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Title: Analysis of Human Health Valuation Models for NETL Technology Evaluation

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Abstract:

The U.S. Department of Energy's National Energy Technology Laboratory (NETL) contracted with Science Applications International Corporation (SAIC) in the Spring of 2002 to explore modeling approaches and tools for valuing the potential human health benefits of technologies supported by NETL. The study goals were to pre-screen candidate, *publicly available valuation models and tools*; conduct a post-screening evaluation relevant to NETL needs; and make recommendations as to the best modeling approach to be used in-house by NETL. This paper summarizes the post-screening analysis results for two computer-based tools: 1) TAF - Tracking and Analysis Framework[1] model and 2) EXMOD - EXternalities MODel[2]. The potential utility was assessed by comparing the modeling approaches and the human health benefits determined by each tool for a set of pre-defined case study emissions data.

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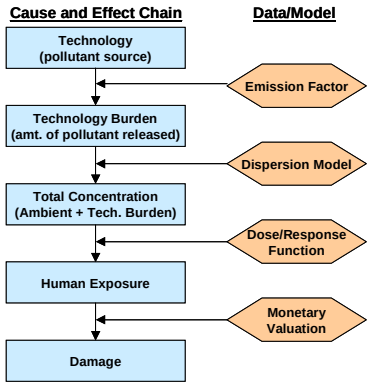
[1] TAF is a national modeling tool originally developed for the National Acid Precipitation Assessment Program by an 11-member collaboration. Resources for the Future (RFF) currently maintains TAF.

[2] EXMOD is a regional modeling tool developed by the Tellus Institute to value the externalities associated with electric power alternatives within New York State.

Valuing human health benefits attributed to emission reductions (e.g., adopting a technology developed by NETL) involves placing a monetary value on the health effects borne by society as a result of the change in point source emissions release from a facility. The process of valuing human health effects consists of four steps as listed below and depicted in the adjacent graphic.



- Estimating point source emissions
- Air quality modeling
- Human health effects estimation
- Valuation of the human health effects

To assess the capabilities of TAF and EXMOD, and to contrast their differences, NETL chose to utilize a case study comparing a "Baseline" scenario to a scenario where Ultra Low NO_x Burner (ULNB) technology was implemented in coal-fired power plants.[3] Given the regional focus of EXMOD, coal-fired power plant data from New York (NY) State were selected as the case study basis for both the baseline and ULNB scenario. NETL provided calendar year 2000 emissions data for 17 coal-fired utility plants. In developing the case study findings, software runs were conducted covering both an "as-is" case study using the two software tools with default settings as well as a "follow-up" study that adapted both models to improve their comparability. After analyzing the case study findings, differences in tool design; modeling approach; and applicability were developed with regards to the most appropriate course of action for NETL in conducting "in-house" valuation studies. This study did not attempt to judge the technical accuracy or level of uncertainty in the benefits determined, rather simply compare the tools "as-is" and investigate potential significant causes for disparity in the final valuation result.

Acknowledgement: This above abstract was developed based on direct excerpts from the DOE/NETL reported entitled "Analysis of Human Health Valuation Models; Case Study: Effect of Ultra Low NO_x Burner Technology on Coal-Fired Utility Plant Air Emissions in the year 2000," May 2002. Science Applications International Corporation prepared this report as part of the Energy and Environmental Solutions, LLC.

[3] Implementing ULNB technology resulted in NO_x emissions being reduced by approximately 60 - 70 percent for a given coal-fired power plant boiler stack.