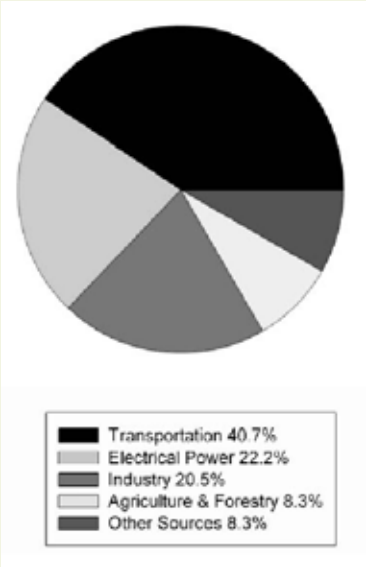
Benefiting the environment, the community and high quality grapes and wine

CHAPTER 4

Protecting Air Quality

Figure 4.1

California Greenhouse Gas Sources by Sector in 2004 (California Energy Commission, 2005)



Risks associated with decreased air quality are increasing in California as a result of expanding human populations and emissions from industrial, transportation, agricultural, and other sectors. A number of regulations have been imposed to curtail problems. Although agriculture is not a leading cause of most problematic air emissions, growers can help resolve problems by proactively limiting air emissions associated with agriculture.

Two categories of air emissions affected by winegrowing are: 1) the US EPA designated criteria pollutants and 2) greenhouse gases. The criteria pollutants of most concern are particulate matter and ozone. Airborne particulate matter less than 10 microns in diameter (PM10) is a serious risk to human health. Emissions of particulate matter result from dust stirred up by wind, vehicles, and equipment or from the combustion of fossil fuels and wood. Ground-level ozone, another risk to human health, is formed by atmospheric reactions of volatile organic compounds (VOCs) with nitrogen oxides (NOx). Like particulate matter, these ozone precursors are associated with use of fossil fuels. VOCs also can be emitted from certain pesticides and other petroleum-derived products.

Global warming resulting from emissions of greenhouse gases (GHGs) poses many risks ranging from adversely affecting crop production to human health concerns. The major GHGs associated with winegrape production are carbon dioxide (CO2) and nitrous oxide (N2O). CO2 can be emitted or stored (sequestered) by plants and soils as a result of plant and microbial activities and management practices. The combustion of fossil fuels is a key source of CO2. N2O is mostly attributed to excessive use of nitrogen fertilizers.

A. Vineyard Practices to Reduce Emissions of Air Pollutants and Greenhouse Gases

Listed below are selected practices for reducing problematic air emissions in vineyard operations. A more comprehensive coverage of these and other practices can be found in the California Code of Sustainable Winegrowing Practices Workbook.

Box 4.1

Carbon Sequestration and Air Quality

Unlike criteria air pollutants, greenhouse gases are of concern primarily because of potential impacts on global warming and other subsequent climatic ramifications such as rising sea levels. Carbon dioxide (CO_2) is the key concern but greenhouse gases also include methane, nitrous oxide, chloroflurocarbons, and others.

Carbon sequestration can be defined as the retention of carbon to prevent or delay its release to the atmosphere as CO_2. Plants are considered a "sink" for CO_2 because they uptake this gas during photosynthesis. Because plants assimilate carbon, enhancing their populations helps limit atmospheric concentrations of carbon dioxide and issues associated with global warming. Perennial plants are particularly efficient at carbon sequestration because carbon is stored in permanent structures, i.e., roots, trunks, and cordons. Grapevines in California, for example, were estimated to assimilate 251,084 tons of CO_2 into permanent structures in 1992 (Larry Williams, 1995, Department of Viticulture and Enology, UC Davis, Presentation at UC Davis Symposium – Recent Advances in Viticulture and Enology).

Carbon sequestration can be increased by maximizing and diversifying vegetation in and around the vineyard, such as utilizing cover crops (especially permanent covers), maintaining or planting hedgerows, seeding unpaved roadways and other areas, and planting trees and shrubs. Additionally, the rate of carbon storage in decomposing plant tissues and soils is enhanced with decreased tillage. These methods also help mitigate airborne dust and PM10.

Source: SWP workbook, p. 16-9

- Vineyard Floor Management
  - Minimize or eliminate tillage (reduces particulate matter, ozone pre cursors, and GHGs)
  - Plant cover crops – especially permanent systems (reduces particulate matter and GHGs)
  - Maintain grass alleys (reduces particulate matter)
  - Reduce equipment passes (reduces particulate matter, ozone precursors, and GHGs)
  - Maintain unfarmed natural habitat and consider peripheral plantings of hedgerows, trees, or other vegetation (reduces particulate matter, ozone precursors, and GHGs)

- Unpaved Surfaces – Roadways and Equipment Staging Areas
  - Apply water or regulatory compliant anti-dust materials (reduces particulate matter)
  - Consider paving, spreading gravel or seeding grasses in these areas for more permanent solutions (reduces particulate matter)
  - Reduce speed and travel (reduces particulate matter, ozone precursors, and GHGs)

- Energy Use and Efficiency
  - Minimize use of fossil fuels – especially petroleum diesel (reduces particulate matter, ozone precursors, and GHGs)
  - Conserve electricity and test and improve the energy efficiency of power equipment, including irrigation pumping plants (reduces particulate matter, ozone precursors, and GHGs)
  - Rely more on renewable energy by installing solar systems or using biodiesel (reduces particulate matter, ozone precursors, and GHGs)
  - Replace or retrofit older diesel engines with cleaner burning technology or install electric motors (reduces particulate matter, ozone pre cursors, and GHGs)

- Pest Management
  - Rely on biological and cultural control tactics to reduce pesticide use (reduces particulate matter, ozone precursors, and GHGs)
  - Base pesticide applications on economic thresholds and/or weather-based decision indices (reduces particulate matter, ozone precursors, and GHGs)
  - When pesticides must be used, apply low VOC products at lowest effective rates and maximize on-target deposition with precision spray

Minimizing tractor passes reduces particulate matter, ozone precursors, and greenhouse gases.

technology (reduces ozone precursors)
  - Use weed management tactics that minimize dust (reduces particulate matter)

- Nitrogen Fertilization
  - Minimize use and rates of synthetic nitrogen fertilizers (reduces GHGs)
  - Time necessary applications to ensure maximum plant uptake (reduces GHGs)

- Carbon sequestration – potential methods to mitigate GHG emissions (See **Box 4.1**)
  Although there is a lack of scientific information on specific wine growing practices and their impacts on carbon, it is recognized that there are several practices that can generally help enhance carbon storage and therefore help offset GHG emissions.
  - Maximize vegetation in/around the vineyard, such as planting and conserving trees, hedgerows, shrubs, etc.
  - Reduce and minimizing tillage
  - Increase soil organic matter, by incorporating organic material, compost and other methods noted in the soil management chapter of this manual

B. Cost-Share Programs to Assist Growers with Air Quality Measures

The Environmental Quality Incentives Program (EQIP) of the United States Department of Agriculture Natural Resources Conservation Service (NRCS) offers cost-share payments to growers for adoption of practices that can mitigate air quality impairment. The following tables indicate costs that the EQIP program will cover for growers who apply and qualify for this payment. SWP workbook criteria and practices have been matched to corresponding NRCS standards and practices for the EQIP program. Individual growers can generate reports in the SWP online system that specify relevant NRCS practices and associated EQIP cost-share opportunities and information. Growers can use the report to simplify and streamline the application and conservation planning processes (contact info@sustainablewinegrowing.org for more information). Additional programs which provide California winegrowers with cost-share incentives for improving technology or practices to reduce air emissions include the Carl Moyer Program and the Agricultural Diesel Conversion Incentive Program (see resources and SWP workbook page 16-16).

A weed steamer eradicates weeds without pesticides, tillage or damage to irrigation lines.

Individual growers can generate reports in the Sustainable Winegrowing Program online system that specify relevant NRCS practices and associated EQIP cost-share opportunities and information.

Growers can use the report to simplify and streamline the application and conservation planning process.

References and Resources

Agricultural Diesel Conversion Incentive Program is a program by Pacific Gas and Electric Company (PG&E) and Southern California Edison (SCE) that provides reduced electricity rates and enhanced line extension allowances for converting stationary diesel irrigation engines to electric motors. For more information visit: http://www.arb.ca.gov/ag/diesel/diesel.htm

California Sustainable Winegrowing Alliance, Wine Institute, and California Association of Winegrape Growers (2006). Code of Sustainable Winegrowing Practices Self-Assessment Workbook.

Carl Moyer Program is a statewide grants program administered by local air districts to retrofit or replace diesel engines for heavy-duty vehicles and equipment. For more information visit: http://www.arb.ca.gov/msprog/moyer/moyer.htm and through regional or county air districts.

Detailed information and specific products recommended for the controlling PM10 in the San Joaquin Valley are available from Agricultural Air Quality, Conservation Management Practices for San Joaquin Valley Farms (2004) found at http://www.valleyair.org/farmpermits/updates/cmp_handbook.pdf.

Environmental Quality Incentive Program (EQIP). California NRCS Air Quality Enhancement Program – Fiscal Year 2008. More information is available at ftp://ftp-fc.sc.egov.usda.gov/CA/programs/EQIP/2008/EQIP_FY08_AirQualityProgDesc.pdf.

Table 4.1: California NRCS Air Quality Initiative: Fiscal Year 2008 Approved Practice Cost Share Rates

Particulate Matter (PM-10) Reduction Initiative – Dust

Road Dust Reduction Initiative – Air Management Practice Code 729 on unpaved farm roads	
Option 1 1st Year Payment Rate	Two-Year EQIP contract – Use product SC-250 heavy road oil or approved equivalent product Application Rate: not to exceed 3,000 gallons/mile $0.85/ft or $4,488/mile
Option 2 Payment Rate	Minimum two-year EQIP contract – One-time application using product SC-250 heavy road oil with appropriate road base or approved equivalent product which will result in a minimum 50% reduction in dust emissions over a five-year period (Design pre-approved by NRCS). $1.50/ft or $7,920/mile

Particulate Matter (PM-10) Reduction Initiative – Conservation Tillage

Cropland Dust Reduction Initiative – Air Management Practice Code 329-345 on agricultural cropland	
Option 1 Payment Rate	Installation of Conservation Tillage (Residue Management) – Minimum of four-year EQIP contract with approved practice designed to reduce the current number of cultural operations or tillage passes through field(s). This practice applies to annually tilled crops. $30/acre, not to exceed 1,000 acres under contract

Particulate Matter (PM-10) Reduction Initiative – Smoke

Smoke Reduction Initiative – Air Management Practice Code 660-384	
Option 1 50% Cost Share	Chipping of almond & walnut prunings – Minimum four-year EQIP contract $20/acre– maximum two payments over four years
Option 2 Payment Rate	Chipping orchard or vineyard removed – One-time cost-share per eligible treatment unit $100/acre – no maximum number of acres

Diesel Engine Replacement Initiative (NOx)

NOx Reduction Initiative – Air Management, Pumping Plant Practice Code 533A	
Option 1	Replacement of stationary or portable (non-self propelled) irrigation pumping power units. Minimum two-year EQIP contract. Must certify destruction of old engine and replace with new "Tier III" diesel, electric motor, propane or natural gas-powered engine.

50% Cost Share -TIER III Option			
50-99 hp engine	$5,500	301-399 hp engine	$16,000
100-174 hp engine	$8,000	400-499 hp engine	$19,000
175-250 hp engine	$12,500	500-599 hp engine	$23,000
251-300 hp engine	$14,000	600+ hp engine	$40,000
50% Cost Share - Electric Motor Option			
50-70 hp engine	$5,000	201-300 hp engine	$17,500
71-100 hp engine	$7,000	301-400 hp engine	$25,000
101-125 hp engine	$10,000	401-500 hp engine	$37,500
126-150 hp engine	$12,000	500+ hp engine	$42,500
151-200 hp engine	$13,000		

Source: USDA-NRCS, California.