The Sustainable Pavement


ENERGY & RECYCLING


PERFORMANCE


WATER QUALITY


CLEAN AIR & COOL CITIES

APA ASPHALT PAVEMENT ALLIANCE

Clean Air & Cool Cities

Lower greenhouse gases, lower fuel consumption

The production and placement of asphalt pavements consumes less fuel and produces lower levels of greenhouse gases. According to a recent study, asphalt pavements require about 20 percent less energy to produce and construct than other pavements.[1] Less fuel consumption means less production of carbon dioxide and other greenhouse gases.

Since 1970, the asphalt industry has decreased total emissions from plants by 97 percent while increasing production by 250 percent.[2] Emissions from asphalt plants are so low, the EPA considers them as only minor sources of industrial pollution.[3]

The asphalt industry is also working on ways to reduce the temperatures at which asphalt pavements are produced and placed. Typically, asphalt paving temperatures are in the range of 280 to 320°F. Lowering these temperatures by 50°F or more would save fuel and reduce production of greenhouse gases and other emissions. Working in cooperation with the Federal Highway Administration, state Departments of Transportation, and other key stakeholders, the asphalt industry's research on several new warm-mix technologies holds great future promise.

Asphalt moves traffic along

When traffic backs up, cars and trucks consume fuel unnecessarily and produce excess emissions. One way to reduce both fuel consumption and emissions is to keep traffic moving along. Asphalt's speed of construction allows planners and managers a way to fix congestion hot spots and bottlenecks, quickly and cost-effectively—often, all the work can be done at off-peak hours, so that the morning and evening commutes go smoothly. Because a newly rehabilitated asphalt road can be opened for traffic as soon as it has been compacted and cooled, keeping lanes coned off for curing is not necessary.

Driving on smooth roads also saves fuel. Studies at a Nevada test track showed that vehicles driving on smooth roads consumed 4.5 percent less fuel, on average, than on rough pavement.[4] Asphalt can make rough roads smoother, quickly, cost-effectively, and without prolonged road closures.

Urban heat island reduction: how asphalt pavements can help

The urban heat island (UHI) effect—the phenomenon that makes cities 2 to 10°F warmer than nearby rural areas on a hot summer day—is not a black and white issue. Many factors contribute to heat retention in urban areas. And, many strategies for reducing the UHI effect are being explored.[5]

Because pavements cover a large percentage of urban areas, and because improvements to pavements occur more frequently than improvements to buildings, pavement-related strategies for cooling off the city core are of interest.

Some attention has been given to the idea of making pavements more reflective, on the theory that a lighter-colored or more reflective surface may keep things cooler. But on closer look, it is seen that many factors other than color and reflectivity—including pavement thickness and the type of surface used—can influence the way a pavement retains, radiates, and/or

Clean Air & Cool Cities

releases heat. When and how heat is released is also of importance.

Porous asphalt pavements have been shown to lower nighttime surface temperatures as compared to other pavements. A thermal image taken by satellite (ASTER) over Phoenix in October 2003 (Figure1) shows that an impervious freeway which has been resurfaced with open-graded asphalt is actually cooler at night than nearby freeways without the asphalt surface. Also influencing the cooling of pavements is the presence of sound walls (which can trap heat), vegetation cover on the adjacent landscape, whether the pavements are at or below grade, and the thickness of the pavement itself. In the same ASTER image, the hottest heat signature is at the airport, where the impervious runways are 23 inches thick.

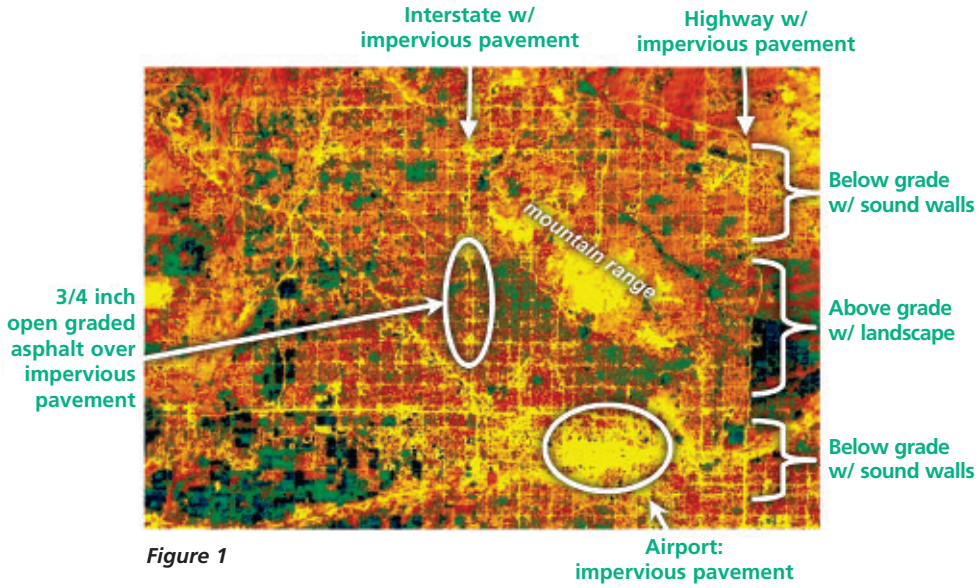

Figure 1

REFERENCES

1. Gambatese, John A. and Sathyanarayanan Rajendran**, "**Sustainable Roadway Construction: Energy Consumption and Material Waste Generation of Roadways," American Society of Civil Engineers, Reston, VA. Proceedings of 2005 Construction Research Congress. (http://www.pubs.asce.org/WWWdisplay.cgi?0520020. Downloaded June 22, 2006.)

2. *Report to Members 2001,* National Asphalt Pavement Association, Lanham, MD. 2002.

3. *Federal Register,* February 12, 2002, pp. 6521 ff. (http://frwebgate.access.gpo.gov/cgi-bin/getpage.cgi?dbname=2002_register&position=all&page=6521, accessed September 7, 2006.) Also, *Federal Register,* November 8, 2002, pp. 68124 ff. (http://frwebgate.access.gpo.gov/cgi-bin/getpage.cgi?dbname=2002_register&position=all&page=68124, accessed September 7, 2006.)

4. Sime, M., et al. *WesTrack Track Roughness, Fuel Consumption, and Maintenance Costs.* Tech Brief published by Federal Highway Administration, Washington, DC. January 2000.

5. Golden, Jay, and Kamil Kaloush, "A Hot Night in the Big city: How to Mitigate the Urban Heat Island," *Public Works,* December 2005. (http://www.pwmag.com/industry-news.asp?sectionID=770&articleID=268116, accessed September 5, 2006.)

Printed with environmentally-friendly ink made from linseed oil.

www.asphaltalliance.com
1-877-272-0077

IM035C