

How you Control a day in Smog City 2

1. Select “Save Smog City 2 from Ozone,” “Save Smog City 2 from Particle Pollution,” or “Create Your Own Smog City 2 Experience.”

2. Set the weather control slider.

Daily weather conditions can significantly affect ozone and particle pollution levels. Ozone levels are highest in the summer when high temperatures, calm winds, and lots of sunshine prevail. In the real world we can't control the weather, but in Smog City 2 you can experiment with how the weather affects pollution levels by adjusting the controls.

Note: The temperature and Air Quality Index (AQI) are shown on the sign in the cityscape.

3. Set the emissions control sliders.

Particle pollution: Some particles are emitted directly from sources such as construction sites, unpaved roads, fields, smokestacks, or fires. Others form when chemicals such as **sulfur dioxides (SO₂) and nitrogen oxides (NO_x)** are emitted into the atmosphere. NO_x is produced from burning fuels, including gasoline and diesel fuel. SO₂ is produced from combustion of fuels containing sulfur, which includes some coals. Particle pollution can occur year-round.

Ozone: Ground-level ozone is formed when **volatile organic compounds (VOCs) and NO_x** mix in sunlight. VOCs are emitted from products like gasoline, industrial chemicals, dry cleaning solvents, paints, and household cleaners. NO_x is produced from burning fuels, including gasoline and diesel fuel. Ground-level ozone is usually highest during the summer.

HINT: For a description of the items in the weather or emissions section, see the information box.

4. Each time you set a control, check the Air Quality Index (AQI) and Total Emissions.

Pay special attention to the ozone levels, particle levels, time of day, and health message. The multi-colored chart indicates the air quality at ground level over time.

Note: The highest level of pollutant determines the AQI. In this example, the AQI is 140, the highest ozone levels are 40 and the highest particle levels are 140.

Total Emissions

This chart shows the relative emissions from the energy, cars and trucks, off road vehicles, consumer products and industry as you have selected them. The colors of the bars in the graph match the pictures of the emission sources. These categories create VOC, NO_x, and SO₂ emissions, which contribute to ground-level ozone and particle pollution.

5. See how population affects the Air Quality Index and Total Emissions.

Population growth affects emissions sources. For example, as the population increases, emissions increase from additional use of energy, cars/trucks, consumer products and industrial sources. Population is also linked to the use of wood-burning stoves and fireplaces. When population increases and the outside air temperature falls below 50°F, increased wood-burning causes more particle pollution.

6. See how a dust storm or wildfire affects the Air Quality Index.

Random Events

Turn on/off events (fires and dust storms) that can affect the levels of particle pollution in Smog City 2. Check the news crawler for details.

7. Reset the controls

Reset

Returns the controls to their original settings.

Glossary

Weather:

Clouds/Sky Cover

Sunlight accelerates the chemical reactions that form ozone. Clouds reduce sunlight and slow ozone formation. Particle pollution forms more quickly when there is moisture or cloud droplets in the air and increasing cloud cover speeds up particle pollution formation. Cloud cover can be sunny, partly cloudy, or cloudy.

Inversion

A temperature inversion is a layer of warm air above the ground that traps particle pollution and ground-level ozone below it. This "lid" prevents air from mixing upward as it normally does. Smog City 2 has three temperature inversion settings: low-altitude, high-altitude, or none.

Wind

Winds blow emissions from the pollution source to other areas. Calm winds cause emission levels to build up, or increase. Wind speeds range from calm, light breeze, breezy, or windy.

Temperature

Heat increases the chemical conversion of emissions to ozone and particle pollution. Lower temperatures can enable gaseous emissions to convert into particles. This control represents the daily maximum temperature and ranges from 30 to 110°F. Note: 60 and 70°F are not represented because the emissions at those ranges are similar to 50 and 80°F, respectively.

Emissions:**Population**

Population growth affects emissions sources. For example, as the population increases, emissions increase from additional use of energy, cars/trucks, consumer products and industrial sources. Population is also linked to the use of wood-burning stoves and fireplaces. When population increases and the outside air temperature falls below 50°F, increased wood-burning causes more particle pollution. In Smog City 2, you can increase the population from near-zero to about two million people.

Energy Sources

All forms of electricity production affect the environment. Most of the electricity in the United States is generated from fossil fuels such as coal, natural gas and oil. Emissions from burning of fossil fuels can lead to smog, acid rain, and haze. Renewable energy like hydroelectric power, wind, and solar technologies produce significantly fewer emissions than traditional power generation technologies.

Cars and Trucks

This category includes passenger vehicles (all sizes), large and medium trucks, and motorcycles.

Off Road

This category includes airplanes, trains, power boats, earth movers, tractors, harvesters, forklifts, bulldozers, and backhoes.

Consumer Products

These products include hair spray, paints and paint thinner, charcoal lighter fluid, glue or other adhesives, and gasoline that add VOCs to the environment.

Industry

Manufacturing facilities, power plants, oil refineries and distribution centers, and food and agricultural processing are included in this category.

Air Quality and Health:**Air Quality Index (AQI)**

The AQI is a color-coded index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might concern you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. The EPA calculates the AQI for five major air pollutants as regulated by the federal Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide (CO), sulfur dioxide (SO₂), and nitrogen oxides (NO_x). Ozone and particle pollution are the most common air pollutants in the United States.

Ozone Levels

Ozone is the main ingredient of smog and presents a serious air quality problem. Even at low levels, ozone can irritate your respiratory system causing coughing, irritation in your throat, or a burning sensation in your airways. Ozone can aggravate asthma and trigger asthma attacks.

Particle Levels

Airborne particles are the main ingredient of haze, smoke, and airborne dust. Particle pollution can cause a number of serious health problems such as: irritation of the eyes, nose and throat; coughing; phlegm; chest tightness; and shortness of breath.