

Combating Fugitive Dust On Wind Farms

Wind farm developers and operators know firsthand the problems that fugitive dust and erosion pose during construction.

BY BOB VITALE

Remember that melody by Kansas, "Dust in the Wind"? Its lyrics preach that a lifetime is just a short and unfulfilling affair. Unfortunately, that recipe for apathy has largely been the case when it comes to addressing dust problems at modern wind farms.

During construction at the site

of a wind farm, massive amounts of dust are kicked up into the atmosphere or are lost via erosion. This continues during wind farm operations, as unpaved roads are the norm. What is considered state-of-the-art dust control in many areas is merely the use of water. However, this method can be expensive or in-

effective and can contribute to severe soil erosion.

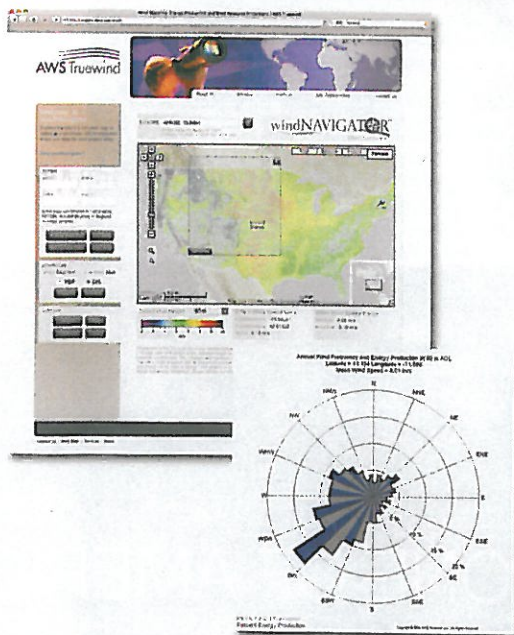
Possible solutions to the problem posed by dust and erosion include vehicle restrictions, paving and surface treatment. It is important that the right approach is taken to safeguard the environment. Further, plants that neglect dust problems are

likely to either face permitting barriers or create ill will within the local population.

Protecting the environment

It is standard practice on wind farms to conduct detailed studies to prevent damage to birds, bats, animal habitats and vegetation. Great care is

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taken by all concerned to execute the findings to minimize environmental impacts during construction and plant operations.

The same cannot be said for dust management and erosion. Wind farms are constantly faced with the challenges of maintaining construction site surfaces. Wash boarding, rutting and potholes on haul roads, as well as on unpaved roadways and construction yards, can increase maintenance costs significantly while lowering on-site productivity. In fact, unchecked dust and unstable soil conditions can hurt almost every aspect of construction operations – from unsafe traffic areas to restricted earthmoving operation to ineffective maintenance.

According to the Environmental Protection Agency (EPA), unpaved roads leading to and from construction areas are a large source of fugitive dust. In some areas, the EPA estimates that fugitive dust accounts for 50% of emissions. It is no surprise, therefore, that state and local regulations require control of particulate matter (PM).

Fugitive dust can have a serious effect on day-to-day operations of a wind farm, leading to diminished visibility, congested breathing, increased vehicle maintenance and storm water runoff problems. These issues can adversely affect the safety and morale of personnel and hamper the efficiency of operations.

Regulatory clampdown

Of the approximately 4 million miles of U.S. roads, about half are paved. In some states, as much as 70% of roads are unpaved. Furthermore, there are tens of thousands of construction sites that require temporary unpaved roads. In addition to dust emissions, vehicles pulverize surface materials, and that leads to soil erosion. A regulatory framework is now in place to address these matters.

In 1987, the National Ambient Air Quality Standard was set at PM 10 (i.e., PM no greater than 10 microns in diameter – about one-sixth the width of a human hair). In 1997, PM 2.5 was introduced. The EPA found that particles below 2.5 microns

were far more harmful than those in the 2.5 micron to 10 micron range.

These days, the environmental agencies monitor particulate emissions in every county in the nation. Those counties that have poor air quality are designated as non-attainment areas. In such regions, the EPA is being particularly vigilant, and violators are subject to fines and other enforcement actions.

The Occupational Safety and Health Administration can also be involved in air quality issues. Congested breathing, accidents due to diminished visibility or potholes, and other health, safety and morale-related issues can hamper operational efficiency and rapidly bring investigators on-site. The bottom line is that an efficient and effective work surface where dust is controlled will reduce workers' compensation claims and heighten morale.

There are other fugitive dust issues to consider beyond those of regulation and health. Failure to control dust and maintain the smoothness of surfaces increases the cost of equipment maintenance. In extreme cas-

es, it might even lead to mechanical problems in wind turbines.

Construction sites also tend to erode at much higher rates than other areas. As a result of runoff or windblown particles deposited into drains, ditches or lakes, sediment can seriously endanger plant and aquatic life. Each phase of a construction project has the potential to create significant volumes of sediment runoff. Controlling erosion on construction sites, therefore, is important, regardless of particle size.

Remediation of dust and erosion

There are several ways to combat dust and erosion. Obviously, paving surfaces solves the problem. Paving can be costly and is often unwanted, either due to aesthetic or environmental considerations. The price tag can be reduced by using gravel or slag. This helps to lower the silt content of the unpaved surface and cuts down on emissions. However, this option requires regular maintenance, including re-grading of surfaces and replenishing the gravel or slag covering from time to time.

Easy. Breezy.

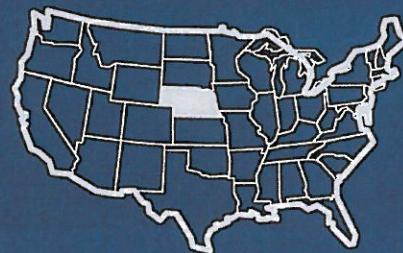
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As a means of environmental protection, water is not an effective solution to dust pollution.

Photo courtesy of Midwestern Industrial Supply Inc.

Another possible remedy is to restrict traffic. This strategy is based on the fact that dust and erosion rise linearly based upon the volume of traffic and the weight of the vehicles. Programs that limit the number of miles traveled on roads can go a long way in reducing emissions.

Surface treatment is another option for reducing dust and erosion. At most sites, however, surface treatments only go as far as watering. Water helps to compact

the roadway, establish a vegetation cover for better erosion control and make grading easier. This option is becoming steadily more expensive, and as many Western states are discovering, it is not an unlimited resource.

Water evaporates rapidly and has to be reapplied continuously for it to remain effective. Runoff, too, is a leading cause of erosion, and water grinds larger particulates into finer ones. When the water dries, more dust remains. As a means of environmental protection, water is not an effective solution to the problem.

For about the same cost as water, it is possible to manage most aspects of fugitive dust on wind farms and particulate emissions of PM 10 and PM 2.5 on haul roads by using surface treatments based on chemical stabilization. When executed properly, this strategy improves the compressive strength of roadway materials, which, in turn, serves as dust control and surface stabilization.

Chemical treatment seeks to change the physical characteristics of

the road surface, thereby suppressing emissions. This process can be accomplished, for example, by forming a hardened surface that binds particles more closely together.

Some companies use water to control dust, and they address erosion control when it becomes an issue. This choice can be expensive. Sediment control is far more expensive than erosion control and far less effective. By stopping erosion before it becomes sediment, it is possible to avoid costly cleanup and environmental effects before they occur. Treatments are available that specifically target the control of erosion, sediment, silt and storm water runoff.

Older treatment options often require harmful substances as part of the treatment. Modern chemicals are available, though, that are environmentally safe and provide superior performance in terms of erosion prevention and dust control.

Permit liabilities

The subjects of dust suppression and erosion prevention relate directly

to project permitting. Storm water permits, for example, are becoming more and more a factor as water quality remains a core concern of regulatory agencies. Without proper planning to protect the soil surface, erosion can have a negative impact on the environment, and an inability to control it exposes the developer to fines and legal liabilities on top of the high cost.

But more importantly, permitting failures can effectively end a project. If residents find greater quantities of dust accumulating on their coffee tables, or a greater incidence of allergies and asthma, there will be local repercussions. *ERP*



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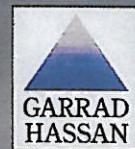
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