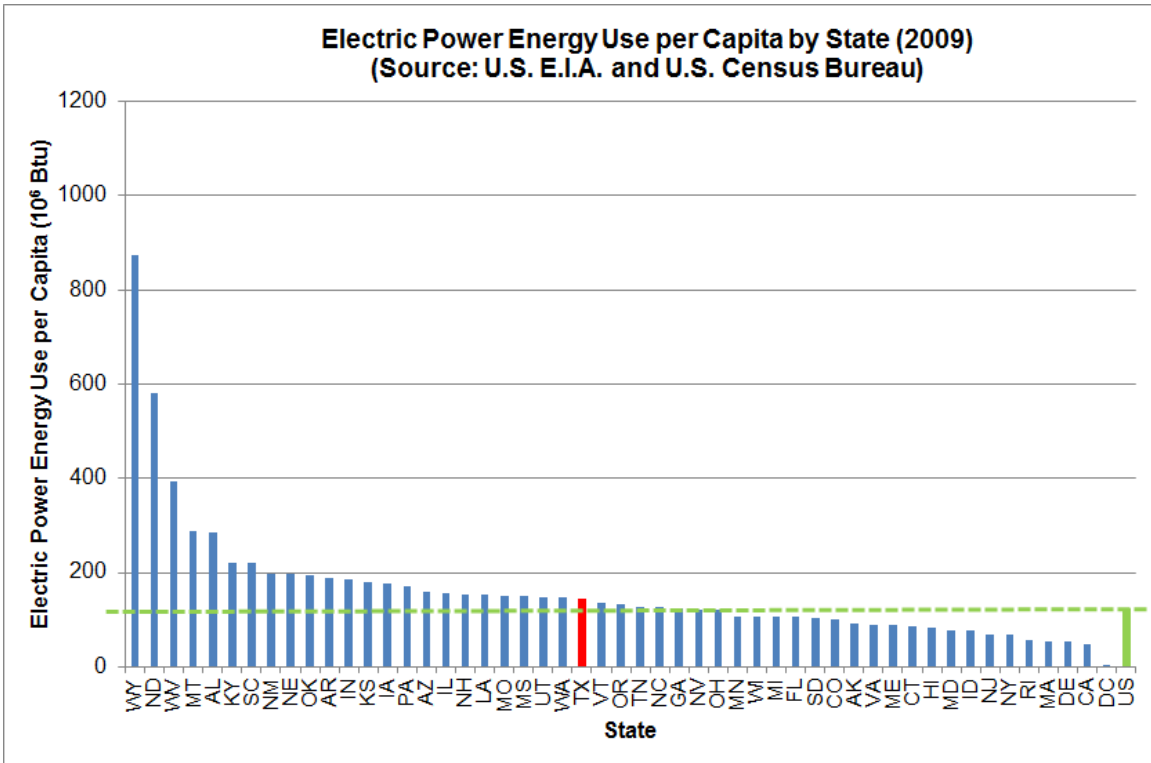
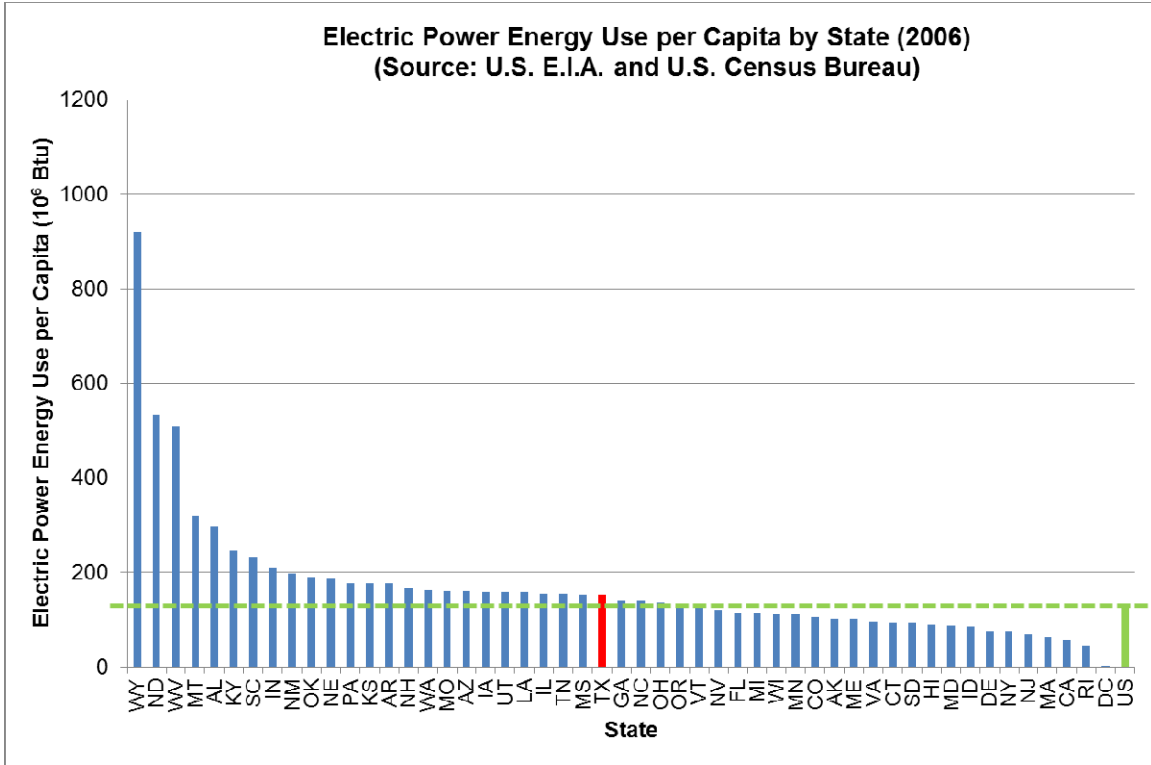


Figure 2.3.1. Energy Use per Capita by the Electric Power Sector, Ranked by State, 2006 and 2009.

## 2.4 Residential and Commercial Energy Use per Capita, Ranked by State (2006 and 2009)

Figure 2.4.1 and Figure 2.4.2, respectively, show the residential and the commercial energy use per capita of the 50 states and the District of Columbia for the year 2006 and 2009. The commercial energy use consists of the energy consumed by many different building types, including businesses, institutions, and organizations that provide services. Figure 2.4.3 shows the combined residential and commercial per capita energy use that can be regarded as the entire building sector's per capita energy use. For the purpose of a comparison and clarity, a different scale was used in Sections 2.4 to 2.6.

The residential and commercial energy use per capita for the U.S. and Texas in 2006 and 2009 are as follows:

- U.S. residential energy use per capita: 69 MMBtu for 2006 and 69 MMBtu for 2009
- U.S. commercial energy use per capita: 59 MMBtu for 2006 and 58 MMBtu for 2009
- U.S. combined, building energy use per capita: 129 MMBtu for 2006 and 127 MMBtu for 2009
- Texas residential energy use per capita: 67 MMBtu for 2006 and 65 MMBtu for 2009
- Texas commercial energy use per capita: 59 MMBtu for 2006 and 59 MMBtu for 2009
- Texas combined, building energy use per capita: 126 MMBtu for 2006 and 124 MMBtu for 2009

Since 2006, no dramatic changes were observed in both U.S. and Texas residential and commercial energy use per capita. Texas had a lower residential energy use per capita than the U.S. average and ranked in 40<sup>th</sup> place in 2006 and 44<sup>th</sup> place in 2009, while its commercial energy use per capita was slightly higher than the U.S. average (32<sup>nd</sup> place in 2006 and 25<sup>th</sup> place in 2009). As a total, Texas ranked in 41<sup>st</sup> place in both 2006 and 2009.

The variation of residential energy intensity between the states was relatively small except for the two least energy-intensive states of California and Hawaii. For the commercial buildings sector, the variation between states was relatively small except for the four top-ranking states, D.C., Wyoming, North Dakota, and Alaska, and the two low-ranking states of California and Hawaii. A similar pattern was found in the combined residential and commercial per capita energy use. It is noticeable that California had far less combined residential and commercial per capita use than the other states and the US average. This could be partly because of their mild climate, and partly because of their earliest adoption of various energy policies and incentives.

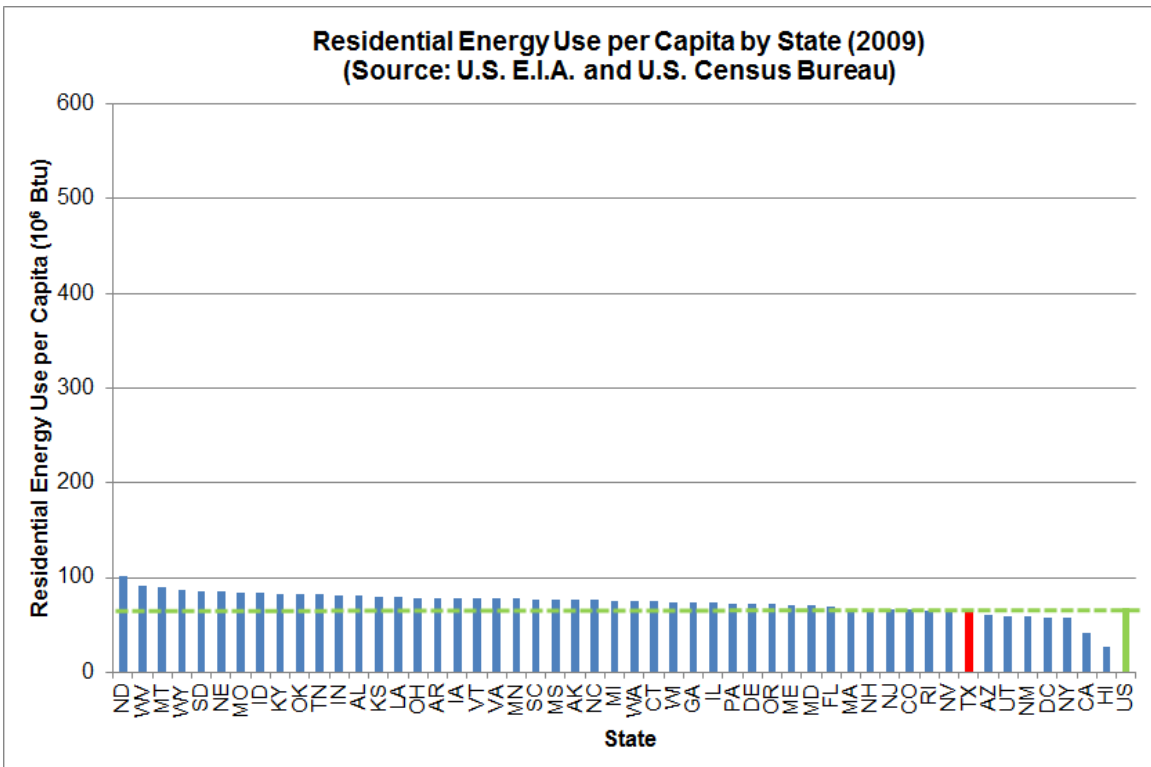
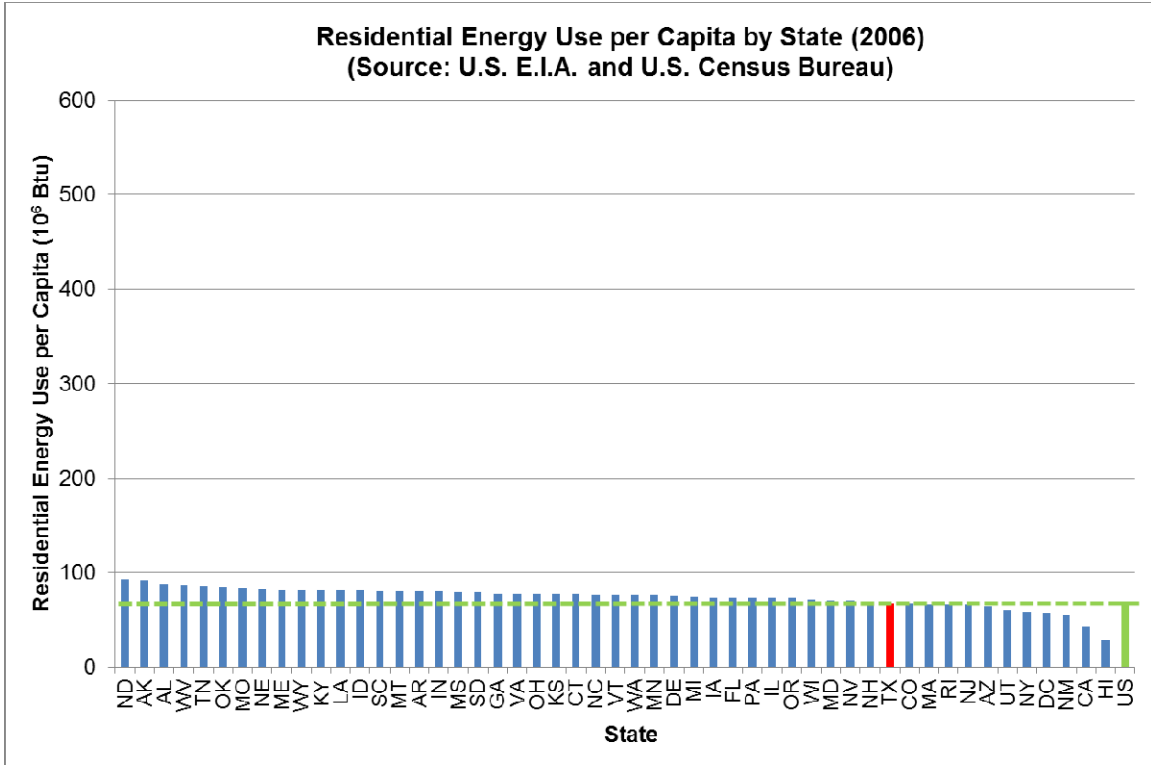


Figure 2.4.1. Energy Use per Capita by the Residential Sector, Ranked by State, 2006 and 2009.

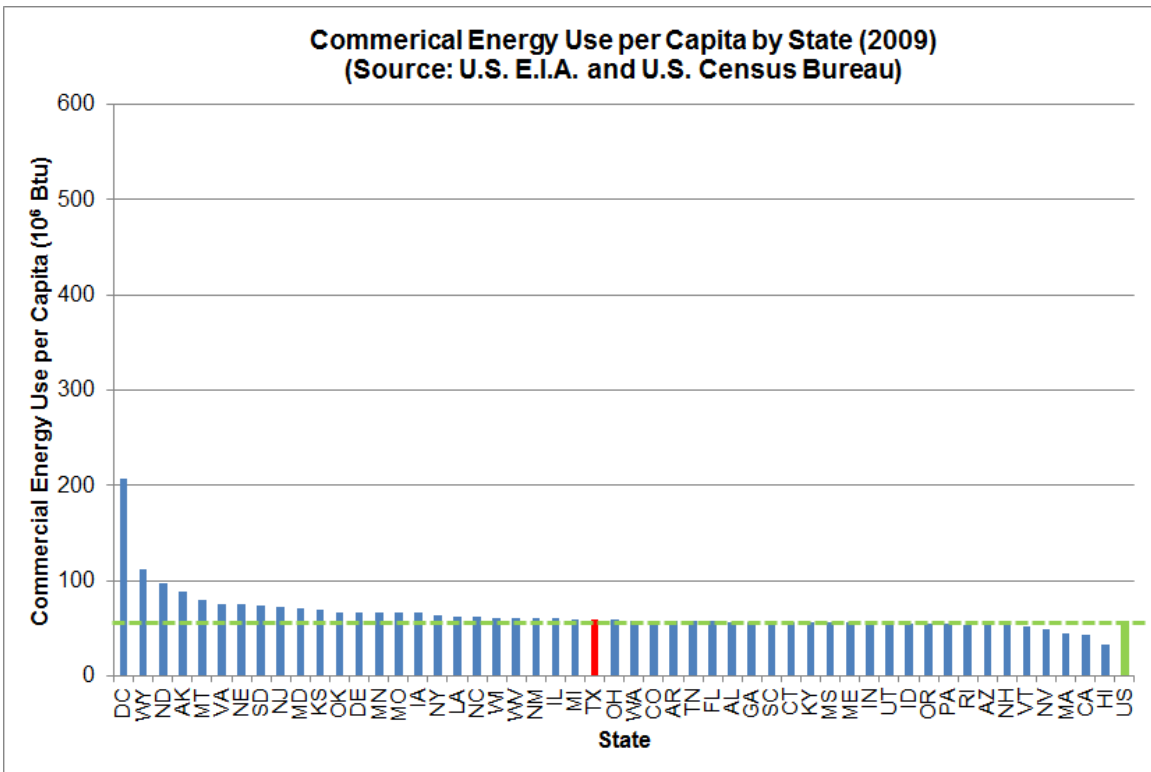
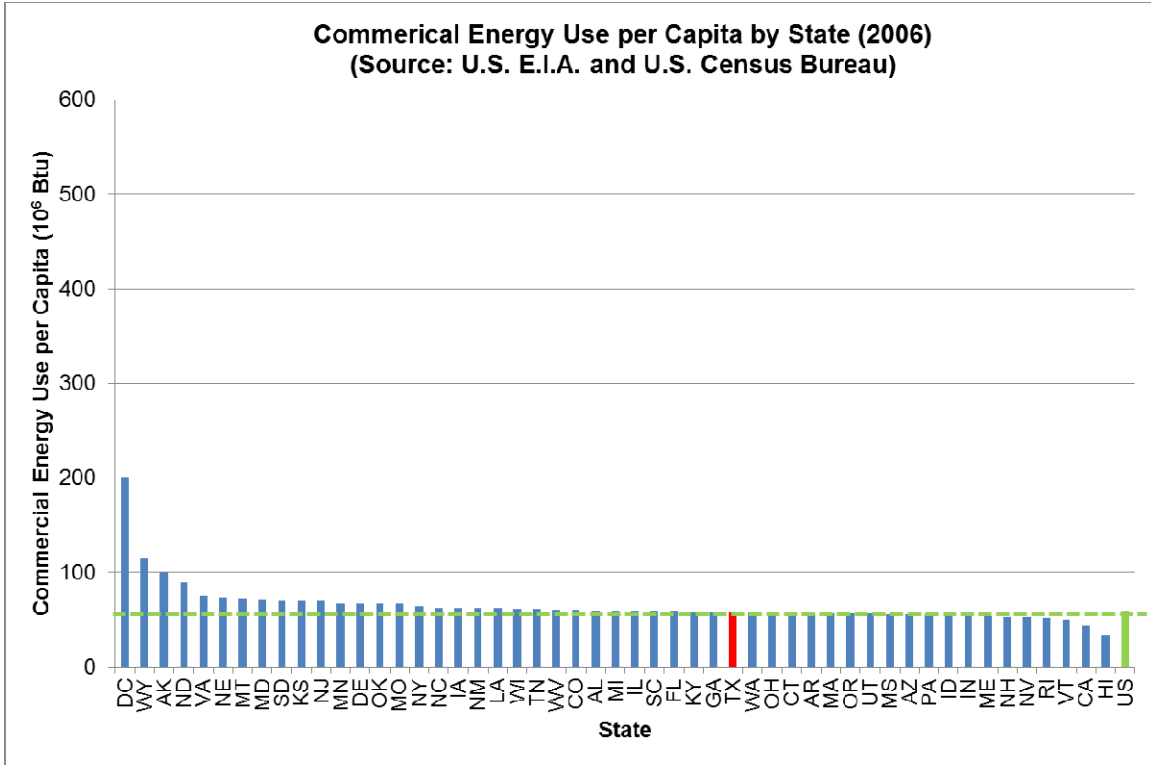


Figure 2.4.2. Energy Use per Capita by the Commercial Sector, Ranked by State, 2006 and 2009.

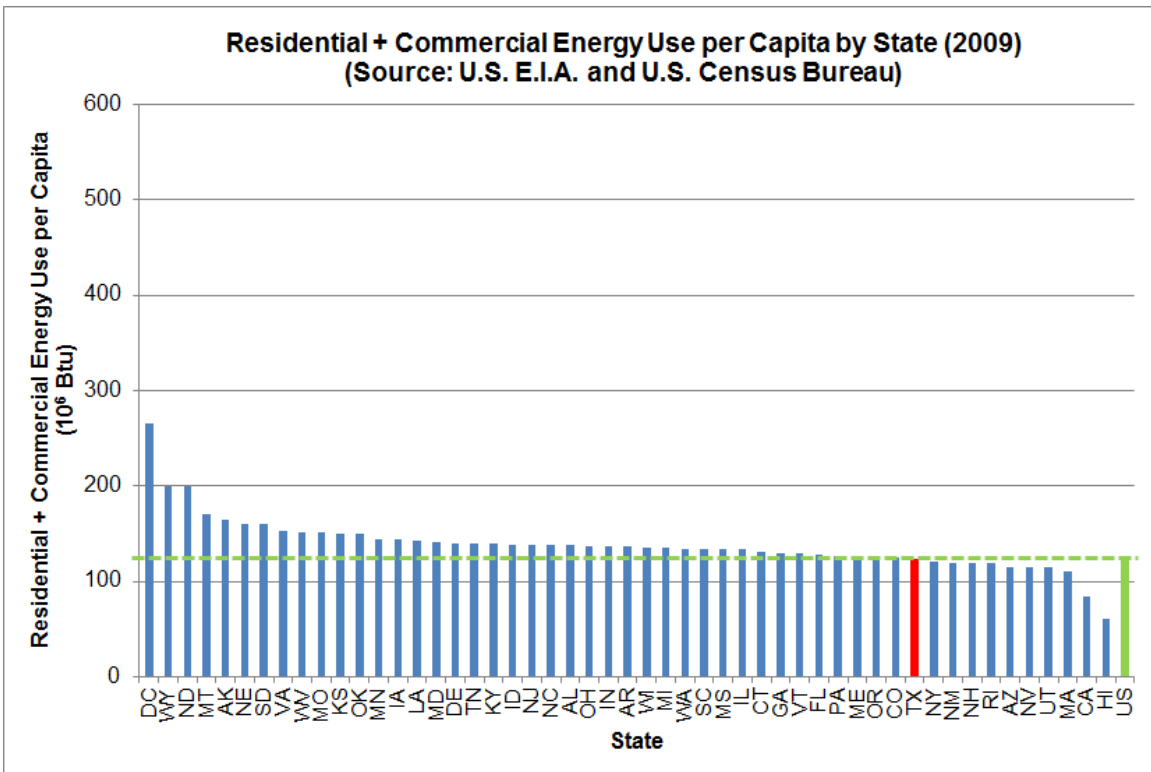
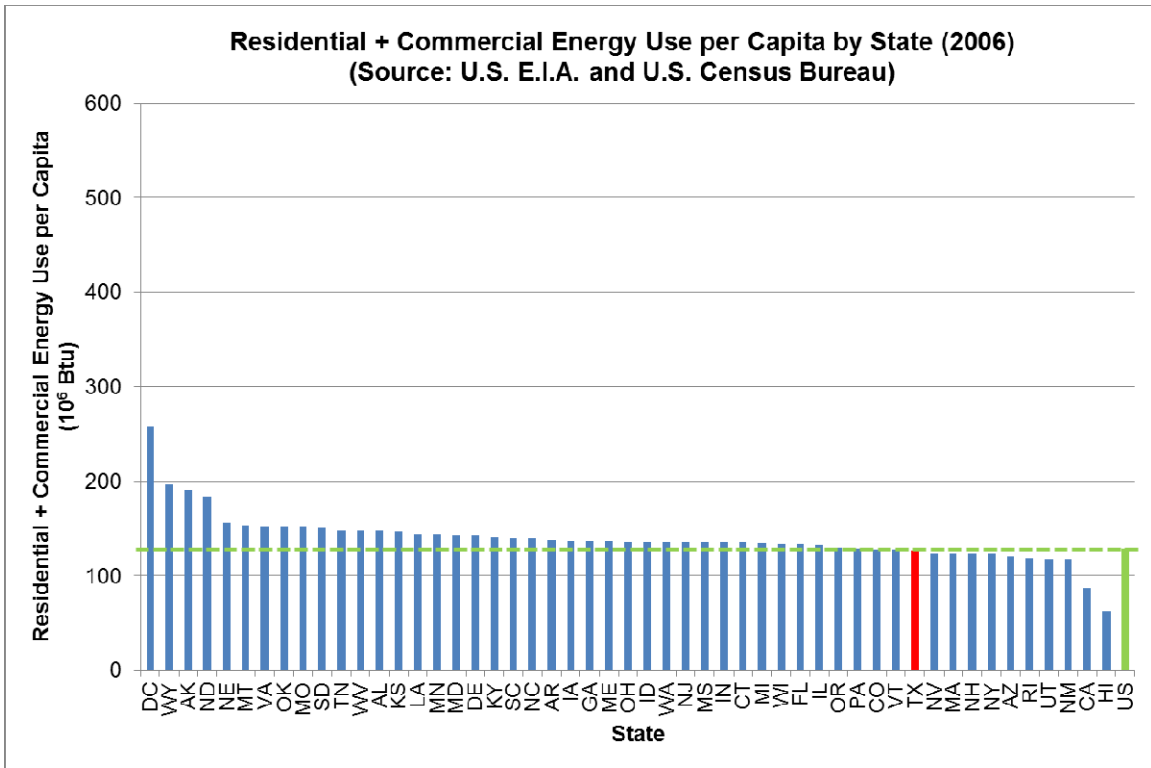


Figure 2.4.3. Energy Use per Capita by the Residential and Commercial Sector, Ranked by State, 2006 and 2009.

## 2.5 Transportation Energy Use per Capita, Ranked by State (2006 and 2009)

Figure 2.5.1 shows the transportation energy use per capita of the 50 states and the District of Columbia for the year 2006 and 2009. The transportation energy use per capita for the U.S. and Texas in 2006 and 2009 are as follows:

- U.S. transportation energy use per capita: 97 MMBtu for 2006 and 88 MMBtu for 2009
- Texas transportation energy use per capita: 123 MMBtu for 2006 and 110 MMBtu for 2009

Both U.S. and Texas transportation energy use per capita has decreased since 2006 by 9 and 13 MMBtu, respectively. Texas had a higher transportation energy use per capita than the U.S. average and ranked in ninth place in 2006 and eighth place in 2009.

Alaska had the highest transportation energy use per capita for 2009 with 274 MMBtu, whereas the District of Columbia had the lowest value with 32 MMBtu. Alaska's high transportation energy intensity may be partly because of its high aviation fuel consumption, and its high industrial energy consumption. Similarly, the District of Columbia's very low transportation energy intensity can be explained with its high availability and usage of public transportation. A similar result can be found in New York which ranked in the second lowest place due to its public transportation.



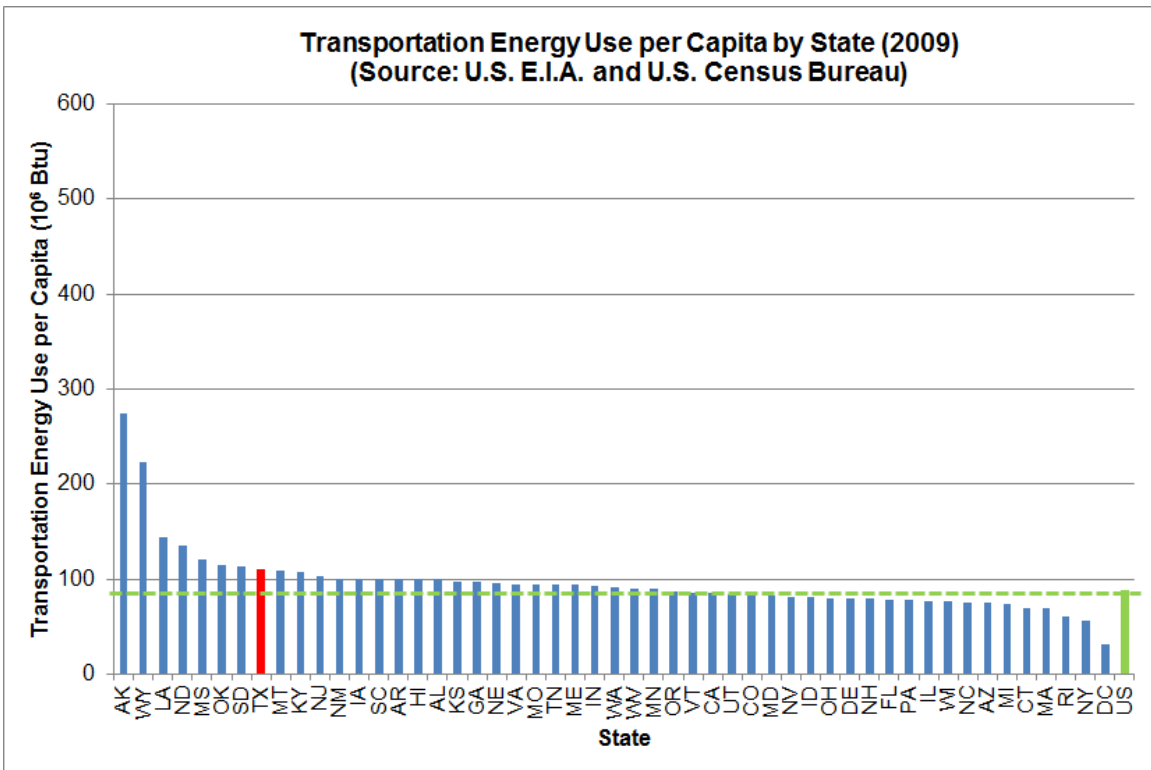
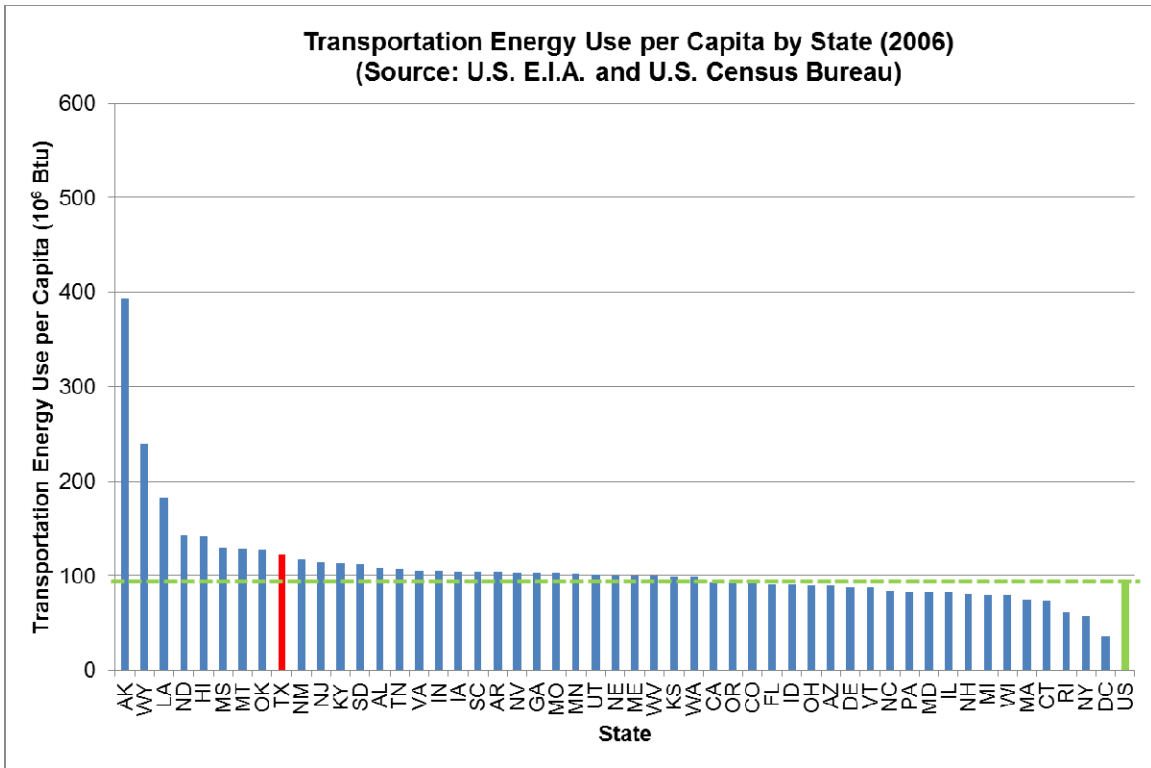


Figure 2.5.1. Energy Use per Capita by the Transportation Sector, Ranked by State, 2006 and 2009.

## 2.6 Industrial Energy Use per Capita, Ranked by State (2006 and 2009)

Figure 2.6.1 shows the industrial energy use per capita of the 50 states and the District of Columbia for the year 2006 and 2009. The industrial energy use per capita for the U.S. and Texas in 2006 and 2009 are as follows:

- U.S. industrial energy use per capita: 109 MMBtu for 2006 and 93 MMBtu for 2009
- Texas industrial energy use per capita: 265 MMBtu for 2006 and 222 MMBtu for 2009

Both U.S. and Texas industrial energy use per capita has decreased since 2006 by 16 and 43 MMBtu, respectively. Texas had a much higher industrial energy use per capita than the U.S. average and ranked in fifth place in 2006 and sixth place in 2009.

The variation of industrial energy intensity between states was very high compared with other end-use sectors. Wyoming had the highest industrial energy use per capita for 2009 with 533 MMBtu, whereas the District of Columbia had the lowest value with 6.5 MMBtu. Alaska, Louisiana, North Dakota, Iowa, and Texas also showed distinctly high industrial energy intensity, more than twice the U.S. average. Due to the large amount of energy consumption by the industrial sector, industrial energy intensity can be regarded as the most significant determinant of total energy use pattern of each state. The ranking of total energy use per capita generally matched closely with the ranking of industrial energy use per capita.

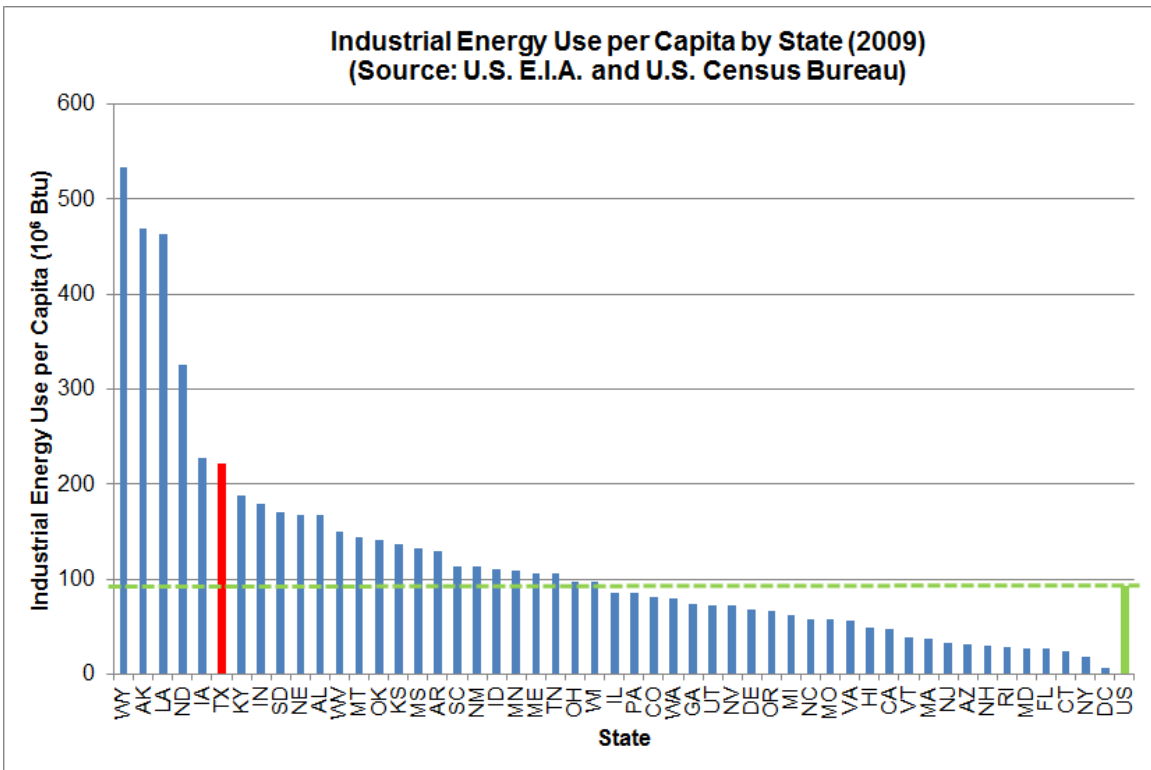
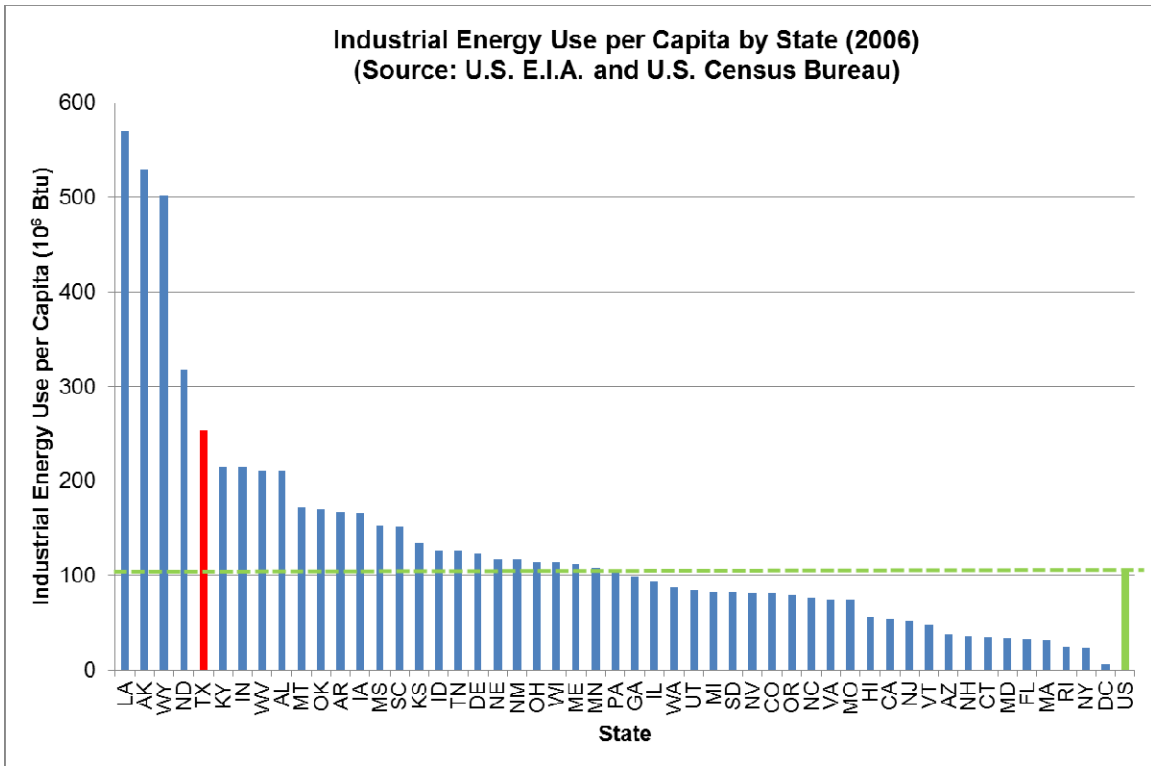


Figure 2.6.1. Energy Use per Capita by the Industrial Sector, Ranked by State, 2006 and 2009.

### 3 HISTORICAL ENERGY USE PER CAPITA FOR THE 12 SEEC STATES DURING 1960-2009

#### 3.1 Overview

This section covers the historical energy use per capita of the 12 SEEC states during the period of 1960 to 2009, including total energy use per capita (Figure 3.2.1) and energy use per capita by end-use sector (Figure 3.3.1 through Figure 3.6.1): electric power, residential, commercial, residential plus commercial, transportation, and industrial sector. Two different scales were selected and used to display data for the comparison purposes. The following scales were used: 1,200 MMBtu for the charts of total and industrial sector and 350 MMBtu for the charts of other sectors, including residential, commercial, residential plus commercial, transportation, and electric power sector.

Each state's energy use per capita is displayed with the U.S. average energy use per capita; the red line indicates the U.S. average energy use per capita. The other 12 lines indicate the historical energy use pattern of each 12 SEEC states - Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

3.2 Total Energy Use per Capita for the 12 SEEC States during 1960-2009

Figure 3.2.1 shows the total energy use per capita of the 12 SEEC states during the period of 1960 to 2009. Louisiana ranked the highest, and the second highest was Texas. This is mainly due to their high industrial energy use per capita. It is noticeable that Texas's total energy use per capita has decreased since 2000. Florida ranked the lowest; and since the middle of the 1970's, their energy use pattern remained almost flat - around 250 MMBtu per capita, less than the U.S. average. Except for the above-mentioned three states, the per capita energy use patterns of the other nine states were tightly grouped.

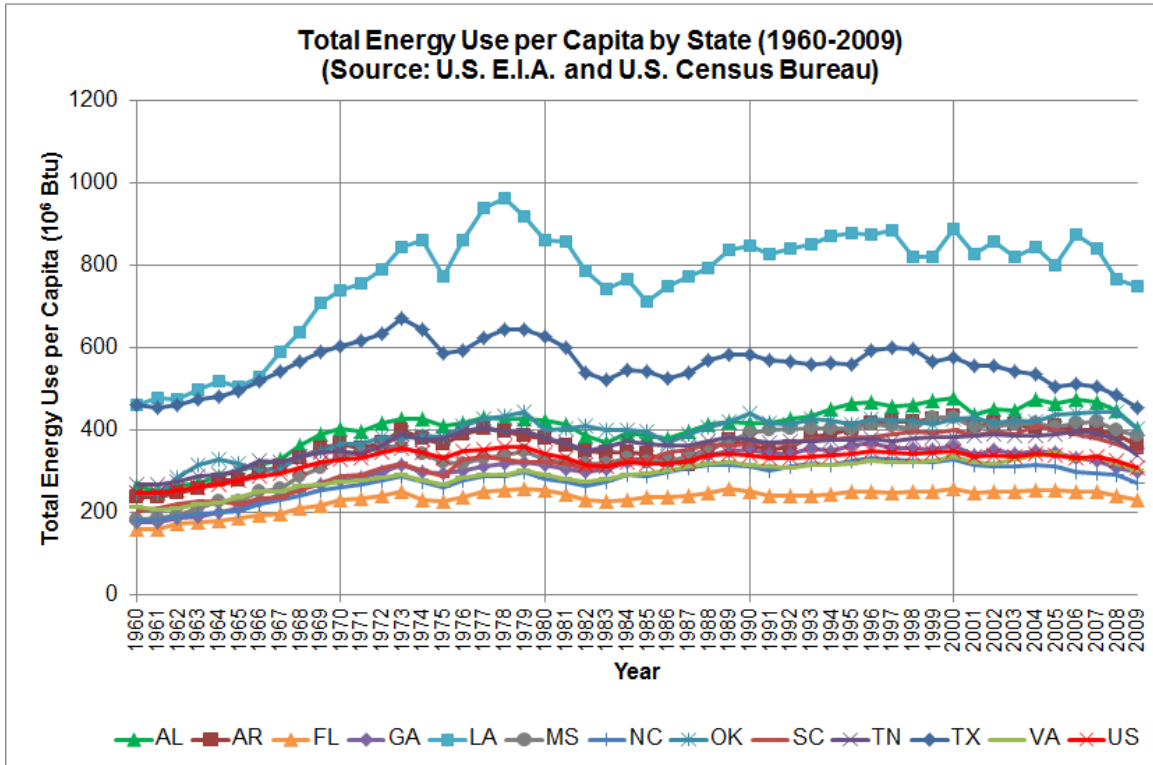


Figure 3.2.1. Total Energy Use per Capita, for the 12 SEEC States during 1960-2009.

### 3.3 Industrial Energy Use per Capita for the 12 SEEC States during 1960-2009

Figure 3.3.1 shows the industrial energy use per capita of the SEEC states during the period of 1960 to 2009. The historical per capita industrial energy use pattern has parallels with the total energy use per capita addressed in the previous section. Louisiana ranked the highest, and the second highest was Texas. It is noticeable that that Texas's industrial energy use per capita has been decreasing since 2000. Florida ranked the lowest, which is much less than the U.S. average. Except for the above-mentioned three states, the per capita industrial energy use patterns of the other nine states were tightly grouped.

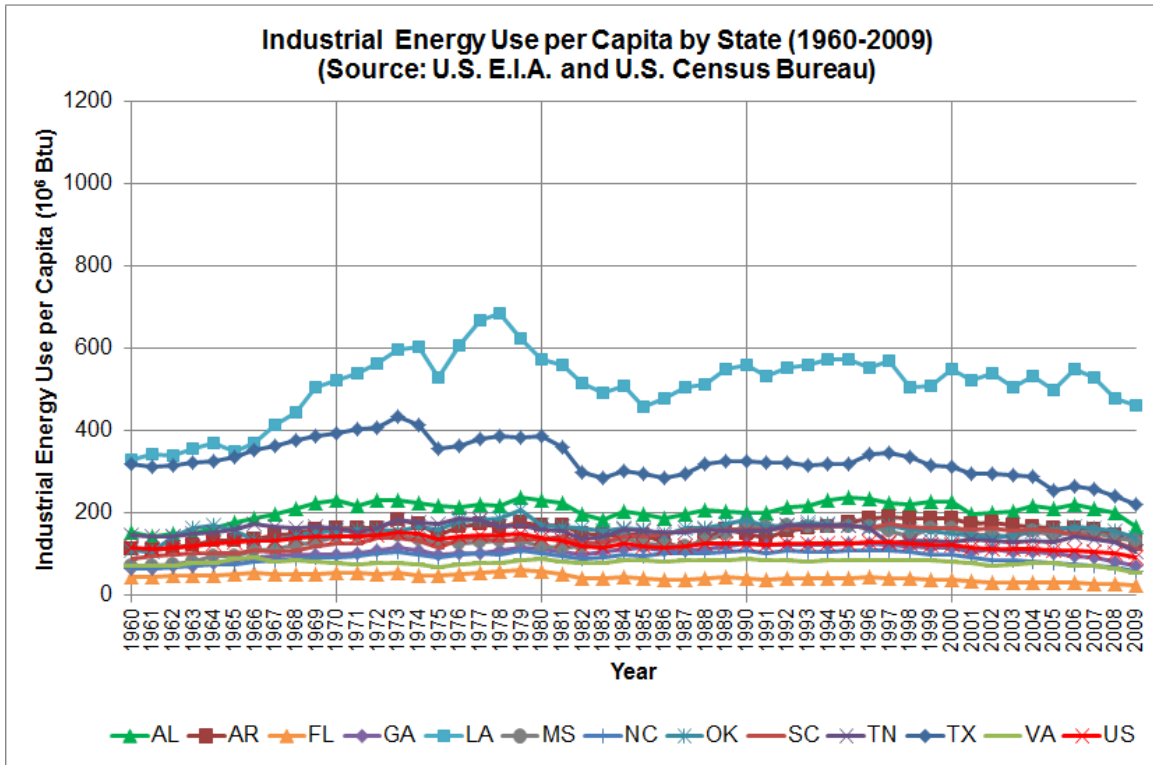


Figure 3.3.1. Energy Use per Capita by the Industrial Sector, for the 12 SEEC States during 1960-2009.

### 3.4 Residential and Commercial Energy Use per Capita for the 12 SEEC States during 1960-2009

Figure 3.4.1 and Figure 3.4.2, respectively, shows the residential and the commercial energy use per capita of the 12 SEEC states during the period of 1960 to 2009, while Figure 3.4.3 shows the combined residential and commercial per capita energy use that can be regarded as the whole building sector's per capita energy use. The commercial energy use consists of the energy consumed by many different building types, including businesses, institutions, and organizations that provide services. For the purpose of a comparison, a different scale was used in Sections 3.4 to 3.6.

For both residential and commercial, the per capita energy use has been slightly increasing over the years. However, the variation across states was very small compared with other end-use sectors; per capita energy uses of all twelve states were tightly grouped with a range of about 20 MMBtu per capita. In 2009, Oklahoma ranked the highest, and the lowest was Texas. For the commercial sector, Virginia ranked the highest, and Mississippi the lowest. Virginia ranked the highest of the combined residential and commercial per capita energy use in 2009. Texas was the lowest among the 12 SEEC states. It is noticeable that Texas' residential energy use per capita has been decreasing since 2000. In addition, abnormal commercial energy use patterns were found in Louisiana and Tennessee. In the late 1970's, Louisiana's commercial energy use per capita was increasing while in the middle 1990's, Tennessee's commercial energy use per capita declined suddenly.

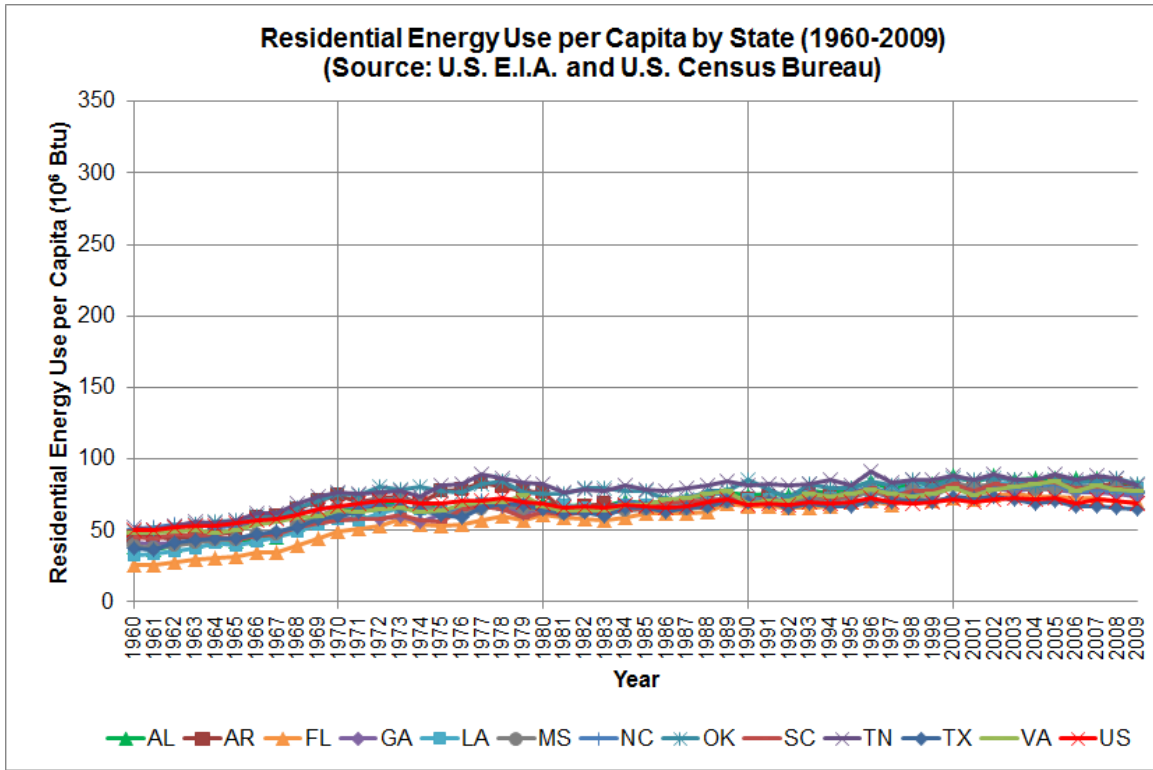


Figure 3.4.1. Energy Use per Capita by the Residential Sector, for the 12 SEEC States during 1960-2009.

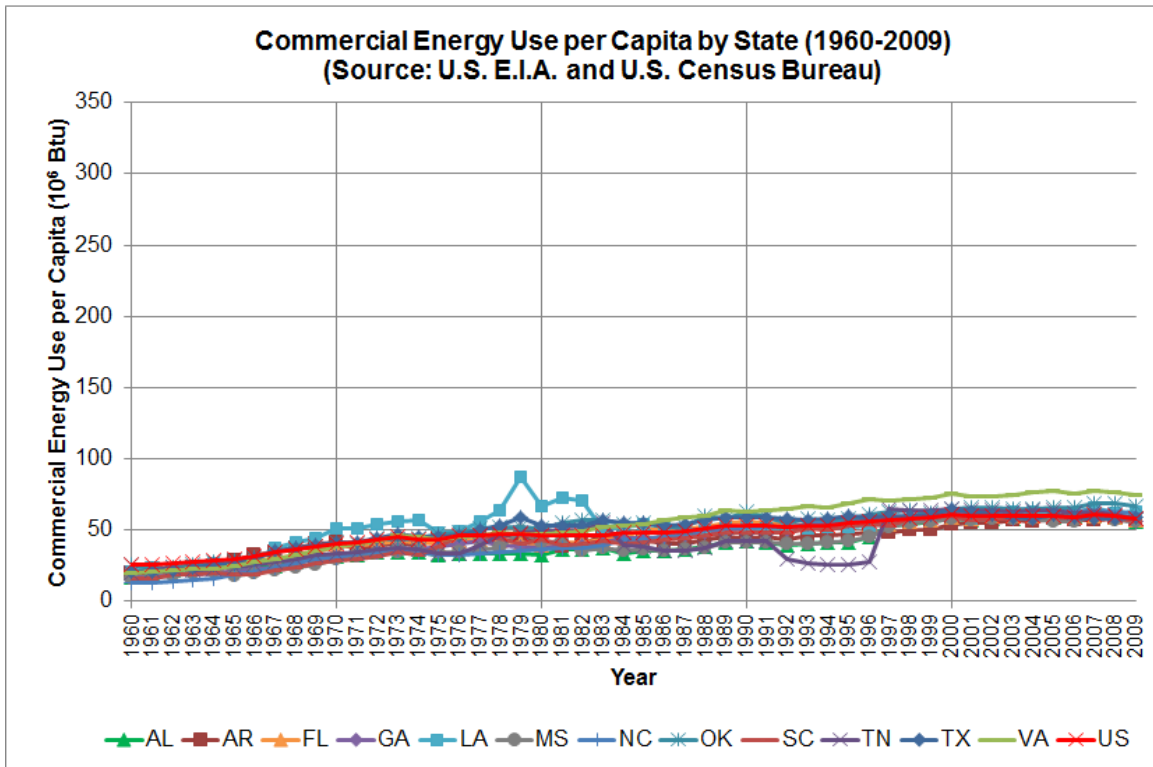


Figure 3.4.2. Energy Use per Capita by the Commercial Sector, for the 12 SEEC States during 1960-2009.



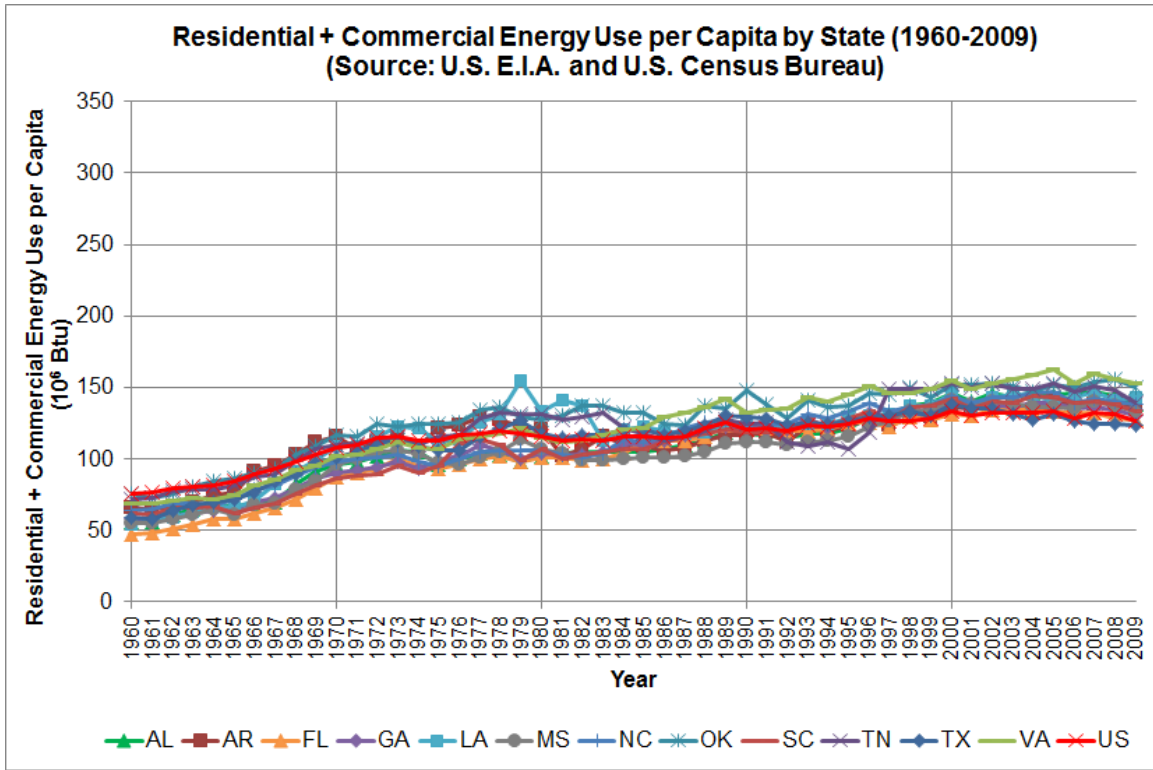


Figure 3.4.3. Energy Use per Capita by the Residential and Commercial Sector, for the 12 SEEC States during 1960-2009.

### 3.5 Transportation Energy Use per Capita for the 12 SEEC States during 1960-2009

Figure 3.5.1 shows the transportation energy use per capita of the 12 SEEC states during the period of 1960 to 2009. The historical per capita transportation energy use patterns have remained constant since the middle 1970's (except for Louisiana) and have started decreasing since 2007. Louisiana ranked the highest and showed distinctly high transportation energy intensity. This is mainly because of the river bridge traffic to transport oil and gas. The second highest group consists of Mississippi, Oklahoma, and Texas. It is notable that Texas' transportation energy intensity is constant since 1980. The lowest group was Florida and North Carolina.

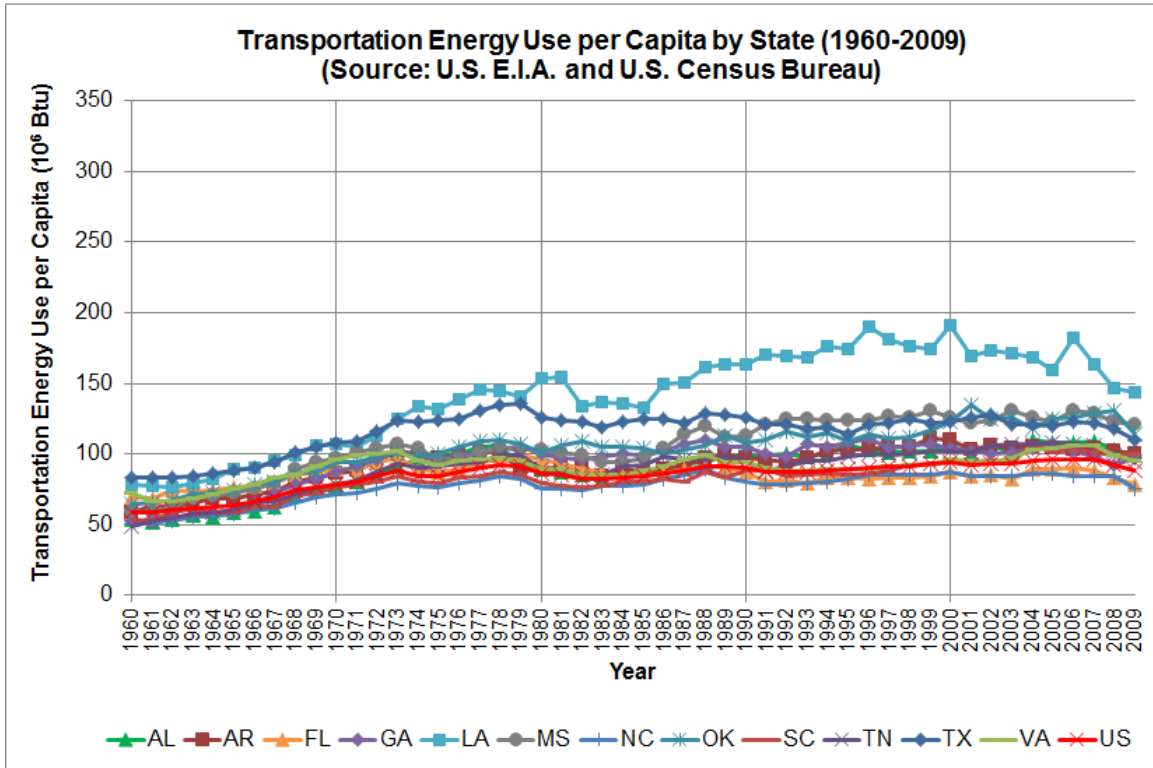


Figure 3.5.1. Energy Use per Capita by the Transportation Sector, for the 12 SEEC States during 1960-2009.

3.6 Electric Power Energy Use per Capita for the 12 SEEC-States during 1960-2009

Figure 3.6.1 shows the electric power energy use per capita of the 12 SEEC states during the period of 1960 to 2009. The electric power energy use consists of the energy consumed by facilities to generate, transmit, and distribute electric energy. Thus, it must be noted that the amount of electricity produced in the state is different from that consumed in the state.

The historical per capita electric power energy use per capita has been rising constantly across all twelve states. Alabama showed a distinctly high consumption and ranked the highest at 286 MMBtu per capita in 2009. The second highest was South Carolina at 221 MMBtu per capita in 2009, and the lowest group consists of Florida and Virginia. Although the top two states, Alabama and South Carolina, export surplus energy to other states, they are also big electricity energy consumers. Among the 50 states and the District of Columbia, Alabama and South Carolina ranked in fifth and seventh place, respectively, in total electricity energy per capita consumed within the state in 2009.

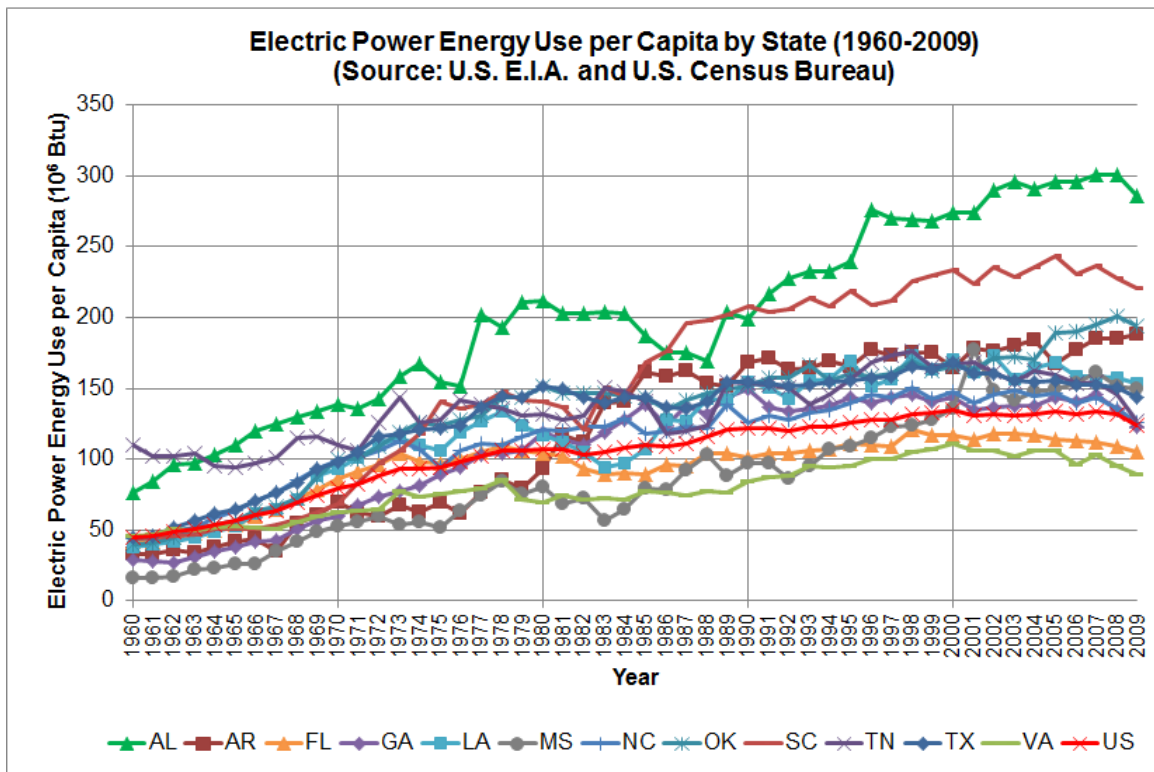


Figure 3.6.1. Energy Use per Capita by the Electric Power Sector, for the 12 SEEC States during 1960-2009.

#### 4 ENERGY USE AND ENERGY USE PER CAPITA BY END-USE SECTOR AND FUEL SOURCE DURING 1960-2009 FOR U.S. AND TEXAS

##### 4.1 Overview

This section covers the historical energy use and energy use per capita by end-use sector and fuel source during 1960-2009 for the U.S. and Texas. This section can be used for a comparison of energy use within the states by end-use and by fuel-source. The end-use sectors consist of residential, commercial, industrial and transportation. The fuel sources consist of coal, natural gas, petroleum and other. Other fuel source includes nuclear electric power, hydro-electric power, biomass, geothermal, wind, photovoltaic, solar thermal energy, and net imports of electricity.

In Section 4.2, the historical U.S. total energy use, both total and per capita, is displayed by end-use sector and by fuel source. In Sections 4.3, historical Texas energy use, both total and per capita, is displayed by end-use sector and by fuel source. The energy consumption of electric power sector was also displayed in the chart of end-use sector energy use. The red dotted line indicates the U.S. average energy use per capita.

Table 4.1 presents the scales that were used for the charts in Sections 4.2-4.3. One hundred twenty and 14 quadrillion Btu were used to display data in the charts of total energy use for the U.S. and Texas, respectively. In the charts of per capita energy use, the scale, 500 MMBtu was used for the U.S., and for Texas, 1,000 MMBtu, was used.

Table 4.1. Chart Scales in Sections 4.2 to 4.3.

Section Number	State	Total (Quads= $10^{15}$ Btu)	per Capita ( $10^6$ Btu)
4.2	US Total	120	500
4.3	Texas(TX)	14	1,000

## 4.2 U.S. Total

Figure 4.2.1 and Figure 4.2.2, respectively, show the total and per capita energy use of the U.S. by end-use sector (residential, commercial, industrial and transportation) and electric power sector during the period of 1960 to 2009. Figure 4.2.3 and Figure 4.2.4, respectively, show the total and per capita energy use of the U.S. by fuel source during the period of 1960 to 2009. The U.S. total energy use has been continuously rising while per capita U.S. energy use has remained constant. Since 2007, both total and per capita energy use have started decreasing. Since 2000, the electric power sector consumed the largest amount of total energy among end-use sectors, followed by industrial, transportation, residential and commercial. By fuel source, the energy consumption of petroleum-based products distinctly occupied the largest proportion of the total. There were little differences between natural gas and coal products, and other fuel sources occupied the smallest proportion.

The total population and energy use information for the U.S. in 2009 are as follows:

- U.S. Total Population (2009): 306,656,290
- U.S. Total Energy Use (Quads= $10^{15}$  Btu, 2009): 94.45 Quads

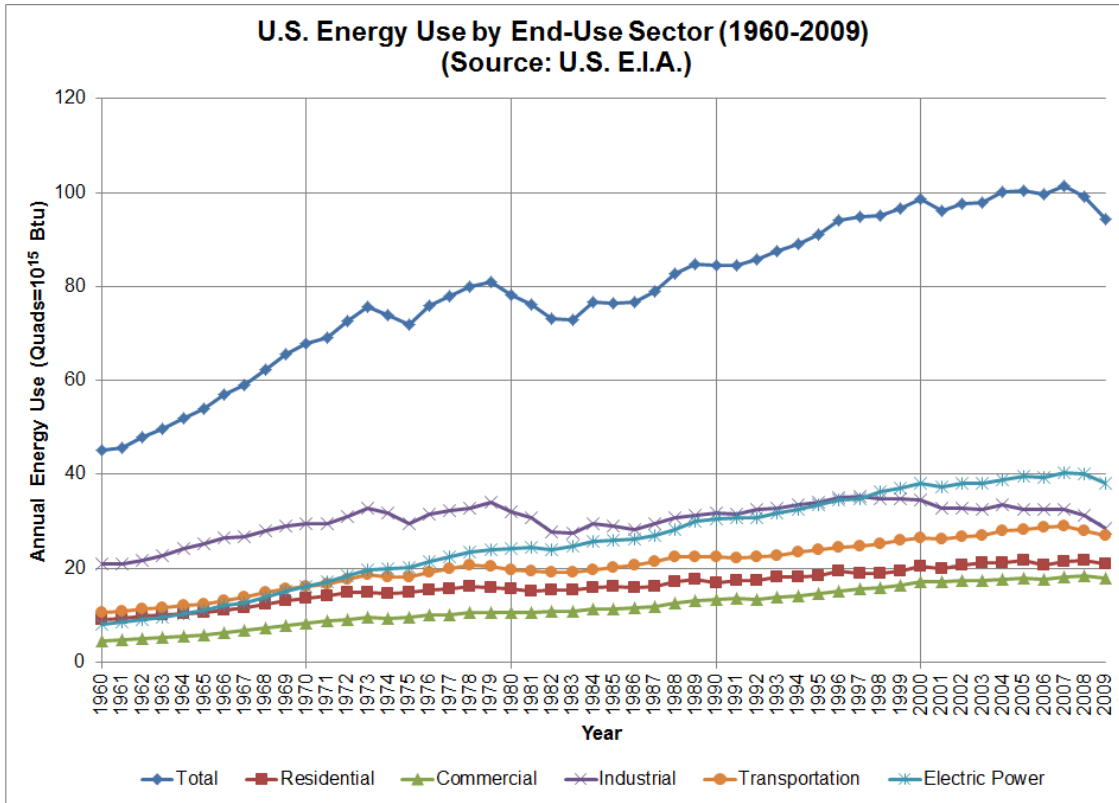


Figure 4.2.1. U.S. Total Energy Use by End-Use Sector during 1960-2009.

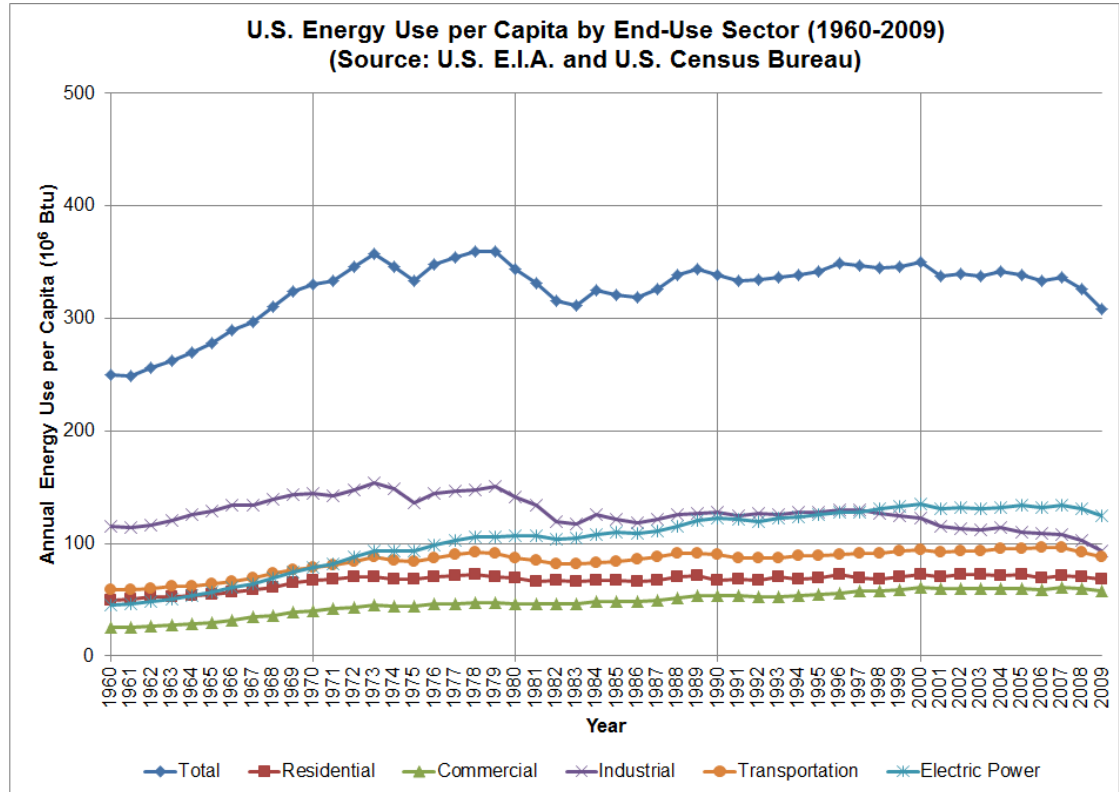


Figure 4.2.2. U.S. Total Energy Use per Capita by End-Use Sector during 1960-2009.

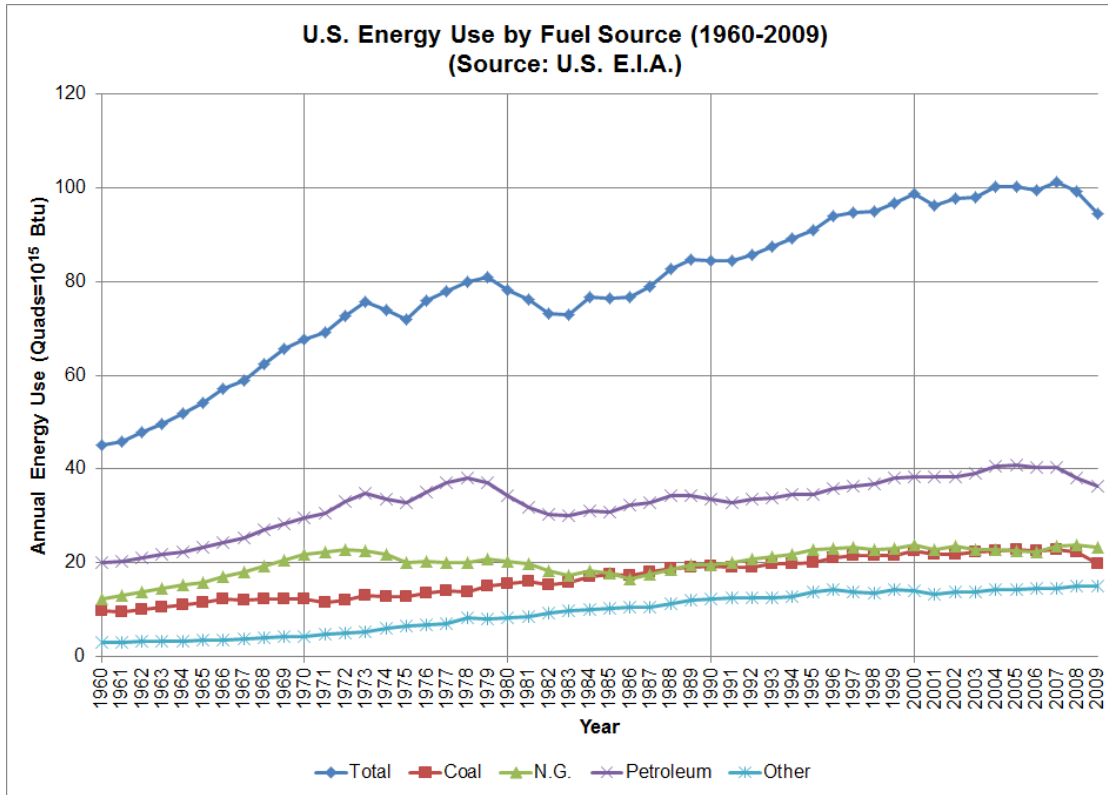


Figure 4.2.3. U.S. Total Energy Use by Fuel Source during 1960-2009.

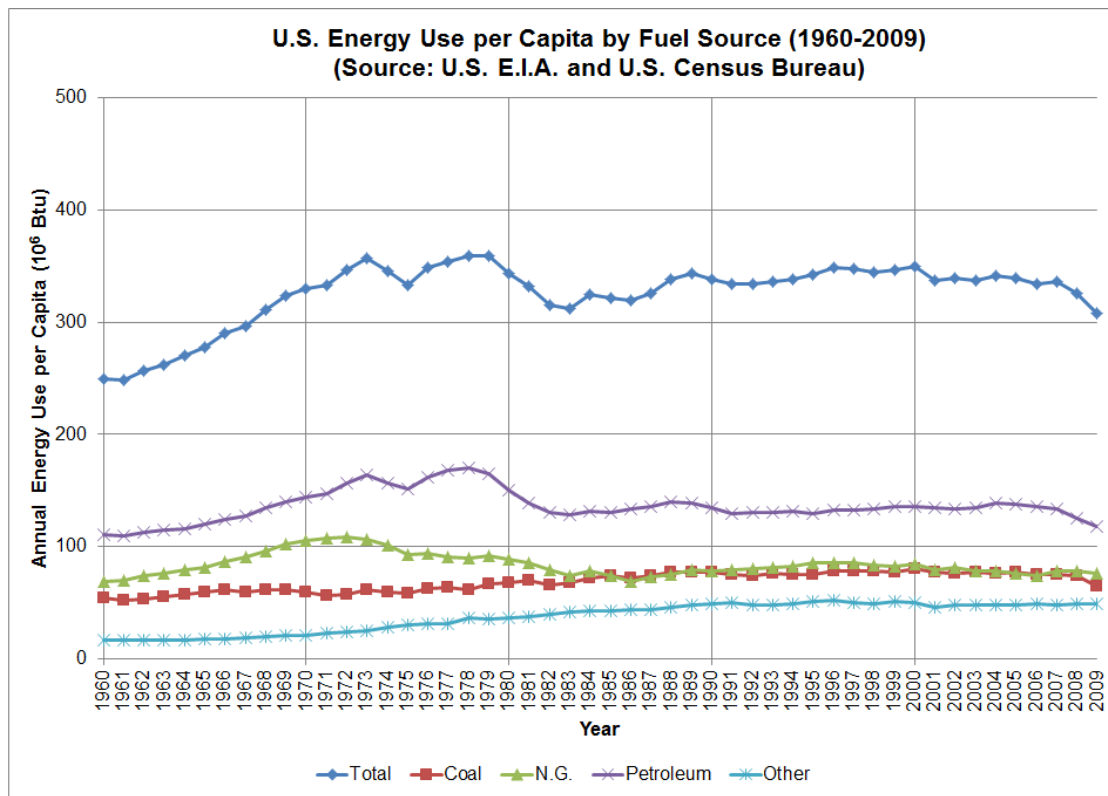


Figure 4.2.4. U.S. Total Energy Use per Capita by Fuel Source during 1960-2009.

### 4.3 Texas

Figure 4.3.1 and Figure 4.3.2, respectively, show the total and per capita energy use of Texas by the end-use sector during the period of 1960 to 2009. Figure 4.3.3 and Figure 4.3.4, respectively, show the total and per capita energy use of Texas by fuel sources during the period of 1960 to 2009. Texas's total energy use has been continuously rising, while per capita energy use has remained constant. Since 2000, per capita energy use in Texas has started decreasing. Texas' energy use per capita is still far beyond the U.S. average per capita. The industrial sector consumed the largest amount of total energy among end-use sectors, followed by electric power, transportation, residential and commercial. By fuel source, the energy consumption of petroleum-based products occupied the largest proportion of total, followed by natural gas, coal, and other fuel sources. It is noticeable that the energy consumption of natural gas products has suddenly decreased since 2004.

The total population and energy use information for Texas in 2009 is as follows:

- Texas Total Population (2009): 24,770,651
- Texas Total Energy Use (Quads= $10^{15}$  Btu, 2009): 11.30 Quads



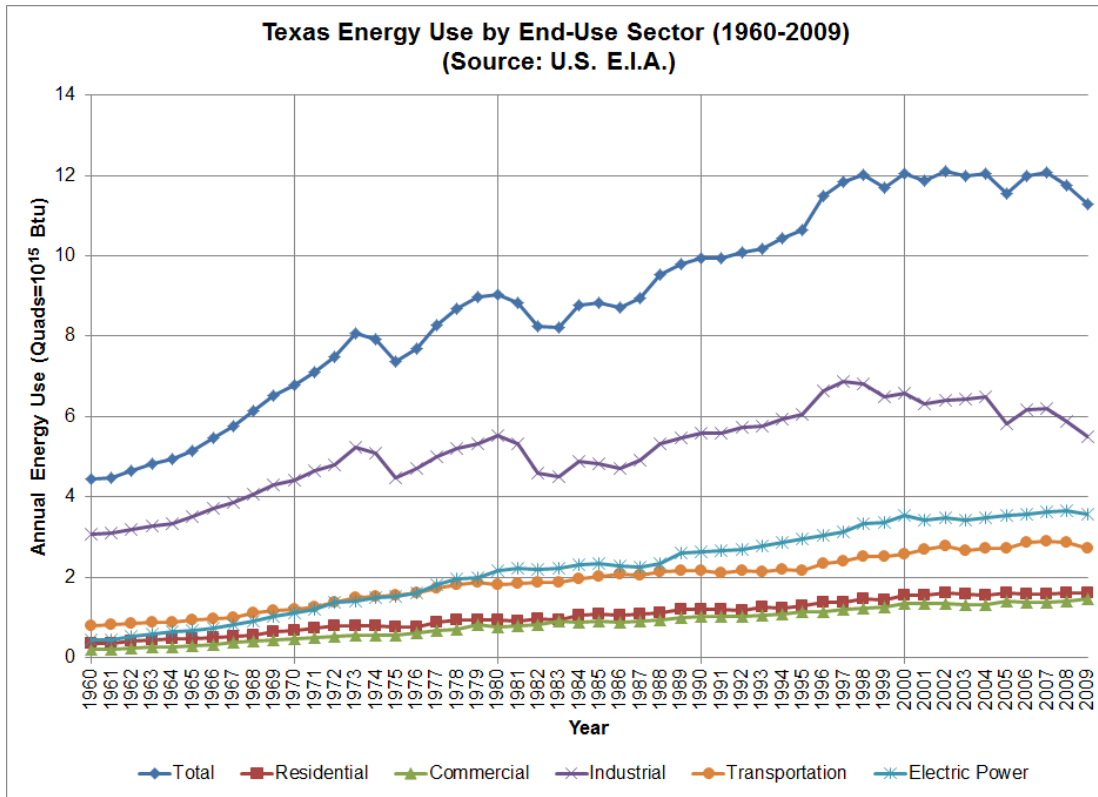


Figure 4.3.1. Texas Energy Use by End-Use Sector during 1960-2009.

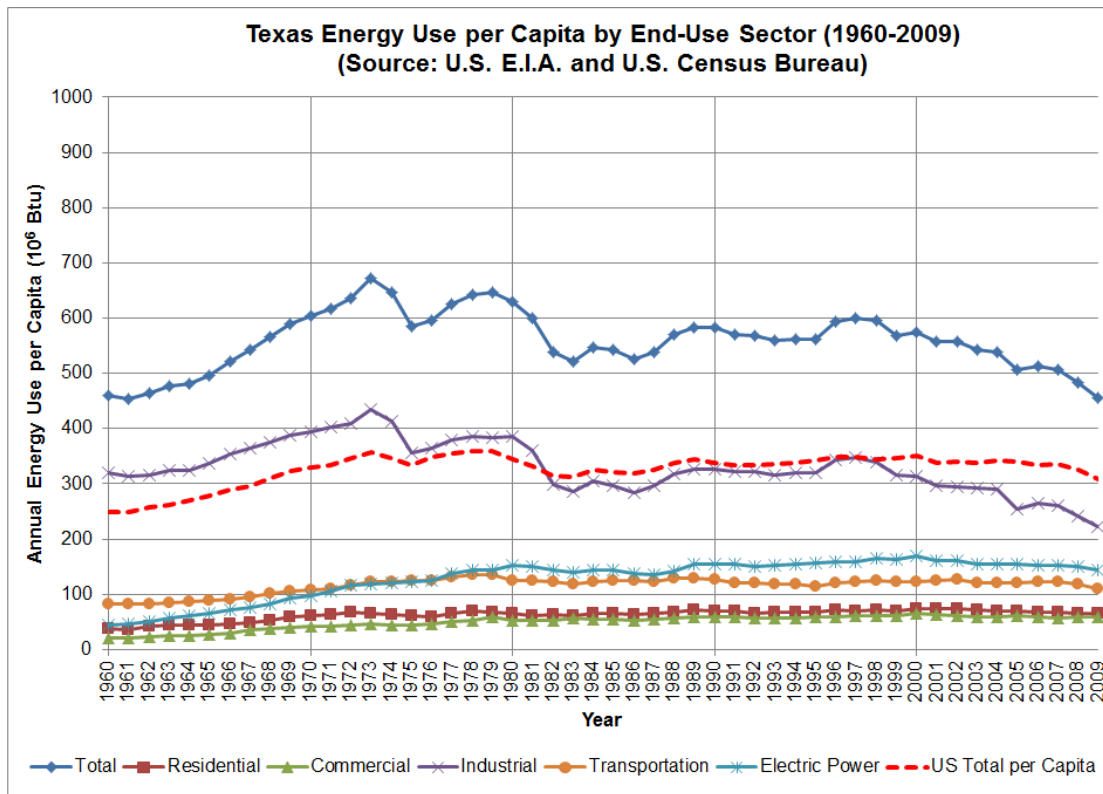


Figure 4.3.2. Texas Energy Use per Capita by End-Use Sector during 1960-2009.

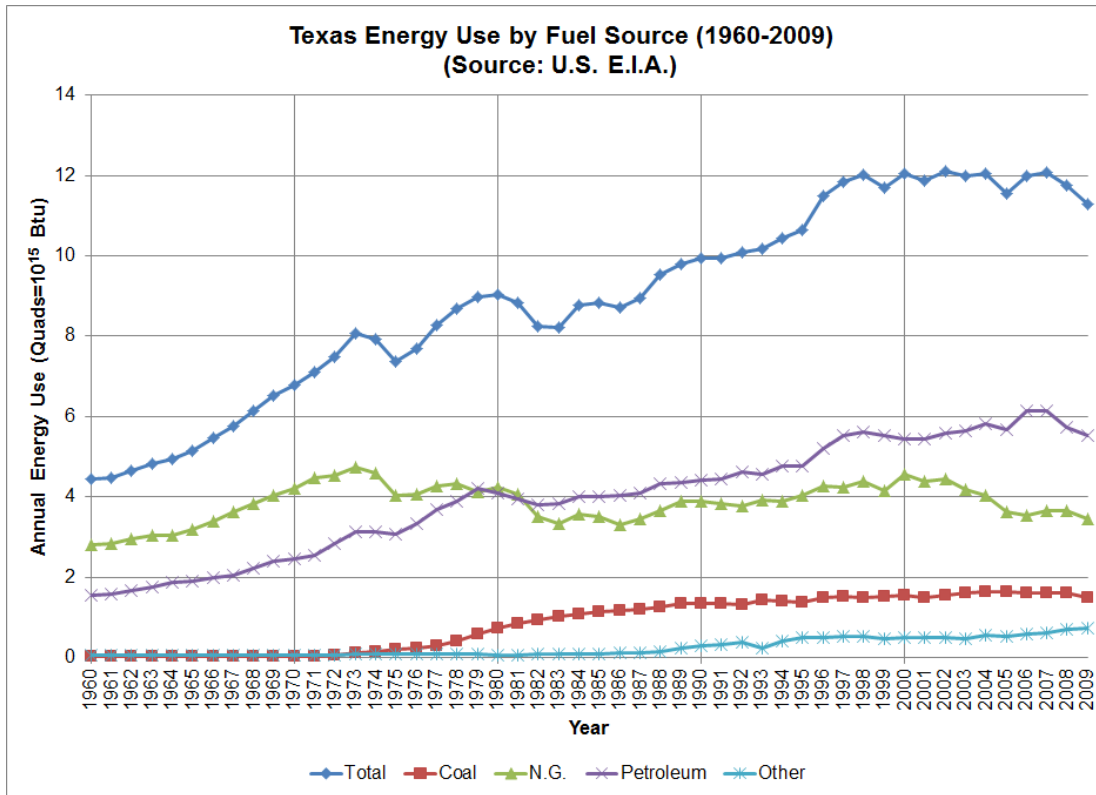


Figure 4.3.3. Texas Energy Use by Fuel Source during 1960-2009.

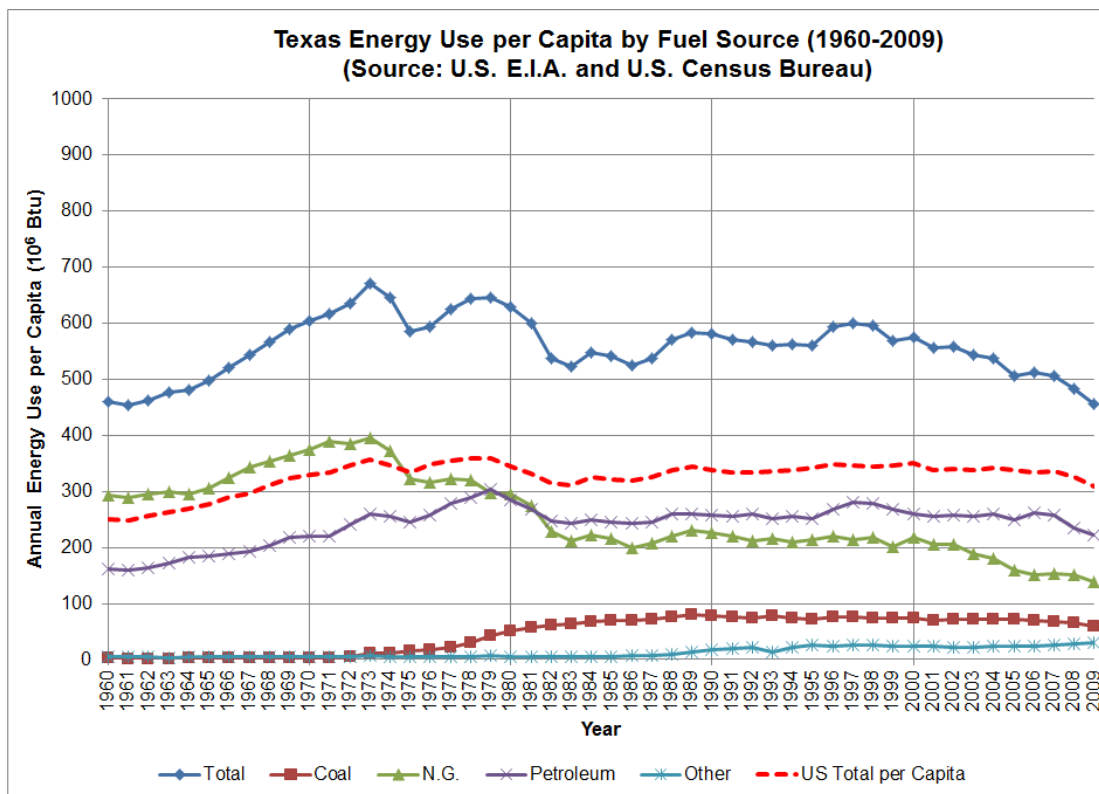


Figure 4.3.4. Texas Energy Use per Capita by Fuel Source during 1960-2009.

## APPENDIX A. Energy Consumption Data.

Appendix A presents the detailed information of energy consumption data sets that have been used for this analysis, including the source, selected data codes, and term definitions. The energy consumption data is taken from the U.S. DOE EIA's State Energy Data System (SEDS) website.

- Energy Consumption Data Sources:  
U.S. DOE, EIA. 2011. *Consumption, Price, and Expenditure Estimates through 2009: Complete Data Files, All States and All Years*, State Energy Data System (SEDS), Energy Information Administration, U.S. Department of Energy, Retrieved from <http://www.eia.doe.gov/emeu/states/seds.html> (accessed June 30, 2011).
- 2009 is the latest year for which state-by-state energy consumption data is available. Among 276 data codes, the selected data codes are presented in Table A.1. The EIA definitions of several terms, which are specific to this report, are presented in Table A.2.
- A new data series “Other (Other Fuel Source),” including nuclear electric power, hydro-electric power, biomass, geothermal, wind, photovoltaic, solar thermal energy, and net imports of electricity, has been defined to display annual energy consumption by fuel source using the following equation:  

$$\text{Other} = \text{TETCB} - \text{CLTCB} - \text{NNTCB} - \text{PATCB} - \text{ELISB}$$
 where:  
 TETCB: Total energy consumed.  
 CLTCB: Coal total consumed.  
 NNTCB: Natural gas total consumed.  
 PATCB: All petroleum products total consumed.  
 ELISB: Net interstate sales of electricity and associated losses.
- For the natural gas based energy consumption, “NNTCB (Natural gas total consumed (excluding supplemental gaseous fuels))” was used instead of “NGTCB (Natural gas total consumed (including supplemental gaseous fuels))” because NGTCB is no longer published.

Table A.1. Selected Energy Consumption Data Codes

MSN	Description	Unit
TETCB	Total energy consumed.	Billion Btu
TERCB	Total energy consumed by the residential sector.	Billion Btu
TECCB	Total energy consumed by the commercial sector.	Billion Btu
TEACB	Total energy consumed by the transportation sector.	Billion Btu
TEICB	Total energy consumed by the industrial sector.	Billion Btu
TEEIB	Total energy consumed by the electric power sector.	Billion Btu
CLTCB	Coal total consumed.	Billion Btu
NNTCB	Natural gas total consumed (excluding supplemental gaseous fuels).	Billion Btu
PATCB	All petroleum products total consumed.	Billion Btu
ELISB	Net interstate sales of electricity and associated losses (negative and positive values).	Billion Btu

Table A.2. EIA Term Definitions

Term	Definition
<b>Residential Sector</b>	An energy-consuming sector that consists of living quarters for private households. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances. The residential sector excludes institutional living quarters.
<b>Commercial Sector</b>	An energy-consuming sector that consists of service-providing facilities and equipment of: businesses; Federal, State, and local governments; and other private and public organizations, such as religious, social, or fraternal groups. The commercial sector includes institutional living quarters. It also includes sewage treatment facilities. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a wide variety of other equipment. <i>Note:</i> This sector includes generators that produce electricity and/or useful thermal output primarily to support the activities of the above-mentioned commercial establishments.
<b>Transportation Sector</b>	An energy-consuming sector that consists of all vehicles whose primary purpose is transporting people and/or goods from one physical location to another. Included are automobiles; trucks; buses; motorcycles; trains, subways, and other rail vehicles; aircraft; and ships, barges, and other waterborne vehicles. Vehicles whose primary purpose is not transportation (e.g., construction cranes and bulldozers, farming vehicles, and warehouse tractors and forklifts) are classified in the sector of their primary use. In this report, natural gas used in the operation of natural gas pipelines is included in the transportation sector.
<b>Industrial Sector</b>	An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods. The industrial sector encompasses the following types of activity: manufacturing (NAICS codes 31-33); agriculture, forestry, fishing and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); and construction (NAICS code 23). Overall energy use in this sector is largely for process heat and cooling and powering machinery, with lesser amounts used for facility heating, air conditioning, and lighting. Fossil fuels are also used as raw material inputs to manufactured products. <i>Note:</i> This sector includes generators that produce electricity and/or useful thermal output primarily to support the above-mentioned industrial activities.
<b>Electric Power Sector</b>	An energy-consuming sector that consists of electricity-only and combined-heat-and-power (CHP) plants within the NAICS (North American Industry Classification System) 22 categories whose primary business is to sell electricity, or electricity and heat, to the public. <i>Note:</i> This sector includes electric utilities and independent power producers.

## APPENDIX B. Population Data.

Appendix B presents the detailed information of population data sets that have been used for this analysis, including the source. The population data used to calculate per capita energy use is taken from the U.S. Census Bureau website. For the intercensal estimates of the total resident population of each state, the reference date is July 1 of each year. For the period of 1960 through 1999, the same data is also available in the U.S. DOE EIA's State Energy Data System (SEDS) website under the data code "TPOPP (Resident population including Armed Forces)." In this analysis different data were used for the period of 2000 through 2009 to reflect a more recent estimation of the population. The population estimation data from 2000 to 2009 are shown in Table B.1.

- Population Data Sources:

1960-1969: U.S. Department of Commerce, U.S. Census Bureau. 1996. *Intercensal Estimates of the Total Resident Population of States: 1960 to 1970*, State Population Estimates, 1900 to 1990, U.S. Census Bureau, Retrieved from <http://www.census.gov/popest/archives/1980s/st6070ts.txt> (accessed April 24, 2009).

1970: U.S. Department of Commerce, U.S. Census Bureau. 1979. *Statistical Abstract of the United States*, Section 1 Population, "No. 11. Resident Population-States: 1960 to 1978." U.S. Census Bureau.

1971-1979: U.S. Department of Commerce, U.S. Census Bureau. 1995. *Intercensal Estimates of the Total Resident Population of States: 1960 to 1970*, State Population Estimates, 1970 to 1980, U.S. Census Bureau, Retrieved from <http://www.census.gov/popest/archives/1980s/st7080ts.txt> (accessed April 24, 2009).

1980: U.S. Department of Commerce, U.S. Census Bureau, 1995. *RESIDENT POPULATION OF STATES (by 5-year age groups & sex)*, U.S. Census Bureau, Retrieved from <http://www.census.gov/popest/archives/1980s/s5yr8090.txt> (accessed February 2, 2009).

1981-1989: U.S. Department of Commerce, U.S. Census Bureau. 1996. *Intercensal Estimates of the Total Resident Population of States: 1980 to 1990*, State Population Estimates, 1900 to 1990, U.S. Census Bureau, Retrieved from <http://www.census.gov/popest/archives/1980s/st8090ts.txt> (accessed April 24, 2009).

1990-1999: U.S. Department of Commerce, U.S. Census Bureau, *Time Series of Intercensal Estimates by County*, Intercensal Estimates, U.S. Census Bureau, Retrieved from [http://www.census.gov/popest/archives/2000s/vintage\\_2001/CO-EST2001-12/index.html](http://www.census.gov/popest/archives/2000s/vintage_2001/CO-EST2001-12/index.html) (accessed April 24, 2009).

2000-2009: U.S. Department of Commerce, U.S. Census Bureau. 2009. *Annual Population Estimates 2000 to 2009: Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009*, National and State Population Estimates, U.S. Census Bureau, Retrieved from <http://www.census.gov/popest/states/NST-ann-est.html> (accessed Jun 30, 2011).

