



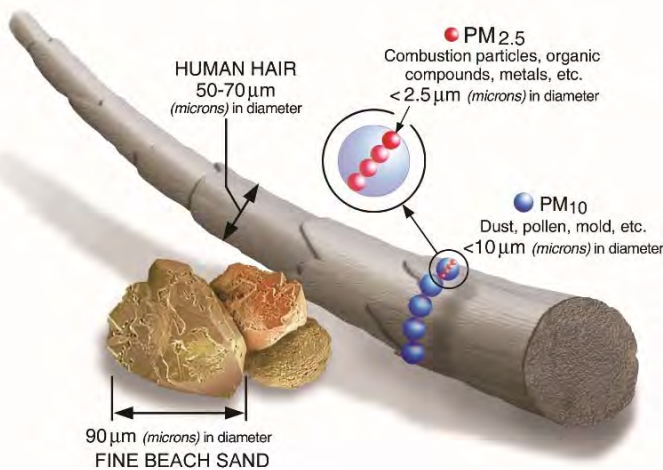
DESERT BREEZE

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Particulate Matter (PM)

Particulate Matter (PM) is a mixture of finely divided solid particles or liquid particles found in surrounding air. Examples of PM are dust, fly ash, soot, smoke, aerosols, fumes, mists and condensing vapors that can be suspended in the air for extended periods of time. Some PM are directly emitted from sources such as construction sites, unpaved roads, fields, wood burning stoves and fireplaces, and wildfires and brush/waste burning. Some are formed in our air as a result of complex reactions of chemicals such as sulfur dioxide and nitrogen oxides which are emitted from power plants, industrial sources and motor vehicles.



Exposure to PM causes various health problems and they are well documented. The smaller the particles, the deeper they can penetrate into our respiratory systems and the more hazardous they are to breathe. Health problems from short term (hours, days) and long term (months, years) PM exposure include asthma, chronic lung diseases, decreased lung function, increased respiratory symptoms (coughing or difficulty breathing) and irregular heartbeats. Children, elderly people and susceptible groups with pre-existing heart or lung diseases are most vulnerable to PM exposures.

Because of those effects, EPA regulates Particulate Matter (PM) to provide public health and welfare protection. EPA is also responsible for setting the standards called National Ambient Air Quality Standards (NAAQS). PM NAAQS are regulated depending on the size: PM₁₀ (inhalable particles with aerodynamic diameter 10 micrometers and smaller) and PM_{2.5} (fine inhalable particles with aerodynamic diameter 2.5 micrometers and smaller). Latest PM standards can be found at <https://www.epa.gov/criteria-air-pollutants/naaqs-table>. Currently, EPA states that our District attains PM_{2.5} standards. As for PM₁₀, EPA designates our District with three different attainment/nonattainment areas. District's PM₁₀ attainment status can be found at <https://www3.epa.gov/region9/air/maps/pdfs/air1300053-1-reg9-pm10-naaqs-designs.pdf>.

Here are a few things we can do to reduce PM pollutions:



- Reduce driving on days with poor air quality.
- Avoid outdoor activities on days with poor air quality.
- Avoid using wood stoves and fireplaces on days with poor air quality.
- Drive slowly on unpaved roads and other dirt surfaces.
- Participate in our District's air quality improvement programs such as DMV Grant Program and Carl Moyer Program.

District is also trying to reduce PM emissions by adopting and amending rules. For example, in March 2015, District amended Rule 402 – Fugitive Dust to prevent, reduce, and mitigate fugitive dust (PM) emissions with more stringent measures and also adopted Rule 402.2 – Agricultural Operations. Because it is all about the people, making sure we can live, breath, and work today and tomorrow while District's time and resources goes towards the goal of attaining cleaner air.



By *Wunna Aung*

Wind Turbines

A wind turbine is used to transform the kinetic energy of the wind into electrical power. Smaller turbines are used to generate electricity for specific applications that have smaller load requirements. Large turbines can be assembled in arrays called wind farms. These wind farms can deliver the power produced to the electrical grid to be used by end consumers. This process is referred to as 'clean' or renewable energy because it can be produced without the pollution of burning fossil fuels, and because all the power generated by wind today will be available to generate more tomorrow.

Located in Kern County is a world premier wind resource area. What this means is that conditions for the generation of energy by harvesting wind power are very good. There are four locations, in the world, that are the best for harvesting the power of the wind. The Tehachapi area is one of the four. The Tehachapi Mountains, including the Pass, associated ridges, and eastern slopes are a superb location for



the generation of energy from the power of the wind. Taking advantage of the brisk winds common in this area is four generations of wind turbine technology.

tions of wind turbine technology.

Newer turbines are replacing older ones as wind 'farms' seek to increase capacity within a constrained geographic area, in a process referred to as 're-powering'. The areas determined to be suitable for wind farms are limited by environmental and social concerns. Horizontal Axis Wind Turbines (HAWT) are dominant in the Tehachapi area, however there are also Vertical Axis Wind Turbines (VAWT). Generally the HAWTs are more efficient than the VAWTs.

The theoretical yield of a wind turbine increases as a factor of the wind speed cubed. Therefore, the lo-

cation of a wind turbine is critical to achieve the greatest return (the electricity generated and sold), for the investment made (design, construction, and maintenance costs). Modern wind turbines are constructed with advanced technology and materials. A new wind turbine may have more than 7,000 components. New wind turbines have blades that average more than 160 feet long, atop towers that average more than 260 feet high. Most components in domestic wind turbines are manufactured here, in the United States.



The most recognizable part of a wind turbine is the rotor assembly. Resin layup techniques and resin injection molding are common in the manufacture of the rotor. Blades made with resins of polyester and epoxy combined with glass and carbon fibers can be used to manufacture rotors with desirable properties like high strength and stiffness, and low weight. The area that the blade passes through is called the disk area, and longer blades mean a larger disk area. More energy can be generated from the same wind speed with a larger disc area. Wind turbines produced currently are designed to be more efficient than ever before. Wind modeling is used to optimize array and turbine design for maximum production and efficiency.

With annual growth in excess of 25% for the last decade, wind power is a dynamic industry. More than 4% of all electricity produced in the United States is from wind power, and that share is growing with the industry. According to the National Renewable Energy Laboratory the *potential* for wind powered electricity generation in the United States is much more than the total annual U.S. consumption of electricity.

By: Brenton Smith

Residential Wood Burning

This is the season of cool weather and the sweet smell of wood burning stoves. The smell of wood smoke can evoke many fond memories but do you know what makes it smell so sweet? Wood smoke contains a complex mixture of particulate matter, volatile organic compounds, carbon monoxide, and toxics such as benzene, toluene, and aldehyde gases.



People typically spend a great deal of their time at home and are potentially exposing themselves to fine particulate matter pollution, if they heat their home with wood. In addition to the smoke that can be released inside the home, studies show that an estimated 70 percent of smoke

from chimneys can re-enter the home and other neighborhood dwellings. Numerous scientific



studies have linked particulate matter pollution to a variety of health problems.

Particulate matter 10 micrometers in diameter and smaller (PM₁₀) pose the greatest health risks,

because they can get deep into the lungs causing irritation and blockage. Breathing-related illnesses increase for at risk groups such as children, elderly, and those with existing heart and lung disease when PM₁₀ levels increase in ambient air. Even healthy people may experience temporary symptoms from exposure to elevated levels of PM₁₀.

So what can be done to reduce particulate matter pollution from wood burning devices?

People who heat with wood should do so as cleanly as possible. Never burn household waste in your fireplace or woodstove and only burn clean, dry, seasoned wood, and maintain a hot fire. Old inefficient fireplaces and woodstoves should be replaced or retrofitted with an EPA-certified insert or new device. Replacing your old woodstove can reduce particulate and toxic air pollution by up to 70 percent. Each old woodstove replaced is equivalent to eliminating particulate emissions from five old diesel buses. Homeowners can further reduce health risks by switching to a pellet stove or by burning a cleaner fuel, such as natural gas or propane.

By: Jeremiah Cravens



The District will end the Subscription Program as of December 31, 2016. In our continuing efforts to keep you informed, please refer to our website at www.kernair.org for the most current District information available regarding our Board of Directors, grants, rule development, agendas, public notices, news, reports, and forms available.

Board of Directors

Ed Grimes, Chair (Councilman, Tehachapi)
Rick Warren, Vice Chair (Councilman, California City)
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Board of Directors usually meet once every two months starting in January at various locations.

Air Pollution Control Officer

Glen E. Stephens, P.E.

Hearing Board Members

Bill Deaver
Doris Lora
Dr. Wallace Kleck
Chris Ellis
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For news updates and other information, please visit the Eastern Kern APCD website at www.kernair.org

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