Business Roundtable

Business Roundtable Comments on
National Ambient Air Quality Standards for Ozone; Proposed Rule
Docket ID No. EPA-HQ-OAR-2008-0699

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INTRODUCTION

Business Roundtable is an association of over 200 chief executive officers of leading U.S. companies working to promote sound public policy and a thriving U.S. economy. Business Roundtable member companies produce $7.4 trillion in annual revenues and employ more than 16 million people. Comprising more than a third of the total value of the U.S. stock market, these companies invest $158 billion annually in research and development, equal to 62 percent of private U.S. research and development spending. In addition, Business Roundtable member companies pay more than $200 billion in dividends to shareholders and generate more than $540 billion in sales for small and medium-sized businesses annually. Business Roundtable companies give more than $9 billion a year in combined charitable contributions.

Business Roundtable appreciates the opportunity to comment on EPA's proposed revisions to the primary national ambient air quality standards for ground-level ozone pursuant to Section 109 of the Clean Air Act.

BUSINESS ROUNDTABLE AND OZONE REGULATION

As CEOs who lead major American companies that operate in communities all across the United States and in every economic sector, members of the Business Roundtable care deeply about both the health of the environment and the health of the economy. Many Business Roundtable member companies offer cutting edge energy and environmental technologies and continue significant investment in developing new innovative products including advanced emissions control technologies. Business Roundtable has long emphasized the need to carefully weigh the impact of new regulations on economic growth and job creation.

To this end, in April 2011, Business Roundtable voiced concerns to EPA about the impacts of its proposal to reconsider and lower the 2008 ozone standard,[1] and in July 2011 joined with other business groups to urge EPA to postpone promulgation of new ozone standards until the regularly scheduled 2013 review.[2] Business Roundtable also called on the Administration to stay the reconsideration of the 2008 ozone rule,[3] and we welcomed the President's determination to hold to the regular timetable under the Clean Air Act for review of the ozone standards in light of

[1] http://businessroundtable.org/media/news-releases/business-roundtable-calls-on-epa-to-delay-proposed-ozone-regulations.

[2] http://businessroundtable.org/media/news-releases/american-businesses-single-out-proposed-epa-ozone-regulations-as-major.

[3] http://businessroundtable.org/resources/letter-to-bill-daley-on-ozone-regulations; http://businessroundtable.org/resources/business-group-letter-urging-president-obama-to-stay-discretionary-epa.

concerns regarding the impact of the reconsideration proposal on economic recovery and job creation. Before the issuance of the now-proposed rule, Business Roundtable wrote to Administrator McCarthy in October 2014[4] to ask that EPA request comment on maintaining the existing 75 parts per billion (ppb) standard. We appreciate the agency's decision to do so.

SUMMARY OF BUSINESS ROUNDTABLE COMMENTS

The Clean Air Act has been a success: the air is cleaner, skies are clearer, and the health risks associated with toxic emissions are substantially lower. EPA's estimates show substantial reductions in emissions of common air pollutants and their precursors, including nitrogen dioxide, sulfur dioxide, carbon monoxide and lead, since 1980.[5] Ozone emissions (averaged over 8 hours) dropped by 33 percent in the period 1980-2013, with a notable decline after 2002. These reductions have driven down the national average to 67 ppb,[6] a concentration that approaches background levels in many areas.

Due to this success, ozone concentrations are approaching levels at which the weight of scientific evidence regarding the benefits of lower standards is less compelling. Put simply, new and emerging science since the last review does not support a change in the current ozone standard.

In addition, we are reaching a tipping point at which further reductions in ozone levels in many parts of the country will become impossible to achieve even after costly reductions in ozone precursor emissions. Although the Administrator may not set the National Ambient Air Quality Standards (NAAQS) based on cost and achievability, EPA should be mindful of the consequences of this decision. By lowering the ozone standard to levels at or near background, EPA will require many local communities to achieve the unachievable – at any and all cost and using non-existent, "unknown controls." If these "unknown controls" fail to materialize on the modeled path, or if an area's background ozone contribution is already at the standard, a large part of the predicted health benefits will be illusory.

Approximately 100 million Americans currently live in areas that fail to meet the 1997 ozone standard of 84 ppb,[7] and over one-third of the population (123 million people) live in areas that do not meet the 2008 standard of 75 ppb.[8] Lowering the ozone NAAQS will not necessarily improve air quality in areas that cannot meet the 1997 or 2008 standards, let alone the tighter standards being proposed. Clean air regulations must reflect current realities, which will enable meaningful progress on improving air quality in the coming decades.

Importantly, final rules to implement the 2008 standards were only issued in February 2015 and published on March 6, 2015, with an effective date of April 6, 2015. It makes little sense to

[4] http://businessroundtable.org/media/news-releases/brt-letter-forthcoming-proposed-ozone-rule.

[5] U.S. Environmental Protection Agency. EPA Air Quality Trends. Accessed on Feb. 2, 2015. http://www.epa.gov/airtrends/aqtrends.html.

[6] *See* http://www.epa.gov/cgi-bin/broker?_service=data&_program=dataprog.aqplot_data_2013.sas&parm=44201&stat=MAX4V&styear=1980&endyear=2013&pre=val&region=99.

[7] U.S. EPA. The Green Book: 8-HR Ozone (1997) Nonattainment Areas. Accessed on Feb. 24, 2015. http://www.epa.gov/airquality/greenbook/gntc.html.

[8] U.S. EPA. The Green Book: 8-HR Ozone (2008) Nonattainment Areas. Accessed on Feb. 24, 2015. http://www.epa.gov/airquality/greenbook/hntc.html.

modify the ozone NAAQS before the current standard has been implemented. States and industry could find themselves in the untenable position of working toward attaining both the 2008 standard and an even tighter standard at virtually the same time.

For all these reasons, Business Roundtable urges the Administrator to maintain the current 75 ppb standard.

I. NEW AND EMERGING SCIENCE SINCE THE LAST REVIEW DOES NOT SUPPORT A CHANGE IN THE EXISTING STANDARD

New scientific evidence since the Agency's last review cycle does not support a change to the current standard. Specifically, there is limited clinical evidence in support of a lower standard.

EPA "[places] relatively less weight on epidemiologic-based risk estimates," owing to their associated uncertainty.[9] Clinical studies are given the greatest weight[10] and thus our discussion is focused on the clinical studies.

Numerous clinical studies have shown a variety of adverse effects in young healthy adults undergoing moderate exercise at ozone concentrations ranging from 200 ppb down to 80 ppb.[11] Clinical studies, however, are much more circumspect about adverse effects below 80 ppb. The conclusion to be drawn from a review of the clinical studies is that science is more certain at higher concentrations (e.g., >80 ppb), less certain at lower concentrations (e.g., <80 ppb), and most uncertain at the lowest concentrations that reported effects (i.e., 60 ppb).

Given the significance of setting a new NAAQS, multiple clinical studies showing statistically-significant adverse effects are needed to justify changing the current primary standard. Business Roundtable did not find such evidence in our review of the Integrated Science Assessment, the Health Risk and Exposure Assessment for Ozone,[12] the Policy Assessment, and the Clean Air

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[9] According to EPA, "Our determination to attach less weight to the epidemiologic-based estimates reflects the uncertainties associated with mortality and morbidity risk estimates, including the heterogeneity in effect estimates between locations, the potential for exposure measurement errors, and uncertainty in the interpretation of the shape of concentration-response functions at lower O3 concentrations. The HREA also concludes that lower confidence should be placed in the results of the assessment of respiratory mortality risks associated with long-term O3 exposures, primarily because that analysis is based on only one study (even though that study is well-designed) and because of the uncertainty in that study about the existence and level of a potential threshold in the concentration-response function (U.S. EPA, 2014, section 9.6)." U.S. Environmental Protection Agency, *Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards* (Policy Assessment), p. 3-133 (2014), available at: http://www.epa.gov/ttn/naaqs/standards/ozone/data/20140829pa.pdf.

[10] According to EPA, "[c]ontrolled human exposure studies provide data with the highest level of confidence since they provide human effects data under closely monitored conditions and can provide exposure response relationships. Such studies are particularly useful in defining the specific conditions under which pollutant exposures can result in health impacts, including the exposure concentrations, durations, and ventilation rates under which effects can occur." Policy Assessment, p. 1-22.

[11] *See, e.g.*, U.S. EPA. Integrated Science Assessment of Ozone and Related Photochemical Oxidants (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/076F, 2013 (Integrated Science Assessment), Figure 6-1, p. 6-7, available at: http://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=247492.

[12] U.S. EPA. Health Risk and Exposure Assessment for Ozone (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA-452/R-14-004a (2014), available at: http://www.epa.gov/ttn/naaqs/standards/ozone/data/20140829healthrea.pdf.

Scientific Advisory Committee (CASAC) review of the Policy Assessment.[13] In fact, clinical studies only found statistically significant adverse effects above the 60 ppb and 70 ppb range recommended by CASAC

Two aspects of clinical studies deserve special scrutiny: the definition of "adverse effect" and "statistical significance."

Adverse Effects. Clinical studies show a wider range of effects at higher concentrations (> 80 ppb) than at lower concentrations (< 80 ppb).[14] In addition, the magnitude of the observed effects tends to increase as concentration increases (Goodman et al. 2013).[15] A particularly relevant issue relates to decrements in forced expiratory volume in one second (FEV_1), a reversible effect and the most frequently noted response across the clinical studies. The question is whether small changes in FEV_1 should be considered adverse.

There appears to be agreement among experts that intra-human variability is around 5% for FEV_1 decrements.[16] This variability suggests that changes in mean FEV_1 of less than 5%, even if statistically significant, do not constitute an adverse effect. Some clinical studies found such small changes in FEV_1 between 60 ppb and 63 ppb (Adams et al. 2006, Schelegle et al. 2009, Kim et al. 2011).[17]

Even when decrements are greater than 5%, reversible effects such as FEV_1 are not considered "adverse" absent reported symptoms (e.g., pain upon deep inspiration, etc.). The American Thoracic Society (ATS) considers reversible loss of lung function in combination with symptoms to be adverse (ATS 2000).[18] By this definition, the lowest ozone concentration found to produce

[13] *See* June 26, 2014 letter from Dr. H. Christopher Frey, Chair, Clean Air Scientific Advisory Committee, to Administrator McCarthy, "CASAC Review of the EPA's *Second Draft Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards*," EPA-CSAC-14-004 (CASAC Review Letter)

available at: http://yosemite.epa.gov/sab/sabproduct.nsf/5EFA320CCAD326E885257D030071531C/$File/EPA-CASAC-14-004+unsigned.pdf.

[14] For example, Schelegle, E., et al., (2009) "6.6-hour inhalation of ozone concentrations from 60 to 87 parts per billion in healthy humans." *Am. J. Respir. Crit. Care Med*. 180: 265-272 (Schelegle et al. 2009) examined FEV_1, forced vital capacity (FVC), the ratio of FEV_1/FVC, and total symptoms severity (TSS) at a range of exposure concentrations. At 72 ppb, only FEV_1 decrements were statistically significant, whereas FEV_1, FVC, FEV_1/FVC, and TSS were all statistically significant at higher concentrations.

[15] Goodman, J., et al. (2013), "Evaluation of adverse human lung function effects in controlled ozone exposure studies," J. Appl. Toxicol.2014; 34: 516-524. doi: 10.1002/jat.2905 (Goodman et al. 2013) plotted mean FEV_1 decrements found in clinical studies across a wide range of ozone concentrations. The magnitude of the mean decrement increases with increased ozone concentration across these clinical studies.

[16] Goodman et al. 2013 reported that Pellegrino R., et al. (2005), "Interpretative strategies for lung function tests." Eur. Respir. J. 26: 948-968, estimated intra-individual variability at about 5% for measurements taken the same day from healthy individuals.

[17] Adams, W.C. 2006. "Comparison of chamber 6.6. hour exposures to 0.04-0.08 ppm ozone via square-wave and triangular profiles on pulmonary responses." *Inhal. Toxicol.* 18: 127-136 (Adams et al. 2006); Kim, C.S., et. al., 2011. "Lung function and inflammatory responses in healthy young adults exposed to 0.06 ppm ozone for 6.6. hours." *Am J. Respir. Crit. Care Med*. 183: 1215-1221 (Kim et al. 2011).

[18] "[T]he committee recommends that a small, transient loss of lung function, by itself, should not automatically be designated as adverse. In drawing the distinction between adverse and nonadverse reversible effects, this committee recommended that reversible loss of lung function in combination with the presence of symptoms should be considered as adverse." American Thoracic Society, 2000. "What constitutes an adverse health effect of air pollution?" *Am J. Respir. Care Med*. 161: 665-673 (ATS 2000). Available at:

an adverse effect is 72 ppb as found in a single study (Schelegle et al. 2009), a result that has not yet been replicated.[19]

Statistical Significance. The issue of statistical significance also is critical. Whereas some researchers (Adams et al. 2006, Schelegle et al. 2009) reported no statistically significant results for exposures at or near 60 ppb, other researchers (Kim et al. 2011) did. The same data sets subsequently were reanalyzed (Brown et al. 2008,[20] Lefohn et al. 2010[21]), and the results indicate that the conclusion of statistical significance of observations depends on the statistical analysis employed.

Disagreement over the "best" statistical test is essentially a disagreement over the tradeoff between Type I (false positive) and Type II (false negative) error. The fact that experts disagree as to the appropriate test to use at 60 ppb is a reflection of the close proximity between the observed effect and no effect. The greater this difference, the greater confidence we have in a causal relationship. At 60 ppb, there is uncertainty over statistical significance; certainty increases at higher concentrations.

II. BACKGROUND LEVELS IN MANY AREAS OF THE COUNTRY THREATEN ATTAINABILITY OF A LOWER OZONE NAAQS

Reductions in emissions of ozone precursors have exceeded actual reductions in ozone concentrations. While NOx emissions levels have shown a 48% decrease between 1990 and 2013, and VOC emissions have fallen by 39%, ozone levels have dropped 23% over the same period.[22] It is unclear whether ozone levels can be improved materially given natural sources of ozone precursor pollutants that cannot effectively be controlled. EPA notes in its final Policy Assessment, for example, that "in some locations and at certain times of the year (e.g., southern states during summer) the majority of VOC emissions [a key component of ozone formation] come from vegetation."[23] In these areas, a strategy aimed at further reductions in VOC emissions is likely to have diminishing effectiveness in reducing ozone formation.

Different regions of the US face different challenges in responding to more stringent ozone standards. Regions with higher background levels will disproportionally bear the economic and social costs of lower ozone standards without any appreciable improvement in air quality. Policy relevant background ozone refers to surface-level ozone present in the US that is not the result of North American anthropogenic emissions, e.g., natural background, international transport from Asia, and stratosphere-to-troposphere transport (STT) events. In a study published in 2011,

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http://www.thoracic.org/statements/resources/archive/airpollution1-9.pdf.

[19] Apart from Schelegle et al. 2009, we are not aware of another clinical study that has examined exposures at or near 70 ppb. Other studies have examined >80, 80, 60, and 40 ppb exposures.

[20] Brown, J.S., et. al., 2008. "Effects of exposure to 0.06 ppm ozone on FEV_1 in humans: a secondary analysis of existing data." *Environ. Health Perspect.* 116: 1023-1026 (Brown et al. 2008).

[21] Lefohn, A.S., et. al, 2010. "An alternative form and level of the human health ozone standard." *Inhal. Toxicol*. 22: 999-1011 (Lefohn et al. 2010).

[22] U.S. Environmental Protection Agency, National Emissions Inventory; Air Quality Trends. Accessed on February 24, 2015. http://www.epa.gov/airtrends/aqtrends.html#airquality.

[23] Policy Assessment, p. 2-9 (citation omitted).

modeled estimates of ozone background levels exceed 50 ppb in large parts of the Western US.[24] This is particularly true for communities in the intermountain west, which are highly susceptible to STT events.[25] Since stratospheric air has elevated ozone concentrations compared to clean tropospheric air, intrusions can significantly increase ground-level ozone concentrations. The concern, as noted by Zhang et al. 2011, is that "[i]f the NAAQS is lowered in the 60-70 ppbv range, areas of the intermountain West will have little or no ability to reach compliance through North American regulatory controls."[26]

As shown in Figure 1,[27] background ozone levels greater than 60 ppb occur over several days in various locations, primarily in the west. Background ozone levels greater than 50 ppb are experienced over a wide expanse of the west, and background levels above 40 ppb occur from coast to coast, and for extended periods of time in eight western states. For many counties and states, background levels beyond their control will make a lower ozone standard virtually unattainable. This is particularly true for communities in the intermountain west, which are exposed to STT events, as shown in Figure 2.

As demonstrated in Figure 3, STT events also occur outside the intermountain west. Lefohn et al. 2011[28] and Lefohn et al. 2012[29] show that across North America, at both low-altitude and elevated sites, modeled STT processes are related to enhanced ozone concentrations at the surface.[30] These intrusions occur at all times of the year, peaking during the spring and early summer.

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[24] Zhang, L., et al., "Improved estimate of the policy-relevant background ozone in the United States using the GEOS-Chem global model with ½^{o} x 2/3^{o} horizontal resolution over North America,"

Atmospheric Environment 45 (2011) 6769-6776 (Zhang et al. 2011),

available at: http://dash.harvard.edu/bitstream/handle/1/12712894/Zhang_ImprovedEstimate.pdf?sequence=1.

[25] Zhang et al. 2011 acknowledges (p. 2) that the study's modeling of policy-relevant background ozone (PRB) "cannot reproduce PRB-relevant exceptional events associated with wildfires or stratospheric intrusions." Thus the estimates of background levels in Zhang et al. 2011 may be understated.

[26] Zhang et al. 2011, p. 7.

[27] Source: Emery, C., et al., "Regional and global modeling estimates of policy relevant background ozone over the United States," Atmospheric Environment (2011), doi:10.1016/j.atmosenv.2011.11.012, (Emery et al. 2011) p. 9, available at: http://www.camx.com/files/aea_10907-prb.aspx.

[28] Lefohn, A.S., et al. (2011). The Importance of Stratospheric-Tropospheric Transport in Affecting Surface Ozone Concentrations in the Western and Northern Tier of the United States. Atmospheric Environment. 45:4845-4857 (Lefohn et al. 2011).

[29] Lefohn, A.S., et al. (2012). Quantifying the Importance of Stratospheric-Tropospheric Transport on Surface Ozone Concentrations at High- and Low-Elevation Monitoring Sites in the United States. Atmospheric Environment. 62:646-656 (Lefohn et al. 2012).

[30] This research is summarized in "Background Surface Ozone, Comments on the ISA" (slide presentation), Lefohn, A.S., A.S.L. & Associates, Sept. 2012, available at: http://yosemite.epa.gov/sab/SABPRODUCT.NSF/B3606BFF01D757E385257A76005CE724/$File/Overheads_AS Lefohn_September_11_2012_ISA.pdf. Lefohn et al. 2011 investigated "the effect of stratospheric events and their associated [ozone] concentration enhancements in the western and northern tier of the US," reporting that "stratospheric contributions were frequent and were related to enhanced [ozone] concentrations ≥ 50 ppb at both high- and low-elevation monitoring sites." (*See* slide presentation, p. 9). Lefohn et al. 2012 analyzed 39 high- and low-elevation monitoring sites in the US, finding that in addition to the high-elevation sites in the west, "low-elevation monitoring sites across the entire US experienced enhanced [ozone] concentrations (i.e., ≥ 50 ppb) coincident with stratospheric contributions." (*See* slide presentation, p. 10).

The EPA Policy Assessment also references the impact of background ozone across the US. As shown in Policy Assessment Figure 2-13, background makes up 40-50% of the total ozone in the Eastern portion of the US. The northern and most northeastern portions of the US have total ozone that is 60-70% background.

Thus, violations of the ozone standard due to background levels and STT events may become the rule rather than the exception for some areas of the country. The west in particular also faces long range transport from Asia that contributes to stratospheric ozone intrusions that often lead to exceedances of the 8-hour ground level ozone standard. As shown in the 2013 Las Vegas Ozone Study (LVOS) conducted by the National Oceanic and Atmospheric Administration (NOAA),[31] "[s]ince the higher background concentrations and episodic increases associated with STT and Asian pollution are unaffected by local control strategies, these processes pose a serious challenge for air quality managers tasked with meeting the NAAQS in the western United States."[32]

According to Langford et al. 2014, "exceedances of the NAAQS generated by high background concentrations and stratospheric intrusions would have occurred on 60% of the days during the LVOS. . . ." The LVOS concluded that all of the ozone exceedance days in Clark County, NV during 2013 "were largely due to outside influences."[33] The LVOS also notes that exceedances would become increasingly frequent if the ozone standard is decreased to 70 ppb or less, and that the "exceptional events" approach may no longer be viable.[34]

There are indications that the Agency is taking this research seriously. For instance, it has formed a working group with states to address the issue of STT events.[35] EPA also may change its exceptional events policy. A proposed rule is expected in the summer of 2015, to be finalized in summer 2016, just before states make recommendations to EPA on classification should the Agency lower the current standard.[36] The LVOS points out the need to revisit the exceptional events policy, which has seldom been used, and only once has been used to acknowledge a single STT event (other applications on STT events are pending).[37] EPA should address its exceptional events policy before, rather than after, finalizing a lower ozone standard that will force many parts of the country into increased dependency on the policy.

Business Roundtable believes that changes to EPA's exceptional events policy are warranted. The policy is not designed for situations where background contribution comes from a variety of sources (i.e., STT, international transport, wildfires, etc.) and it is that enhancement that results in a monitored value exceeding the standard. We recommend that the Agency (1) streamline the

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[31] NOAA Earth System Research Laboratory Chemical Sciences Division, *see* http://www.esrl.noaa.gov/csd/projects/lvos.html.

[32] Langford, A.O., et al., "An overview of the 2013 Las Vegas Ozone Study (LVOS): Impact of stratospheric intrusions and long-range transport on surface air quality," Atmospheric Environment (2014) 1-18, http://dx.doi.org/10.1016/j.atmosenv.2014.08.040 (Langford et al. 2014), p. 2 (available at: http://www.gfdl.noaa.gov/cms-filesystem-action/user_files/m1l/Langford_etal_AE_2014.pdf).

[33] *Id.*, p. 16.

[34] *Id.*, p. 3.

[35] Personal communication with Earth System Research Laboratory, NOAA, January 2015.

[36] Personal communication with EPA Office of Air Quality Planning and Standards, January 2015.

[37] Personal communication with EPA Office of Air Quality Planning and Standards, January 2015.

process for applying for an exceptional events exclusion, (2) greatly lessen the evidentiary burden on the states, and (3) utilize direct measurement, such as satellite data (e.g., Tropospheric Emissions: Monitoring of Pollution (TEMPO), which will launch in the 2017-19 timeframe) to help determine STT events when possible.[38]

It is important to note, however, that even if EPA revises its exceptional events policy and affords flexibility in implementation that withstands any potential challenge, the consideration of background, including STT events, remains vitally important in setting the ozone standard. The NOAA LVOS study demonstrated that STT events, one type of background, are impacting state compliance with the current standard of 75 ppb.[39] Furthermore, the LVOS suggests that the progress in lowering ozone nationwide is not uniform across the country:

> More than 65% of the rural eastern U.S. sites surveyed in a recent study. . . showed statistically significant decreases in median ozone during the summer with 43% also exhibiting significant decreases in the spring. In contrast, only 8% of the western U.S. rural sites examined showed similar summertime decreases, and more than 50% had significant springtime increases. . . .The absence of clear trends in the west may reflect the cancellation of local emission controls by increasing background concentrations.[40]

US background ozone levels are significant enough that many parts of the country are penalized for ozone levels beyond their control. Given their significance, particularly in certain regions of the country, the Administrator can and should consider background levels in establishing the ozone NAAQS. As the Policy Assessment observed, the Clean Air Act "does not require the Administrator to establish a primary NAAQS at a zero-risk level or at background concentration levels…, but rather at a level that reduces risk sufficiently so as to protect public health with an adequate margin of safety."[41] Importantly, "[t]he selection of any particular approach for providing an adequate margin of safety is a policy choice left specifically to the Administrator's judgment."[42]

In discussing the consideration of the scientific evidence in the review leading to the proposed standards, and in particular considerations regarding ambient ozone concentration estimates attributable to background sources, the Policy Assessment acknowledges that "[a]s with the primary standard, in identifying the range of policy options supported by the evidence and information, staff has not considered proximity to background O_3 concentrations. The Administrator, when evaluating the range of possible standards that are supported by the

[38] TEMPO will help to more accurately identify STT events through geostationary satellite observation compared to non-direct measurement techniques such as computer simulations. *See* Zoogman, P., et. al. 2014. "Monitoring High-Ozone Events in the US Intermountain West Using TEMPO Geostationary Satellite Observations." Atmospheric Chemistry and Physics 14 (12): 6261–6271. doi:10.5194/acp-14-6261-2014. (Zoogman et al. 2014). Available at http://dash.harvard.edu/bitstream/handle/1/14004549/Monitoring%20high-ozone%20events%20in%20the%20US%20Intermountain%20West%20using%20TEMPO%20geostationary%20satellite%20observations.pdf?sequence=1.

[39] The three exceedances of the current standard during the LVOS were each attributable to an STT episode.

[40] Langford et al. 2014, p. 2 (citations omitted).

[41] Policy Assessment, p. 1-4 (citations omitted).

[42] *Id*. (citation omitted).

scientific evidence, **could consider proximity to background O_3 concentrations** as one factor in selecting the appropriate standard."[43] Indeed, in issuing the 1997 ozone standard, Administrator Browner did just this. Among the factors Administrator Browner cited in rejecting a 70 ppb standard was the proximity of background levels to such a standard.[44]

Business Roundtable urges the Administrator to consider background ozone concentration in exercising her judgment and making her policy choice regarding the adequate margin of safety to be achieved through the ozone standard. Lowering the current primary standard will exacerbate the ongoing problem of background ozone levels that are uncontrollable. This is a compelling reason to maintain the current standard and undertake research to more credibly estimate the role of background concentrations (and STT events in particular) before the next review cycle. CASAC also has suggested taking a closer look at US background ozone levels.[45]

III. A SIGNIFICANTLY LOWER OZONE NAAQS COULD PROVIDE ILLUSORY HEALTH BENEFITS IF IT CAUSES LARGE PARTS OF THE NATION TO ENTER AN ERA OF WIDESPREAD AND CHRONIC NONATTAINMENT

Each incremental reduction in the current standard will require finding more emission reductions from unknown sources. EPA's Regulatory Impact Analysis found that emissions reductions beyond known controls[46] would be needed to meet the alternative 60 ppb, 65 ppb or 70 ppb standards.[47] As shown in Figure 4, the RIA suggests that of the total NOx and VOC emissions reductions needed to achieve a 70 ppb standard, 22% are unknown, 38% are unknown if the standard is 65 ppb, and 65% are unknown if the standard is 60 ppb.[48]

In short, as the ozone standard decreases, our ability to achieve the standard will become increasingly reliant on technologies that currently do not exist. As discussed above, the RIA concludes that "known controls" will not be sufficient to achieve full compliance with alternative standards, or even the existing standard:

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[43] Policy Assessment, p. 1-42 (emphasis supplied).

[44] Environmental Protection Agency, National Ambient Air Quality Standards for Ozone, Final Rule, 62 *Fed. Reg.* 38856 (Jul. 18, 1997), at p. 38868 (". . . the Administrator gives significant weight to the following considerations: * * * (3) As many commenters have noted, based on information in the Criteria Document with regard to ambient concentrations of O_3 from background sources, an 8-hour standard set at [a 70 ppb] level would be closer to peak background levels that infrequently occur in some areas due to nonanthropogenic sources of O_3 precursors, and thus more likely to be inappropriately targeted in some areas on such sources.")

[45] "We underscore the need for research to address . . . the characterization of background levels." CASAC Review Letter, p. iv.

[46] Known control measures analyzed for purposes of the RIA included measures applied to electric generating units, non-EGU point, nonpoint (area) and nonroad mobile sources. Control measures were applied to point and nonpoint sources of NOx, and in a portion of the geographic areas where NOx controls were applied, EPA also applied control measures to sources of VOC. U.S. EPA, Regulatory Impact Analysis of the Proposed Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone 2014 ("Regulatory Impact Analysis" or "RIA"), pp. 4-19 - 4-21. Available at: http://www.epa.gov/ttn/ecas/regdata/RIAs/20141125ria.pdf.

[47] "There were several areas where known controls did not achieve enough emissions reductions to attain the alternative standards of 70, 65 and 60 ppb. To complete the analysis, the EPA then estimated the additional emissions reductions beyond known controls needed to reach attainment, also referred to as unknown controls." RIA, p. 4-21.

[48] Derived from RIA, Table 4-10, p. 4-22.

> **Available technologies that might achieve NOx and VOC reductions to attain alternative ozone NAAQS *__are not sufficient__*.** In some areas of the U.S., the information we have about existing controls does not result in sufficient emissions reductions needed to meet *__the existing standard__*. After applying existing rules and the illustrative known controls across the nation (excluding California), in order to reach 70 ppb we were able to identify controls that reduce overall NOx emissions by 490,000 tons and VOC emissions by 55,000 tons. In order to reach 65 ppb we were able to identify controls that reduce overall NOx emissions by 1,100,000 tons and VOC emissions by 110,000 tons. After these reductions, in order to reach 70 ppb over 150,000 tons of NOx emissions remained, and in order to reach 65 ppb over 750,000 tons of NOx emissions remained.[49]

Moreover, EPA data suggests that the marginal cost of __known__ NOx controls will quickly become burdensome and, as shown in Figure 5, even go "off the chart" at around 1.2 million tons of reductions, which is well short of the reductions required under either a 65 ppb or 60 ppb standard.[50] Additionally, EPA assumes that all __unknown__ controls will have a constant marginal cost of $14,000 for NOx and $15,000 for VOCs,[51] whereas a study by NERA Economic Consulting suggests that the marginal costs for unknown controls is likely to be substantially higher.[52]

As a result, a significant decrease in the ozone standard could usher in an era of widespread and chronic nonattainment across the nation. Ozone standards in the range proposed likely would place large sections of the country in nonattainment status.

A nonattainment designation effectively places local communities under a stringent statutory and regulatory regime, and places constraints on economic growth. There are practical implications for business investment for both existing and potential new sources. Existing sources could be faced with retrofitting equipment or scaling back their activity. New sources could be required to purchase offsets or to site their projects elsewhere. In some counties, offsets are not readily available.

The greater the extent of a county's nonattainment, the more restrictive the control requirements become. Reasonably Available Control Technologies (RACT) would be required for all existing sources; and Lowest Achievable Emissions Rates (LAER), where costs are not a consideration, would be required for new and modified sources. New sources would face offset requirements greater than 1:1, which increase with the severity of the county's nonattainment. A continuing failure to attain the standards can result in more stringent stationary source standards, vehicle

[49] RIA, p. 8-15 (emphasis supplied).

[50] Source: RIA, Figure 7-1, p. 7-5, and Table 4-10, p. 4-22. Marginal cost curve developed by Business Roundtable from EPA figure.

[51] RIA, Section 7.1.2., pp. 7-4 to 7-5.

[52] NERA Economic Consulting, "Assessing Economic Impacts of a Stricter National Ambient Air Quality Standard for Ozone," (July 2014) available at: http://www.nera.com/content/dam/nera/publications/2014/PUB_NERA_NAM_Ozone_Report_0714.pdf. The NERA Consulting study was updated in February 2015. *See* NERA Economic Consulting, "Economic Impacts of a 65 ppb National Ambient Air Quality Standard for Ozone," (February 2015), available at: http://www.nera.com/content/dam/nera/publications/2015/NERA_NAM_Ozone_Update_0215.pdf.

inspection and maintenance programs, controls on small businesses such as dry cleaners, service stations and printing shops, and eventually the imposition of fees on emissions.

As documented by recent economic research, the consequences of nonattainment designations can be far reaching. Shadbegian and Wolverton 2010 identified the importance of policymakers understanding whether environmental regulation affects plant location decisions.[53] They observed that studies have found that "more stringent environmental regulation deters new plant openings and may even cause firms to relocate plants to areas with more lax environmental regulations."[54] Greenstone 2012 estimated a 4.8 percent decline in total factor productivity levels for emitting plants located in non-attainment areas,[55] which corresponds to annual lost output in the manufacturing sector of nearly $21 billion (2010 dollars).[56] Ozone regulations were found to have particularly large negative effects on productivity.[57] Hanna 2010 estimated that US-based multinational firms increased their foreign production by 9% and their foreign assets by 5% in response to tougher regulation under the Clean Air Act Amendments of 1990.[58]

The costs borne by workers in emitting industries do not appear to have been considered quantitatively in this rulemaking. Walker 2013 found that following a non-attainment designation, "[t]he average worker in a regulated sector experienced a total earnings loss equivalent to 20% of their preregulatory earnings."[59]

In summary, as the geographic scope of nonattainment areas expands, new investments in manufacturing will have nowhere to go in the United States. The consequence of expanded nonattainment will be to reduce investment, while making minimal progress toward reducing ozone levels. As a consequence, the health benefits predicted by EPA from a lower ozone NAAQS could well prove to be illusory.

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[53] Shadbegian, R. and Wolverton, A., "Location Decisions of U.S. Polluting Plants: Theory, Empirical Evidence, and Consequences," EPA National Center for Environmental Economics, 2010 (Shadbegian and Wolverton 2010), available at: http://yosemite.epa.gov/ee/epa/eed.nsf/ec2c5e0aaed27ec385256b330056025c/81d7332051b52ed88525772700744a02/$FILE/2010-05.pdf.

[54] *Id*., p. 38.

[55] Greenstone, M., et al., "The Effects of Environmental Regulation on the Competitiveness of U.S. Manufacturing," MIT Center for Energy and Environmental Policy Research 2012 (Greenstone et al. 2012), pp. 2, 31. Available at: http://web.mit.edu/ceepr/www/publications/workingpapers/2012-013.pdf.

[56] *Id.*, p. 32.

[57] *Id.*, pp. 2, 32.

[58] Hanna, R., 2010. "US Environmental Regulation and FDI: Evidence from a Panel of US-Based Multinational Firms" (Hanna 2010). *American Economic Journal: Applied Economics*, 2(3): 158-89, p. 187. Available at: http://scholar.harvard.edu/files/remahanna/files/fdi_aej_july_2010.pdf.

[59] Walker, W.R., "The Transitional Costs of Sectoral Reallocation: Evidence from the Clean Air Act and the Workforce," The Quarterly Journal of Economics (2013) (Walker 2013), pp. 1787-1835, at pp. 1791, 1830. Available at: http://faculty.haas.berkeley.edu/rwalker/research/walker_transitional_costs_CAA.pdf.

IV. EPA SHOULD PROVIDE TIME FOR THE 2008 STANDARD TO BE IMPLEMENTED AND FOR OTHER FEDERAL MEASURES TO IMPROVE AIR QUALITY TO TAKE EFFECT BEFORE CHANGING THE OZONE STANDARD

The final rule to implement the 2008 standards was only issued in February 2015 and published in the *Federal Register* on March 6, 2015,[60] effective April 6, 2015. The rule establishes due dates for air agencies to submit State Implementation Plans (SIPs) demonstrating how areas designated as nonattainment will meet the standards. The rule also clarifies attainment dates for each nonattainment area according to its classification.

Under the current compliance schedule, all of the components of a state SIP would appear to be required by no later than 4 years after the July 20, 2012 effective date of nonattainment designations, or by July 2016 –16 months from now – for areas that are classified as serious and higher, and by July 2015 for areas that are classified as moderate.

EPA has not yet received, let alone approved, most of the SIP components that are required in connection with the 2008 standards. Realistically, it can be expected to take several years before the agency is in a position to approve the SIPs for areas designated as moderate and above.

It makes little sense to modify the ozone NAAQS before the current standard has been implemented. States and industry could find themselves in the untenable position of working toward attaining both the 2008 standard and an even tighter standard at virtually the same time. States should be given time to do the work necessary to comply with the 2008 standard, as well as other regulations that will affect ozone levels. EPA should have time to determine how effective the SIPs are likely to be in reducing ozone levels given already adopted but not yet fully implemented federal measures that are designed to improve air quality before issuing a revised standard. The delay in implementing the 2008 standard and the need to better understand emissions reductions from other federal regulatory programs are compelling arguments for retention of the 75 ppb standard.

V. CONCLUSION

Business Roundtable recommends that EPA maintain the existing 75 ppb standard. The weight of new science since the last review does not warrant a change in the current standard. Moreover, natural background levels and EPA's increasing reliance on "unknown" controls likely will result in illusory health benefits. A standard that is unlikely to be met in many regions of the country provides no real benefit but yet will impose significant economic costs.

In addition, EPA should update its policy on exceptional events, particularly as it relates to STT events. The Agency should recognize, however, that such changes cannot justify setting the ozone NAAQS at a level approaching background concentrations. EPA should: 1) streamline the process for applying for an exceptional events exemption; 2) greatly lessen the evidentiary burden on states applying for the exemption; and 3) utilize direct measures, such as satellite data (*e.g.*., TEMPO) to help determine STT events whenever possible.

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[60] http://www.gpo.gov/fdsys/pkg/FR-2015-03-06/pdf/2015-04012.pdf.

Finally, EPA should continue looking for every opportunity to implement the existing ozone standard in the most flexible and least burdensome manner. EPA should work closely with state governments, local governments, and other interested parties to encourage innovative approaches to improving air quality, reward early actions, and respond to the fact that a substantial share of ozone levels is totally outside a community's sphere of influence. Ultimately, a sustained effort to ensure that the regulated community has maximum flexibility to achieve the federal ozone standard is essential to improving air quality in the coming decades while preserving public and political support for the Clean Air Act.

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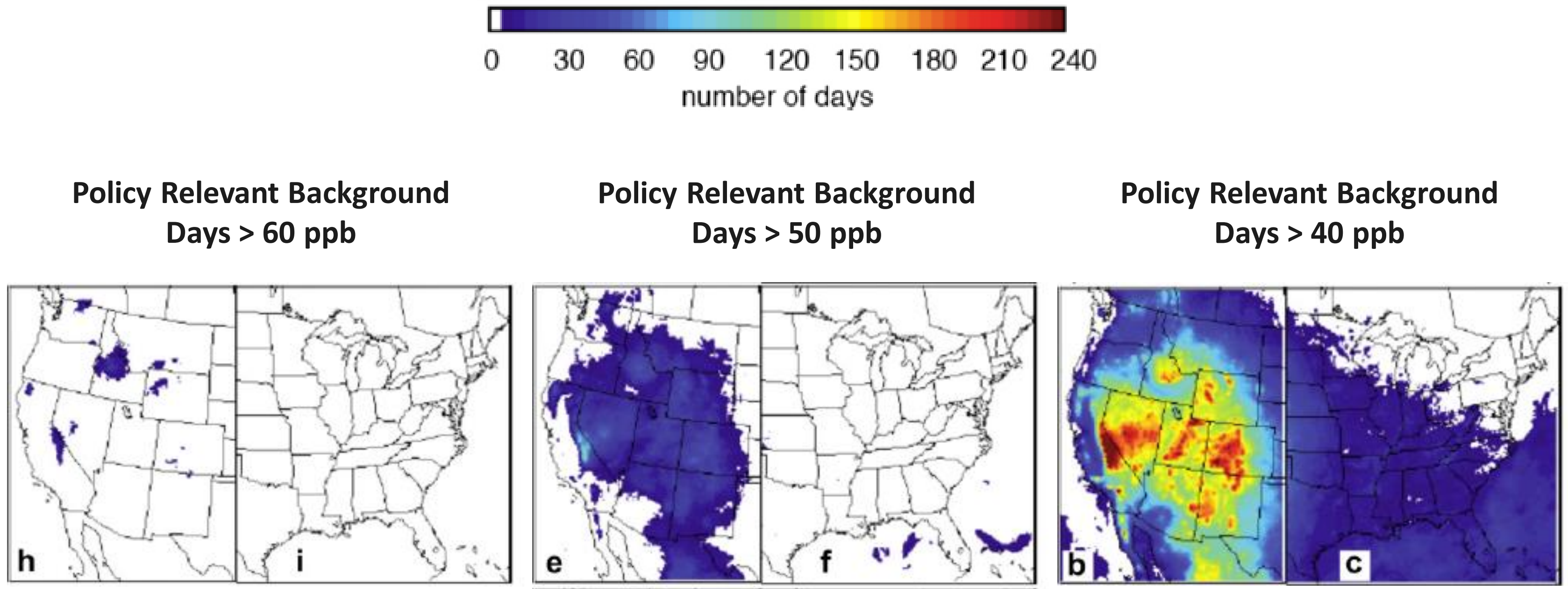
Figure 1.

Number of Days Experiencing Policy Relevant Background Ozone Levels

Daily Maximum 8-Hour Average Ozone Levels, 2006 (CAMx Model)

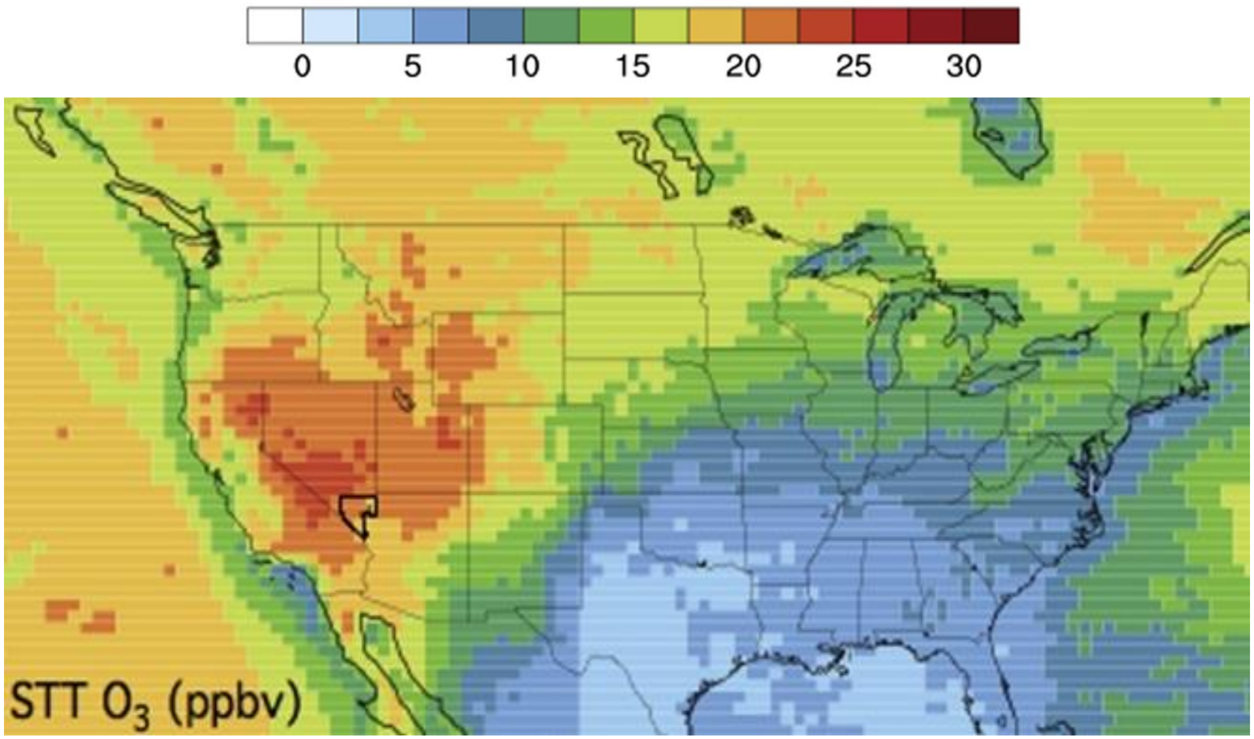


Source: Emery et al. (2011).

Figure 2.

Modeled Estimates of Stratosphere-to-Troposphere Transport (STT) Events

Mean Contributions of STT to MDA8 Surface Ozone, May-Jun 2010

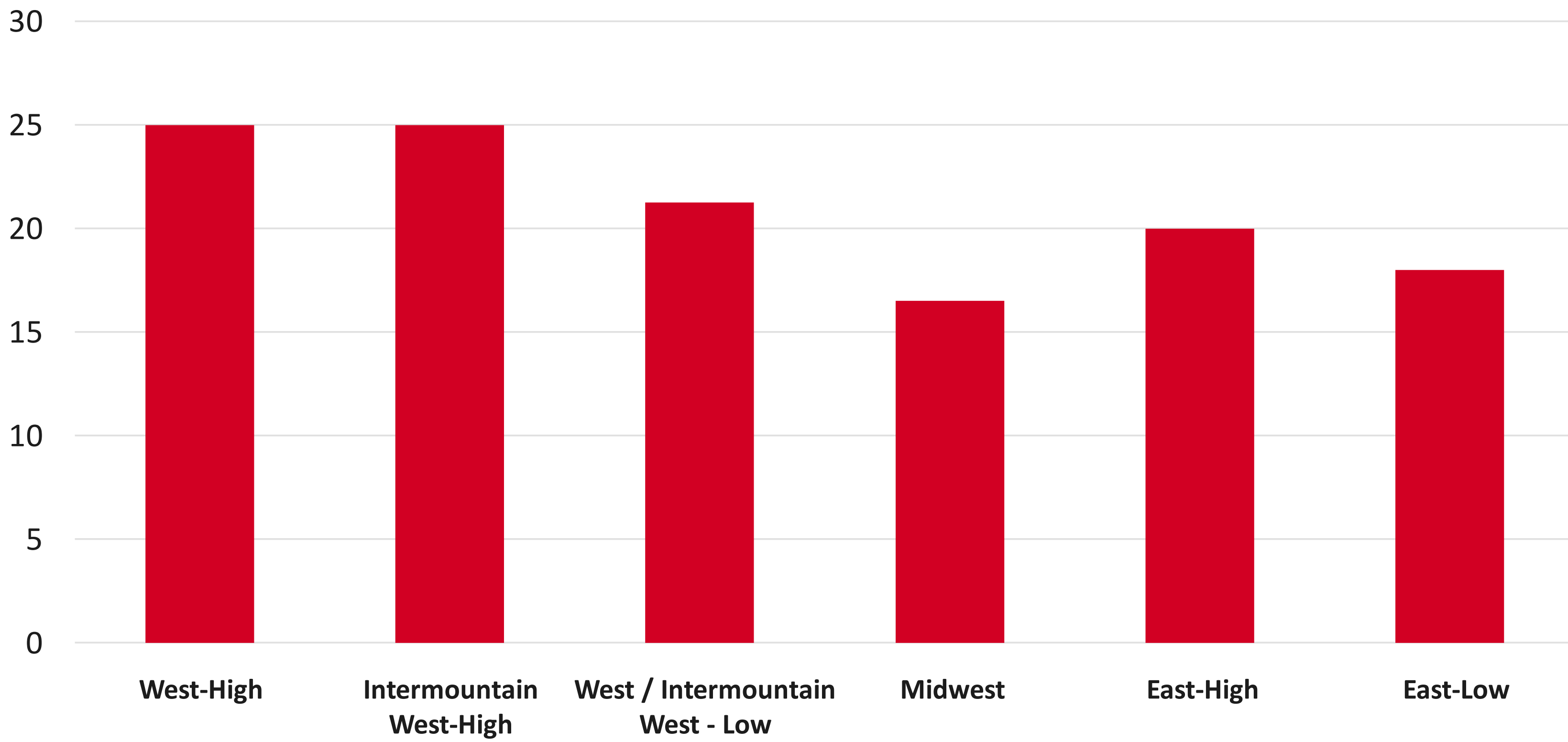


Source: Langford et al. (2014). Adapted from Lin et al. (2012).

Figure 3.

STT-S* Event Coincidence with ≥ 50 ppb Ozone Levels

Average Number of Days per Month during the Spring (March, April, & May)



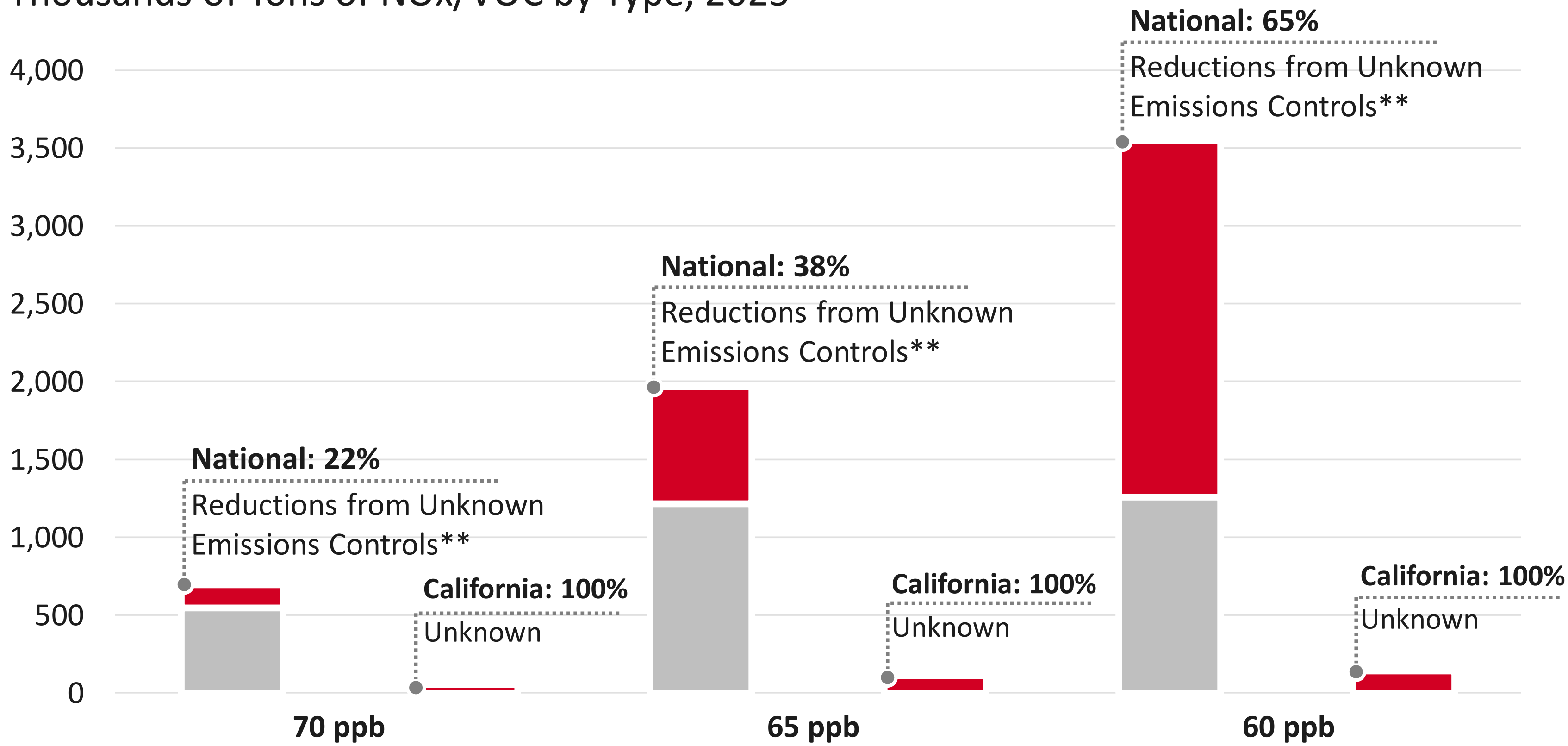
*Stratosphere-to-Troposphere Transport to the ground “surface”.

Adapted from A. S. Lefohn et al. (2012). “Quantifying the importance of stratospheric-tropospheric transport on surface ozone concentrations at high- and low-elevation monitoring sites in the United States,” *Atmospheric Environment* 62 (2012) 646-656.

Figure 4.

Total NOx & VOC Emission Reductions Needed to Achieve Various Standards

Thousands of Tons of NOx/VOC by Type, 2025*



*CA reductions are post-2025.

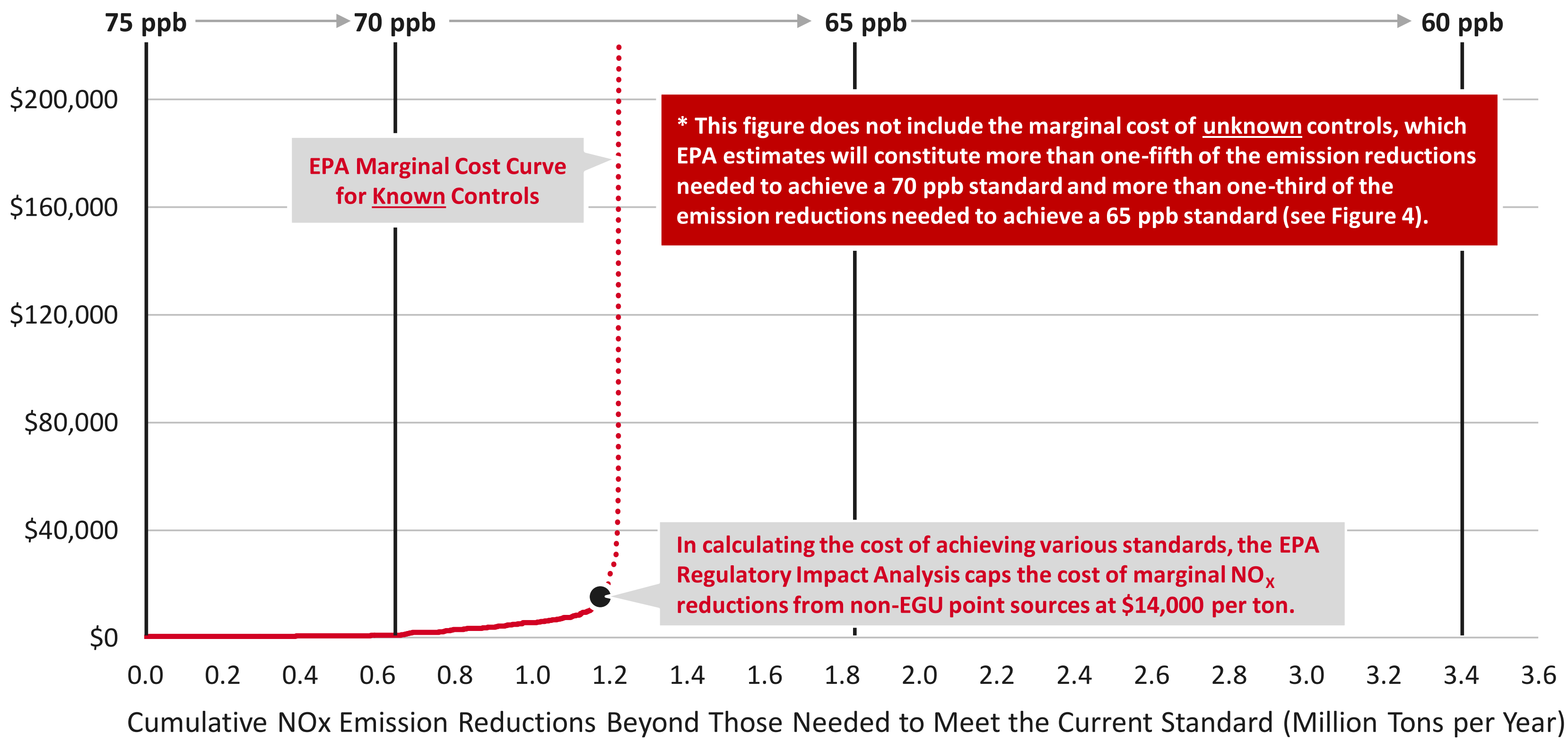
**"Unknown emissions controls" are theoretical sources of ozone precursor emissions reductions that the EPA has not yet been unable to identify.

Source: U.S. Environmental Protection Agency (November 2014). "Regulatory Impact Analysis of the Proposed Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone." Table 4-10.

Figure 5.

Marginal Costs of Known NOx Controls Relative to Various Ozone Standards*

Dollars per Ton of Reduction



Source: U.S. Environmental Protection Agency (November 2014). "Regulatory Impact Analysis of the Proposed Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone." Table 4-10 (Reductions) & Figure 7-1 (Costs). Underlying data for Figure 7-1 provided by EPA.