

Colorado Department of Public Health & Environment

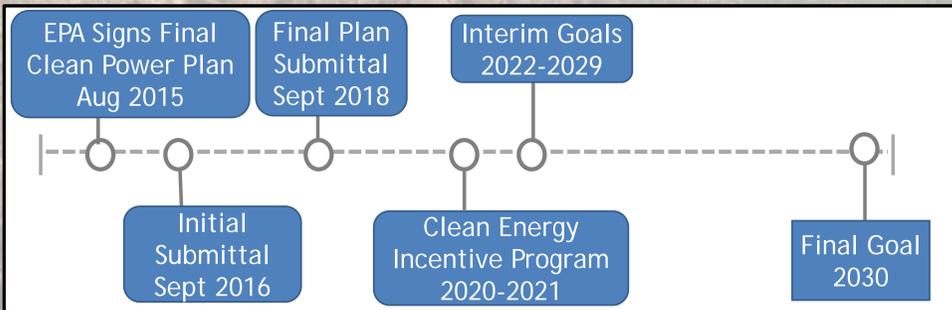
Air Pollution Control Division

111(d) - The Clean Power Plan:

What is the Clean Power Plan?

•The first national standard to reduce carbon dioxide (CO₂) emissions from power plants.

When do states have to meet the standard?



How will it work?

- EPA set interim and final CO₂ emission targets for coal-fired and natural gas combined cycle power plants.
- EPA's CO₂ targets are based on three Building Blocks for reducing emissions:
 - Making existing coal-fired power plants more efficient by improving their heat rate;
 - Shifting electric generation from existing coal-fired power plants to existing natural gas plants;
 - Generating electricity from zero emission renewable sources like wind & solar.
- Colorado will develop its own plan to reduce emissions in a way that is right for Colorado.
 - Colorado may use any mix of the Building Blocks.
 - Other strategies may also be used, such as energy efficiency or upgrading electric transmission lines.
 - The state will involve the public through an extensive stakeholder process to minimize costs and ensure a reliable electric grid.
- Colorado can choose to meet either a rate-based or mass-based goal.
 - A rate-based goal limits the amount of CO₂ emitted per megawatt-hour of electricity generated.
 - A mass-based goal caps the total number of tons CO₂ emitted from existing power plants.
- States have flexibility in designing their plans. They may allow emissions trading and may collaborate with other states to adopt multi-state plans.

Why is it important?

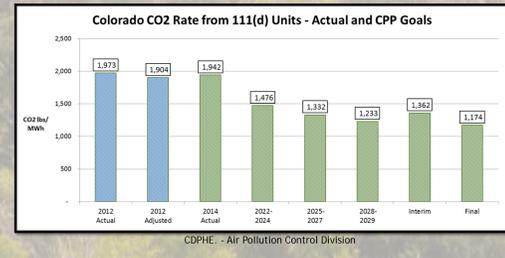
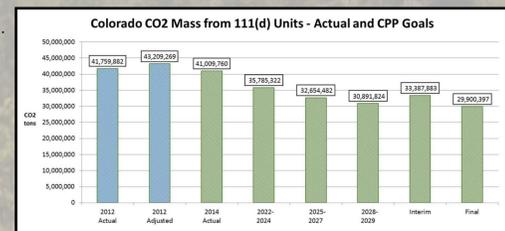
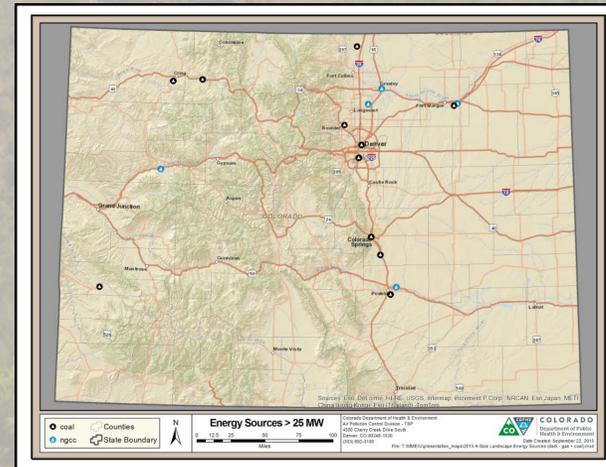
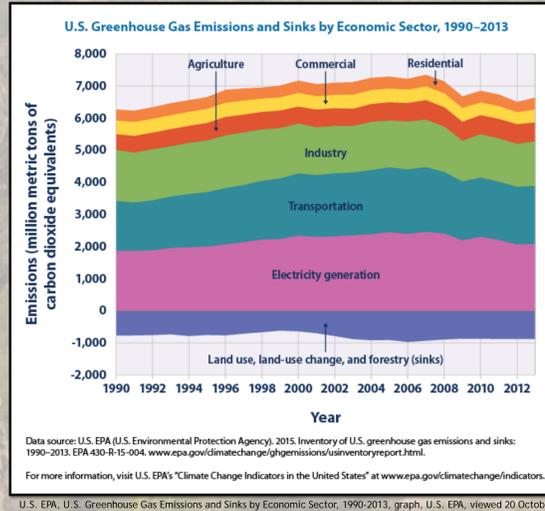
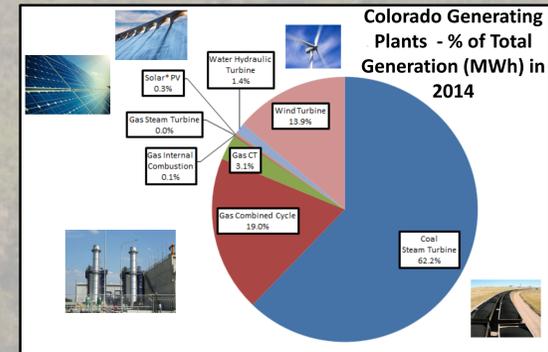
- CO₂ has been linked to climate change.
- Climate change has led to rising temperatures and sea levels.
- Climate change is tied to heat waves, drought, worsening smog, and extreme weather such as hurricanes and flooding.
- Reducing carbon emissions may help slow climate change.
- CO₂ is the most common greenhouse gas (GHG). It accounts for 82% of the U.S.'s GHG emissions.
- In the U.S. approximately 1/3 of the CO₂ emissions are from power generation.

What are the benefits?

- Reduces emissions of CO₂ and other pollutants.
- EPA estimates that every year, nationwide, the Clean Power Plan will prevent:
 - 3,600 premature deaths
 - 1,700 heart attacks
 - 90,000 asthma attacks
 - 300,000 missed days at work and school
- The Clean Power Plan's estimated environmental and health benefits are:
 - \$20 billion in climate benefits
 - \$14-\$34 billion in health benefits
 - \$26-\$45 billion net benefits

What does it mean for Colorado?

- Colorado must develop & adopt a state plan or be subject to the federal plan.
- Colorado must reduce CO₂ emissions by 38% on a rate basis or by 31% on a mass basis by 2030.
 - Must also meet interim targets in 2022-2029.
- Goals are based on how much electricity the state generates from coal and natural gas.



Ozone/NO_x Regional Trends

Nitrogen Oxides (NO_x)

•Plays major role in ozone formation ("ozone precursor") particulate matter, haze and acid rain. Primarily nitrogen dioxide (NO₂) and nitric oxide (NO).

•Man-made significant sources: burning fuel in automobiles, industrial engines and power plants.

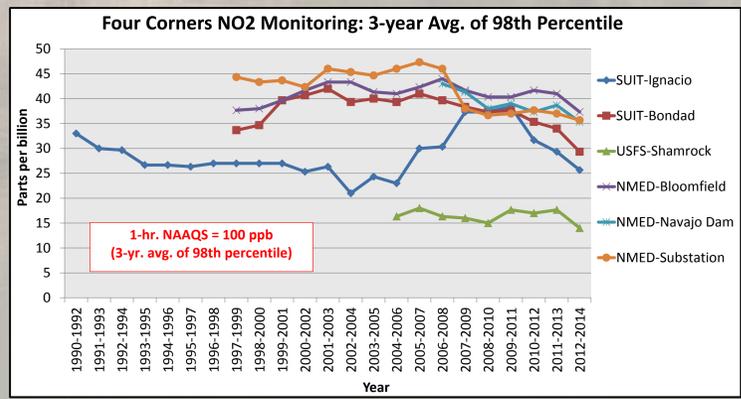
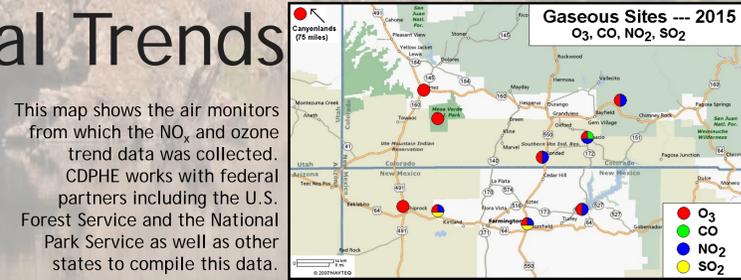
Health and Environmental Effects of NO_x

- Health effects: increase in respiratory problems, causes symptoms in asthmatics & increases susceptibility to respiratory infections.
- Environmental effects: Contributor to acid rain, ozone, & visibility impairment. Changes in plant species composition & diversity in terrestrial and wetland systems. Eutrophication (excessive algae growth) in lakes & streams. Severe depletion of dissolved oxygen and increased levels of toxins harmful to aquatic life.

Impacts in Colorado

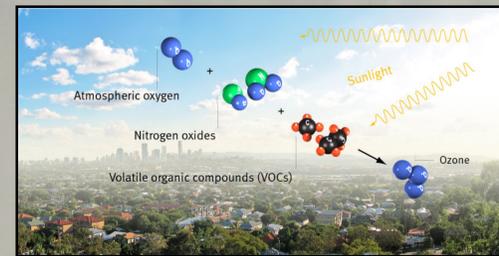
•Colorado monitors NO₂ at two sites: downtown Denver (termed CAMP) and Welby (north of Denver). Both sites show NO₂ values that are well below National Ambient Air Quality Standards (NAAQS), similar to national trends, which are currently at the lowest levels recorded in the past 20 years. Other sites in Colorado also show levels well below the standard.

•Four Corners area sites and air pollution source categories are shown to the right. NO₂ concentrations are expected to continue decreasing in the future per new federal and state regulations aimed at reducing ozone precursors.



Ozone:

- Formed through interaction between volatile organic compounds (VOCs) & nitrogen oxides (NO_x) in presence of sunlight.
- Colorless and odorless at ambient concentrations. Typically not emitted from individual sources directly.
- Emissions from motor vehicles, industry, oil and gas production, and vegetation contribute to ozone formation.
- Highest ground-level ozone concentrations usually occur in the summer when hot, still days cause reactive pollutants to form ozone. However, high ozone levels have been observed in winter in areas with high oil and gas production activities.

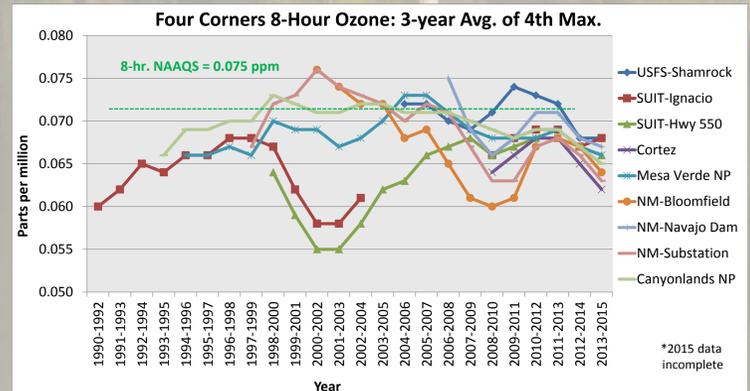


Health and Environmental Effects

- Causes breathing difficulties & respiratory infections in the elderly, the young & those with preexisting ailments such as asthma. Can cause premature mortality. Even healthy people who exercise or work outdoors can experience respiratory effects from ozone. Causes detrimental effects on plants and ecosystems.

Impacts in Colorado

Denver-metro and the North Front Range have been designated by the EPA as a marginal nonattainment area for ozone for failing to meet the 2008 ozone standard of 75ppm. The rest of Colorado presently attains the ozone standard. The Colorado Air Quality Control Commission (AQCC) takes regulatory actions to reduce ozone precursors; adopted regulatory changes to significantly reduce VOC emissions from oil and gas production in 2014. In 2011, the Commission approved a regional haze plan that includes substantial NO_x emission reductions that will also improve ozone throughout the state. New federal motor vehicle emissions standards and Colorado's motor vehicle inspection and maintenance programs also help reduce precursors of ozone.



Ozone concentrations in the four corners region (above) have been declining over the past 3 years and are below the existing NAAQS of 0.075ppm and the new NAAQS of 0.070ppm. It is expected that these levels will drop further in the future due to new and existing state and federal regulations aimed at reducing ozone precursors.