Renewable Energy Resources

EN 216 & EN 301 (/M)

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Total World Delivered Energy Consumption by sectors and Fuels

TABLE 1-1   Total World Delivered Energy Consumption by End-Use Sector and Fuel in 2017 (EIA, 2018)

All values are in Quad Btu (quadrillion Btu). (1 quadrillion Btu = 1×10^{15} Btu = 0.95×10^{15} kJ)

Fuel	Total	Electricity	Residential	Commercial	Industrial	Transportation	All End-Use Sectors
Oil*	196.7	6.7	8.5	3.9	69.7	106.7	188.8
Natural gas	130.7	44.0	20.6	8.8	53.2	4.1	86.6
Coal	159.8	90.5	4.3	1.6	63.5	0.0	69.4
Nuclear	26.9	26.9	—	—	—	—	—
Electricity	—	—	21.0	16.8	35.1	1.6	74.5†
Renewables	74.9	55.5	1.3	0.2	17.9	—	19.4
Total	589.0	223.6†	55.7	31.3	239.4	112.4	438.8

*The values given for oil also include other nonpetroleum liquid fuels such as ethanol, biodiesel, coal-to-liquids, natural gas liquids, and liquid hydrogen.
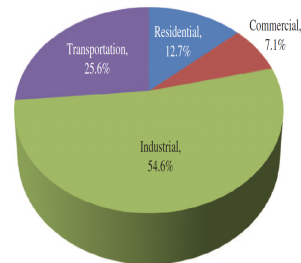

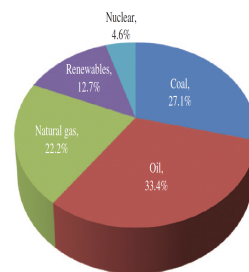**Figure 1-1**   Percentages of global energy use by end-use sectors in 2017 (*EIA, 2018*).

Figure 1-2   Percentages of total world primary energy supply by fuel in 2017 (*EIA, 2018*).

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Problem 1
In table 1-1, the total energy consumption by different energy sources is given to be 589.0 Quad Btu while the total energy use by all end-use sectors is 438.8 Quad Btu. using the table data calculate the total amount of energy lost during the production of electricity by all energy sources. Also calculate the amount of electricity produced in kWh and the overall thermal efficiency of electricity production by all energy sources.

- Ton of Oil equivalent (toe) is an amount of energy unit commonly used to express large amount of energy. It represents the amount of energy released by burning 1 ton (1000 kg) of crude oil. One toe is taken equal to 42 GJ.

- The power plant in the USA generated 4.05×10^9 MWh of electricity in a year. According to table 1.1, 74.5 quad Btu of electricity is produced. Express these values in the toe unit. Also determine the percentage of global electricity generation that occurred in the USA.