



MARINE DIESEL ENGINES AND AIR POLLUTION

Exhaust from marine diesel engines contributes significantly to air pollution that damages the environment and harms public health. Marine diesel engines are among the dirtiest of all diesel engines because they burn the lowest grade diesel fuel and have not been required to meet air quality standards.

In 1998, the state of California categorized particulate matter from diesel exhaust as a cancer-causing toxic air contaminant responsible for 70 percent of excess cancers caused by air pollution.

Diesel exhaust consists of a complex mixture of gases, vapors and fine particles that are released when diesel fuel is burned in an internal combustion engine. These emissions contribute to the three main components of air pollution -- smog, particulate matter and global warming gases.

Smog-Forming Emissions

Nitrogen oxides (NO_x) are formed when nitrogen and oxygen react inside the extremely hot, highly pressurized chambers of compression-ignition engines. NO_x combines in the atmosphere with hydrocarbons, reacting in heat and sunlight to form ground-level ozone (O₃), a primary contributor to urban smog.

Ozone is good high in the stratosphere, where it protects the earth from the sun's ultraviolet rays, but dangerous low in the atmosphere where it traps heat, affects human health and impacts vegetation. Smog irritates the respiratory system, causing coughing, choking and reduced lung capacity.

Sulfur oxides (SO_x) are emitted from unburned diesel fuel, resulting in small particles of sulfur and carbon that spew out the exhaust pipe and contribute to smog. SO_x emissions are directly related to sulfur content in fuel. Combined with water vapor, SO_x forms acid rain. Acid rain degrades crops, water and the environment.

Exposure to sulfur dioxide (SO₂) irritates and restricts human airways, causing chest tightness. Long-term exposure leads to bronchitis and suppressed immune system.

Particulate matter consists of tiny solid particles and liquid droplets of soot, dust, salt, acid and metals that are invisible to the eye, but can appear as clouds or a fog-like haze. Particles less than 10 microns in diameter, about one-seventh the thickness of human hair, are known as PM10. These particles can be inhaled deep into the lung and are known to cause cancer. Diesel contains 60 to 200 times more small particles than gasoline engine exhaust.

Global warming gases, including carbon dioxide, methane and nitrogen oxide, are released when fossil fuels are burned, trapping heat in the atmosphere and causing global warming and climate change. Scientists have warned of dire environmental consequences if the greenhouse effect continues unchecked.