

## **Economic Impact and Small Business Analysis for the Final Amendments to the Compression Ignition (CI) Engine New Source Performance Standard (NSPS)**

The U.S. EPA is amending the NSPS for stationary CI engines that were published on June 11, 2006. Based on a settlement agreement resulting from a legal challenge to the original rule, the EPA must promulgate amendments to the CI NSPS by June 8, 2011. The impacts discussed in this memorandum are based on implementing more stringent standards for stationary CI engines with a displacement greater than or equal to 10 liters/cylinder (l/cyl) and less than 30 l/cyl, consistent with recent revisions to standards for similar mobile source marine engines. Specifically, the EPA is amending the CI NSPS to require stationary CI engines greater than or equal to 10 l/cyl and less than 30 l/cyl to meet the emission standards for the same size and displacement engines as currently required under 40 CFR part 1042, Control of Emissions from New and In-Use Marine Compression-Ignition Engines and Vessels. These standards will be phased-in between 2013 and 2017 model year engines, depending on the size and displacement.

### **BASIS OF ESTIMATED EMISSION REDUCTIONS**

The 40 CFR part 1042 emission standards include recently finalized more stringent standards, i.e., Tier 3 and Tier 4 emission standards, and are the standards that the EPA is adopting for stationary CI engines greater than or equal to 10 l/cyl and less than 30 l/cyl. Tier 3 standards are based on in-engine controls and ultra low sulfur diesel fuel use. The Tier 4 standards are based on diesel particulate filters (DPF) and selective catalytic reduction (SCR). Consistent with how the EPA has treated stationary emergency CI engines in the past, the EPA is not requiring standards that force aftertreatment for stationary emergency CI engines. Only stationary non-emergency CI engines greater than or equal to 10 l/cyl and less than 30 l/cyl will be subject to emission standards based on aftertreatment under the final amendments.

In order to estimate the number of new stationary CI in the displacement range that would be subject to Tier 3 and Tier 4 emission standards under the final amendments to the CI NSPS, we obtained information from the Engine Manufacturers Association (EMA).<sup>1</sup> According to EMA, it is estimated that 8 new engines between 10 l/cyl and 30 l/cyl would be produced yearly and would become subject to the rule. Of these 8 engines, 3 are expected to be non-emergency engines and 5 are expected to be emergency engines, according to EMA. All engines are expected to be used for power generation.

In order to estimate the pollutant reductions for stationary CI engines between 10 l/cyl and 30 l/cyl that would be subject to 40 CFR part 1042 emission standards, we compared Tier 4 emission standards from 40 CFR part 1042 to the previous standards that applied to these engines under the CI NSPS, which were consistent with the emission standards in 40 CFR part 94. We used emission standards from Tables 3-16 and 3-41 of the 2008 Regulatory Impact

---

<sup>1</sup>Email from Joe Suchecki, EMA to Tanya Parise, EC/R, Inc. April 7, 2010.

Analysis (RIA) for locomotive and marine CI engines.<sup>2</sup> The cumulative emissions reductions associated with the amendments in the year 2018 are 8 tpy of PM, 295 tpy of NO<sub>x</sub>, and 4 tpy of HC. The year 2018 is the first year these emission standards would be fully implemented for stationary CI engines between 10 and 30 liters l/cyl. In the year 2030, the cumulative emissions reductions are estimated at 38 tpy of PM, 1,100 tpy of NO<sub>x</sub>, and 18 tpy of HC.

## **BASIS OF ESTIMATED COSTS TO AFFECTED SOURCES**

In order to estimate the costs associated with requiring Tier 4 emission standards for new non-emergency stationary CI engines, we consulted with the EPA Office of Transportation and Air Quality (OTAQ). We used the costs presented in the 2008 RIA for locomotive and marine engines<sup>2</sup> in order to estimate the cost associated with meeting Tier 4 emission standards based on aftertreatment controls. Specifically, after consulting with OTAQ, it was found most appropriate to use the hardware (or variable) costs in Tables 7A-5 and 7A-6 and the auxiliary engine costs from Tables 7B-20 and 7B-21 of the 2008 RIA for locomotive and marine engines.<sup>2</sup> The hardware and auxiliary costs were multiplied by the number of new stationary non-emergency CI engines between 10 l/cyl and 30 l/cyl to determine the total capital costs. No capital costs were attributed to new stationary emergency CI engines between 10 l/cyl and 30 l/cyl because these engines will not be subject to emission standards that force aftertreatment. The capital cost associated with the amendments to the CI NSPS is \$236,000 (\$2009) in 2018.

The annual costs associated with the requirements for new non-emergency CI engines between 10 l/cyl and 30 l/cyl include the operating costs for the urea usage for the SCR control system, DPF maintenance, and the increased fuel consumption associated with DPF. These annual cost elements were estimated based on communication with OTAQ<sup>3,4</sup> and information from Nonroad Engine Modeling documents.<sup>5</sup> The cumulative annualized cost is estimated to be \$142,000 (\$2009) in 2018 and \$711,000 (\$2009) in 2030.

## **ECONOMIC IMPACTS**

In this economic analysis, we estimate impacts for the year 2018. We allocate the annual costs to the electric power generation industry (NAICS 2211), the industry we expect the 3 new non-emergency CI engines affected by 2018 will be located, and the industry in which two-thirds of the existing CI engines are currently classified.<sup>6</sup> We use the annual average revenue for the electric power generation industry, which is projected using U.S. Energy Information Administration (EIA) data at \$360 billion for 2015 (2009 dollars).<sup>7</sup> Assuming that a single

---

<sup>2</sup> Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder, EPA/420-R-08-001a May 2008.

<sup>3</sup> Email from Todd Sherwood, OTAQ to Tanya Parise, EC/R, Inc. October 6, 2009.

<sup>4</sup> Email from Todd Sherwood, OTAQ to Tanya Parise, EC/R, Inc. April 21, 2010.

<sup>5</sup> Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling -- Compression Ignition EPA420--P-04-009 April 2004 NR-009c.

<sup>6</sup> Regulatory Impact Analysis for the Compression-Ignition (CI) RICE NESHAP. February 2010. Available on the Internet at <http://www.epa.gov/ttn/ecas/regdata/RIAs/CIRICENESHAPRIA2-17-10cleanpublication.pdf>.

<sup>7</sup> This estimate is from EIA's AEO 2011, and is derived by taking either total electricity use (for generation) or sales (transmission and distribution) and multiplying by forecasted prices by service category from Table 8 (Electricity Supply, Disposition, Prices, and Emissions).

affected non-emergency engine will be owned by one firm, we thus assume three firms are affected by the amendments to the NSPS. Thus, the annual cost per affected firm is \$47,333 (or 142,000/3). We estimate economic impacts using the cost-to-receipt (i.e., sales) ratio, or the “sales test.” The “sales test” is the impact methodology the EPA employs in analyzing small entity impacts as opposed to a “profits test,” in which annualized compliance costs are calculated as a share of profits.

This is because revenues or sales data are commonly available data for entities normally impacted by EPA regulations and profits data normally made available are often not the true profit earned by firms because of accounting and tax considerations. Revenues as typically published are usually correct figures and are more reliably reported when compared to profit data. The use of a “sales test” for estimating small business impacts for a rulemaking such as this one is consistent with guidance offered by the EPA on compliance with SBREFA<sup>8</sup> and is consistent with guidance published by the U.S. SBA’s Office of Advocacy that suggests that cost as a percentage of total revenues is a metric for evaluating cost increases on small entities in relation to increases on large entities.<sup>9</sup>

By using an annualized cost to revenue metric, we estimate the average economic impact to firms in the electric power sector to be \$142,000/\$360 billion, or 0.0.00003 percent of revenues. Assuming one of these firms is a small entity, the impact on the small entity is also 0.00003 percent. Thus, based on this impact and there being only one small entity affected by this proposal, we certify that there is no significant economic impact on a substantial impact on small entities (SISNOSE) associated with this rule. In addition, since the annualized cost as a percent of sales or revenues estimate is an approximation of the maximum price increase required for a product for a firm to recover all costs of compliance, the maximum price increase associated with this NSPS will be no greater than 0.00003 percent. The change in affected product output should also be no higher than this.

---

<sup>8</sup> The SBREFA compliance guidance to EPA rulewriters regarding the types of small business analysis that should be considered can be found at <http://www.epa.gov/sbrefa/documents/rfafinalguidance06.pdf>, pp. 24-25.

<sup>9</sup> U.S. SBA, Office of Advocacy. A Guide for Government Agencies, How to Comply with the Regulatory Flexibility Act, Implementing the President’s Small Business Agenda and Executive Order 13272, May 2003.