CHAPTER 13. UTILITY IMPACT ANALYSIS

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13.1 INTRODUCTION

The U.S. Department of Energy (DOE) will analyze specific effects of its proposed standard levels on the electric utility industry as part of the notice of proposed rulemaking analyses, using a variant of the DOE Energy Information Administration's (EIA's) National Energy Modeling System (NEMS). The NEMS is a large, multi-sectoral, partial equilibrium model of the U.S. energy sector. EIA uses NEMS to produce the *Annual Energy Outlook (AEO)*. NEMS produces a widely recognized baseline energy forecast for the United States, and this energy forecast is available in the public domain. DOE will use a variant known as NEMS-BT to provide key inputs to the analysis.[a]

The utility impact analysis will consist of a comparison between model results for the base case and for policy cases in which proposed standards are in place. The use of NEMS-BT for the utility analysis offers several advantages. As the official DOE energy forecasting model, NEMS relies on a set of assumptions that are transparent and have received wide exposure and commentary. NEMS-BT allows an estimate of the interactions between the various energy supply and demand sectors and the economy as a whole. The utility impact analysis will report the changes in installed capacity and generation, by fuel type, that result for each candidate standard level, as well as changes in electricity and natural gas sales to the commercial and industrial sectors.

DOE plans to conduct the utility impact analysis as a policy deviation from the 2011 version of the *AEO* (*AEO2011*),[1] applying the same basic set of assumptions. For example, the operating characteristics (*e.g.*, energy conversion efficiency, emissions rates) of future electricity generating plants are as specified in the *AEO2011* reference case. DOE also will explore deviations from some of the reference case assumptions to represent alternative futures. Two alternative scenarios use the high and low economic growth cases. (The reference case corresponds to medium growth.) The high economic growth case assumes higher projected growth rates for population, labor force, and labor productivity, resulting in lower predicted inflation and interest rates relative to the reference case and higher overall aggregate economic growth. The opposite is true for the low growth case.

13.2 METHODOLOGY

The electric utility impact analysis will consist of NEMS-BT forecasts for generation, installed capacity, sales, and prices. NEMS provides reference case load shapes for several end uses. The model uses predicted growth in demand for each end use to build up a projection of the

[a] For more information on NEMS, please refer to the DOE EIA documentation. A useful summary is *National Energy Modeling System: An Overview 2000*, DOE/EIA-0581(2000), March 2000. EIA approves use of the name NEMS to describe only an official version of the model without any modification to code or data. Because this analysis entails some minor code modifications and the model is run under various policy scenarios that are variations on EIA assumptions, DOE refers to the model by the name NEMS-BT (BT refers to DOE's Building Technologies Program, under whose aegis this work has been performed). NEMS-BT was previously called NEMS-BRS.

total electric system load growth for each region, which it uses to predict the necessary additions to capacity. NEMS-BT accounts for the implementation of efficiency standards by decrementing the appropriate reference case load shape. DOE will determine the size of the decrement using data for the per-unit energy savings developed in the life-cycle cost and payback period analysis (chapter 8 of the preliminary technical support document (TSD)) and the forecast of shipments developed for the national impact analysis (preliminary TSD chapter 9).

The predicted reduction in capacity additions is sensitive to the peak load impacts of the standard. DOE will investigate the need to adjust duration of the high load period that could impact this end use in NEMS-BT.

Because the *AEO2011* version of NEMS forecasts only to the year 2035, DOE must extrapolate results to 2045. DOE conducts an extrapolation to 2045 to be consistent with the analysis period being used by DOE in the national impact analysis. It will not be feasible to extend the forecast period of NEMS-BT for the purposes of this analysis, nor does EIA have an approved method for extrapolation of many outputs beyond 2035. While it might seem reasonable in general to make simple linear extrapolations of results, in practice this is not advisable because outputs could be contradictory. For example, changes in the fuel mix implied by extrapolations of those outputs could be inconsistent with the extrapolation of marginal emissions factors. An analysis of various trends sufficiently detailed to guarantee consistency is beyond the scope of this work and, in any case, would involve a great deal of uncertainty. Therefore, DOE intends to use simple replications of year 2035 for all extrapolations beyond 2035 to guarantee consistent results. As with the *AEO* reference case in general, the implicit assumption is that the regulatory environment does not deviate from the current known situation during the extrapolation period. Only changes that have been announced with date-certain introduction are included in NEMS-BT.

13.3 RESULTS

Results of the analysis will include changes in commercial electricity sales, installed capacity, and generation by fuel type for each candidate standard level in 5-year increments extrapolated to the year 2045.

REFERENCES

1. U.S. Department of Energy–Energy Information Administration. *Annual Energy Outlook 2011 with Projections to 2035*. 2011. Washington, D.C. DOE/EIA-0383(2011).