

## Errata: Jon Lesser, “Short Circuit: The High Cost of Electric Vehicle Subsidies”

The EPA’s reporting of PM10 emissions includes all smaller particulate matter emissions, including PM 2.5. The original version of this report, released on May 15, mistakenly calculated PM10 and PM2.5 emissions separately for electric vehicles (EVs) and internal-combustion vehicles (ICVs). The corrected values do not change Mr. Lesser’s conclusion that EVs emit lots more particulates than ICVs. However, values for both ICV and EV particulates are lower.

The revised report includes the corrected text and figures. Below are the text changes with corrections:

### Corrections, p. 17

Using the data in Figure 11, average PM10 emissions from coal-fired power plants were 246.8 lbs/gigawatt-hour (GWh),<sup>111</sup> while average PM2.5 emissions were 185.4 lbs/GWh. ~~or 432.2 lbs/GWh in total.~~ PM emissions include all particles less than 10 microns in diameter, and thus include PM2.5 emissions. Similarly, average PM10 emissions from natural gas-fired power plants were 44.2 lbs/GWh and average PM2.5 emissions were 42.7 lbs/GWh. ~~for a total of 86.9 lbs/ GWh.~~ Thus, the ~~overall~~ average emissions rate for natural gas-fired power plants is about one-sixth ~~one-fifth~~ as large as for coal-fired power plants.

Under the National Ambient Air Quality Standards (NAAQS) of the Clean Air Act, new coal-fired power plants must limit overall particulate emissions to 0.09 lbs/MWh (90 lbs/GWh). New natural gas-fired plants have virtually zero particulate emissions.<sup>112</sup>

Therefore, total particulate emissions associated with ZEVs equals total ZEV electricity use times the average emissions rates. In 2030, for example, total particulate emissions would be just over 1,100 tons ~~just about 3,100~~

~~tons~~ at the average and about 350 ~~530~~ tons if all generating plants meet the new NAAQS.

Corrections, p. 20

As Figure 15 shows, the estimated per-ton damages for PM2.5 are much larger than the damages for PM10 emissions. As discussed previously, because EIA Annual Energy Outlook 2018 does not forecast particulate emissions, we use the percentages of ~~total PM emissions for PM10 and~~ PM2.5 emissions provided in the 2014 EPA Emissions Inventory to estimate an average PM emissions damage cost.

Specifically, as Figure 11 showed, for a coal-fired plant, 75% ~~57%~~ of the particulate emissions are ~~PM10, while 43% are~~ PM2.5. For natural gas plants, the corresponding percentages of ~~PM10 and~~ PM2.5 emissions is ~~51% and 49%~~ ~~97%~~. ~~Combining these percentages with the damage estimate values in Figure 15, the weighted average damage values for all particulate emissions are \$5,108/ton (2017\$) for coal-fired plants and \$5,746/ton (2017\$) for natural gas-fired plants.~~ The annual damages from PM emissions are calculated based on total PM emissions from coal- and natural-gas fired generators, and the percentage of PM2.5 emissions relative to total PM emissions in each year.

Assuming that the same ratios of PM10 and PM2.5 emissions hold for generating plants meeting the NAAQS, which restrict coal-fired plants to 90 lbs/ GWh and natural gas-fired ones to virtually zero, we can derive estimates of the annual particulate emissions by using EIA projections of the mix of coal- and natural gas-fired generation. The resulting annual environmental damages for ZEVs increase steadily, to just over \$168 ~~\$170~~ million (2017\$) by 2050, of which \$136 million, about 81%, ~~80%~~, is associated with SO<sub>2</sub> emissions; \$29 million, about 17%, is associated with NO<sub>x</sub> emissions; and \$3 million, ~~\$5 million~~, about 2%, ~~3%~~, is associated with PM10 and PM2.5 emissions (Figure 16).<sup>129</sup>

By contrast, total damages associated with SO<sub>2</sub>, NO<sub>x</sub>, and particulate emissions from the same number of ICVs, including emissions from refineries associated with the production of gasoline, are predicted to increase to just \$48 million ~~\$50 million~~ per year (2017\$) in 2050, less than one-third of the damages incurred to power ZEVs.<sup>130</sup>

On a present-value basis, over 2016–50, total damages from SO<sub>2</sub>, NO<sub>x</sub>, and particulates associated with ZEVs are \$2.81 billion ~~\$2.84 billion~~ (2017\$), while damages from the same number of ICVs (including refinery-related emissions) would total \$730 million ~~\$801 million~~ (2017\$).<sup>131</sup>