



Air
Resources
Board

California
Environmental
Protection
Agency

California Diesel Fuel

All diesel fuel sold in California must meet pollution-cutting specifications established by the California Air Resources Board (ARB). These specifications ensure that California diesel fuel is the cleanest-burning diesel in the United States. ARB's diesel-fuel regulations were adopted in 1988 and took effect in 1993.

Air-Quality Benefits

Diesel-powered vehicles account for a disproportionate amount of several health-threatening pollutants emitted by motor vehicles. Diesel-powered vehicles account for about 4 percent of California motor vehicles but produce 40 percent of the nitrogen oxides and 60 percent of directly emitted particulates (soot) from California vehicles.

California diesel fuel produces significantly lower emissions than conventional diesel fuel used in California prior to 1993. The switch from conventional to California diesel resulted in the following emission reductions from diesel-powered vehicles and equipment:

- **An 82 percent reduction in sulfur dioxide.** Sulfur dioxide causes a constriction of the airways and poses a particular health hazard for asthmatics. Children exposed to sulfur dioxide experience increased respiratory tract infections, and healthy people may experience sore throats, coughing and breathing difficulties when exposed to high sulfur dioxide concentrations.
- **A 25 percent reduction in particulate matter.** The microscopic particles are less than one-fifth the thickness of a human hair, are small enough to become lodged deep inside the lung, and contribute to respiratory disease and premature death. Short-term exposures can lead to coughing and minor throat irritation. Longer-term exposures can lead to increased bronchial disease. Some particles can be carriers for other toxic compounds, such as benzene, and can increase potential cancer risks.
- **A 7 percent reduction in oxides of nitrogen (NOx).** Oxides of nitrogen combine in the air with other pollutants to form ozone, the primary component of smog. Ozone aggravates common respiratory ailments, such as asthma and bronchitis, and contributes to premature aging of lung tissue and various chronic lung diseases.

California diesel fuel also reduces emissions of several toxic substances, including benzene and polynuclear aromatic hydrocarbons (PAHs).

Federal regulations for diesel fuel in the other 49 states took effect at the same time as California's diesel regulation in 1993. The "federal" diesel fuel does not reduce NOx emissions and only reduces particulate emissions by 5 percent. The additional benefits from California diesel are important because the highest levels of particulate matter and ozone in the United States are in California.

Specifications

California's diesel-fuel regulation contains two principal requirements:

- The fuel's sulfur content is capped at .05 percent, about one-fifth the level of pre-1993 diesel fuel. The lower sulfur content reduces emissions of both sulfur dioxide and particulate matter.

2020 L Street
P.O. Box 2815
Sacramento, CA
95812

Tel: 916.322.2990

- The fuel's aromatic hydrocarbon content is capped at 10 percent, about one-third the level of pre-1993 diesel fuel. The lower levels of aromatic hydrocarbons reduce emissions of both particulate matter and NOx. Because of the investment in refinery equipment needed to meet the 10-percent requirement, small refiners are allowed to meet a less-stringent 20 percent limit on aromatic hydrocarbons. The volume of fuel that can be produced at 20 percent is limited to prevent the loss of air-quality benefits.

ARB allows alternatives to the aromatic-hydrocarbon concentration if a refiner can demonstrate through independent testing that an alternative diesel formulation provides comparable emission benefits. Most refiners have taken advantage of this flexibility to produce alternative diesel formulations that provide the same air-quality benefits as fuel meeting ARB specifications, but are less expensive to refine.

Economic impacts

On average, a gallon of California diesel fuel costs approximately one to four cents more to produce than diesel fuel in other states. The increased production cost is one factor among many that determine fuel prices. Many other factors, including weather, crude-oil prices and product supply and demand, also affect fuel prices.

Between January 1997 and September 2000, wholesale California diesel prices remained close to those in Arizona, Nevada and Oregon. During this period:

- California's wholesale diesel prices were lower than the other three states approximately 30 percent of the time.
- California's wholesale diesel prices were between 0 to 5 cents more per gallon than the other three states approximately 41 percent of the time.
- California's wholesale diesel prices were 5 to 10 cents more per gallon than the other three states approximately 19 percent of the time.
- California's wholesale diesel prices exceeded the other three states by more than 10 cents per gallon approximately 9 percent of the time.

California's refineries normally produce sufficient amounts of diesel to meet in-state demand. Diesel fuel also can be imported into California as long as it meets ARB's requirements. If a refinery is unable to produce sufficient California diesel due to unforeseen circumstances beyond its control (such as a refinery accident), it can request a temporary variance from ARB to produce or import diesel that does not meet ARB's requirements as needed to ensure minimum adequate diesel supplies in California.

The ARB approved diesel variances in 1993 and 1996. In most cases, ARB required refineries receiving a variance to pay a mitigation fee for each gallon of noncomplying fuel produced to ensure it does not accrue a financial benefit from selling fuel that is cheaper to produce than California diesel.

A Cost-Effective Clean-Air Measure

The use of California diesel has significantly reduced pollution originating from diesel vehicles and equipment in California. Wholesale diesel prices in California have remained on average within five cents per gallon of diesel in neighboring states. These costs and benefits show that California diesel has been comparable in cost-effectiveness to many other air-quality measures in California.

California diesel is part of the state's core strategy of reducing air pollution through the use of cleaner fuels, motor vehicles and off-road equipment. This strategy has dramatically lowered air pollution in the last 25 years and will continue to reduce health threats to Californians from exposure to air pollutants.