# *Unions for Jobs & Environmental Progress*

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Re: Proposed Revisions to National Ambient Air Quality Standards for Ozone,
U.S. EPA Docket EPA-HQ-OAR-2008-0699
79 Fed.Reg. 79234, December 17, 2014

Ladies and gentlemen:

These comments on the above-proposed rulemaking are submitted on behalf of Unions for Jobs and Environmental Progress (UJEP), an independent association of national and international labor unions identified below. UJEP's member unions represent more than 3.2 million workers in electric power, rail transportation, coal mining, construction, and other energy-related industries. UJEP members' jobs and economic wellbeing will be vitally affected by U.S. EPA's decisions on any revision to the National Ambient Air Quality Standards (NAAQS) for ozone.

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*UJEP is an independent association of labor unions involved in energy production and use, transportation, engineering, and construction. Our members are: International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers Union; International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers; International Brotherhood of Electrical Workers; International Brotherhood of Teamsters; SMART Transportation Division; Transportation • Communications International Union; United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada; United Mine Workers of America; and Utility Workers Union of America.*

## Summary of Comments

EPA is proposing to revise the primary 8-hour ozone standard from its current level of 75 ppb to a more stringent level within a recommended range of 65 to 70 ppb, while taking comment on a more stringent standard of 60 ppb. The agency also is proposing to establish new secondary standards to protect vegetation and other welfare-related values. UJEP's comments focus on the proposed revision to the primary ozone standard.

UJEP recommends that EPA retain the current primary ozone standard of 75 ppb. The available science remains subject to substantial uncertainties at levels below the current standard, and does not clearly support setting a primary standard more stringent than 75 ppb. In the alternative, should the Administrator exercise her policy judgment to revise the primary standard, we urge that the standard be set at a level not more stringent than 70 ppb. This would avoid the severe impacts on states, consumers, jobs, and economic growth associated with widespread nonattainment of a standard set at a lower level, as well as risks to electric reliability posed by the retirement of additional coal-based generating units potentially subject to SCR retrofit requirements. These impacts are discussed *infra*.

Our position on revision of the primary ozone standard recognizes both the substantial reductions in ambient ozone levels that have resulted from implementation of a variety of state and federal emission control programs over the past several decades, as well as the projected continued air quality improvements that will result from "on-the-books" emission control programs such as the Tier 3 motor vehicle and fuel rules, the Cross-State Air Pollution Rule, the Heavy-Duty Diesel Rule, and other source-focused emission control programs.[1] A revision to the primary ozone standard is not needed to ensure this continued air quality progress. A more stringent standard leading to widespread nonattainment based on current EPA methods for nonattainment area designations would threaten jobs across most energy-related sectors, including electric utility generation, oil and gas extraction and processing, and all other industry sectors dependent on fossil fuels.

EPA estimates that 7 to 51 Gigawatts (GW) of coal-based electric generating capacity may be subject to the retrofit of selective catalytic reduction technology under revised standards of 70 and 65 ppb, respectively. UJEP respectfully disagrees. We are concerned that the 145 units that EPA identified as retrofit candidates include a majority of smaller and older units that likely would shut

[1] *See, e.g.*, U.S. EPA, Air Quality Modeling Technical Support Document Tier Motor Vehicle Emission Standards, EPA-454/R-14-002 (February 2014).

down rather than retrofit control technology, causing substantial direct and indirect job losses. Moreover, EPA's ozone air quality modeling for 2025 assumes full implementation of the proposed Clean Power Plan. Any plant closures associated with a revised ozone standard would be in addition to the 49 GW of unit shutdowns that EPA has projected due to that rule. UJEP members estimate that some 51,000 direct jobs in mining, coal transportation, and electric generation are at risk due to this projected level of closures under the Clean Power Plan.[2] A comparable number of direct jobs are at risk in this rulemaking.

EPA's assessment of current and prior ozone research needs and uncertainties as summarized in the Policy Assessments for the current rulemaking and the 2008 standard revision shows little, if any, change in nearly a dozen major research needs, including more robust data on the potential confounding health effects of other pollutants. As summarized in the key "95 Cities" mortality research by Bell, *et al.*, the statistical associations observed between ozone exposure and mortality may be confounded by other pollutants:

> (T)he estimated effect of ozone, although robust to the adjustment for PM10, may still reflect the risk from the photochemical pollution mixture more generally. Atmospheric photochemistry produces several hazardous pollutants, in addition to ozone, such as peroxyacyl nitrates. Ozone may act as a surrogate indicator for this highly complex and geographically variable mixture and is likely to be an imperfect measure of potential toxicity. The degree to which ozone functions as a surrogate for other pollutants or the pollutant mixture in general, and thereby misclassifies toxicity, may vary across locations and depend on the mix of sources and meteorologic factors. Although statistically significant relationships were identified for all ozone concentration metrics considered, the analysis did not identify a particular metric as the optimum predictor of mortality.[3]

The Clean Air Scientific Advisory Committee (CASAC) noted the need for multi-pollutant assessments of the health effects of air pollution in its July 1, 2014, letter commenting on the Second Draft Health Risk and Exposure Assessment:

> The current approach to review and revision of the primary NAAQS is based on a one-pollutant-at-a-time approach. As the state of science regarding the joint effects of human exposure to multiple

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[2] Union Presidents' Comments on Proposed Clean Power Plan, EPA Docket No. EPA-HQ-OAR-2013-0602 (November 18, 2014).

[3] Bell, M.L., *et al*., Ozone and Short-term Mortality in 95 US Urban Communities, 1987-2000, 292 *JAMA* 2272, 2277 (2004, footnotes omitted, emphasis added), available at http://www.ce.jhu.edu/epastar2000/epawebsrc/ellis/2004%20JAMA%20O3%20mortality.pdf.

> pollutants improves, the EPA should consider how review and revision of the NAAQS can be done synergistically for logical, scientifically relevant groupings of criteria pollutants. For example, ozone and nitrogen oxides (NOx) are both criteria pollutants and are inter-related via atmospheric chemistry, and human exposure to these pollutants is often in the form of a mixture that includes both, and other pollutants such as particulate matter. The National Research Council and the North American Research Strategy for Tropospheric Ozone have both made detailed recommendations for multipollutant approaches to air quality management, and the EPA has been exploring a multipollutant approach for the secondary standards for SOx and NOx. CASAC encourages the EPA to explore multipollutant approaches for review of the primary standards, and would be receptive to a request by the agency to review planning or methods documents for such approaches.[4]

Expert comments on the draft policy and health risk assessments in the current rulemaking have identified a range of uncertainties in the scientific bases for the current ozone standard, supporting the view that the 75 ppb standard is adequately protective of public health, and that the benefits of a reduced standard are over-estimated:

> The contribution of risks occurring at concentrations of ozone at or below background becomes more important as lower NAAQS are considered. The methodology EPA uses to calculate risk assumes no threshold concentration for health effects and assumes that exposure to concentrations of ozone at or below background levels pose a real threat to human health. These assumptions also inflate the estimated health risks and the estimated health risk reductions when more stringent NAAQS are considered. …
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> The epidemiological or observational studies of the association of ozone with various health endpoints continue to be difficult to interpret. … EPA made choices as to which associations to include in the core analyses, how to model the concentration-response functions, and as to the way the analyses are presented in the REA that dramatically overstate the magnitude and certainty of ozone health risks. …
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> (T)he preliminary PA conclusion regarding adequacy relies on CASAC's previous advice regarding the level of the standard and does not consider the new information that (1) background ozone is much closer to the current standard than thought during the last review, (2) we now have clear evidence for a threshold in the first physiological effects of ozone, (3) the risk based on person-days of exposure that might cause FEV1 (lung

[4] CASAC Review of the EPA's Health Risk and Exposure Assessment for Ozone (Second External Review Draft – February, 2014) (July 1, 2014) at 3-4.

function) decrements is extremely low at the current standard, and (4) the uncertainty as to whether ozone is causing hospital admissions or mortality is much larger than thought in the previous review.[5]

These concerns justify a more cautious approach to the interpretation of the controlled human exposure studies on which the agency places the "greatest weight" in the current review. In fact, the vast majority of the health effects evidence presented in the agency's 2013 Integrated Science Assessment is taken from studies available to EPA in the 1997 and 2008 ozone standard reviews.[6]

Continuing uncertainties in current ozone health effects research buttress UJEP's recommendation that the current 75 ppb ozone standard is adequate to protect public health with the requisite margin of safety. The Administrator should exercise her policy judgment to retain the current primary standard, or, as discussed *supra*, to set the standard at a level not more stringent than 70 ppb.

## Background

EPA promulgated the current primary ozone standard in 2008 through the regular course of review of the NAAQS, resulting in a reduction in the level of the standard from 0.084 ppm (rounded) to 0.075 ppm, with compliance measured to three significant digits.[7] On September 16, 2009, then-EPA Administrator Lisa P.

[5] Wolff, G.T., *et al.*, Review and Critique of the U. S Environmental Protection Agency First External Review Drafts of the "Health Risk and Exposure Assessment for Ozone" and the "Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards" (October 12, 2012), available at http://www.airimprovement.com/reports/first_draft_o3_rea__pa_2012.pdf.

[6] *See, e.g.*, EPA, Integrated Science Assessment for Ozone and Related Photochemical Oxidants, EPA 600/R-10/076F (January 2013) at 6-265 *et seq*.

[7] 73 FR 16436 (March 27, 2008). The process that EPA employed to establish the 2008 primary standard is described in the notice for the 2009 reconsideration: The EPA initiated the most recent periodic review of the air quality criteria and standards for O3 in September 2000 with a call for information (65 FR 57810; September 26, 2000) for the development of a revised Air Quality Criteria Document for O3 and Other Photochemical Oxidants (henceforth the''2006 Criteria Document''). A project work plan (EPA, 2002) for the preparation of the Criteria Document was released in November 2002 for CASAC and public review. The EPA held a series of workshops in mid-2003 on several draft chapters of the Criteria Document to obtain broad input from the relevant scientific communities. These workshops helped to inform the preparation of the first draft Criteria Document (EPA, 2005a), which was released for CASAC and public review on January 31, 2005; a CASAC meeting was held on May 4–5, 2005 to review the first draft Criteria Document. A second draft Criteria Document (EPA, 2005b) was released

Jackson announced that EPA would initiate a reconsideration of the ozone standards established in 2008.[8] That reconsideration was terminated by President Obama in 2011, leading to a multi-year delay in nonattainment area designations and state planning for SIP compliance. As a result, many states have not yet complied with the requirements of the 2008 NAAQS, including even "moderate" nonattainment areas whose SIPs are not due until later this year. In January 2014, EPA initiated a guidance process to help states to comply with the "Good Neighbor" obligations under Section 110(a)(2)(d) of the Clean Air Act.[9]

UJEP members filed comments with EPA in the 2008 ozone rulemaking supporting a revision of the 8-hour primary standard at the level ultimately adopted by the agency. Our comments emphasized the substantial scientific uncertainties associated with a primary standard set below a level of 0.075 ppm:

> “Based upon uncertainties in the available science ... we recommend adoption of a revised primary standard at a level not lower than 0.075 ppm. ... In the alternative, based upon the substantial scientific uncertainties identified in the record, (we) would support a primary standard consistent with the upper end of the Staff Paper’s recommendation for a revised standard ‘somewhat below’ a level of 0.080.”[10]

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for CASAC and public review on August 31, 2005, and was discussed along with a first draft Staff Paper (EPA, 2005c) at a CASAC meeting held on December 6–8, 2005. In a February 16, 2006 letter to the Administrator, CASAC provided comments on the second draft Criteria Document (Henderson, 2006a), and the final 2006 Criteria Document (EPA, 2006a) was released on March 21, 2006. In a June 8, 2006 letter to the Administrator (Henderson, 2006b), CASAC provided additional advice to the Agency concerning chapter 8 of the final 2006 Criteria Document (Integrative Synthesis) to help inform the second draft Staff Paper.
A second draft Staff Paper (EPA, 2006b) was released on July 17, 2006 and reviewed by CASAC on August 24–25, 2006. In an October 24, 2006 letter to the Administrator, CASAC provided advice and recommendations to the Agency concerning the second draft Staff Paper (Henderson, 2006c). A final 2007 Staff Paper (EPA, 2007a) was released on January 31, 2007. In a March 26, 2007 letter (Henderson, 2007), CASAC offered additional advice to the Administrator with regard to recommendations and revisions to the primary and secondary O3 NAAQS. 79 FR 2938, 2942.

[8] “EPA Announces It Will Reconsider National Smog Standards,” Press Release (September 16, 2009).

[9] *See*, Memorandum from Stephen D. Page, OAQPS, "Information on the Interstate Transport Good Neighbor Provisions for the 2008 Ozone National Ambient Air Quality Standards (NAAQS) under Clean Air Act Section 110(a)(2)(d)(i)(I)," (January 22, 2014).

[10] Unions for Jobs & the Environment, Comments on Proposed Revisions to the National Ambient Air Quality Standards (October 9, 2007).

We are particularly concerned that the proposed revision of the primary standard to a level of 65 to 70 ppb would lead to significant job losses across the country due to the increase in the number of counties classified as nonattainment and the inability of states to attain a revised standard within this range "as expeditiously as practicable."

In a meeting with OMB OIRA staff on November 7, 2014, UJEP members emphasized that increased unemployment is statistically associated with increased mortality.[11] EPA's Regulatory Impact Analysis for this rulemaking provides ample justification for our concerns about the potential adverse employment impacts of lowering the primary ozone standard within the range that EPA has proposed.

## Scientific Bases of a Revised Primary Standard

The 2008 primary ozone standard was set at a level between the recommended ranges of EPA Staff and the Clean Air Science Advisory Committee (CASAC), and within the range recommended by Staff (<0.08 – 0.060). CASAC's 2007 recommendation for a primary standard between 0.060 and 0.070 ppm – the recommendation that CASAC reiterated in this rulemaking - represented its best judgment about the appropriate level of the standard based upon its review of the scientific evidence on ozone health effects. Based upon its extensive review of the health effects evidence, including CASAC's recommendations, EPA Staff recommended a broader range from "somewhat below" the 0.08 standard to a level as low as 0.060. The Administrator exercised his discretion in making a policy judgment to set the standard at a level consistent with Staff's recommendation.

CASAC's recommendations are advisory to, but are not binding upon the Administrator.[12] In our view, the record before the Administrator supported the

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[11] *See*, Lundin, *et al.*, "Unemployment and mortality—a longitudinal prospective study on selection and causation in 49321 Swedish middle-aged men," 64 *J. Epidemiol. Community Health* 22-28 (2010)*;* Brenner, M.H., Mooney, A., "Unemployment and health in the context of economic change" *Soc. Sci. & Medicine*, 17 (16) 1125-1138 (1983); Brenner, M.H., Commentary: Economic growth is the basis of mortality rate decline in the 20th century—Experience of the United States 1901–2000, *Int'l J. Epidemiol*. (2005). More recent analyses by researchers at the University of Zurich reveal a 20% to 30% increase in suicide rates associated with rising unemployment during the financial crises of 2008-09. *See*, Nordt, C., *et al.*, Modelling suicide and unemployment: a longitudinal analysis covering 63 countries, 2000–11, *The Lancet Psychiatry* (February 10, 2015), available at: http://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366%2814%2900118-7/abstract.

[12] These issues were addressed by the Court of Appeals for the D.C. Circuit in the remand of the

agency's decision in 2008, as it does now.

In the 2008 ozone standard rulemaking, the agency balanced a massive array of uncertain scientific data on the public health effects of ozone, as summarized by EPA's findings:

> In considering the available information, the Administrator also judges that a standard level below 0.070 ppm would not be appropriate. In reaching this judgment, the Administrator notes that there is only quite limited evidence from clinical studies at exposure levels below 0.080 ppm O3. Moreover, the Administrator recognizes that in the body of epidemiological evidence, many studies report positive and statistically significant associations, while others report positive results that are not statistically significant, and a few do not report any positive O3-related associations. In addition, the Administrator judges that evidence of a causal relationship between adverse health outcomes and O3 exposures becomes increasingly uncertain at lower levels of exposure. The Administrator also has considered the results of the exposure assessments in reaching his judgment that a standard level below 0.070 ppm would not be appropriate. …
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> In considering the results of the health risk assessment, as discussed in section II.B above, the Administrator notes that there are important uncertainties and assumptions inherent in the risk assessment and that this assessment is most appropriately used to simulate trends and patterns that can be expected as well as providing informed but still imprecise estimates of the potential magnitude of risks. The Administrator particularly notes that as lower standard levels are modeled, including a standard set at a level below 0.070 ppm, the risk assessment continues to assume a causal link between O3 exposures and the occurrence of the health effects examined, such that the assessment continues to indicate reductions in O3-related risks upon meeting a lower standard level. As

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2006 PM standards. With regard to the level for the annual PM2.5 standard, the Court rejected EPA's response that its approach was consistent with CASAC's recommendation. The Court stated that "The EPA failed adequately to explain its reasons for not accepting CASAC's recommendation [to consider the short-term studies as a basis for a lower annual standard], instead stating only that it did not 'disagree with CASAC's factual statements regarding the findings of [the short-term studies].'" *American Farm Bureau Fed'n v. EPA*, 559 F.3d 512, 521 (D.C. Cir., 2009). The Court did not vacate the standard in part because "the EPA's failure adequately to explain itself is in principle a curable defect." *Id.* at 528. The finding of a "curable defect" implies that EPA could explain why it had not followed CASAC's advice on the level of the primary ozone standard. Regarding the secondary PM standard, the Court observed that EPA rejected the recommendations of both CASAC and Agency staff. Because EPA had failed to identify any target level of visibility protection and therefore lacked a basis for reasoned decision making, the Court determined it "need not decide whether it was reasonable for the agency to reject the target recommended by the Staff Paper and the CASAC because it was based on uncertain subjective evidence." *Id.* at 530.

discussed above, however, the Administrator recognizes that evidence of a causal relationship between adverse health effects and O3 exposures becomes increasingly uncertain at lower levels of exposure.
Given all of the information available to him at this time, the Administrator judges that the increasing uncertainty of the existence and magnitude of additional public health protection that standards below 0.070 ppm might provide suggests that such lower standard levels would likely be below what is necessary to protect public health with an adequate margin of safety.[13]

This summary of the available scientific evidence available to the agency in the 2008 rulemaking underscores the critical uncertainties associated with the health studies relied upon by EPA Staff and by the CASAC in reaching their respective recommendations in 2006-2007. The 2007 Policy Assessment Staff Paper ably summarizes these in the context of needed research improvements:

> Following completion of the 1996 Ozone Staff Paper (U.S. EPA, 1996), the EPA held a research needs workshop and produced a draft document for review by the CASAC at a public meeting held November 16, 1998. Based on our review of scientific information contained in the 2006 CD, we have concluded that $O_3$ health research needs and priorities have not changed substantially since the above document was written. Key uncertainties and research needs that continue to be high priority for future reviews of the health-based primary standards are identified below:
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> (1) An important aspect of risk characterization and decision making for air quality standard levels for the $O_3$ NAAQS is the characterization of the shape of exposure-response functions for $O_3$, including the identification of potential population threshold levels. Recent controlled human exposure studies conducted at levels below 0.08 ppm $O_3$ provide evidence that measurable lung function effects occur in some individuals for 6-8 hr exposures in the range of 0.08 to as low as 0.04 ppm. A major limitation of these data is that they were collected in one laboratory located in an area of the U.S. that typically experiences higher ambient air levels of $O_3$; therefore, prior attenuation of subject response may have been a factor in the responses observed. Considering the importance of estimating health risks in the range of 0.04 to 0.08 ppm $O_3$, additional research is needed to evaluate responses in healthy and asthmatic individuals in the range of 0.04 to 0.08 ppm for 6-8 hr exposures while engaged in moderate exertion.
> (2) Similarly, for health endpoints reported in epidemiological studies such as hospital admissions, ED visits, and premature mortality, an important aspect of characterizing risk is the shape of concentration-response functions for $O_3$, including identification of potential population threshold levels. Most of the recent studies and analyses continue to show no evidence for a clear threshold in the relationships between $O_3$ levels and these health endpoints or have suggested that any such thresholds must be at very low levels approaching policy relevant background levels. Whether or not exposure errors, misclassification of exposure,

[13] 72 FR 37880 (emphasis added.)

or potential impacts of other copollutants may be obscuring potential population thresholds is still unknown.
(3) The extent to which the broad mix of photochemical oxidants and more generally other copollutants in the ambient air (e.g., PM, $NO_2$, $SO_2$, etc.) may play a role in modifying or contributing to the observed associations between ambient $O_3$ and various morbidity effects and mortality continues to be an important research question. Ozone has long been known as an indicator of health effects of the entire photochemical oxidant mix in the ambient air and has served as a surrogate for control purposes. A better understanding of sources of the broader pollutant mix, of human exposures, and of how other pollutants may modify or contribute to the health effects of $O_3$ in the ambient air, and vice versa, is needed to better inform future NAAQS reviews.
(4) As epidemiological research has become a more important factor in assessing the public health impacts of $O_3$, methodological issues in epidemiological studies have received greater visibility and scrutiny. Investigations of questions on the use of generalized additive models in time-series epidemiological studies have raised model specification issues. There remains a need for further study on the selection of appropriate modeling strategies and appropriate methods to control for time-varying factors, such as temperature, and to better understand the role of copollutants in the ambient air.
(5) Limited controlled human exposure and epidemiology research has provided suggestive evidence of both direct and indirect effects of $O_3$ on the cardiovascular system, cardiovascular hospital admissions, and cardiovascular mortality. However, additional work will be needed to examine biologically plausible mechanisms of cardiovascular effects and to determine the extent to which $O_3$ is directly implicated or works together with other pollutants in causing adverse cardiovascular effects in sensitive individuals and in the general population.
(6) Most epidemiological studies of short-term exposure effects have been time-series studies in large populations. Time-series studies remain subject to uncertainty due to use of ambient fixed-site data serving as a surrogate for ambient exposures, to the difficulty of determining the impact of any single pollutant among the mix of pollutants in the ambient air, to limitations in existing statistical models, or to a combination of all of these factors. Independent variables for air pollution have generally been measurements made at stationary outdoor monitors, but the accuracy with which these measurements actually reflect subjects' exposure is not yet fully understood. Also, additional research is needed to improve the characterization of the degree to which discrepancy between stationary monitor measurements and actual pollutant exposures introduces error into statistical estimates of pollutant effects in time-series studies.
(7) Improved understanding of human exposures to ambient $O_3$ and to related copollutants is an important research need. Population-based information on human exposure for healthy adults and children and susceptible or at-risk populations including asthmatics to ambient $O_3$ concentrations, including exposure information in various microenvironments, is needed to better evaluate current and future $O_3$ exposure models. Such information is needed for sufficient periods to facilitate evaluation of exposure models throughout the $O_3$ season.
(8) Information is needed to improve inputs to current and future population-

> based $O_3$ exposure and health risk assessment models. Collection of time-activity data over longer time periods is needed to reduce uncertainty in the modeled exposure distributions that form an important part of the basis for decisions regarding air quality standard for $O_3$ and other air pollutants. Research addressing energy expenditure and associated breathing rates in various population groups, particularly healthy and asthmatic children, in various locations, across the spectrum of physical activity, including sleep to vigorous physical exertion is needed.
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> (9) An important consideration in the $O_3$ NAAQS review is the characterization of policy relevant background levels. There still remain significant uncertainties in the characterization of 8-hr daily maximum O3 background concentrations. Further research to improve the evaluation of the GEOS-CHEM model which has been used to characterize estimates of policy relevant background levels would help reduce uncertainties in estimating health risks relevant for standard setting (i.e., those risks associated with exposure to $O_3$ in excess of policy relevant background levels) and would aid in the development of associated control programs.[14]

These noted shortcomings in the health and epidemiological evidence associated with short- and long-term exposure to ozone have not materially changed since the prior review of the ozone standard, and support our concerns about the inadequate bases for revising the primary ozone standard to a level below 75 ppb. Indeed, EPA's August 2014 Policy Assessment underlying the proposed revision of the primary standard echoes verbatim most of the same research needs identified by the 2007 Policy Assessment, especially uncertainties associated with the effects of copollutants, and concludes that "...health research needs and priorities have not changed substantially since the 2007 O3 Staff Paper.":

> It is important to highlight the uncertainties associated with establishing standards for O3 during and after completion of the NAAQS review process. Research needs go beyond what is necessary to understand health effects, population exposures, and risks of exposure for purposes of setting standards. Research can also support the development of more efficient and effective control strategies. In this section, we highlight areas for future health-related research, model development, and data collection activities to address these uncertainties and limitations in the current body of scientific evidence.
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> As has been presented and discussed in the ISA, particularly chapters 4 through 7, the scientific body of evidence informing our understanding of health effects associated with long and short-term exposures to O3 has been broadened and strengthened since the O3 NAAQS review completed in 2008. Still, we have concluded that O3 health research needs and priorities have not changed substantially since the 2007 O3 Staff Paper (EPA 2007). Key uncertainties and

[14] U.S. EPA, Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper at 6-87-90, EPA-452/R-07-003, January 2007 (emphasis added, footnotes omitted.)

research needs that continue to be high priority for future reviews of the health-based standards are identified below:

(1) An important aspect of risk characterization and decision making for air quality standard levels for the O3 NAAQS is the characterization of the shape of exposure-response functions for O3, including the identification of potential population threshold levels. Recent controlled human exposure studies of measurable lung function effects provide evidence for a smooth dose-response curve without evidence of a threshold for exposures between 40 and 120ppb $O_3$ (US EPA, 2013, Figure 6-1). Considering the importance of estimating health risks in the range below 80 ppb $O_3$, additional research is needed to evaluate responses in healthy and especially people with asthma in the range of 40 to 70 ppb for 6-8 hour exposures while engaged in moderate exertion.

(2) Similarly, for health endpoints reported in epidemiologic studies such as hospital admissions, ED visits, and premature mortality, an important aspect of characterizing risk is the shape of concentration-response functions for $O_3$, including identification of potential population threshold levels. Most of the recent studies and analyses continue to show no evidence for a clear threshold in the relationships between $O_3$ concentrations commonly observed in the U.S. during the $O_3$ season and these health endpoints, though evidence indicates less certainty in the shape of the concentration-response curve at the lower end of the distribution of $O_3$ concentrations. However, there continues to be heterogeneity in the $O_3$-mortality relationship across cities (or regions), including effect modifiers that are also expected to vary regionally, which are sources of uncertainty. Additionally, whether or not exposure errors, misclassification of exposure, or potential impacts of other copollutants may be obscuring potential population thresholds is still unknown.

(3) The extent to which the broad mix of photochemical oxidants and more generally other copollutants in the ambient air (e.g., PM, $NO_2$, $SO_2$, etc.) may play a role in modifying or contributing to the observed associations between ambient $O_3$ and various morbidity effects and mortality continues to be an important research question. Ozone has long been known as an indicator of health effects of the entire photochemical oxidant mix in the ambient air and has served as a surrogate for control purposes. A better understanding of sources of the broader pollutant mix, of human exposures, and of how other pollutants may modify or contribute to the health effects of $O_3$ in the ambient air, and vice versa, is needed to better inform future NAAQS reviews.

(4) As epidemiologic research has continued to be an important factor in assessing the public health impacts of $O_3$, methodological issues in epidemiologic studies have received greater visibility and scrutiny. There remains a need to further examine alternative modeling specifications and control of time-varying factors, and to better understand the role of copollutants in the ambient air. Additionally, there remains uncertainty around the role of temperature as a potential confounder or effect modifier in epidemiologic models.

(5) Recent animal toxicological evidence, combined with limited evidence from controlled human exposure studies of cardiovascular morbidity and epidemiologic studies of cardiovascular mortality, have provided evidence of both direct and indirect effects on the cardiovascular system. However, additional work will need

to examine biologically plausible mechanisms of cardiovascular effects, expand upon preliminary evidence from controlled human exposure studies, address inconsistencies observed in epidemiologic studies of cardiovascular morbidity, and determine the extent to which $O_3$ is directly implicated or works together with other pollutants in causing adverse cardiovascular effects in both at-risk and the general populations.

(6) Most epidemiologic studies of short-term exposure effects have employed time-series or case-crossover study designs and have been conducted in large populations. These study designs remain subject to uncertainty due to use of ambient fixed-site data serving as a surrogate for ambient exposures, and to the difficulty of determining the impact of any single pollutant among the mix of pollutants in the ambient air. Measurements made at stationary outdoor monitors have been used as independent variables for air pollution, but the accuracy with which these measurements actually reflect subjects' exposure is not yet fully understood. Also, additional research is needed to improve the characterization of the degree to which discrepancy between stationary monitor measurements and actual pollutant exposures introduces error into statistical estimates of pollutant effects in epidemiologic studies.

(7) Recent studies of "long-term" $O_3$ often evaluate associations with daily maximum concentrations, averaged over the $O_3$ season. Research is needed to better understand the extent to which health effects associated with such long-term metrics are attributable to long-term average concentrations versus the repeated occurrence of daily maximum concentrations.

(8) Improved understanding of human exposures to ambient $O_3$ and to related copollutants is an important research need. Population-based information on human exposure for healthy adults and children and at-risk populations, including people with asthma, to ambient $O_3$ concentrations, including exposure information in various microenvironments, is needed to better evaluate current and future $O_3$ exposure models. Such information is needed for sufficient periods to facilitate evaluation of exposure models throughout the $O_3$ season.

(9) Information is needed to improve inputs to current and future population-based $O_3$ exposure and health risk assessment models. Collection of time-activity data over longer time periods is needed to reduce uncertainty in the modeled exposure distributions that form an important part of the basis for decisions regarding NAAQS for $O_3$ and other air pollutants. Research addressing energy expenditure and associated breathing rates in various population groups, particularly healthy children and children with asthma, in various locations, across the spectrum of physical activity, including sleep to vigorous exertion, is needed.

(10) An important consideration in the $O_3$ NAAQS review is the characterization of background levels. There still remain substantial uncertainties in the characterization of 8-hour daily max $O_3$ background concentrations. Further research to improve the evaluation of the global and regional models which have been used to characterize estimates of background levels would improve understanding of the role of non-U.S. anthropogenic emissions on $O_3$ levels over the U.S.[15]

[15] U.S. EPA, OAQPS, Policy Assessment for the Review of the Ozone National Ambient Air

The role of other atmospheric pollutants in ozone health effects studies is among the most important areas of scientific uncertainty. As summarized in the key "95 Cities" mortality research by Bell, *et al.*, the statistical associations observed between ozone exposure and mortality may be confounded by other pollutants:

> (T)he estimated effect of ozone, although robust to the adjustment for PM10, may still reflect the risk from the photochemical pollution mixture more generally. Atmospheric photochemistry produces several hazardous pollutants, in addition to ozone, such as peroxyacyl nitrates. Ozone may act as a surrogate indicator for this highly complex and geographically variable mixture and is likely to be an imperfect measure of potential toxicity. The degree to which ozone functions as a surrogate for other pollutants or the pollutant mixture in general, and thereby misclassifies toxicity, may vary across locations and depend on the mix of sources and meteorologic factors. Although statistically significant relationships were identified for all ozone concentration metrics considered, the analysis did not identify a particular metric as the optimum predictor of mortality.[16]

The Clean Air Scientific Advisory Committee (CASAC) noted the need for multi-pollutant assessments of the health effects of air pollution in its July 1, 2014, letter commenting on the Second Draft Health Risk and Exposure Assessment:

> The current approach to review and revision of the primary NAAQS is based on a one-pollutant-at-a-time approach. As the state of science regarding the joint effects of human exposure to multiple pollutants improves, the EPA should consider how review and revision of the NAAQS can be done synergistically for logical, scientifically relevant groupings of criteria pollutants. For example, ozone and nitrogen oxides (NOx) are both criteria pollutants and are inter-related via atmospheric chemistry, and human exposure to these pollutants is often in the form of a mixture that includes both, and other pollutants such as particulate matter. The National Research Council and the North American Research Strategy for Tropospheric Ozone have both made detailed recommendations for multipollutant approaches to air quality management, and the EPA has been exploring a multipollutant approach for the secondary standards for SOx and NOx. CASAC encourages the EPA to explore multipollutant approaches for review of the primary standards, and would be receptive to a request by the agency to review

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Quality Standards at 4-70 *et seq*., EPA-452/R-14-006, 2014 (emphasis added, footnotes omitted.)

16 Bell, M.L., *et al*., Ozone and Short-term Mortality in 95 US Urban Communities, 1987-2000, 292 *JAMA* 2272, 2277 (2004, footnotes omitted, emphasis added), available at http://www.ce.jhu.edu/epastar2000/epawebsrc/ellis/2004%20JAMA%20O3%20mortality.pdf.

planning or methods documents for such approaches.[17]

Expert comments on the draft policy and health risk assessments in the current rulemaking have identified a range of uncertainties in the scientific bases for the current ozone standard, supporting the view that the 75 ppb standard is adequately protective of public health, and that the benefits of a reduced standard are over-estimated:

> The contribution of risks occurring at concentrations of ozone at or below background becomes more important as lower NAAQS are considered. The methodology EPA uses to calculate risk assumes no threshold concentration for health effects and assumes that exposure to concentrations of ozone at or below background levels pose a real threat to human health. These assumptions also inflate the estimated health risks and the estimated health risk reductions when more stringent NAAQS are considered. …
>
> The epidemiological or observational studies of the association of ozone with various health endpoints continue to be difficult to interpret. … EPA made choices as to which associations to include in the core analyses, how to model the concentration-response functions, and as to the way the analyses are presented in the REA that dramatically overstate the magnitude and certainty of ozone health risks. …
>
> (T)he preliminary PA conclusion regarding adequacy relies on CASAC's previous advice regarding the level of the standard and does not consider the new information that (1) background ozone is much closer to the current standard than thought during the last review, (2) we now have clear evidence for a threshold in the first physiological effects of ozone, (3) the risk based on person-days of exposure that might cause FEV1 (lung function) decrements is extremely low at the current standard, and (4) the uncertainty as to whether ozone is causing hospital admissions or mortality is much larger than thought in the previous review. [18]

These uncertainties in the assumptions and methodologies underlying current ozone health effects research buttress UJEP's recommendation that the current 75 ppb ozone standard is adequate to protect public health with

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[17] CASAC Review of the EPA's Health Risk and Exposure Assessment for Ozone (Second External Review Draft – February 2014) (July 1, 2014) at 3-4.

[18] Wolff, G.T., *et al*., Review and Critique of the U. S Environmental Protection Agency First External Review Drafts of the "Health Risk and Exposure Assessment for Ozone" and the "Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards" (October 12, 2012), available at http://www.airimprovement.com/reports/first_draft_o3_rea__pa_2012.pdf.

the requisite margin of safety. The Administrator should exercise her policy judgment to retain the current primary standard, or, as discussed *supra*, to set the standard at a level not more stringent than 70 ppb.

## EPA's Regulatory Impact Analysis

The Regulatory Impact Analysis (RIA) accompanying the proposed revision of the ozone standards raises the following areas of concern for UJEP members:

1) The number of areas that could be classified as nonattainment with either a 65 ppb or 70 ppb primary ozone standard, based on 2011-13 ozone design value data, as well as EPA's baseline projections for 2025, could place large portions of the nation into nonattainment, including several industrial and manufacturing centers, with adverse consequences for jobs and economic growth. Even relatively small commercial developments could be impacted by costly emission offset requirements. Major expansions of existing refinery, chemical, and other industrial facilities would need to comply with stringent LAER emission controls as well as emission offset requirements.

2) EPA has modeled 2025 future air quality assuming full implementation of the proposed Clean Power Plan, including 49 Gigawatts of coal-based generation retirements. Given the substantial uncertainties about the compliance feasibility, risks to electric reliability, and timing of the emissions reductions proposed by the CPP, based on comments received by EPA from states, industries, and regional transmission organizations, as well as the ongoing FERC reliability workshops, UJEP believes that EPA should have modeled future air quality based on an "on-the-books" assessment. This is consistent with past agency practice in considering only final regulations in assessments of proposed regulations. Using an "on-the-books" baseline would provide a more accurate basis for determining the potential impacts of the alternative standards on EGUs and other sectors. The impacts portrayed in the EPA baseline scenario thus may understate the magnitude of costs and additional risks to electric reliability associated with achieving the proposed primary standards.

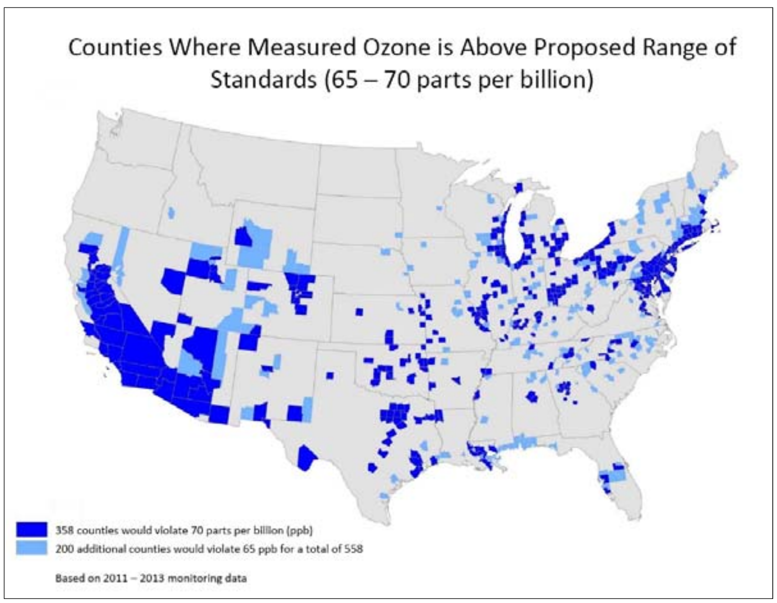
3) EPA has substantially underpredicted the potential retirement of coal generation assets in its assessment of the impacts of a 65 ppb standard. The RIA assumes that some 51 GW of coal capacity may be retrofitted with Selective Catalytic Reduction (SCR) technology to facilitate attainment of a 65 ppb standard. The majority of units identified by EPA as retrofit candidates are smaller and older units that are more likely to retire than to receive SCR retrofits. The potential

retirement of a substantial portion of this 51 GW would be in addition to the 49 GW of coal unit retirements projected to result by 2020 under Option I of the Clean Power Plan, as assumed in EPA's baseline scenario for the revised ozone standard. This could reduce the existing coal fleet to a level of some 150 GW, roughly one-half its 2010 level, adding significant new risks to electric reliability.

Each of these issues is discussed in greater detail below.

<u>Risks of Widespread Nonattainment</u>

EPA's air quality modeling for a revised standard shows substantial areas of ozone nonattainment in 2025 at either 65 or 70 ppb, assuming full implementation of the proposed Clean Power Plan with State Option I, including 49 GW of coal retirements. Based on 2011-13 ozone design values, EPA calculates that 358 counties would violate a standard of 70 ppb, while an additional 200 counties would violate a standard of 65 ppb (see map below).




The RIA projects that nonattainment would be reduced by 2025 based on modeling including ongoing emission reduction programs and the emission reductions associated with the Clean Power Plan: 9 counties would violate a 70 ppb standard, while 68 additional counties would violate a 65 ppb standard:

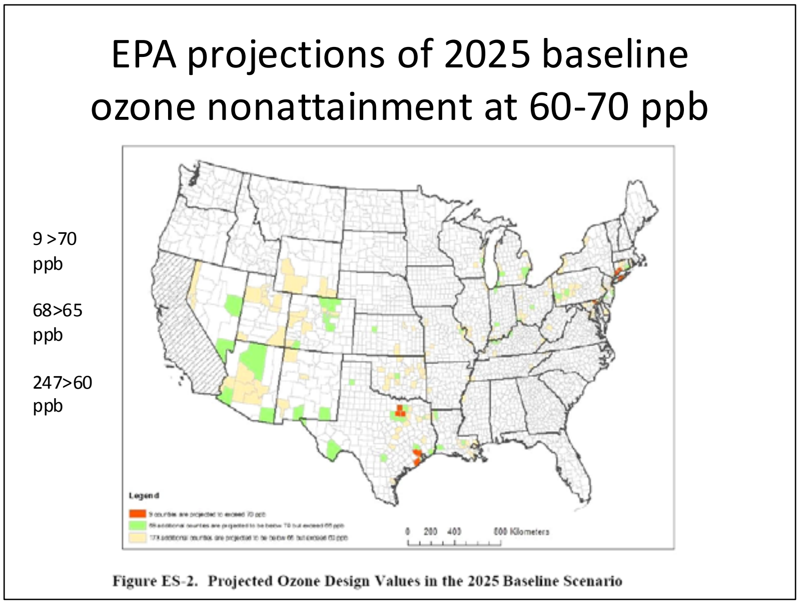
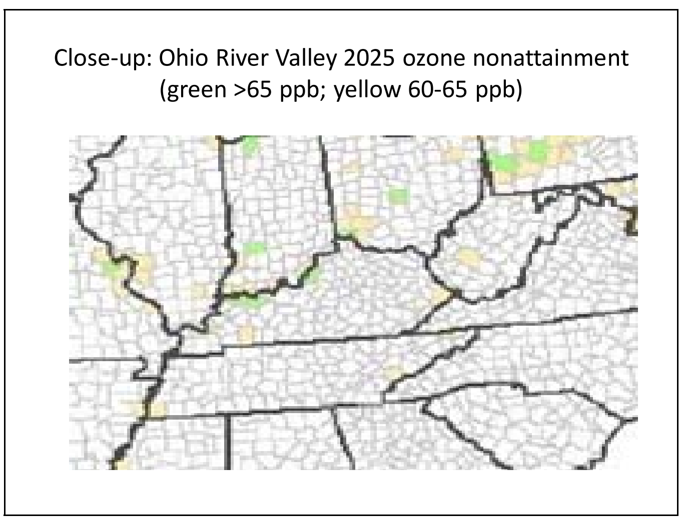


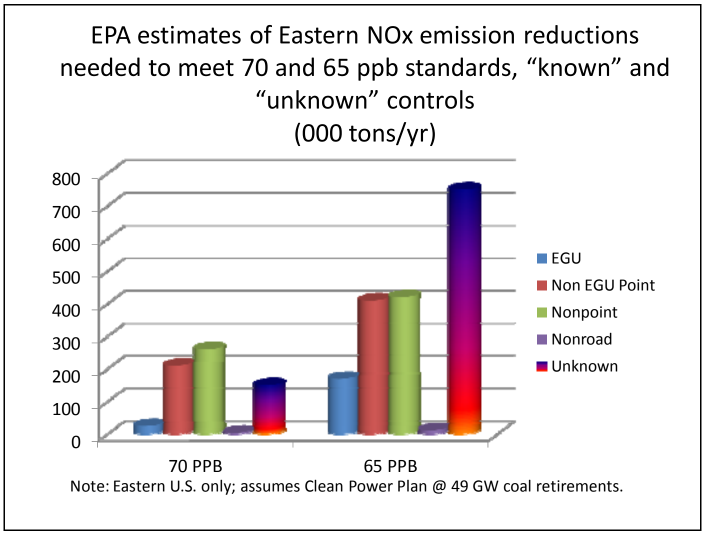

Figure ES-2. Projected Ozone Design Values in the 2025 Baseline Scenario

A closer look at the RIA's nonattainment projections for 2025 shows that a 65 ppb standard would create substantial areas on nonattainment along the Ohio River Valley and in other industrialized areas of the Midwest:




Unrealistic Source Control Projections

EPA's RIA projects that most of the "known" NOx reductions needed for attainment of a 65 or 70 ppb standard would be provided by non-EGU industrial point sources and area sources, with EGU reductions from the retrofit of 7 GW to 51 GW of SCRs on the post-CPP coal fleet (~200 GW). Virtually no emission reductions are projected for the motor vehicle fleet, the dominant source of ozone precursor emissions in most areas of the country. In 2010, on-road and off-road mobile sources accounted for 55% of national NOx emissions, and 33% of total VOC emissions.[19] With a 65 ppb standard, the largest category of source controls in the eastern U.S. is "unknown."




Source: U.S. EPA Ozone RIA (2014).

EPA's EGU emission reduction estimates, ranging from 30,000 to 211,000 tons of NOx per year, may be very conservative if states are unable to attain major reductions from industrial, area, and "unknown" sources, or if the emission reductions and coal plant retirements assumed to result from implementation of the Clean Power Plan were delayed or modified.

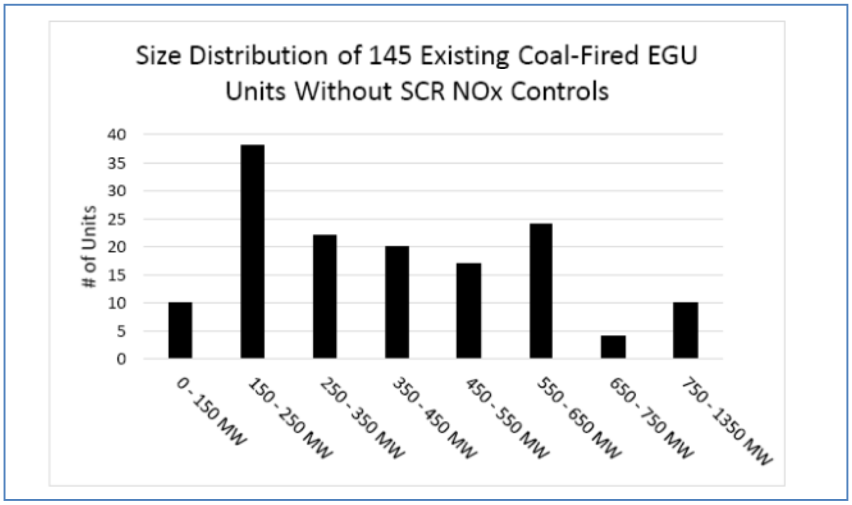
The RIA offers the following explanation of the approach that EPA used to identify EGUs potentially subject to SCR retrofit requirements:

> While all existing coal-fired EGUs already have low NOx burners, there are EGUs that could have a selective catalytic reduction (SCR) system installed, or could improve their NOx emissions by replacing an existing selective non-catalytic reduction (SNCR) system with an SCR system. The EPA identified 145 existing coal-fired EGUs, with a total of 51.0 GW of capacity, that (1) are in areas anticipated to need additional NOx reductions under an alternative ozone standard of 65 ppb, and (b) do not already have an SCR emission control system. (For an alternative ozone standard of 70 ppb, there are 15 EGUs so identified, with a total of 7.4 GW of capacity.) RIA at 568.

These assumed SCR retrofit requirements are likely to induce additional coal

[19] U.S. EPA, Our Nation's Air - Status and Trends through 2010, EPA-454/R-12-001 (2012), Fig. 2.

plant retirements due to the high capital and variable costs of SCRs, and the relatively small size and age of the majority of generating units in EPA's analysis. Only 38 of the 145 units targeted for potential SCR retrofits are larger than 550 MW:




Source: U.S. EPA Ozone RIA, Fig. 10-1 (2014).

Analysis of the NETL Coal Plant Data Base (2007) for units between 100 MW and 550 MW indicates an average unit capacity of 242 MW and an average age of 48.9 years as of January 27, 2014.[20] It is highly improbable that units with these size and age characteristics would be considered viable candidates for SCR retrofits five or more years from now, when a revised ozone standard would trigger additional NOx reduction requirements from EGUs and other source sectors.

EPA estimates the capital cost of retrofitting an SCR on a 300 MW unit at $86 million, or $287 per kW. Assuming a weighted average cost of capital of 7.75%, a capacity factor of 65%, and a ten-year cost recovery period, the capital recovery charge alone for retrofitting a 300 MW unit with SCR technology would be $7.26 per MWh. Additional operating and maintenance costs would increase this to more than $8 per MWh. With average on-peak electric prices of $33 to $44/MWh in most eastern markets in 2013 (see chart below), the additional costs associated with SCR retrofits would render most of the units targeted by EPA as uneconomic. These concerns would apply in both regulated and deregulated jurisdictions.

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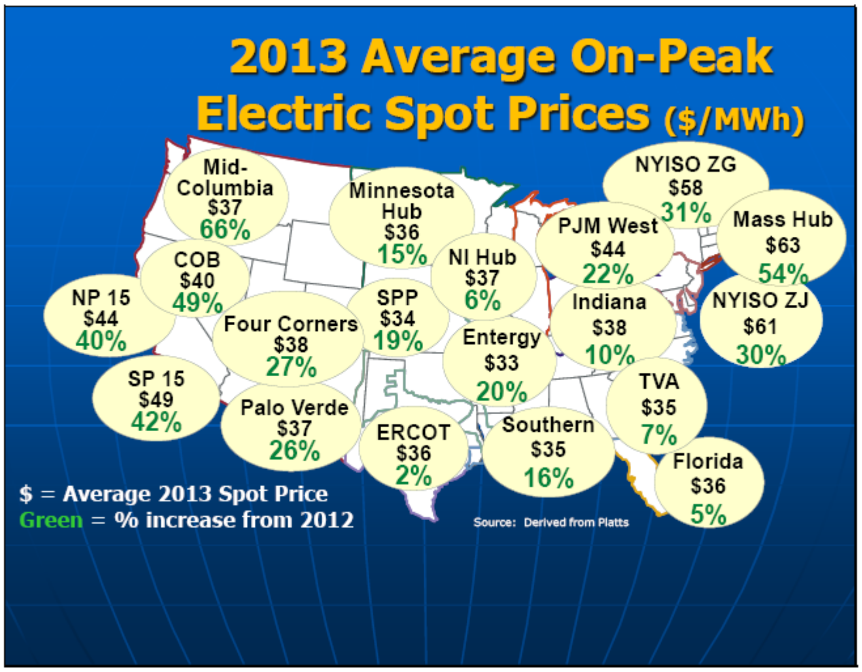
[20] Calculated from NETL Coal Plant Data Base (2007) on January 27, 2015. The 100 MW lower threshold represents an assumed minimum size for SCR retrofits.




Source: FERC 2013 State of the Market Report (March 2014).

For these reasons, we disagree with EPA's projection of SCR retrofits at 145 coal-based units. It appears more likely that the majority of the targeted units would retire rather than incur the additional costs of SCR retrofits, similar to industry's compliance response for older and smaller units under EPA's 2011 MATS rule. Moreover, if the 49 GW of coal unit retirements due to the Clean Power Plan were not included in EPA's ozone modeling, most of this capacity likewise could be subject to SCR retrofits if a standard such as 65 ppb were promulgated. This would dramatically increase the number of units at risk of retirement as well as the risks to electric reliability posed by compliance with a revised ozone standard.

Other Considerations

A revised primary ozone standard likely would trigger a new round of Section 126 petitions aimed at stationary sources, as well as a new EPA NOx transport rule to replace CSAPR. Given the wide range of industrial and area sources identified by EPA as potentially requiring additional emission controls to meet either a 65 ppb or 70 ppb standard, any new transport rule would need to encompass a substantially broader group of sources than EGUs alone. Meanwhile, as noted above, EPA is developing Good Neighbor guidance for states to consider when developing Good Neighbor SIPs to comply with the current ozone standard. These Good Neighbor SIPs likely will contain source control requirements more stringent than current CSAPR emission caps.

UJEP therefore urges EPA to retain the current 75 ppb ozone standard. The residual scientific uncertainties about the health effects of ozone and the role of copollutants raise cautions about any downward revision of the standard, especially extending into the range below 70 ppb.

We will appreciate your consideration of these comments.

Sincerely,

Jim Hunter
Director, Utility Department
International Brotherhood of
Electrical Workers, AFL-CIO

President, UJEP

Cc: Honorable Regina McCarthy, U.S. EPA
Richard L. Trumka, AFL-CIO