$PM_{2.5}$ NAAQS

- Health effects are significant
  - Aggravated asthma
  - Increased respiratory symptoms like coughing, painful breathing
  - Chronic bronchitis
  - Decreased lung function
  - Premature death in people with heart and lung disease

	1997 Standards*		2006 Standards*	
	Annual	24-hour	Annual	24-hour
$PM_{2.5}$ (Fine Particles)	15 µg/m³ Annual arithmetic mean, averaged over 3 years	65 µg/m³ 24- hour average, 98th percentile, averaged over 3 years	15 µg/m³ Annual arithmetic mean, averaged over 3 years	35 µg/m³ 24- hour average, 98th percentile, averaged over 3 years

* For 1997 and 2006 PM2.5 NAAQS, secondary standards to protect against welfare effects were established identical to the primary standards for protection of public health.

Estimated Benefits of Attaining PM2.5 Standards Greatly Exceed the Costs

- 1997 $PM_{2.5}$ NAAQS
  - 39 nonattainment areas designated in 2005 (with 88 million population)
  - State plans were due in 2008
  - 33 of 39 areas are attaining based on 2008-2010 data
  - Key strategy: SO2 reductions from power industry (CAIR)
  - Estimated benefits = $43-97 billion; estimated costs = $6.7 billion
- 2006 $PM_{2.5}$ NAAQS
  - 31 nonattainment areas designated in 2009 (with 70 million population); state plans are due in December 2012. Eleven areas attaining based on 2008-2010 data.
  - Several new western areas with high winter values
  - Larger role for nitrate and carbonaceous $PM_{2.5}$ (e.g., wood smoke)
  - Combination of Transport Rule in east and local area reductions
  - Estimated benefits = $17 billion; estimated costs = $5.4 billion
  - Note: Primary annual and secondary standards were remanded to EPA

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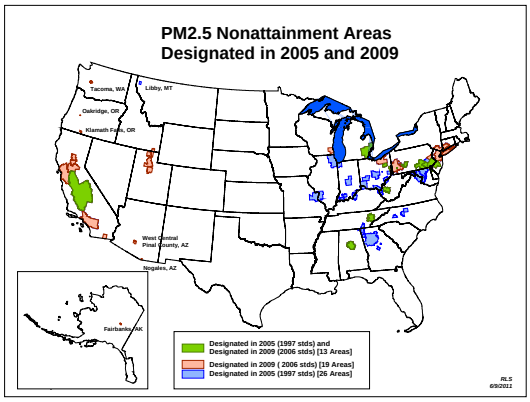

Timeline for $PM_{2.5}$ NAAQS Implementation

Milestone	1997 PM2.5 NAAQS	2006 PM2.5 NAAQS	If new PM2.5 std. in 2012
Effective Date of Standard	September 1997	December 2006	2012
Effective Date of Designations	April 2005	December 2009	2014*
SIPs Due	April 2008	December 2012	2017
Attainment Within Five Years	April 2010 (based on 2007-2009 monitoring data)	December 2014 (based on 2012-14 monitoring data)	2019
Attainment Date with Extension	Up to April 2015 (based on 2012-2014 monitoring data)	Up to December 2019 (based on 2017-19 monitoring data)	2024

* EPA may take an extra year for designating nonattainment areas under certain circumstances.

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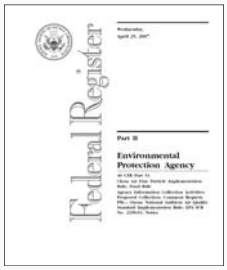
$PM_{2.5}$ Implementation Rule

- $PM_{2.5}$ implementation rule (2007)
  - Precursor policies
  - Emission inventory
  - Control measures
  - Attainment demonstration
    - Control measures (RACM / RACT)
    - Modeling and other analyses
    - Attainment date – "as expeditiously as practicable"
  - Reasonable further progress
  - Contingency measures
  - Enforceable regulations



- June 2007 State workshop presentations provide detailed information on implementation rule issues.
  - See http://www.epa.gov/ttn/naaqs/pm/pm25_implementation_presentations.html

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Attainment Plans for the 2006 24-Hour $PM_{2.5}$ Standard

- Significant health benefits will be achieved through state and local actions to attain the standard!
- Regulatory impact analysis for 2006 PM NAAQS
  - Combination of national, regional and local emission reductions is needed
  - Provides example control strategies and modeling
  - Reductions of direct PM2.5 emissions provide greatest air quality improvement and health benefits on a per ton basis
  - http://www.epa.gov/ttn/ecas/ria.html
- Framework of existing implementation rule is appropriate for attainment planning for 2006 PM2.5 standards
  - Supplementary guidance memo under development

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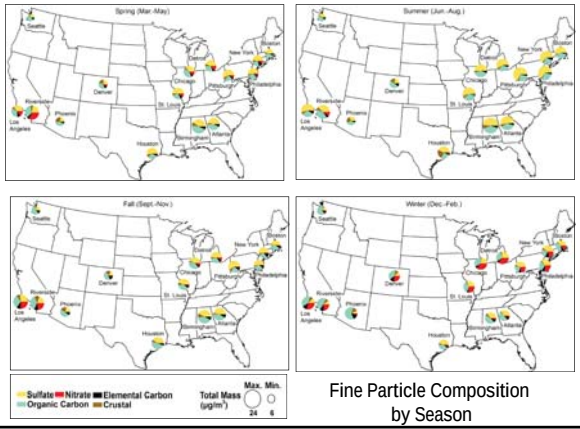
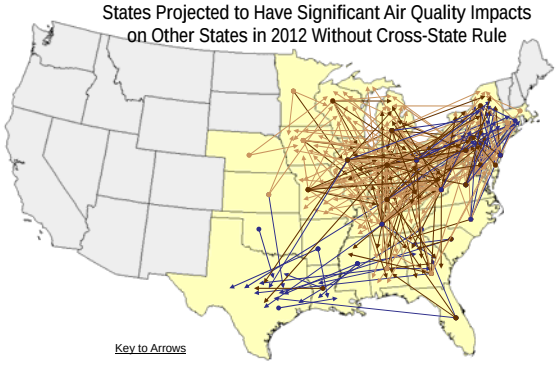


Fine Particle Composition by Season

Interstate Air Pollution Impacts: States Projected to Have Significant Air Quality Impacts on Other States in 2012 Without Cross-State Rule



Key to Arrows

- Linkage of Upwind to Downwind for Ozone
- Linkage of Upwind to Downwind for Annual $PM_{2.5}$
- Linkage of Upwind to Downwind for 24 hour $PM_{2.5}$

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Implementation Issues for 24-Hour $PM_{2.5}$ Standard

- Develop baseline year emission inventories
  - Include condensable PM
- Account for projected reductions and air quality improvement from Federal and State rules on the books
  - Several rules for onroad and nonroad engines, and fuels
  - Cross-State Air Pollution Rule (2011); Utility toxics rule (upcoming)
- Identify local and in-state contributors to the nonattainment problem
  - Sources of direct PM2.5 (including condensable PM), SO2, NOx
- Evaluate technically and economically feasible new control measures for sources in nonattainment area and state
- Air quality modeling to assess emission targets, future year air quality projections
- Adopt rules for reasonably available measures (RACM/RACT) in order for the area to attain "as expeditiously as practicable"
- Presumption: attain within five years
  - If State cannot show area will attain in 5 years, it can propose up to 10 year attainment date as part of SIP submittal
- Other programs
  - General conformity, Transportation conformity, New source review

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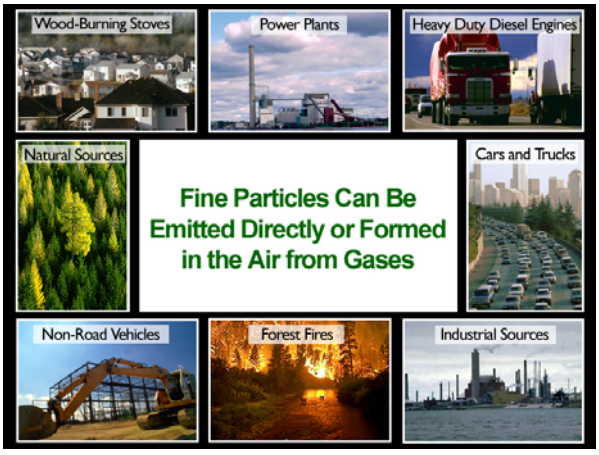
Condensable Particulate Matter

- PM is comprised of filterable and condensable emissions. Condensable emissions are a significant percentage of direct PM2.5 emissions from certain sources.
- Emission inventories have been required to include condensable PM for a number of years.
- In response to comments on PM2.5 implementation rule, EPA established a "transition period" and committed to refining the test method for condensable PM2.5
  - Completed in December 2010
- Thus, initial PM2.5 attainment plans due in 2008 (for 1997 standards) were not required to address condensable PM2.5 emissions and control measures
- Now: for PM2.5 attainment plans due after January 2011, such as attainment plans for the 2006 24-hour PM2.5 NAAQS, emissions limits including condensable PM are required for any sources included in control strategy









Stationary Source Priority Sectors for Air Toxics

- Petroleum Refining
- Chemical Manufacturing
- Iron & Steel
- Utilities
- Oil & Gas
- Portland Cement

• Emissions from these sectors often affect low-income and minority communities
• Multi-pollutant benefits: urban nonattainment areas for PM2.5; GHG emissions

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Example Emission Reduction Measures

- New or improved direct PM and precursor controls on stationary sources (e.g. scrubbers, selective catalytic reduction, improved combustion efficiency of industrial processes, baghouse, ESP, diesel particle filter)
- Year-round operation of seasonal stationary source NOx controls
- Diesel retrofits (trucks, school buses, stationary engines)
- Diesel idling / electrification (trucks, trains, port equipment, etc)
- Programs to reduce emissions from poorly maintained vehicles
- Year-round measures to reduce vehicle miles traveled (carpooling incentives, etc.)
- Programs to reduce emissions from residential wood combustion, outdoor wood boilers, and back yard barrel burning
- Open burning laws and better enforcement
- Smoke management plans
- Reducing emissions of volatile organic compounds (surface coatings, gasoline, solvents, etc.)
- Vehicle inspection & maintenance/ on-board diagnostics

More information available at http://www.epa.gov/pm/measures.html

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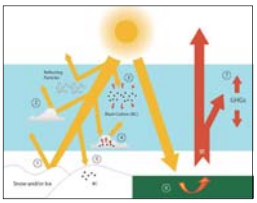
Short-Lived Climate Forcers and Climate Change

- Important climate co-benefits can be achieved (particularly in regions with snow and ice) with reductions of conventional air pollutants such as black carbon, a component of PM, and methane, a contributor to background ozone
  - Some studies estimate that radiative forcing of BC could be larger than any GHG other than CO2
- UNEP Integrated Assessment of Black Carbon and Tropospheric Ozone (2/17/11)
  - See: ww.unep.org/gc/gc26/download.asp?ID=2197
- EPA Report to Congress on Black Carbon
  - Peer review: EPA Advisory Council on Clean Air Compliance Analysis. To be finalized late 2011
- UN Convention on Long-Range Transboundary Air Pollution
- Arctic Council

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Near Salt Lake City, 11/17/09, 35 ug/m3