Appendix 2-C

Conversion of Electricity Into Energy Units

Analyses of energy use often require that different forms of energy (natural gas, oil, electricity) be combined into one common measure, typically Btus. The conversion of electricity into Btus is problematic, as there is no one correct conversion method. If one converts 1 kWh of electricity directly into heat, the amount of energy released is 3,412 Btus. This conversion ratio of 3,412 Btus per kWh is known as the 'site' conversion ratio. Site conversion ignores the energy used to produce that 1 kWh of electricity. A typical coal-burning power-plant, for example, requires about 10,240 Btus of energy in the form of coal to produce 1 kWh of electricity.

An alternative to the site conversion ratio is the "primary" conversion ratio of 10,240 Btus per kWh, which includes the energy used to produce the electricity. This ratio better captures the actual energy savings resulting from increased electric efficiency, however it too has its drawbacks. The primary conversion ratio does not account for energy losses occurring during transportation of fuels; however these losses occur for all types of fuel (including those being delivered to the powerplant), suggesting that failure to account for transportation losses may not result in a bias toward any one fuel type. The primary conversion ratio also overstates the energy needed to produce electricity from hydropower; however in the United States less than 10 percent of electricity comes from hydropower,[1] making this issue less of a concern for this report.

This report uses the primary conversion ratio for electricity in most calculations. This allows for a more accurate comparison of the true energy savings resulting from increases in the efficiency of electricity use. Furthermore the price of electricity is comparable to that of other fuels when the primary conversion ratio is used (table 2-C-l), making primary conversions useful for comparing dollar savings as well.

Table 2-C-l-Comparison of Fuel Prices Using Two Electricity Conversion Ratios

Fuel	Price	Units	Site conversion price ($/MBtu)	Primary conversion price ($/MBtu)
Natural gas.	5.61	Dollars per MBtu	$5.61	$5.61
Oil.	1.06	Dollars per gallon	7.08	7.08
Electricity.	7.8	Cents per kWh	*22.86*	*7,62*

NOTE: Prices are 1990 residential. Conversion ratios assumed are oil at 149,700 Btus per gallon, electricity site at 3,412 Btus per kWh, electricity primary at 10,240 Btus per kWh.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1990,* DOE/EIA-0384(90) (Washington, DC: May 1991), pp. 159, 179, 225, 294.

[1] U.S. Department of Energy, Energy Information Administration, *Annual Energy* Review *1990*, DOE/EIA-0384(90) (Washington DC: May 1991), p. 209.