# CSAPR Documented Emission Reductions, Integrated Planning Model Control Scenarios, and Associated Nonattainment Ozone Changes

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**Annual NOx Emission Reductions**

Emission reductions of ozone precursors have been significant in recent years and will continue into the future as the result of on-the-books controls. As published by EPA, annual national and State-level NOx emissions are expected to decline between 2011 and 2017. Figure 1 presents State-level annual NOx emissions from all anthropogenic categories for the base year 2011 and projected base case of 2017. As can be seen in this figure and in the associated Table 1, within the 23 state eastern U.S. domain impacted by the CSAPR, these NOx emissions decrease by approximately 2,450,000 tons (27%). Comparatively, annual NOx emissions from electric generating utilities (EGUs) decrease by 373,000 tons, or 26% from 2011 levels and have already shown significant reduction below projected progress as reported by CAMD CEM data in 2014 (Figure 2).

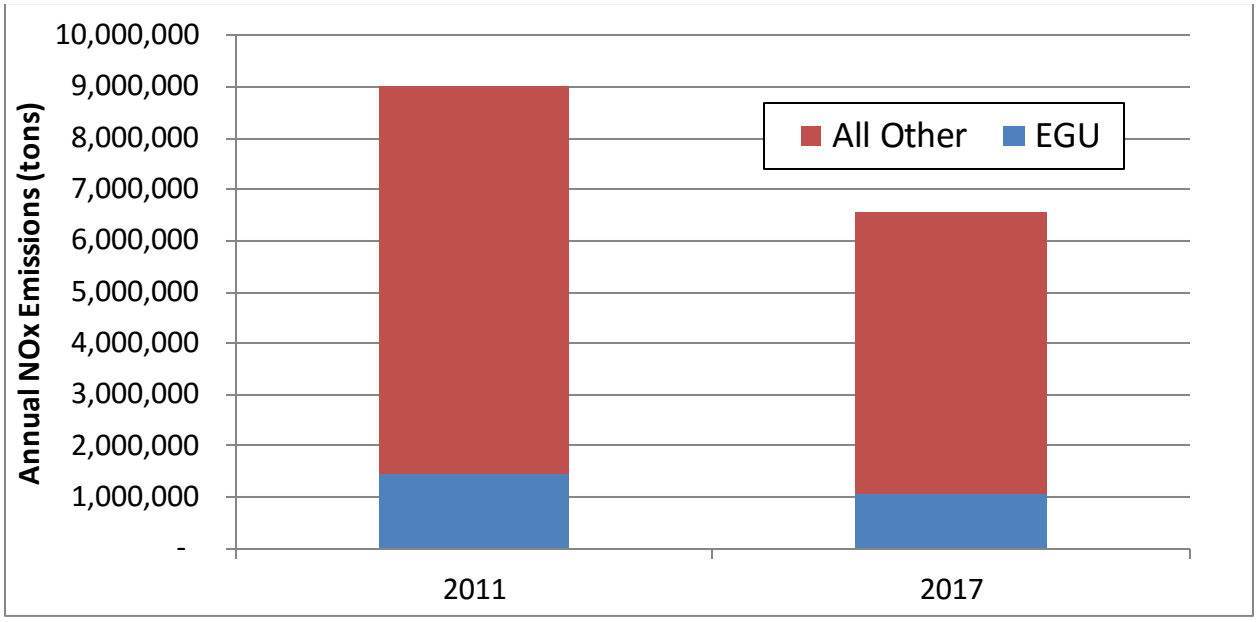


**Figure 1.** Annual NOx emission reduction trends; all sources and EGUs.

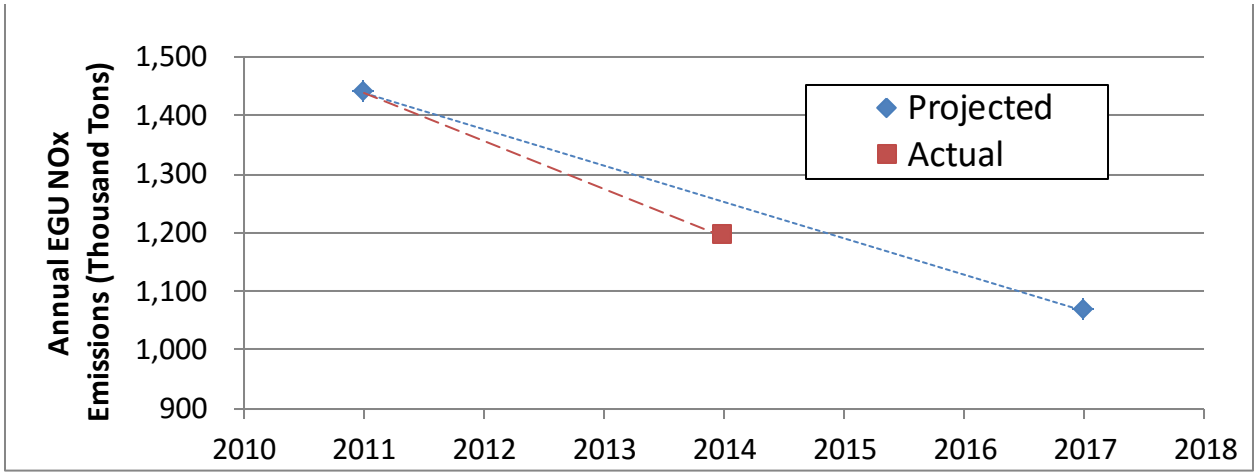


**Figure 2.** Annual EGUs NOx emission trends and projection.

**Table 1.** Annual NOx Emission Reduction Trends; All Sources and EGUs.

| | Annual NOx Emissions (Tons) --- 23 CSAPR States | | | | |
|---|---|---|---|---|---|
| | All Sources | | Electric Generating Utilities | | |
| State | 2011[1] | 2017[2] | 2011[1] | 2014[3] | IPM 5.14 2017[2] |
| Alabama | 357,022 | 223,568 | 64,008 | 51,850 | 27,607 |
| Arkansas | 230,813 | 170,207 | 38,562 | 38,396 | 26,096 |
| Illinois | 504,642 | 358,286 | 73,670 | 49,776 | 35,372 |
| Indiana | 440,614 | 326,059 | 119,387 | 109,708 | 100,788 |
| Iowa | 238,571 | 156,305 | 39,704 | 32,337 | 21,034 |
| Kansas | 340,096 | 200,710 | 43,400 | 26,237 | 25,481 |
| Kentucky | 325,690 | 251,174 | 92,279 | 86,980 | 86,018 |
| Louisiana | 533,211 | 419,027 | 50,109 | 37,264 | 27,266 |
| Maryland | 164,876 | 111,618 | 19,706 | 15,053 | 8,858 |
| Michigan | 440,244 | 316,933 | 77,893 | 56,824 | 72,898 |
| Mississippi | 204,022 | 130,636 | 27,586 | 20,173 | 17,873 |
| Missouri | 370,818 | 241,103 | 66,168 | 74,192 | 46,932 |
| New Jersey | 166,521 | 134,868 | 7,242 | 7,096 | 8,924 |
| New York | 386,743 | 273,384 | 27,256 | 22,214 | 15,135 |
| North Carolina | 364,707 | 234,405 | 48,813 | 44,288 | 49,263 |
| Ohio | 581,520 | 384,429 | 104,199 | 89,345 | 70,888 |
| Oklahoma | 424,589 | 324,890 | 80,936 | 37,562 | 50,032 |
| Pennsylvania | 558,859 | 424,900 | 153,562 | 125,612 | 118,370 |
| Tennessee | 319,661 | 206,343 | 27,000 | 22,370 | 14,286 |
| Texas | 1,299,550 | 1,112,029 | 147,204 | 122,467 | 135,462 |
| Virginia | 312,169 | 214,366 | 40,139 | 27,648 | 24,221 |
| West Virginia | 173,444 | 157,946 | 56,620 | 72,970 | 61,818 |
| Wisconsin | 266,671 | 180,120 | 31,881 | 21,773 | 19,903 |
| **23 State Total** | **9,005,052** | **6,553,307** | **1,437,324** | **1,192,138** | **1,064,525** |

[1] 2011eh_cb6v2_v6_11g_state_sector_totals.xlsx (referenced in EPA-HQ-OAR-2015-0500-0087)
[2] 2017eh_cb6v2_v6_11g_state_sector_totals.xlsx (referenced in EPA-HQ-OAR-2015-0500-0087)
[3] Air Markets Program Data tool (http://ampd.epa.gov/ampd/)

**Alternate Integrated Planning Model EGU Emission Scenarios**

For purposes of determining whether alternate cost-based EGU emission control scenarios would be appropriate for reducing ozone at downwind monitors in the CSAPR modeling domain, EPA ran a series of IPM emission scenarios. Figures 2 and 3 present the emissions and emission reductions for all EGU as predicted by IPM, for the 2017 ozone season, as published by EPA in the document "Ozone Transport Policy Analysis Proposed Rule TSD"[4]. Figure 3 is taken from Table B-2, '2017 Ozone Season NOx EGU Emissions for Each State at Various Pollution Control Cost Thresholds (CT) per Ton of Reduction (Tons) "All Units"' while Figure 4 is taken from Table B-3, 'Emission Differences between the 5.14 Base Case and the Other Pollution Control Cost Thresholds (Tons) from "All Units"'.

In this policy analysis TSD, EPA states that "[t]he air quality modeling for this proposal, including identifying nonattainment and maintenance receptors, performing contribution analysis, and modeling an illustrative control case relied on IPM v5.14. After the modeling analyses were underway, the EPA released an updated IPM base case, version 5.15, and the final Clean Power Plan (CPP). In order to reflect all on-the-books policies as well as the most current power sector modeling data, the EPA performed an assessment (described in this TSD) to reflect inclusion of IPM 5.15 with the CPP for this proposal." Based on this information, is it noted that EPA failed to account for its latest estimates of EGU emissions under the CPP when conducting both the air quality modeling (and associated attainment tests) and State level contribution analysis.

In fact, from these two figures, it is noted that EPA's estimate of ozone season NOx emissions from EGUs used in the air quality modeling and significant contribution analysis used to justify the rule is approximately 93,000 higher than latest on-the-books estimates expected by EPA. States that have the greatest seasonal decrease difference (lower in v 5.15 than in v 5.14) between the modeled simulation (v 5.14) and the one identified by EPA as the true base case (v 5.15) are Kentucky (11, 792 tons), Michigan (10,188 tons), and Pennsylvania (8,574 tons). Alternately, the States that show the largest increase in emissions between the two scenarios are Maryland (2,217 tons), Alabama (1,441 tons), and Nevada (355 tons).

Finally, it can be observed in Figure 3 that the national proposed emission budgets are 84,775 tons of NOx lower during the ozone season relative to the CPP base case (v 5.15) as compared 92,961 tons "removed" by simply moving from IPM v 5.14 to the unmodeled (with CAMx) CPP base case.

[4] http://www.epa.gov/sites/production/files/2015-11/documents/ozone_transport_policy_analysis_tsd.pdf

**Table B-2. 2017 Ozone Season $NO_x$ EGU Emissions* for Each State at Various Pollution Control Cost Thresholds (CT) per Ton of Reduction (Tons) "All Units".**

| | 5.14 Base Case | 5.15 Base Case | $500/ton CT | $1300/ton CT | $3400/ton CT | $5000/ton CT | $6400/ton CT | $10000/ton CT | Less Stringent Control Alternative | Proposed Emissions Budgets | More Stringent Control Alternative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Alabama** | 12,151 | 13,592 | 11,863 | 10,015 | 9,944 | 8,846 | 8,219 | 7,797 | 12,095 | 10,486 | 10,531 |
| **Arizona** | 20,835 | 16,960 | 16,961 | 10,895 | 11,150 | 11,032 | 11,012 | 10,924 | 16,975 | 16,975 | 16,975 |
| **Arkansas** | 11,890 | 6,399 | 6,386 | 6,295 | 5,624 | 5,335 | 5,254 | 4,560 | 6,414 | 6,414 | 6,536 |
| **California** | 4,122 | 3,789 | 3,789 | 3,788 | 3,781 | 3,786 | 3,785 | 3,670 | 3,789 | 3,789 | 3,789 |
| **Colorado** | 14,897 | 13,467 | 13,467 | 13,444 | 12,835 | 12,584 | 12,176 | 11,541 | 13,467 | 13,467 | 13,467 |
| **Connecticut** | 1,587 | 1,607 | 1,607 | 1,610 | 1,589 | 1,570 | 1,570 | 1,544 | 1,607 | 1,607 | 1,607 |
| **Delaware** | 388 | 580 | 580 | 580 | 580 | 580 | 580 | 576 | 580 | 580 | 580 |
| **District of Columbia** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Florida** | 33,539 | 30,046 | 28,840 | 23,522 | 22,968 | 22,820 | 22,397 | 22,190 | 30,284 | 30,433 | 30,469 |
| **Georgia** | 9,535 | 7,498 | 7,378 | 7,260 | 7,159 | 7,072 | 7,041 | 7,072 | 7,501 | 7,510 | 7,516 |
| **Idaho** | 206 | 251 | 244 | 245 | 245 | 246 | 246 | 246 | 252 | 248 | 249 |
| **Illinois** | 15,810 | 11,002 | 10,627 | 10,564 | 10,493 | 10,427 | 10,415 | 10,295 | 10,773 | 10,761 | 10,750 |
| **Indiana** | 43,910 | 42,496 | 35,885 | 30,374 | 29,590 | 28,811 | 29,143 | 25,797 | 35,843 | 31,033 | 31,018 |
| **Iowa** | 9,364 | 8,307 | 8,190 | 7,951 | 7,913 | 7,913 | 7,940 | 7,342 | 8,153 | 7,935 | 7,935 |
| **Kansas** | 11,694 | 11,820 | 11,393 | 11,424 | 11,602 | 11,426 | 11,393 | 11,766 | 11,393 | 11,393 | 11,393 |
| **Kentucky** | 38,993 | 27,201 | 23,593 | 15,306 | 14,848 | 14,756 | 13,774 | 12,726 | 24,203 | 15,976 | 16,027 |
| **Louisiana** | 13,925 | 11,162 | 11,127 | 11,074 | 10,791 | 10,739 | 10,741 | 10,535 | 11,166 | 11,077 | 11,083 |
| **Maine** | 1,609 | 1,565 | 1,565 | 1,565 | 1,565 | 1,557 | 1,552 | 1,552 | 1,565 | 1,565 | 1,565 |
| **Maryland** | 5,107 | 7,324 | 6,295 | 6,297 | 6,160 | 6,147 | 5,955 | 5,955 | 6,132 | 6,138 | 6,009 |
| **Massachusetts** | 1,956 | 2,219 | 2,268 | 2,229 | 2,221 | 2,186 | 2,115 | 2,069 | 2,222 | 2,222 | 2,219 |
| **Michigan** | 32,421 | 22,233 | 21,858 | 19,340 | 18,862 | 18,713 | 18,717 | 18,677 | 22,073 | 20,635 | 20,635 |
| **Minnesota** | 11,501 | 11,223 | 11,145 | 10,947 | 10,743 | 10,691 | 10,650 | 9,576 | 11,226 | 11,226 | 11,226 |
| **Mississippi** | 8,951 | 8,299 | 8,217 | 8,002 | 7,416 | 7,208 | 6,895 | 6,258 | 7,788 | 7,579 | 7,067 |
| **Missouri** | 20,632 | 18,663 | 17,732 | 17,705 | 17,767 | 17,881 | 17,322 | 17,113 | 17,757 | 17,793 | 17,831 |
| **Montana** | 8,502 | 7,759 | 7,746 | 7,746 | 7,746 | 7,722 | 7,722 | 7,722 | 7,759 | 7,759 | 7,759 |
| **Nebraska** | 14,548 | 14,613 | 14,613 | 14,237 | 11,388 | 11,209 | 10,752 | 9,786 | 14,579 | 14,577 | 14,578 |
| **Nevada** | 4,192 | 4,547 | 4,532 | 4,530 | 3,323 | 3,158 | 2,584 | 1,840 | 4,546 | 4,546 | 4,546 |
| **New Hampshire** | 301 | 289 | 289 | 289 | 294 | 296 | 295 | 299 | 289 | 289 | 289 |
| **New Jersey** | 4,617 | 3,950 | 3,581 | 3,580 | 3,576 | 3,573 | 3,570 | 3,489 | 3,091 | 3,090 | 3,085 |
| **New Mexico** | 17,266 | 17,372 | 17,372 | 16,940 | 16,942 | 16,813 | 16,364 | 16,238 | 17,372 | 17,372 | 17,372 |
| **New York** | 9,123 | 7,911 | 7,807 | 7,638 | 7,578 | 7,579 | 7,305 | 7,072 | 7,870 | 7,675 | 7,676 |
| **North Carolina** | 22,048 | 17,307 | 15,385 | 15,389 | 13,784 | 13,685 | 12,895 | 12,774 | 15,341 | 15,341 | 14,215 |
| **North Dakota** | 23,037 | 16,423 | 16,423 | 13,078 | 13,054 | 12,743 | 12,480 | 12,430 | 16,246 | 16,246 | 16,246 |
| **Ohio** | 29,693 | 29,249 | 23,503 | 19,603 | 19,583 | 19,785 | 19,545 | 19,473 | 23,504 | 19,823 | 19,823 |
| **Oklahoma** | 24,335 | 19,620 | 18,918 | 17,450 | 16,452 | 15,799 | 13,930 | 13,023 | 19,614 | 18,103 | 18,114 |
| **Oregon** | 1,038 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 |
| **Pennsylvania** | 52,173 | 43,599 | 41,389 | 16,834 | 16,826 | 16,704 | 16,686 | 16,613 | 42,421 | 17,094 | 17,087 |
| **Rhode Island** | 208 | 257 | 257 | 260 | 257 | 257 | 257 | 257 | 254 | 255 | 256 |
| **South Carolina** | 6,183 | 5,875 | 4,819 | 4,739 | 4,701 | 4,693 | 4,690 | 4,721 | 6,016 | 6,046 | 6,047 |
| **South Dakota** | 653 | 297 | 297 | 297 | 297 | 297 | 297 | 297 | 297 | 297 | 297 |
| **Tennessee** | 6,382 | 5,566 | 5,492 | 5,454 | 5,446 | 5,367 | 5,350 | 5,307 | 5,493 | 5,493 | 5,494 |
| **Texas** | 66,651 | 59,199 | 58,570 | 56,391 | 54,406 | 53,283 | 52,529 | 52,707 | 59,228 | 57,146 | 57,223 |
| **Utah** | 25,160 | 24,489 | 24,489 | 21,018 | 21,018 | 20,078 | 19,846 | 19,209 | 24,489 | 24,489 | 24,489 |
| **Vermont** | 198 | 163 | 163 | 163 | 163 | 163 | 163 | 163 | 163 | 163 | 163 |
| **Virginia** | 11,254 | 9,201 | 8,778 | 8,662 | 7,809 | 6,292 | 6,182 | 6,339 | 9,252 | 8,882 | 8,911 |
| **Washington** | 1,002 | 747 | 747 | 747 | 747 | 747 | 747 | 926 | 747 | 747 | 747 |
| **West Virginia** | 25,606 | 25,664 | 25,071 | 14,755 | 13,649 | 13,453 | 13,421 | 13,421 | 25,071 | 14,755 | 13,649 |
| **Wisconsin** | 8,801 | 5,923 | 5,920 | 5,906 | 5,845 | 5,825 | 5,674 | 5,331 | 5,917 | 5,917 | 5,917 |
| **Wyoming** | 14,281 | 10,796 | 10,724 | 10,167 | 9,258 | 9,245 | 8,812 | 8,345 | 10,796 | 10,796 | 10,796 |
| **Nationwide** | **702,278** | **609,317** | **578,695** | **497,105** | **480,788** | **397,120** | **386,293** | **367,409** | **511,907** | **524,543** | **451,848** |

*Source: Integrated Planning Model run by EPA, 2015. See Appendix A for list and description of these IPM runs. Emissions have been rounded to the nearest ton. Emissions shown for all fossil-fired units greater than 25 MW when only an ozone season cost constraint is applied. Costs are in 2011$.

**Figure 3.** Table B-2 from Air Policy TSD; State-level 2017 ozone season EGU NOx emissions for various pollution control cost thresholds.

**Table B-3. Emission Differences between the 5.14 Base Case and the Other Pollution Control Cost Thresholds (Tons) from "All Units".**

| | 5.14 Base Case | 5.15 Base Case | $500/ton CT | $1300/ton CT | $3400/ton CT | $5000/ton CT | $6400/ton CT | $10000/ton CT | Less Stringent Control Alternative | Proposed Emissions Budgets | More Stringent Control Alternative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Alabama** | 0 | 1,441 | -288 | -2,136 | -2,207 | -3,305 | -3,932 | -4,354 | -56 | -1,665 | -1,620 |
| **Arizona** | 0 | -3,874 | -3,874 | -9,940 | -9,685 | -9,802 | -9,822 | -9,911 | -3,860 | -3,860 | -3,860 |
| **Arkansas** | 0 | -5,492 | -5,505 | -5,595 | -6,267 | -6,555 | -6,637 | -7,330 | -5,476 | -5,476 | -5,355 |
| **California** | 0 | -333 | -333 | -334 | -341 | -336 | -337 | -452 | -333 | -333 | -333 |
| **Colorado** | 0 | -1,430 | -1,430 | -1,453 | -2,062 | -2,313 | -2,721 | -3,356 | -1,430 | -1,430 | -1,430 |
| **Connecticut** | 0 | 20 | 19 | 22 | 2 | -17 | -17 | -44 | 20 | 20 | 20 |
| **Delaware** | 0 | 192 | 192 | 192 | 192 | 192 | 192 | 188 | 192 | 192 | 192 |
| **District of Columbia** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Florida** | 0 | -3,493 | -4,700 | -10,017 | -10,571 | -10,719 | -11,142 | -11,350 | -3,255 | -3,106 | -3,070 |
| **Georgia** | 0 | -2,038 | -2,157 | -2,275 | -2,376 | -2,464 | -2,494 | -2,463 | -2,035 | -2,025 | -2,019 |
| **Idaho** | 0 | 44 | 38 | 38 | 39 | 39 | 39 | 39 | 45 | 42 | 43 |
| **Illinois** | 0 | -4,808 | -5,183 | -5,245 | -5,317 | -5,383 | -5,394 | -5,515 | -5,037 | -5,049 | -5,060 |
| **Indiana** | 0 | -1,414 | -8,025 | -13,536 | -14,320 | -15,099 | -14,767 | -18,113 | -8,067 | -12,877 | -12,892 |
| **Iowa** | 0 | -1,057 | -1,174 | -1,413 | -1,452 | -1,452 | -1,424 | -2,023 | -1,211 | -1,429 | -1,429 |
| **Kansas** | 0 | 126 | -301 | -271 | -93 | -269 | -301 | 71 | -301 | -301 | -301 |
| **Kentucky** | 0 | -11,792 | -15,400 | -23,687 | -24,146 | -24,237 | -25,220 | -26,267 | -14,790 | -23,017 | -22,967 |
| **Louisiana** | 0 | -2,764 | -2,798 | -2,851 | -3,134 | -3,187 | -3,185 | -3,391 | -2,760 | -2,849 | -2,843 |
| **Maine** | 0 | -44 | -44 | -44 | -44 | -52 | -57 | -57 | -44 | -44 | -44 |
| **Maryland** | 0 | 2,217 | 1,189 | 1,191 | 1,053 | 1,041 | 848 | 848 | 1,026 | 1,032 | 903 |
| **Massachusetts** | 0 | 262 | 312 | 273 | 264 | 230 | 158 | 113 | 265 | 265 | 262 |
| **Michigan** | 0 | -10,188 | -10,563 | -13,081 | -13,559 | -13,708 | -13,704 | -13,744 | -10,348 | -11,786 | -11,786 |
| **Minnesota** | 0 | -278 | -356 | -553 | -758 | -810 | -851 | -1,925 | -275 | -275 | -275 |
| **Mississippi** | 0 | -653 | -734 | -949 | -1,536 | -1,743 | -2,056 | -2,693 | -1,163 | -1,372 | -1,884 |
| **Missouri** | 0 | -1,969 | -2,900 | -2,927 | -2,865 | -2,751 | -3,310 | -3,519 | -2,875 | -2,839 | -2,801 |
| **Montana** | 0 | -743 | -756 | -756 | -756 | -780 | -780 | -780 | -743 | -743 | -743 |
| **Nebraska** | 0 | 65 | 65 | -311 | -3,160 | -3,339 | -3,796 | -4,762 | 31 | 29 | 30 |
| **Nevada** | 0 | 355 | 340 | 338 | -868 | -1,034 | -1,608 | -2,352 | 355 | 354 | 354 |
| **New Hampshire** | 0 | -12 | -12 | -12 | -7 | -5 | -6 | -2 | -12 | -12 | -12 |
| **New Jersey** | 0 | -667 | -1,036 | -1,037 | -1,041 | -1,044 | -1,047 | -1,128 | -1,526 | -1,528 | -1,532 |
| **New Mexico** | 0 | 106 | 106 | -326 | -324 | -452 | -902 | -1,027 | 106 | 106 | 106 |
| **New York** | 0 | -1,213 | -1,317 | -1,486 | -1,545 | -1,545 | -1,818 | -2,051 | -1,253 | -1,448 | -1,447 |
| **North Carolina** | 0 | -4,741 | -6,663 | -6,659 | -8,263 | -8,363 | -9,153 | -9,274 | -6,707 | -6,707 | -7,833 |
| **North Dakota** | 0 | -6,614 | -6,614 | -9,959 | -9,983 | -10,295 | -10,557 | -10,607 | -6,791 | -6,791 | -6,791 |
| **Ohio** | 0 | -444 | -6,190 | -10,090 | -10,110 | -9,908 | -10,147 | -10,220 | -6,189 | -9,870 | -9,870 |
| **Oklahoma** | 0 | -4,714 | -5,417 | -6,884 | -7,883 | -8,535 | -10,404 | -11,311 | -4,720 | -6,232 | -6,220 |
| **Oregon** | 0 | -238 | -238 | -238 | -238 | -238 | -238 | -238 | -238 | -238 | -238 |
| **Pennsylvania** | 0 | -8,575 | -10,785 | -35,339 | -35,347 | -35,469 | -35,488 | -35,560 | -9,752 | -35,079 | -35,086 |
| **Rhode Island** | 0 | 49 | 49 | 52 | 49 | 49 | 49 | 49 | 47 | 48 | 48 |
| **South Carolina** | 0 | -308 | -1,365 | -1,444 | -1,482 | -1,491 | -1,493 | -1,462 | -167 | -137 | -136 |
| **South Dakota** | 0 | -356 | -356 | -356 | -356 | -356 | -356 | -356 | -356 | -356 | -356 |
| **Tennessee** | 0 | -816 | -890 | -928 | -937 | -1,015 | -1,032 | -1,075 | -890 | -889 | -888 |
| **Texas** | 0 | -7,452 | -8,081 | -10,260 | -12,245 | -13,369 | -14,123 | -13,944 | -7,423 | -9,506 | -9,428 |
| **Utah** | 0 | -671 | -671 | -4,142 | -4,142 | -5,082 | -5,314 | -5,951 | -671 | -671 | -671 |
| **Vermont** | 0 | -36 | -36 | -36 | -36 | -36 | -36 | -36 | -36 | -36 | -36 |
| **Virginia** | 0 | -2,054 | -2,476 | -2,593 | -3,445 | -4,962 | -5,072 | -4,915 | -2,002 | -2,372 | -2,343 |
| **Washington** | 0 | -256 | -256 | -256 | -256 | -256 | -256 | -76 | -256 | -256 | -256 |
| **West Virginia** | 0 | 57 | -535 | -10,851 | -11,957 | -12,153 | -12,185 | -12,185 | -535 | -10,851 | -11,957 |
| **Wisconsin** | 0 | -2,878 | -2,881 | -2,894 | -2,955 | -2,976 | -3,127 | -3,469 | -2,884 | -2,884 | -2,884 |
| **Wyoming** | 0 | -3,486 | -3,558 | -4,115 | -5,023 | -5,037 | -5,470 | -5,937 | -3,486 | -3,486 | -3,486 |
| **Nationwide** | **0** | **-92,961** | **-123,583** | **-205,173** | **-221,490** | **-230,390** | **-240,492** | **-253,916** | **-117,865** | **-177,736** | **-180,222** |

*Source: Integrated Planning Model run by EPA, 2015. See Appendix A for list and description of these IPM runs. Emissions have been rounded to the nearest ton. Emissions shown for all fossil-fired units greater than 25 MW when only an ozone season cost constraint is applied. Costs are in 2011$.

**Figure 4.** Table B-3 from Air Policy TSD; State-level 2017 ozone season EGU NOx emission differences from modeled IPMv. 5.14 Base Case for various pollution control cost thresholds.

**Ozone Concentrations at Nonattainment Monitors Associated with IPM Strategies**

According to EPA, the proposed NOx controls represented in the above figures result in "meaningful" ozone improvements (p. 75736). In contrast to this statement, as noted in the air policy TSD and represented in Table 2, none of the CSAPR nonattainment monitors are estimated to have resolved their average design value problems (i.e., estimated nonattainment) at any of the NOx cost thresholds examined when examined across the IPM v. 5.15 scenarios.

Table 2 identifies the relatively insignificant change in future year design values projected by EPA. This table lists the nonattainment monitors from CSAPR and their estimated nominal change in design value associated with the thousands of tons NOx reduced under the cost effective control strategies investigated by EPA.

In fact, the only change of significance noted in EPA's design value analysis is the average design value for two maintenance monitors (Richmond, NY and Hamilton, OH) dropped below 76 ppb in the transition from the IPM v. 5.14 to IPM v. 5.15 base cases. In other words, should EPA have run CAMx using the 2017 EGU base case they feel is more representative of on-the-books controls, they estimate that at least two additional projected monitors in the impacted eastern states (and the associated significant contribution requirements of upwind states) would have been eliminated.

**Table. 2.** Summary design values at CSAPR nonattainment monitors for various pollution control cost thresholds.

| | | | | | | | IPM v.5.15 Avg DV | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monitor | State | County | 2011 Avg DV | 2011 Max DV | 2017 5.14 Avg DV | 2017 5.14 Max DV | Base Case | $500 /ton CT | $1,300 /ton CT | $3,400 /ton CT | $5,000 /ton CT | $6,400 /ton CT | $10,000 /ton CT | Less Stringent Control Alternative | Proposed Emissions Budgets | More Stringent Control Alternative |
| 90013007 | Connecticut | Fairfield | 84.3 | 84.3 | 77.1 | 81.4 | 76.9 | 76.8 | 76.5 | 76.5 | 76.5 | 76.5 | 76.4 | 76.8 | 76.5 | 76.5 |
| 90019003 | Connecticut | Fairfield | 83.7 | 83.7 | 78.0 | 81.1 | 77.9 | 77.8 | 77.5 | 77.5 | 77.5 | 77.5 | 77.5 | 77.8 | 77.5 | 77.5 |
| 90099002 | Connecticut | New Haven | 85.7 | 85.7 | 77.2 | 80.2 | 77.1 | 77.1 | 76.9 | 76.9 | 76.9 | 76.9 | 76.9 | 77.1 | 76.9 | 76.9 |
| 480391004 | Texas | Brazoria | 88.0 | 88.0 | 81.4 | 82.3 | 81.2 | 81.1 | 81.1 | 81.1 | 81.0 | 81.0 | 81.0 | 81.2 | 81.1 | 81.1 |
| 481210034 | Texas | Denton | 84.3 | 84.3 | 76.9 | 79.4 | 76.7 | 76.7 | 76.6 | 76.6 | 76.6 | 76.5 | 76.5 | 76.7 | 76.6 | 76.6 |
| 484392003 | Texas | Tarrant | 87.3 | 87.3 | 79.6 | 82.1 | 79.4 | 79.3 | 79.3 | 79.2 | 79.2 | 79.2 | 79.2 | 79.3 | 79.3 | 79.3 |
| 484393009 | Texas | Tarrant | 86.0 | 86.0 | 78.6 | 78.6 | 78.4 | 78.4 | 78.3 | 78.3 | 78.2 | 78.2 | 78.2 | 78.4 | 78.3 | 78.3 |
| 551170006 | Wisconsin | Sheboygan | 84.3 | 84.3 | 77.0 | 79.4 | 76.7 | 76.6 | 76.6 | 76.6 | 76.5 | 76.5 | 76.5 | 76.6 | 76.6 | 76.6 |