

3 are combined for the purpose of this analysis). It should be noted that PADD 5 includes Alaska and Hawaii. Because those two states are geographically separate from the rest of PADD 5, we seek comment on whether they should be considered as separate fuel markets.

The NDEIM uses an intermediate run time frame and assumes perfect competition in the market sectors. It is a computer model comprised of a series of spreadsheet modules that define the baseline characteristics of the supply and demand for the relevant markets and the relationships between them. A detailed description of the model methodology, inputs, and parameters is provided in chapter 10 of the draft RIA prepared for this proposal. The model methodology is firmly rooted in applied microeconomic theory and was developed following the OAQPS Economic Analysis Resource Document.<sup>294</sup> Based on the specified market linkages, the model is shocked by applying the engineering compliance cost estimates to the appropriate market suppliers and then numerically solved using an iterative auctioneer approach by "calling out" new prices until a new equilibrium is reached in all markets simultaneously.

The actual economic impacts of the proposed rule will be determined by the ways in which producers and consumers of the engines, equipment, and fuels affected by the proposal change their behavior in response to the costs incurred in complying with the standards. In the NDEIM, these behaviors are modeled by the demand and supply elasticities. The supply elasticities for the engine and equipment markets and the demand elasticities for the application markets were estimated using econometric methods. The procedures and results are reported in Appendix 10.1 of the draft RIA. Literature-based estimates were used for the supply elasticities in the application and fuel markets.

There are two ways to handle the demand elasticities for the engine, equipment, and fuel markets. In the approach used in NDEIM, these demand elasticities are internally derived based on the specified market linkages, *i.e.*, the demand for engines, equipment, and fuel are modeled as directly related to the supply and demand of goods and services supplied by the final application markets. In other words, the supply of those goods and services

determines the demand for equipment and fuel, and the supply of equipment determines the demand for engines. Using this approach, the NDEIM predicts that engine and equipment production will decrease by only a small amount: 0.013% and 0.014% respectively (see Table V.F-1). Also, please see draft RIA Appendices 10A and 10B for more detailed estimates on the price increase estimates. Because the application markets are modeled with inelastic or unit elastic demand and supply elasticities (quantity supplied/demanded is expected to be fairly insensitive to price changes or they will vary directly with price changes), the model predicts that engine and equipment manufacturers will pass along virtually all of their costs to end users.

An alternative approach could be used in which the demand elasticities for the equipment, engine, and fuel markets are not derived as part of the model. They could be estimated separately or a sensitivity analysis could be conducted that assumes more elastic values than those generated by the NDEIM. We are continuing to investigate this matter and will be placing additional information about elasticities in the docket during the comment period for this rule. We request comment on that information as well as on the methodology and other aspects of this EIA.

The estimated engine and equipment market impacts are based solely on the expected increase in variable costs associated with the proposed standards. Fixed costs associated with the engine emission standards are not included in the market analysis reported in Table IV-F-1. This is because in an analysis of competitive markets the industry supply curve is based on its marginal cost curve, and fixed costs are not reflected in changes in the marginal cost curve. In addition, fixed costs are primarily R&D costs associated with design and engineering changes, and firms in the affected industries currently allocate funds for these costs. Therefore, fixed costs are not likely to affect the prices of engines or equipment. This assumption is described in greater detail in section 10.2 of the draft RIA. R&D costs are a long-run concern and decisions to invest or not invest in R&D are made in the long run. If funds have to be diverted from some other activity into R&D needed to meet the environmental regulations, then these costs represent a component of the social costs of the rule. Therefore, fixed costs are included in the welfare impact estimates reported in Table V.F-2 as additional costs on producers. We also

performed a sensitivity analysis, included in chapter 10 of the draft RIA for this proposal, that includes fixed costs as part of the model. This results in a transfer of welfare losses from engine and equipment markets to the application markets, but does not change the overall welfare losses associated with the proposal.

Economic theory indicates that, in the long run, prices are expected to reflect the average total costs of the marginal producer in a market and not just variable costs. This suggests that it may be necessary to treat fixed costs differently for a long-run analysis. We will continue to investigate this effect and intend to place additional information in the docket during the comment period for this rule. We request comment on that information as well as on how fixed costs and R&D expenditures are handled in the NDEIM.

In addition to the variable and fixed costs described above, there are three additional costs components that are included in the total social cost estimates of the proposed regulation but that are not explicitly included in the NDEIM. These are operating savings (costs), fuel marker costs, and spillover from 15 ppm fuel to higher sulfur fuel. We request comment on how best to incorporate each of these costs in the analysis.

Operating savings (costs) refers to changes in operating costs that are expected to be realized by users of both existing and new nonroad diesel equipment as a result of the reduced sulfur content of nonroad diesel fuel. These include operating savings (cost reductions) due to fewer oil changes, which accrue to nonroad engines, and marine and locomotive engines, that are already in use as well as new nonroad engines that will comply with the proposed standards (*see* section V.B.). These savings (costs) also include any extra operating costs associated with the new PM emission control technology which may accrue to new engines that use this new technology. These savings (costs) are not included directly in the model because some of the savings accrue to existing engines and because these savings (costs) are not expected to affect consumer decisions with respect to new engines. Instead, they are added into the estimated welfare impacts as additional costs to the application markets, since it is the users of these engines that will see these savings (costs). Nevertheless, a sensitivity analysis was also performed in which these savings (costs) are included as inputs to the NDEIM, where they are modeled as benefits accruing to the application producers. The results of

<sup>294</sup> U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Innovative Strategies and Economics Group, OAQPS Economic Analysis Resource Document, April 1999. A copy of this document can be found in Docket A-2001-28, Document No. II-A-14.