Read the following statements carefully and indicate whether they are true (T) or false (F).
Note: For partial credit (if an answer is incorrect), summarize the procedure you used to obtain the answer and show the relevant calculations.

F (25%) If the energy consumption of a country, whose GDP is $100 billion, consists of 80 million tons of coal (12,000 BTU/lb), 20 million barrels of oil (5.6e6 BTU/bbl) and 5 trillion cubic feet of natural gas (960 BTU/scf), its energy intensity does not exceed 20,000 BTU/$GDP.

\[
\begin{align*}
\text{Coal: } & 1.92 \times 10^5 \text{ Btu/yr} \\
\text{Oil: } & 1.12 \times 10^{14} \text{ Btu} \\
\text{NG: } & 4.8 \times 10^{15} \text{ scf} \\
\end{align*}
\]

\[
\text{EI} = \frac{6.83 \times 10^{15} \text{ Btu}}{1.6 \times 10^9 \text{ $GDP}} = 68,320 \text{ Btu Btu/GDP}
\]

T (25%) If the annual growth rate of natural gas use (currently at 1.5e12 scf) is 5.7%, it will take more than 10 years for the consumption to reach 3.0e12 scf.

\[
G_0 = \frac{1.5 \times 10^{12}}{0.057} = 2.6 \times 10^{12} \text{ scf}
\]

\[
\frac{1.5 \times 10^{12} \text{ scf}}{0.057} = 2.6 \times 10^{12} \text{ scf}
\]

F (25%) If the efficiency of a 650-MW power plant (CUF=90%) is 40% and it uses natural gas (23,500 BTU/lb), its annual output of CO₂ does not exceed 1.0e6 metric tons.

\[
\frac{44 \text{ mt CO}_2}{12 \text{ mt C}} \left( \frac{12 \text{ mt NG}}{16 \text{ mt NG}} \right) \left( \frac{1 \text{ lb}}{2 \times 10^6 \text{ lb}} \right) \left( \frac{23,500 \text{ Btu}}{1 \text{ Btu}} \right) \left( \frac{365 \text{ days}}{1 \text{ yr}} \right) \left( \frac{1 \text{ yr}}{1 \text{ Btu}} \right)
\]

\[
650 \times 10^3 \text{ kWh/a} \left( \frac{24 \text{ h}}{1 \text{ d}} \right) \left( \frac{365 \times 0.9 \text{ d}}{1 \text{ yr}} \right) = 2.3 \times 10^6 \text{ mt CO}_2/\text{yr}
\]

T (25%) If 1 kWh of electricity costs 12 cents and a household uses four 1500-W hair dryers during 10 minutes every day, the monthly electric bill attributed to these devices does not exceed $15.

\[
6 \times 0.01 \text{ kWh/a} \times 6 \text{ min/d} \times \frac{30 \text{ d}}{1 \text{ month}} \times \frac{1 \text{ h}}{60 \text{ min}} \times \frac{0.12 \text{ $/kWh}}{1 \text{ kWh}} = 0.36 \text{ $/month}
\]

(5.6e6 BTU/bbl) and 5 trillion cubic feet of natural gas (960 BTU/scf), its energy intensity does not exceed 20,000 BTU/$GDP.

\[
\text{EI} = \frac{6.83 \times 10^{15} \text{ Btu}}{1.6 \times 10^9 \text{ $GDP}} = 68,320 \text{ Btu Btu/GDP}
\]

\[
\text{EI} = \frac{6.83 \times 10^{15} \text{ Btu}}{1.6 \times 10^9 \text{ $GDP}} = 68,320 \text{ Btu Btu/GDP}
\]

\[
2.6 \times 10^{12} \text{ scf}
\]

\[
2.3 \times 10^6 \text{ mt CO}_2/\text{yr}
\]

\[
0.36 \text{ $/month}
\]

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