Appendix F

Alternatives for Estimating Energy Consumption

This appendix is reprinted from the *Annual Energy Review 2010*. EIA continues to review alternative options for accounting for energy consumption and related losses, such as those associated with the generation and distribution of electricity.

I. Introduction

This year, the U.S. Energy Information Administration (EIA) has examined different ways to represent energy consumption in the *Annual Energy Review* (*AER*). This examination centered on two methods for representing related aspects of energy consumption and losses. The first is an alternative method for deriving the energy content of noncombustible renewable resources, which has been implemented in AER 2010 (Table 1.3). The second is a new representation of delivered total energy and energy losses.

This appendix provides an explanation of these alternative methods. Section II provides a background discussion of the alternatives and the reasons for considering these changes to the energy balance presentation. Section III identifies the specific changes incorporated in AER 2010.

II. Background

Alternative Approaches for Deriving Energy Contents for Noncombustible Renewables

EIA compiles data on most energy sources in physical units, such as barrels and cubic feet, in order to calculate total primary energy consumption. Before aggregation, EIA converts data for these energy sources to the common unit of British thermal units (Btu), a measure that is based on the thermal conversion of energy resources to heat and power.

Noncombustible renewables are resources from which energy is extracted without the burning or combustion of a fuel. They include hydroelectric, geothermal, solar, and wind energy. Because power from noncombustible renewables is produced without fuel combustion, there are no set Btu conversion factors for these energy sources.

In the past, EIA has represented hydroelectric, solar, and wind energy consumed for electric generation as the amount of energy it would require, on average, to produce an equivalent number of kilowatthours (kWh) of electricity using fossil fuels. In this appendix, this approach is referred to as the "fossil-fuel equivalency" approach. For the remaining noncombustible renewable resource, geothermal energy, energy consumed for electricity generation has been based on estimates of plant efficiencies in converting geothermal energy to electricity.

The fossil-fuel equivalency approach evolved in an era when the primary goal of U.S. energy policy was reducing dependence on imported petroleum and when a significant amount of electricity was generated using fuel oil. It was intended to indicate the amount of fossil energy displaced by the renewable energy source. But fuel oil is no longer used to generate electricity to a substantial degree and the international community largely uses a different approach, applying the constant conversion factor of 3,412 Btu/kWh. In addition, using a separate approach for geothermal generation may distort the analysis of the relative share of this generation resource. EIA also has a desire to better account for energy losses and efficiency. For these reasons, EIA considered three alternative methods for deriving the energy contents for noncombustible renewables, designated here as the fossil-fuel equivalency, captured energy, and incident energy approaches.

Fossil-Fuel Equivalency Approach

With this approach, EIA would continue to apply the fossil-fuel equivalent conversion factor to hydroelectric, solar, and wind energy and would begin applying it to geothermal energy. This approach would eliminate the inconsistency between geothermal and other noncombustibles, enable fuel displacement analysis, and