ENVIRONMENTAL ASSESSMENT FOR PROPOSED ENERGY CONSERVATION STANDARDS FOR SMALL ELECTRIC MOTORS

TABLE OF CONTENTS

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EA.1 INTRODUCTION

The U.S. Department of Energy (DOE) will conduct an environmental assessment as part of the notice of proposed rulemaking. DOE will assess the impacts of proposed energy conservation standards for small electric motors on certain environmental indicators using a variant of the U.S. DOE/Energy Information Administration (EIA)'s National Energy Modeling System (NEMS).[a] EIA uses NEMS to produce the *Annual Energy Outlook (AEO).*[1] DOE will use a variant known as NEMS-BT to provide key inputs to the analysis, based on the 2008 version of the *AEO* (*AEO2008*). Results of the environmental assessment will be similar to those provided in *AEO2008*.

DOE intends the environmental assessment to provide emissions results to policymakers and other stakeholders, and to fulfill requirements that the environmental effects of all new Federal rules be properly quantified and considered. The environmental assessment considers three criteria pollutants—sulfur dioxide (SO_2), nitrogen oxides (NO_x), and mercury—as well as carbon emissions. The only form of carbon emissions tracked by NEMS-BT is carbon dioxide (CO_2), so the carbon discussed in this report is only in the form of CO_2. For each of the trial standard levels, DOE will calculate total emissions using NEMS-BT, using additional, external analysis as needed.

Although DOE intends to consider only SO_2, NO_x, mercury, and CO_2 in its environmental assessment, there are other air pollutants that are of concern. Specifically, the Clean Air Act requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards for the following six common air pollutants, also know as "criteria pollutants": (1) ozone, (2) particulate matter (PM), (3) carbon monoxide (CO), (4) nitrogen dioxide, (5) SO_2, and (6) lead.[2] EPA recently added mercury to this list. Some of the "criteria pollutants" (i.e., ozone, PM, CO, and lead) are not driven significantly by either electric utility power plants or fuel-fired appliances. Therefore, DOE does not intend to address them in the environmental assessment. In the case of ozone and particulate matter, other pollutants are precursors to their formation and atmospheric conditions are the driving force behind their formation. Also, SO_2 and NO_x are the primary precursors to ozone and PM, respectively, and will already be addressed by the environmental assessment. In the case of CO, electric utilities and fuel-fired appliances are not significant sources. For electric power plants, almost all carbon emissions are in the form

[a] For more information on NEMS, please refer to the U.S. Department of Energy, Energy Information Administration documentation. A useful summary is *National Energy Modeling System: An Overview 2000*, DOE/EIA-0581(2000), March 2000. See http://tonto.eia.doe.gov/bookshelf/SearchResults.asp?title=modeling. 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 as NEMS-BT (BT is DOE's Building Technologies Program).

of CO_2 as the combustion process is lean enough not to yield CO in significant amounts. For fuel-fired appliances, proper appliance maintenance, installation, and use can prevent dangerous levels of CO. A well-designed and properly functioning heating or cooking appliance should not produce toxic or lethal levels of CO, as, most often, CO poisoning occurs in the home as a result of malfunctioning appliances. Finally, with regard to lead, the ban on the use of leaded gasoline has resulted in a dramatic decrease in lead emissions since the mid 1970s. In general, industrial processes (not electric utilities), particularly primary and secondary lead smelters and battery manufacturers, are responsible for most of lead emissions and all violations of the lead air quality standards.

EA.2 METHODOLOGY

DOE will conduct the environmental assessment as a policy deviation from the *AEO2008*, using the same basic set of assumptions. For example, the emissions characteristics of an electricity generating plant will be exactly those used in *AEO2008*. The NEMS reference case and alternative growth scenarios are as described in the utility impact analysis (see preliminary Technical Support Document (TSD) chapter 13).

The NEMS-BT model tracks carbon emissions using a detailed carbon module; this approach provides good results because of its broad coverage of all sectors and inclusion of interactive effects. Past experience with carbon results from NEMS suggests that the NEMS-generated emissions estimates are somewhat lower than estimates based on simple average factors. One of the reasons for this divergence is that NEMS tends to predict that conservation displaces renewable generating capacity in the later years of its forecast. On the whole, NEMS-BT provides carbon emissions results of reasonable accuracy, at a level consistent with other published Federal results.

The NEMS-BT model reports the two airborne pollutant emissions that DOE has reported in past analyses: SO_2 and NO_x. The Clean Air Act Amendments of 1990 set an SO_2 emissions cap on all power generation.[3] The attainment of this target, however, is flexible among generators through the use of emissions allowances and tradable permits. The NEMS-BT model includes a module for SO_2 allowance trading and delivers a forecast of SO_2 allowance prices. Accurate simulation of SO_2 trading tends to imply that physical emissions effects will be zero, as long as emissions are at the ceiling. There is an SO_2 benefit from conservation in the form of a lower allowance price but, since the impact of any one standard on the allowance price is likely small and highly uncertain, DOE does not plan to monetize the SO_2 benefit.

Also, the NEMS-BT model has an algorithm for estimating NO_x emissions from power generation. The impact of these emissions, however, will be affected by the Clean Air Interstate Rule (CAIR), which the U.S. Environmental Protection Agency (EPA) issued on May 12, 2005.[4] CAIR will permanently cap emissions of NO_x in 28 eastern States and the District of Columbia. As with SO_2 emissions, a cap on NO_X emissions means that equipment efficiency standards may have no physical effect on these emissions. When NO_x emissions are subject to emissions caps,

DOE's emissions reduction estimate corresponds to incremental changes in the prices of emissions allowances in cap-and-trade emissions markets rather than physical emissions reductions. Therefore, while the emissions cap may mean that physical emissions reductions will not result from standards, standards could produce an environmental-related economic benefit in the form of lower prices for emissions allowance credits. However, as with SO_2 allowance prices, DOE does not plan to monetize this benefit because the impact on the NO_x allowance price from any single energy conservation standard is likely small and highly uncertain.

With regard to mercury emissions, NEMS has an algorithm for estimating these emissions from power generation. However, the impact on mercury emissions will be affected by the Clean Air Mercury Rule (CAMR), which the EPA issued on May 18, 2005.[5] CAMR will permanently cap emissions of mercury for new and existing coal-fired plants in all States. As with SO_2 and NO_x emissions, a cap on mercury emissions means that equipment efficiency standards may have no physical effect on these emissions. When mercury emissions are subject to emissions caps, DOE's emissions reduction estimate corresponds to incremental changes in the prices of emissions allowances in cap-and-trade emissions markets rather than physical emissions reductions. Therefore, while the emissions cap may mean that physical emissions reductions will not result from standards, standards could produce an environmental-related economic benefit in the form of lower prices for mercury emissions allowance credits. However, as with SO_2 and NO_x allowance prices, DOE does not plan to monetize this benefit because the impact on the mercury allowance price from any single energy conservation standard is likely small and highly uncertain.

EA.3 RESULTS

The results for the environmental assessment are similar to a complete NEMS run, as published in the *AEO2008*. These include emissions for SO_2, NO_x, mercury, and CO_2 in five-year forecasted increments, extrapolated to the year 2045. DOE will report the outcome of the analysis for each trial standard level as a deviation from the *AEO2008* reference case results.

REFERENCES

[1] U.S. Department of Energy-Energy Information Administration. *Annual Energy Outlook 2008 with Projections to 2030*, June, 2008. Washington, DC. DOE/EIA-0383(2008).

[2] U.S. Environmental Protection Agency. *Six Common Air Pollutants*. Washington, DC. <http://www.epa.gov/air/urbanair/>

[3] U.S. Environmental Protection Agency. *Clean Air Act*. Washington, DC. <http://www.epa.gov/air/caa/>

[4] U.S. Federal Register. *Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule); Revisions to Acid Rain Program; Revisions to the NO_X SIP Call, Final Rule*, May 12, 2005. 70 FR 25162.

[5] U.S. Federal Register. *Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, Final Rule*, May 18, 2005. 70 FR 28606.