

Using and Saving Energy

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How the United States Uses Energy

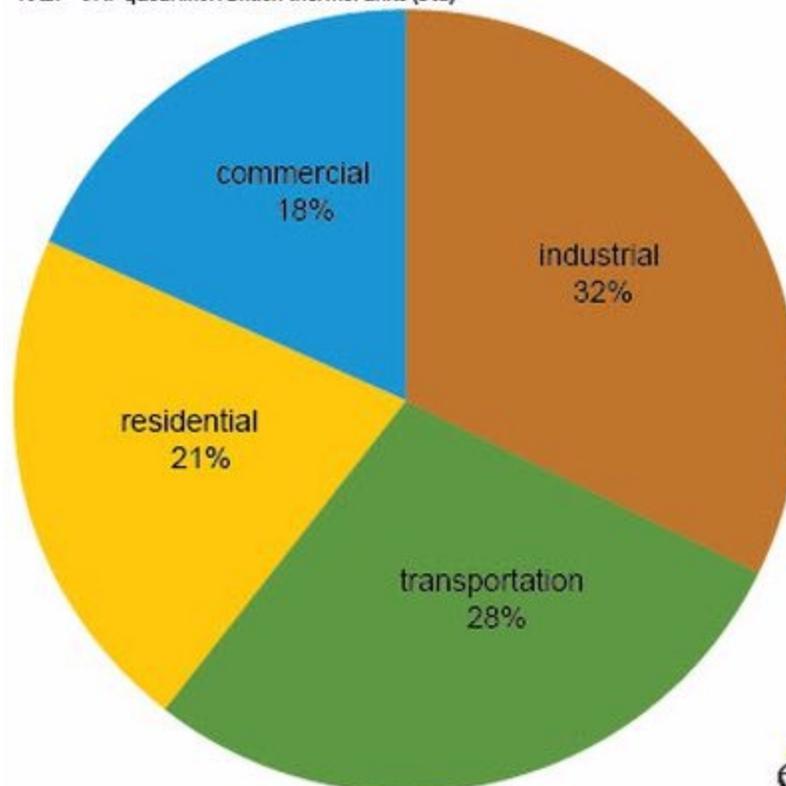
This text is taken from the U.S. Energy Information Administration's Kids Page.

The United States is a highly developed and industrialized society. Americans use a lot of energy in homes, in businesses, and in industry. Americans also use energy for personal travel and for transporting goods. There are five energy consuming sectors:

- The industrial sector includes facilities and equipment used for manufacturing, agriculture, mining, and construction.
- The transportation sector includes vehicles that transport people or goods, such as cars, trucks, buses, motorcycles, trains, aircraft, boats, barges, and ships.
- The residential sector consists of homes and apartments.
- The commercial sector includes offices, malls, stores, schools, hospitals, hotels, warehouses, restaurants, and places of worship and public assembly.
- The electric power sector consumes primary energy to generate most of the electricity consumed by the other four sectors.

Share of total U.S. energy consumed by end-use sector in the United States, 2015

Total = 97.7 quadrillion British thermal units (Btu)



Note: Sum of individual percentages may not equal 100 because of independent rounding.

Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 2.1 (April 2016), preliminary data



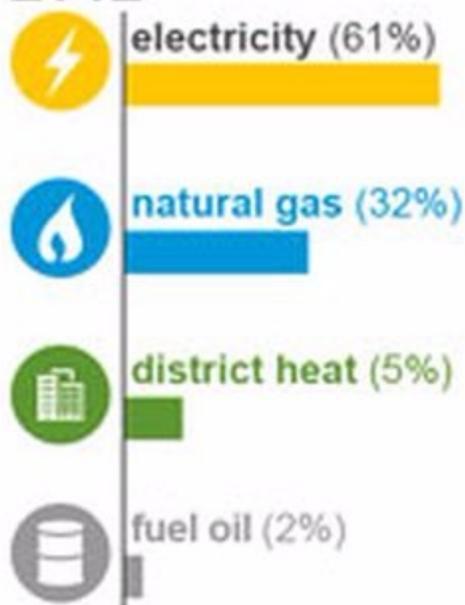
Energy Use in U.S. Commercial Buildings

This text is taken from the U.S. Energy Information Administration's Kids Page.

How do commercial buildings - like offices, hospitals, schools, places of worship, warehouses, hotels, barber shops, libraries, shopping malls - use energy?

Commercial buildings include a variety of building types-offices, hospitals, schools, police stations, places of worship, warehouses, hotels, and shopping malls. Different commercial building activities have unique energy needs but, as a whole, space heating accounted for about 25% of the total energy use in commercial buildings in 2012.

Shares of major energy sources used in commercial buildings, 2012



Source: U.S. Energy Information Administration, 2012 Commercial Building Energy Consumption Survey: Energy Usage Summary, Table 1 (March 2016)

Types of energy used in commercial buildings

Electricity and natural gas are the most common energy sources used in commercial buildings. Most individual commercial buildings have their own heating and cooling systems. However, some commercial buildings are supplied by *district energy systems*. When there are many buildings close together, like on a college campus or in a big city, it is sometimes more efficient to have a central

heating and cooling plant that distributes steam, hot water, or chilled water to all of the different buildings. District energy systems may also produce electricity along with heating and cooling energy. District energy systems generally use fossil fuels (coal, natural gas, or fuel oil), although some use renewable sources of energy (biomass, geothermal, solar, and wind energy).

Energy use by type of building

Of all the commercial building types, mercantile and service buildings use the most total energy. Other commercial users of energy include offices, schools, health care and lodging facilities, food establishments, and many others.

The top five energy-consuming building categories used about half of the energy consumed by all commercial buildings in 2012, and they include the following types of buildings:

- **Mercantile and service** (15% of total energy consumed by commercial buildings)
 - Malls and stores
 - Car dealerships
 - Dry cleaners
 - Gas stations
- **Office** (14% of consumption)
 - Professional and government offices
 - Banks
- **Education** (10% of consumption)
 - Elementary, middle, and high school
 - Colleges
- **Health care** (8% of consumption)
 - Hospitals
 - Medical offices
- **Lodging** (6% of consumption)
 - Hotels
 - Dormitories
 - Nursing homes

Energy Use in U.S. Homes

This text is taken from the U.S. Energy Information Administration's Kids Page.

What uses more energy in our homes - heating, cooling, lighting, or powering electronics like TVs, computers, and MP3 players? And, do houses in the United States use more electricity or natural gas?

The ability to heat and cool is one important accomplishment of modern technology. Our ovens, freezers, and homes can be kept at any temperature we choose, a luxury that wasn't possible 100 years ago. But keeping our homes comfortable uses a lot of energy.

Lighting is also essential to a modern society. Lights have revolutionized the way we live, work, and play. Most homes still use the traditional incandescent bulbs invented by Thomas Edison. These bulbs convert only about 10% of the electricity they use into light; the other 90% is converted into heat. In 1879, the average bulb produced only 14 lumens (a measure of the quantity of light) per watt, compared to about 17 lumens per watt from modern incandescent bulbs. By adding halogen gases, the efficiency can be increased to 20 lumens per watt.

Compact fluorescent bulbs, or "CFLs," have made inroads into home lighting systems in the last few years. These bulbs last much longer and use much less energy than incandescent bulbs, producing significant savings over the life of the bulb.

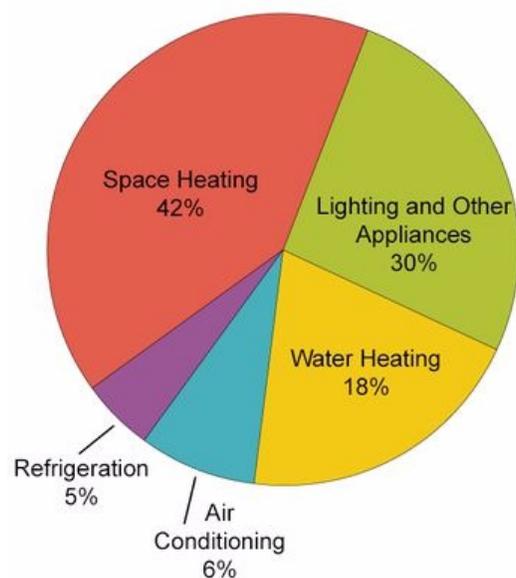
Appliances such as refrigerators, washing machines, and dryers are also more energy efficient than they used to be. Congress passed the National Appliance Energy Conservation Act in 1990 that requires new appliances to meet strict energy efficiency standards. Learn what it means to be energy efficient.

The amount of energy we use in our homes mainly depends on the climate where we live and the types and number of energy consuming devices we use. The pie chart on the right shows the major energy uses in homes in 2009, when most energy use was for space heating (42%), followed by electronics, lighting and other appliances (30%), water heating (18%), air conditioning (6%), and refrigeration (5%).

The number and variety of ways we use energy in homes is changing rapidly. Energy use for air conditioning has doubled since 1980. U.S. households currently plug in more appliances and electronics at home than ever before. While refrigerators and cooking equipment have long been standard in homes, the ownership of appliances such as microwaves, dishwashers, and clothes washers and dryers has increased over the past 30 years.

It is increasingly common for homes to use multiple

How Energy Is Used in Homes (2009)*



* 2009 is the most recent year for which data are available.

Source: U.S. Energy Information Administration, *Residential Energy Consumption Survey (RECS) 2009*.

televisions and computers. Additionally, the home electronics market is constantly innovating, and new products such as DVRs, game systems, and rechargeable electronic devices are becoming ever more integral to our modern lifestyle. As a result of these changes, appliances and electronics (including refrigerators) now account for nearly one-third of all energy used in homes.

Types of Energy Used In Homes

Natural gas and electricity are the most-consumed energy sources in U.S. homes, followed by heating oil, and propane. Natural gas and heating oil (fuel oil) are used mainly for home/space heating. Space heating accounts for the largest share of the energy used in U.S. homes. Electricity, which is used for heating and cooling, also lights our homes and runs almost all of our appliances including refrigerators, toasters, and computers. Many homes in rural areas use propane for heating, while others use it to fuel their barbecue grills.

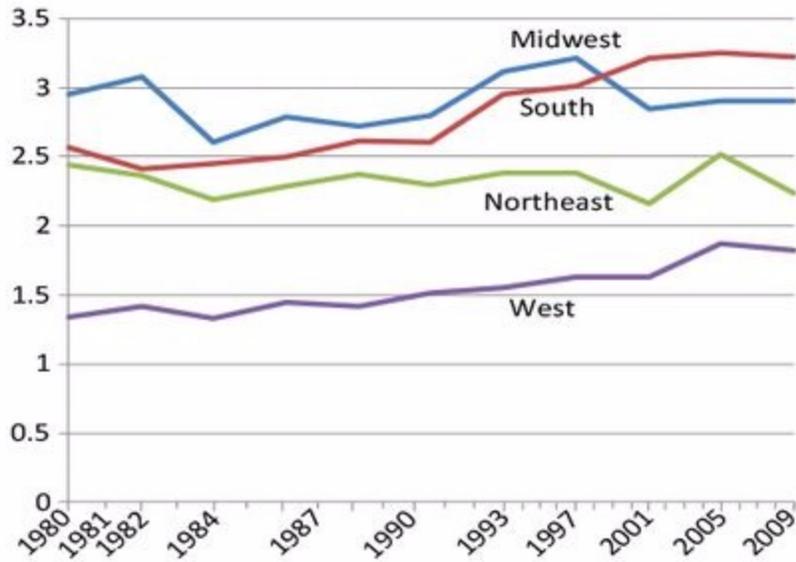
Regional Consumption Data Reflect Population Shifts and Climate

In the late 1990s, homes in the South Census Region surpassed the Midwest in consuming the most energy in the United States. This shift reflects the economic boom in the region, which stimulated U.S. migration to the South and the construction of more and larger homes. In 2009, homes in the South consumed 3.22 quadrillion Btu, about 3% of the country's total energy use and about 32% of energy used in homes.

Due to the longer heating seasons, the Northeast and Midwest regions still, consume the most energy per household, at 108 and 112 Million Btu per household in 2009, respectively.

Total Home Energy Use By Region, 1980-2009

quadrillion Btu



Source: U.S. Energy Information Administration, *Residential Energy Consumption Survey (RECS) 1980-2009*.

Using and Saving Energy

This text is taken from the U.S. Energy Information Administration's Kids Page.

Saving Energy

What can I do to save energy? What is the difference between **energy conservation** and **energy efficiency**?

Everyone uses energy

People use energy each day for transportation, cooking, heating and cooling rooms, manufacturing, lighting, entertainment, and many other uses. The choices people make about how they use energy -turning machines off when they're not using them or choosing to buy fuel-efficient vehicles and energy-efficient appliances-affects the environment and everyone's lives.

Efficiency and conservation are different but related

The terms *energy efficiency* and *energy conservation* have distinct meanings:

- **Energy efficiency** is using technology that requires less energy to perform the same function. Using a compact fluorescent light bulb that requires less energy instead of using an incandescent bulb to produce the same amount of light is an example of energy efficiency.
- **Energy conservation** is any behavior that results in the use of less energy. Turning the lights off when leaving the room and recycling aluminum cans are both ways of conserving energy.

Recycling

It almost always takes less energy to make a product from recycled materials than it does to make it from new materials.

Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products. Recycling often saves energy and natural resources.

Natural resources include land, plants, minerals, and water. When we use materials more than once, we conserve natural resources.

Recycling saves energy in the production of new products

Making a product from recycled materials almost always requires less energy than it does to make the product from new materials. For example, using recycled aluminum cans to make new aluminum cans uses 95% less energy than using bauxite ore, the raw material aluminum is made from.

Recycling paper saves trees and water. For every one ton of paper made from recycled paper, it saves up to 17 trees and uses 50% less water.

Energy Use in U.S. Transportation

This text is taken from the U.S. Energy Information Administration's Kids Page.

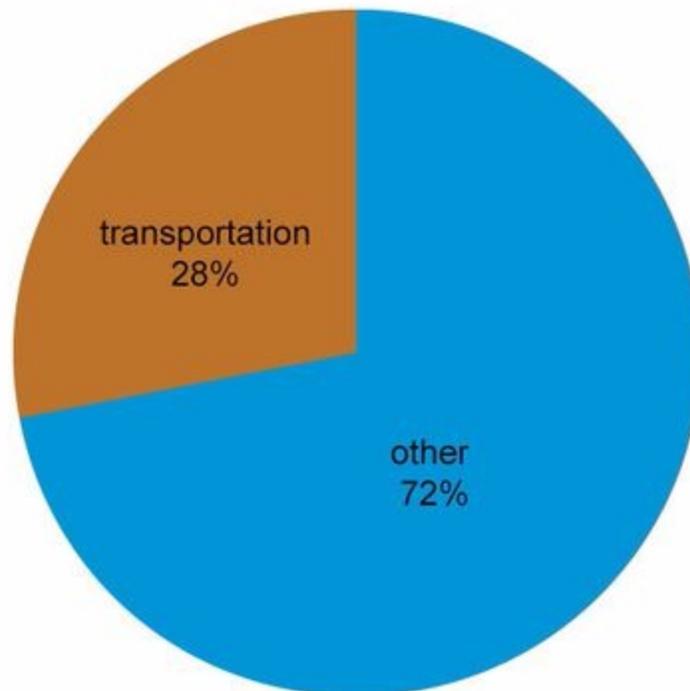
All together, [people in the United States] drive [their] cars, motorcycles, trucks, and buses about 3 trillion miles per year. Combined, gasoline and diesel make up 84% of all of the energy used for transportation.

The United States is a nation on the move. About 28% of all the energy that people in the United States consume goes to transporting people and goods from one place to another.

Different types of energy sources (or fuels) are used for transportation in the United States

- Petroleum products: made from crude oil and liquids from natural gas processing including gasoline, diesel fuel, jet fuel, residual fuel oil, and propane
- Biofuels: ethanol and biodiesel
- Natural gas
- Electricity (produced from many different energy sources)

Share of total U.S. energy used for transportation, 2015

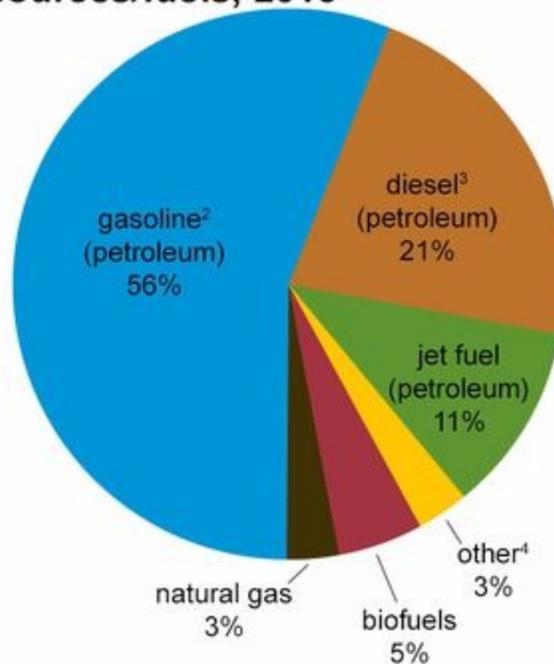


Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 2.1, preliminary data, April 2016 

Energy sources are used in several major ways

- Gasoline is used in cars, motorcycles, light trucks, and boats. Aviation gasoline is used in many types of airplanes.
- Diesel fuel (or distillate fuel) is used mainly by trucks, buses, and trains, and in boats and ships.
- Kerosene is used in jet airplanes and some types of helicopters.
- Residual fuel oil is used in ships.
- Biofuels are added to gasoline and diesel fuel.
- Natural gas is used as compressed natural gas and liquefied natural gas in cars, buses, and trucks. Most of the vehicles that use natural gas are in government and private vehicle fleets.
- Natural gas is also used to operate compressors to move natural gas in pipelines.
- Propane (a hydrocarbon gas liquid) is used in cars, buses, and trucks. Most of the vehicles that use propane are in government and private vehicle fleets.
- Electricity is used by public mass transit systems and by electric vehicles.

U.S. transportation energy sources/fuels, 2015¹



¹ Based on energy content

² Motor gasoline and aviation gas; excludes ethanol

³ Excludes biodiesel

⁴ Electricity, liquefied petroleum gas, lubricants, residual fuel oil, and other fuels

Note: Sum of individual components may not equal 100% because of independent rounding.

Source: U.S. Energy Information Administration, *Monthly Energy Review*, Tables 2.5 and 3.8c, preliminary data, April 2016



Petroleum is the main source of energy for transportation

In 2015, petroleum products provided about 92% of the total energy the U.S. transportation sector

used. Biofuels, such as ethanol and biodiesel, contributed about 5% of the total energy the transportation sector used, and natural gas contributed about 3%. Electricity provided less than 1% of the total energy used.

Gasoline is the most commonly used U.S. transportation fuel

Gasoline is the dominant transportation fuel in the United States. Gasoline (excluding fuel ethanol) accounted for 56% of total U.S. transportation energy use in 2015. When the ethanol that is blended with petroleum gasoline to make finished motor gasoline is included in the percentage share, gasoline's share goes up to about 60% of total transportation energy use in 2015. Gasoline (including fuel ethanol) consumption for transportation averaged about 9 million barrels (379 million gallons) per day. (About 6 million gallons per day of gasoline were consumed for uses other than for transportation.)

Biofuels are added to petroleum fuels

Ethanol and biodiesel were actually some of the first fuels used in automobiles, but they were replaced by gasoline and diesel fuel. Today, most of the biofuels used in vehicles are added to gasoline and diesel fuel. Government incentives and mandates contributed to large increases in the use of biofuels in the United States over the past several decades. The amount of fuel ethanol added to motor gasoline consumed for transportation went from about 1 billion gallons in 1995 to about 14 billion gallons in 2015. Biodiesel consumption increased from 10 million gallons in 2001 to about 1.5 billion gallons in 2015.

Energy Use in U.S. Industry

This text is taken from the U.S. Energy Information Administration's Kids Page.

More energy is consumed for industry and manufacturing than for any other purpose. What industries use more energy - refining, chemical, paper, or metal industries?

The United States is a highly industrialized country. Industry accounts for about one-third of the energy used in the country.

There [is] a variety of different energy sources used in the industrial sector. Energy sources can be used as boiler fuel, which is used to generate steam or hot water. Energy sources can also be used in process heating, which is used to raise the temperature of products in the manufacturing process. Energy sources are also used as feedstocks to make products.

Industry uses many energy sources

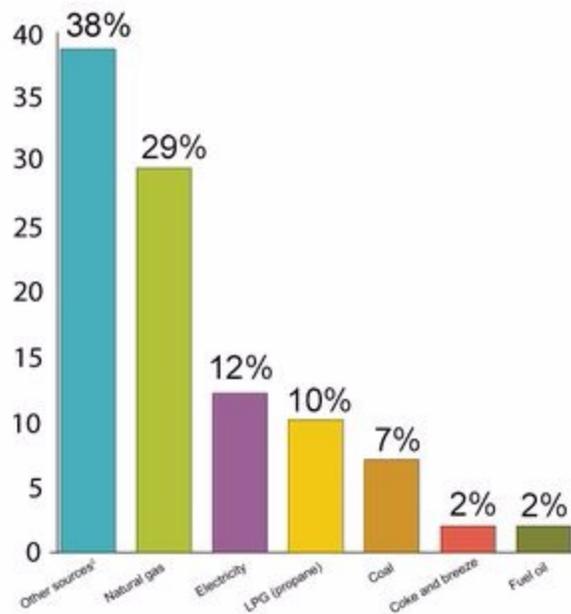
In the manufacturing sector, the predominant energy sources are natural gas and electricity (a secondary source).

Manufacturers also use several other energy sources for heat, power, and electricity generation:

- Steam
- Pulping liquor from paper making
- Agricultural waste
- Tree wood
- Wood residues from mill processing
- Wood-related and paper-related refuse

Sources of energy used for industry and manufacturing, 2010¹

percent



Source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey 2010*, Table 1.2 (March 2013)

¹Includes all use of energy and fuels; excludes shipments of energy sources produced onsite.

²Other sources include steam, pulping liquor from paper making, agricultural waste, tree wood, wood residues from mill processing, and wood-related and paper-related refuse.

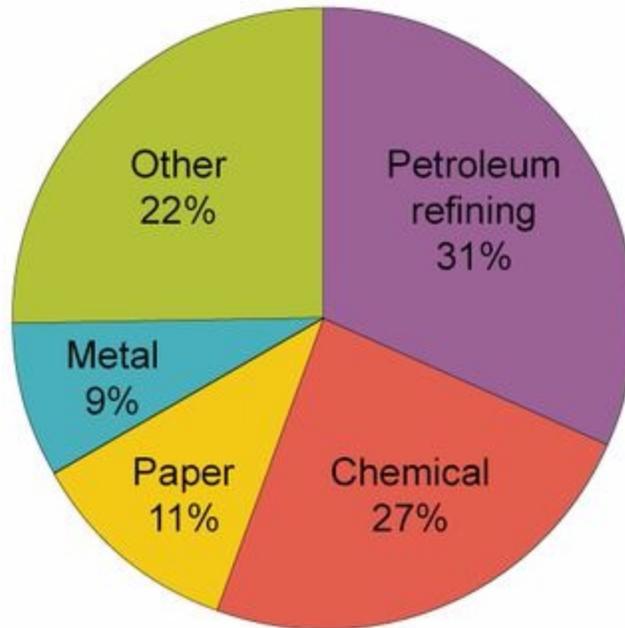
Other energy sources account for 38% of the energy manufacturers' use of heat, power, and electricity generation. Included in these sources are steam, pulping liquor from paper making, agricultural waste, tree wood, wood residues from mill processing, and wood-related and paper-related refuse.

Energy use by type of industry

Every industry uses energy, but there are a handful of energy-intensive industries that use most of the energy consumed by the industrial sector.

The petroleum refining industry is the largest industrial consumer of energy, followed closely by the chemical industry. The refining, chemical, paper, and metal industries combine to use 96% of energy feedstocks; 60% of energy consumed for heat, power, and electricity generation; and 78% of total energy use.

Energy use by type of industry, 2010¹



Source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey 2010*, Table 1.2 (March 2013)

¹Includes all use of energy and fuels; excludes shipments of energy sources produced onsite.

Energy sources used as feedstocks

Many energy sources like coal and petroleum are used in manufacturing. When raw materials are used in the manufacturing process, they are called feedstocks.

Liquefied petroleum gas, coal, natural gas, and other, less common sources were used as energy-related feedstocks in 2010:

- Liquefied petroleum gas (33%)
- Coal (8%)
- Natural gas (8%)
- Other, less common sources (49%)