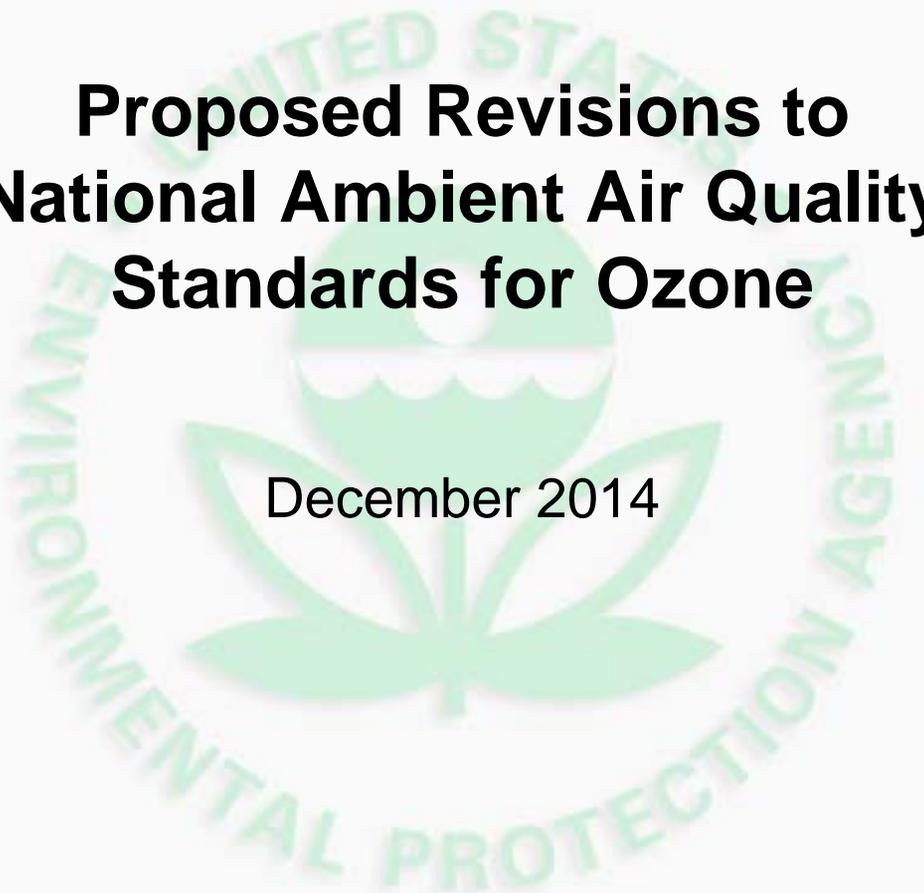




# **Proposed Revisions to National Ambient Air Quality Standards for Ozone**

December 2014





## Overview

### 2014 Proposed Ozone Standards

**Health-based:** 65-70 ppb

**Welfare-based:** 65-70 ppb



- On November 25, 2014, EPA proposed to strengthen the national ambient air quality standards for ground-level ozone, based on extensive scientific evidence about ozone's effects on public health and welfare.
- The proposed updates will improve public health protection, particularly for children, the elderly and people of all ages who have lung diseases such as asthma.
- The proposed standards reflect strong scientific evidence regarding the harmful effects of ozone on human health and the environment – including more than 1,000 new studies.
  - Decades of scientific research links ozone to asthma attacks, bronchitis, heart attacks and premature death.
  - Elevated ozone levels can make it harder for even healthy people to breathe.
- Existing and proposed federal measures are leading to substantial reductions in ozone nationwide, which will help improve air quality and help many areas meet any revised standard.



# Overview

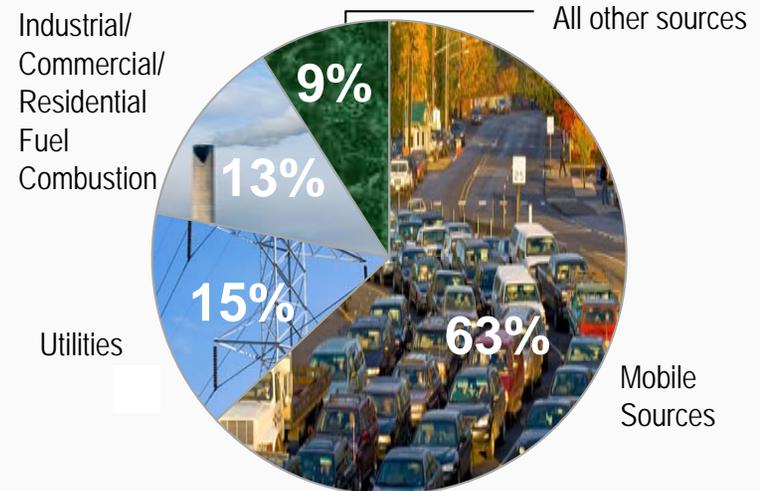
- The Clean Air Act requires primary standards to be “requisite to protect public health with an adequate margin of safety,” including the health of groups of people considered more at risk.
  - In making this judgment, the EPA Administrator considers factors such as the nature and severity of health effects, the size of the at-risk groups affected, and the degree of certainty and uncertainty in the science.
- The law requires EPA to review the standards every five years.
- EPA is proposing to strengthen the level of both the primary and secondary ozone standards to a level in the range of 65 to 70 ppb to improve public health protection for millions of Americans. The current standard is 75 ppb.
  - A rigorous review of the latest science and advice from the agency’s independent science advisors, the Clean Air Scientific Advisory Committee (CASAC), informed this proposal.
- EPA is also proposing to:
  - update the Air Quality Index (AQI) for ozone; and
  - make certain updates to monitoring and permitting requirements, which will smooth the transition and assure that the public has full information about air quality
- Implementing these standards is a federal, state, and tribal partnership. EPA will continue to do our part to assist states and tribes and streamline implementation.



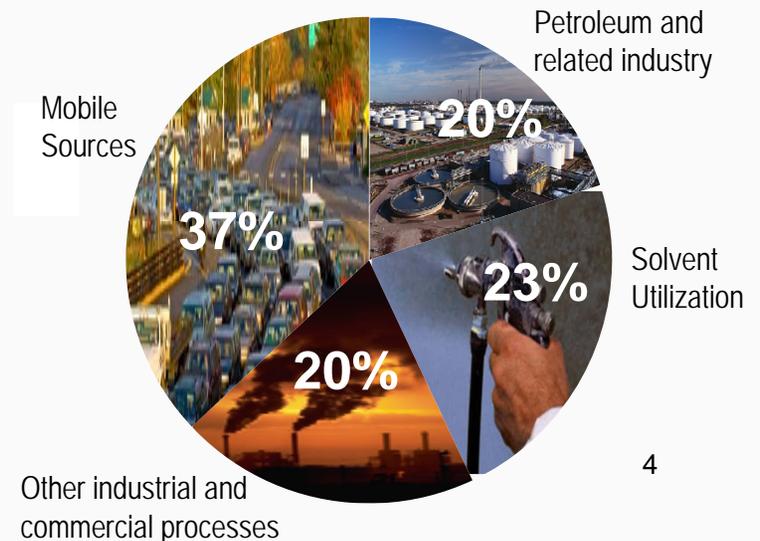
## About Ground-Level Ozone

- Ozone is the main component of smog.
- It is not emitted directly into the air but forms when emissions of precursors, including nitrogen oxides (NOx), volatile organic compounds (VOCs), carbon monoxide and methane “cook” in the sun.
- Emissions from industrial facilities, electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are the major man-made sources of NOx and VOCs.

### Sources of NOx

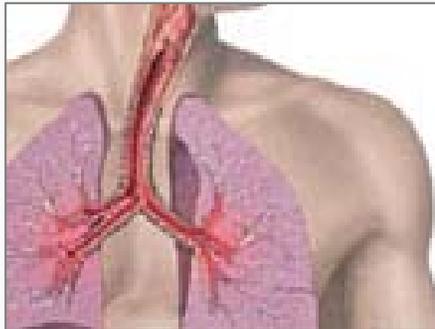


### Sources of VOC





## Health effects of ground-level ozone



### The science shows that ozone:

- Inflames and damages the airways
- Aggravates lung disease, including asthma, emphysema and bronchitis
- Increases the frequency and severity of asthma attacks
- Reduces lung function, making it harder to breathe as deeply as normal
- Causes coughing and sore throat or burning sensation in airways



## Health effects of ground-level ozone

- Millions of Americans are affected by ozone pollution. At-risk groups include:
  - Children, because their lungs are still developing and they are more likely to be active outdoors. They are also more likely to have asthma.
  - People with lung disease such as asthma or chronic obstructive pulmonary disease (COPD)
  - Older adults
  - People who are active outdoors, such as outdoor workers
- Breathing ozone can lead to:
  - More medication use for people with asthma
  - More frequent visits to the doctor
  - Missed school days
  - Missed work days
  - More emergency room visits and hospital admissions
  - Increased risk of premature death from lung or heart diseases





## Ozone and the Environment

- Ground-level ozone is absorbed by the leaves of plants, where it can:
  - Interfere with the ability of sensitive plants to produce and store food, leading to reduced growth and yields.
  - Make sensitive plants more susceptible to certain diseases, insects, harsh weather, other pollutants, and competition.
  - Visibly injure the leaves of plants, affecting the appearance of vegetation in national parks, recreation areas and cities.
  - Reduce or change plant species diversity.
  - Such effects have the potential to impact ecosystems and the benefits they provide.





## Establishing and Meeting a NAAQS is a 2-Step Process

- EPA sets national ambient air quality standards (NAAQS) for six pollutants.
  - Ground-level ozone
  - Carbon monoxide
  - Nitrogen dioxide
  - Particulate matter
  - Lead
  - Sulfur dioxide
- The Clean Air Act outlines a 2-step process for setting and then meeting standards.
- Step 1 is **setting the standards**, which requires EPA to conduct an extensive scientific review to determine whether new standards are necessary to protect public health and welfare.
  - The Clean Air Act bars EPA from considering cost in setting the NAAQS.
- Step 2 is **implementing the standards**, which involves states, and tribes if they wish to, putting measures and programs in place to reduce harmful pollution to meet the standards.
  - The Clean Air Act specifies that cost, technical feasibility and the time needed to meet the standards are all factors that should be taken into account in this step.
  - State and federal programs have a proven record of improving air quality while the economy grows. EPA will use long-standing provisions in the law to work with state, tribal and local partners to make sure these standards are implemented in a flexible and cost-effective way.

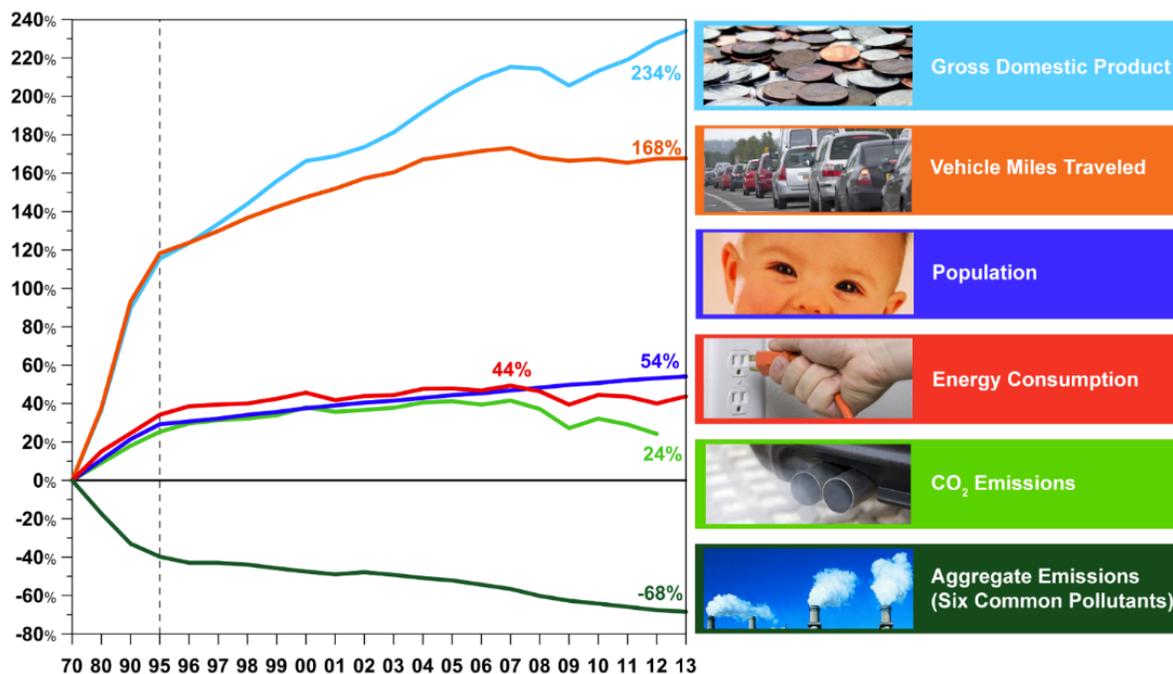


## Environmental Progress Continues

- The success of the NAAQS program shows that clean air results in improved air quality and public health, strengthens our economy and puts the U.S. at the forefront of technology innovation and environmental stewardship.

### Comparing growth and emissions

Over the past four and a half decades we have cut harmful air pollution by about 70 percent, while the U.S. economy has more than tripled.

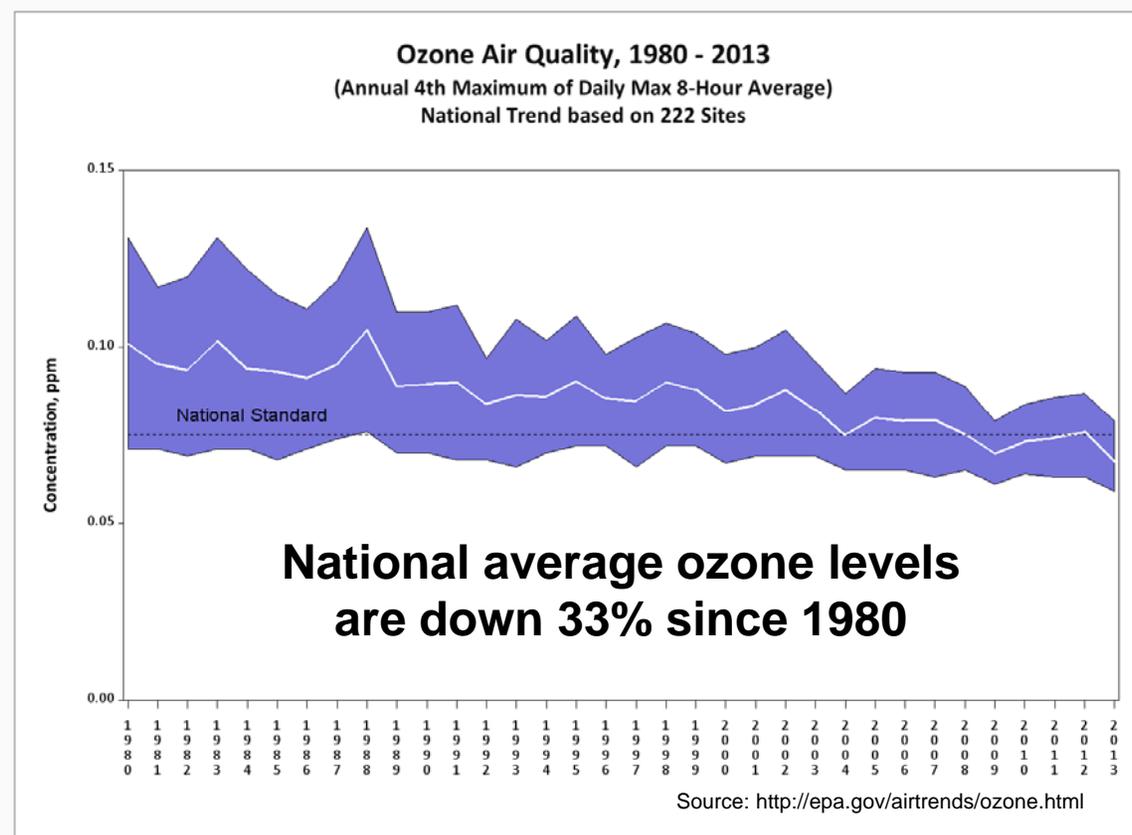


Source: <http://epa.gov/airtrends/aqtrends.html#comparison>



## National Air Standards Reduce Pollution

- Setting and implementing national standards for pollution has made the air cleaner.
- 90% of areas designated nonattainment for the 1997 ozone standards now meet those standards.
- The science shows that further reductions in ozone will improve public health protection.
- We will continue to work together with states using common sense and flexible programs to build on the progress we have already made.





## Step 1: Setting Ozone Standards - Primary

- The Clean Air Act requires EPA to review the NAAQS every five years to determine whether they remain “requisite to protect public health with an adequate margin of safety,” based on the latest scientific evidence on ozone and health.
  - That evidence has expanded significantly since EPA last updated the standards in 2008 and shows the current standard is not adequate.
- For this proposal, the Administrator considered:
  - the most recent scientific information about ozone exposure and health effects,
  - air quality information,
  - quantitative risk information,
  - the uncertainties and limitations of the scientific evidence and other quantitative analyses,
  - the conclusions of EPA experts, and
  - advice from EPA’s independent science advisors.
- Based on this review, the Administrator is proposing that the current primary ozone standard is not requisite to protect public health, including at-risk groups, with an adequate margin of safety.



## Step 1: Setting Ozone Standards - Primary

- Proposing health-based standard of **65-70 ppb** (8-hr average).
  - Taking comment on lower levels including 60 ppb and on the proposed decision that the current standard does not protect public health with an adequate margin of safety
- Proposing to retain the averaging time and form of the standard.
- CASAC and EPA staff experts concluded that the scientific evidence supports a standard within a range of 60 to 70 ppb.
- The Administrator did not include a standard of 60 ppb in the proposed range, because of increasing uncertainty in the scientific evidence at lower ozone concentrations.
  - This uncertainty reduces confidence that ozone standard levels set below 65 ppb will result in additional health improvements beyond those that would result from a standard in the proposed range of 65 to 70 ppb.



## Step 1: Setting Ozone Standards - Secondary

- The Clean Air Act requires EPA to set secondary standards that specify the level of air quality that is “requisite to protect the public welfare from any known or anticipated adverse effects.”
  - These effects include impacts on soils, water, crops, vegetation, man-made materials, weather, visibility and climate, among others.
- The Administrator is proposing that the current secondary standard is not requisite to protect public welfare and that revision is needed.
- Proposing a two-step approach to provide appropriate protection for public welfare:
  1. defining a target level of protection, and
  2. revising the standard to achieve that level of protection.



## Step 1: Setting Ozone Standards - Secondary

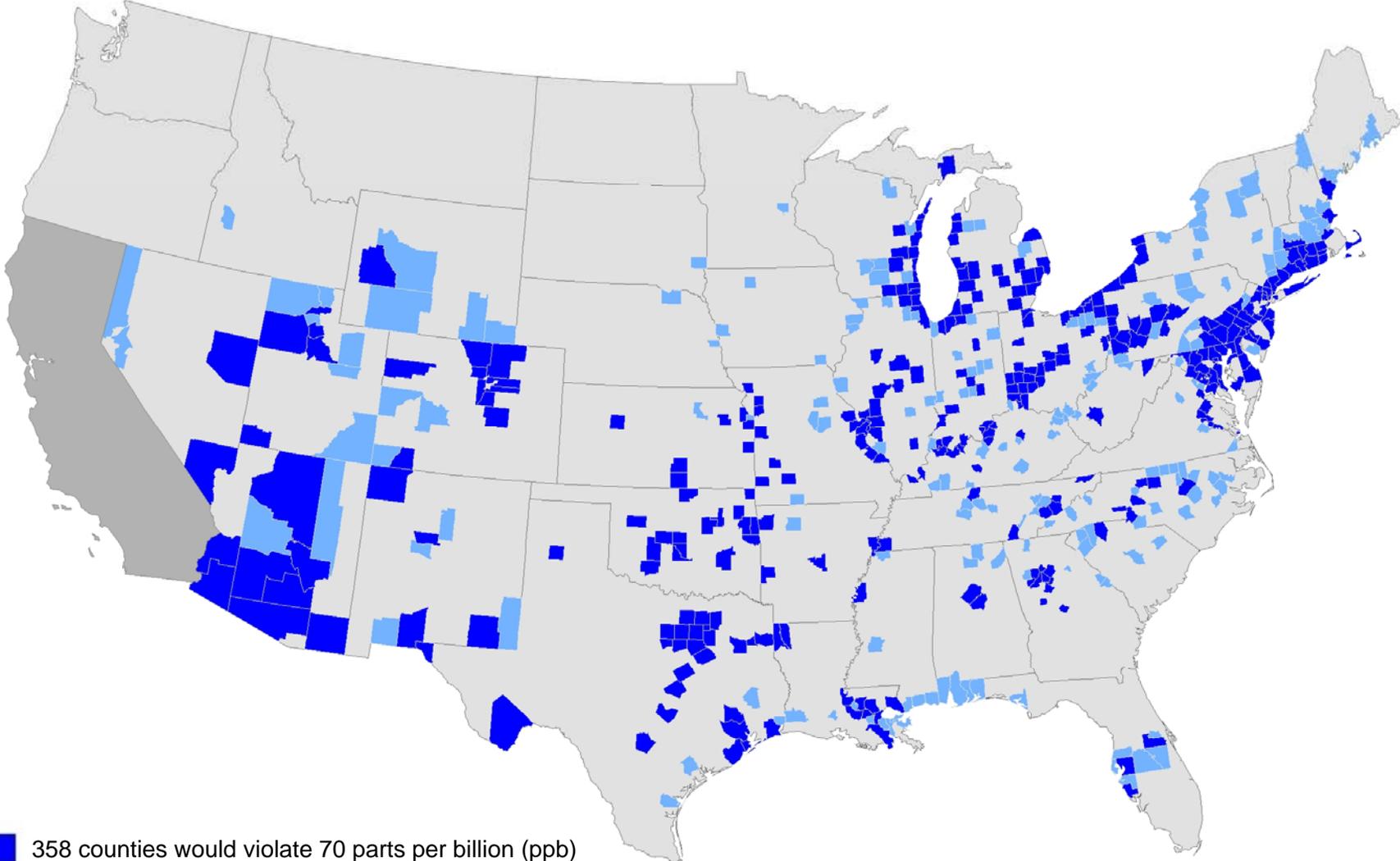
- The impact of ozone exposure on trees, plants and ecosystems often is assessed using a seasonal index.
- Proposing to define a target level of protection for public welfare in terms of a cumulative, seasonal metric (W126) index value within the range of 13 to 17 ppm-hrs (3-year average).
  - Soliciting comment on defining a target level of protection within the range of 7 to 13 ppm-hrs.
- Proposing **secondary** ozone standard to protect public welfare to a level within the range of 65 ppb to 70 ppb. Analyses show that a standard in this range would provide protection equivalent to a W126 index value of 13 to 17 ppm-hrs.
  - Soliciting comment on revising the secondary standard to a distinct W126-based standard within a range of 13 to 17 ppm-hrs.
  - Soliciting comment on a distinct W126-based standard within the range extending below 13 ppm-hrs down to 7 ppm-hrs.
  - Soliciting comment on retaining the current standard of 75 ppb.



## Existing and Proposed Federal Rules Will Help Reduce Ozone Pollution

- Rules intended to reduce ozone precursors such as NO<sub>x</sub> and VOCs, along with rules that will reduce these pollutants as a co-benefit of reducing toxic emissions and carbon pollution, will help most areas of the country meet a revised primary and secondary ozone standard in the range of 65-70 ppb by 2025.
- These federal programs include:
  - Requirements to reduce the interstate transport of ozone
  - The Mercury and Air Toxics Standards
  - Mobile Source-Related Standards, especially the Tier 3 emission control requirements for motor fuels and vehicles
  - Regional Haze Best Available Retrofit Technology Emission Standards
  - Emissions Standards for Reciprocating Internal Combustion Engines
  - Emissions Standards for Industrial, Commercial and Industrial Boilers, and
  - The Clean Power Plan

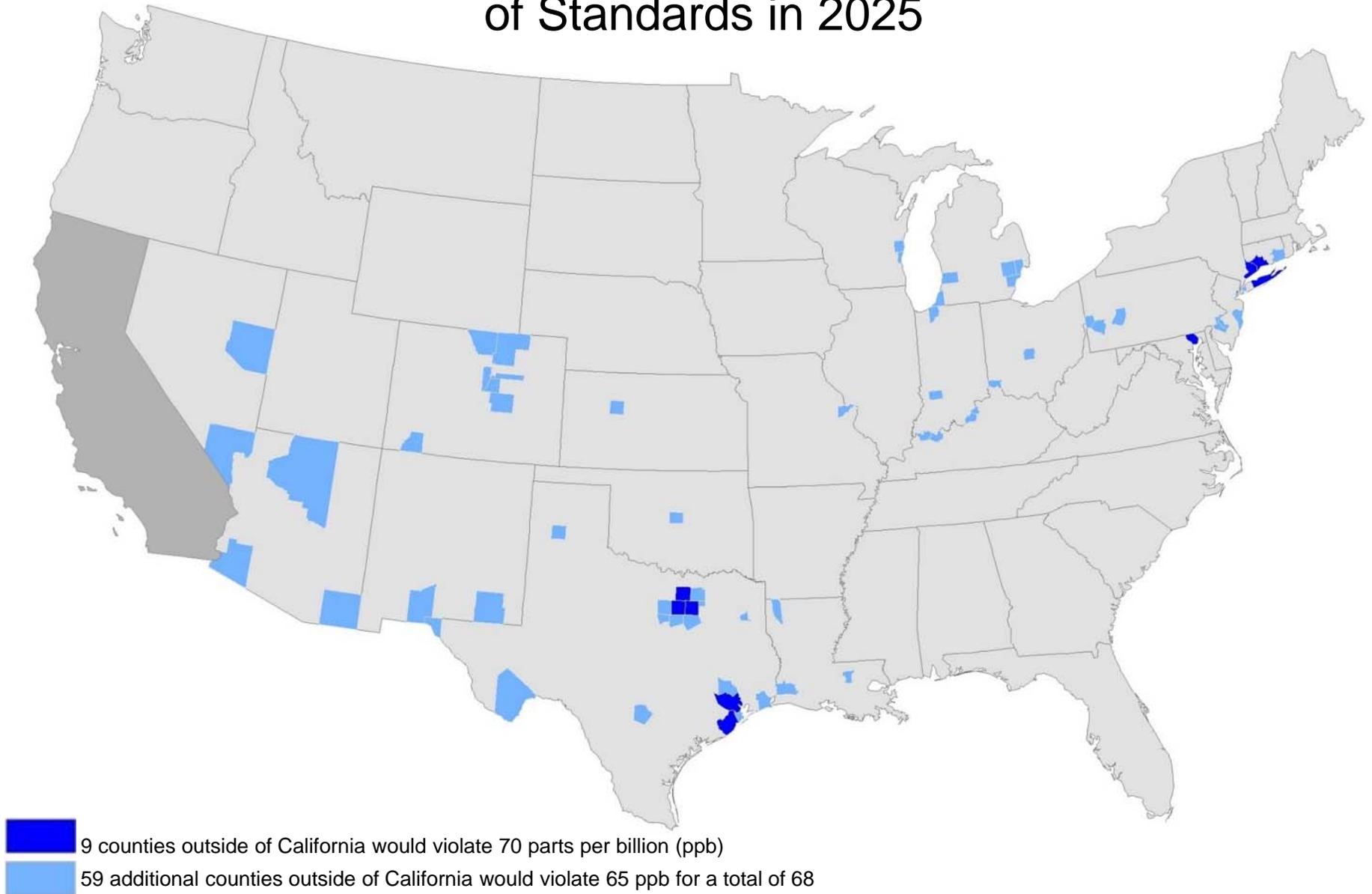
# Counties Where Measured Ozone is Above Proposed Range of Standards (65 – 70 parts per billion)



- 358 counties would violate 70 parts per billion (ppb)
- 200 additional counties would violate 65 ppb for a total of 558

Based on 2011 – 2013 monitoring data

# EPA Projects Most Counties Would Meet the Proposed Range of Standards in 2025



Because several areas in California are not required to meet the existing standard by 2025 and may not be required to meet a revised standard until sometime between 2032 and 2037, EPA analyzed California separately. Details are available in the Regulatory Impact Analysis for this proposal.



## Benefits and Costs of Meeting the Proposed Standards

- EPA estimates that meeting the standards in 2025 will yield annual health benefits of:
  - \$6.4 to \$13 billion for a standard of 70 ppb
  - \$19 to \$38 billion for a standard of 65 ppb
- This includes the value of preventing significant health effects in children and adults.
- EPA estimates that annual costs would be:
  - \$3.9 billion for a standard of 70 ppb
  - \$15 billion for a standard of 65 ppb

Health Effects Avoided	70 ppb	65 ppb
<b>Premature deaths</b> <i>(adults and children)</i>	710 to 1,400 or higher	2,000 to 4,300 or higher
<b>Asthma exacerbation</b> <i>(children 6-18)</i>	320,000	960,000
<b>Acute bronchitis</b> <i>(children 8-12)</i>	790	2,300
<b>Upper and lower respiratory symptoms</b> <i>(children 7 – 14)</i>	24,000	70,000
<b>School loss days</b> <i>(children 5 - 17)</i>	330,000	1 million
<b>Asthma emergency room visits</b> <i>(adults and children)</i>	1,400	4,300
<b>Respiratory hospital admissions</b> <i>(adults and children)</i>	510	1,500
<b>Cardiovascular hospital admissions</b> <i>(adults)</i>	180	530
<b>Days when people miss work</b> <i>(adults)</i>	65,000	180,000
<b>Days when people must restrict their activities</b> <i>(adults)</i>	1.3 million	4 million
<b>Nonfatal heart attacks</b> <i>(adults)</i>	64 to 600	180 to 1,700

*Note: These numbers do not include California which was analyzed separately*



## Benefits and Costs for California Estimated Separately

- Because several areas in California are not required to meet the existing standard by 2025 and may not be required to meet a revised standard until sometime between 2032 and 2037, EPA estimated benefits and costs for California separately.
- EPA estimates that meeting the standard after 2025 in California will yield annual health benefits of:
  - \$1.1 to \$2 billion for a standard of 70 ppb.
  - \$2.2 to \$4.1 billion for a standard of 65 ppb.
- EPA estimates that annual costs in California would be:
  - \$800 million annually for a standard of 70 ppb.
  - \$1.6 billion annually for a standard of 65 ppb.

Health Effects Avoided	70 ppb	65 ppb
<b>Premature deaths</b> <i>(adults and children)</i>	110 to 210 or higher	230 to 430 or higher
<b>Asthma exacerbation</b> <i>(children 6-18)</i>	99,000	210,000
<b>Acute bronchitis</b> <i>(children 8-12)</i>	67	130
<b>Upper and lower respiratory symptoms</b> <i>(children 7 – 14)</i>	2,100	4,100
<b>School loss days</b> <i>(children 5 - 17)</i>	110,000	230,000
<b>Asthma emergency room visits</b> <i>(adults and children)</i>	340	740
<b>Respiratory hospital admissions</b> <i>(adults and children)</i>	130	290
<b>Cardiovascular hospital admissions</b> <i>(adults)</i>	16	32
<b>Days when people miss work</b> <i>(adults)</i>	5,500	11,000
<b>Days when people must restrict their activities</b> <i>(adults)</i>	320,000	690,000
<b>Nonfatal heart attacks</b> <i>(adults)</i>	6 to 54	11 to 110



## Step 2: Implementing the Standards

- Improving air quality is a partnership between the federal government, states and tribes. EPA will work closely with states and tribes to implement any revised ozone standard.
- Once EPA sets a new air quality standard, or revises an existing standard, it then designates areas as meeting or not meeting the standards based on recommendations from states.
  - States with nonattainment areas develop implementation plans showing how they will meet the standards, based on federal measures and any additional state or local measures.
- The schedule for attainment of any revised primary ozone standard varies by nonattainment designation classification. Attainment deadlines range from 3 to 20 years depending on the level of the ozone in the area, and the deadlines can be adjusted based on area-specific challenges.
- The Clean Air Act requires states to meet secondary ozone standards as “expeditiously as practicable,” but does not provide specific timeframes.



## Tentative timeline for designations and implementation

- After a standard is final, states and tribes work with EPA to make plans to meet it. This process is laid out in the Clean Air Act and some of the key milestones are shown here.

<i>Designation Schedule</i>		
	Schedule	Tentative Date
State and Tribe Recommendations	Within 1 year after NAAQS promulgation	October 2016
Final Designation	Within 2 years after NAAQS promulgation (Administrator has discretion to extend the deadline by one year to collect sufficient information.)	October 2017 Effective date may vary. (Air quality data years: 2014 –2016)
<i>Implementation Schedule</i>		
Infrastructure SIP	Within 3 years after NAAQS promulgation	October 2018
Attainment Plans Due	Within 36 - 48 months after designations depending on classification	October 2020-2021

<i>Attainment Schedule by Classification</i>	
Classification	Schedule*
Marginal	3 years to attain
Moderate	6 years to attain
Serious	9 years to attain
Severe	15 to 17 years to attain
Extreme	20 years to attain

\*Areas must attain as expeditiously as practical, but not later than the schedule in the table. Two one-year extensions are available in certain circumstances based on air quality.



# Proposed Changes to the Air Quality Index

- EPA is proposing updates to the Air Quality Index (AQI) for ozone pollution.
  - The AQI is EPA’s color-coded tool used by state and local governments to help inform the public about current and daily air quality and recommends steps that individuals can take to reduce their exposure to air pollution.
  - The AQI converts ozone concentrations to a number on a scale from 0 to 500.
- EPA is proposing to change the breakpoints for each AQI category based on the level of the proposed primary standard and information from the health studies examined in the review.
- EPA is soliciting comments on these proposed revisions to the AQI.

AQI Category	Index values	Current Breakpoints (2008 AQI) (ppb, 8-hour avg)	Proposed Breakpoints (ppb, 8-hour avg)
<b>Good</b>	0 - 50	0 - 59	0 – (49 to 54)
<b>Moderate</b>	51 – 100	60 – 75	(50 – 55) – (65 to 70)
<b>Unhealthy for Sensitive Groups</b>	101 - 150	76 - 95	(66 to 71) - 85
<b>Unhealthy</b>	151 - 200	96 - 115	86 - 105



## Proposed Changes to Monitoring Requirements

- EPA is proposing changes to monitoring requirements to smooth the transition to any revised standards and assure that the public has full information about air quality.
- **Ozone monitoring season**
  - Proposing to extend the ozone monitoring season for 33 states, to match the times of year when data show ozone can approach unhealthy levels, and to alert the public;
  - Proposing to require year-round monitoring at 80 existing multipollutant monitoring sites (NCORE) stations.
  - Implementation of revised seasons proposed for January 1, 2017.
- **Photochemical Assessment Monitoring Stations (PAMS)**
  - Revising PAMS applicability to all ozone non-attainment areas with NCORE sites – uses existing network infrastructure.
  - Proposing changes to certain required methods.
  - Proposing changes to decrease monitoring burden and increase flexibility.
  - Implementation deadlines of 2017 or 2019 based on nonattainment status of areas.
- **Ozone Federal Reference Method**
  - Proposing to add a new ozone Federal Reference Method (FRM) while retaining the current FRM and Federal Equivalent Methods (FEMs).
  - Impact on state monitoring networks will be minimal as existing approved methods are adequate for continued operation.



# Proposed Changes to Clean Air Permitting Provisions and Other Efforts to Ease Transition

- PSD Grandfathering
  - Proposing that any in-the-pipeline permit application meeting certain conditions would be required to consider its impact on the 2008 NAAQS but not the 2015 NAAQS
  - Seeking comment on appropriate criteria for PSD grandfathering
- Ongoing and Upcoming Efforts
  - Ongoing reductions from federal measures (including reductions in ozone precursors).
  - Planning timely assistance for state, tribal and local air agencies.
  - Exceptional Events Rule revisions and guidance (forthcoming).



## Ozone NAAQS Review Schedule

- **Proposal** signed on November 25, 2014
- **Public comment period** for 90 days after proposal is published in the Federal Register
  - Comments should be labeled with Docket ID number EPA-HQ-OAR-2008-0699
- **3 Public hearings** will be held in January 2015. More details will be announced in a separate Federal Register notice.
- **Final Rule** to be signed by October 1, 2015
- For more information on the rule and how to comment, go to <http://www.epa.gov/air/ozonepollution/>



# Appendix



## Calculating the W126 Index

- The impact of ozone exposure on trees, plants and ecosystems often is assessed using a seasonal index.
- W126 index is a seasonal index designed to reflect the cumulative ozone exposures that can damage plants and trees. Here's how it's calculated for EPA's proposal:
  - **Measure** hourly ozone concentrations for each hour from 8 a.m. to 8 p.m.;
  - **Weight** each hourly measurement, with more weight given to higher ozone concentrations;
  - **Add** the 12 weighted hourly values to get a daily value;
  - **Add** the daily values for each month to get a monthly value;
  - **Add** the monthly values in each consecutive three-month period during the ozone season. The highest of these three-month sums is the seasonal index value.
  - **Average** the seasonal index values over the most recent three years.



## Ozone Standard – History Since 2008 Review

- March 27, 2008: EPA revises primary and secondary ozone standards from 84 ppb to 75 ppb (8-hour average).
- » In 2013, the D.C. Circuit remanded the secondary standard to the Agency for reconsideration because the Agency did not determine what level of protection was requisite to protect the public welfare.
- January 19, 2010: EPA proposes to reconsider the 2008 ozone standard.
- » Change primary standard to within range of 60 to 70 ppb.
  - » Change secondary standard to cumulative seasonal standard within range of 7 to 15 ppm-hours.
- September 2, 2011: January 2010 proposal is withdrawn and EPA focuses on upcoming 5 year review.
- June 19, 2013: Coalition of public health and environmental groups, including Sierra Club and ALA, file lawsuit in federal court asking court to set deadline for action on overdue ozone standards.
- April 29, 2014: U.S. District Court in San Francisco orders EPA to issue new ozone standards (proposal by Dec.1, 2014, final by Oct.1, 2015).