Silver and white cars are cooler, says study

October 25 2011, by Nancy Owano

Black and silver experimental vehicles parked facing south in Sacramento, California on July 17, 2010.

(PhysOrg.com) -- From an environment standpoint, silver and white cars are cool; black cars are not. Researchers at the Berkeley Lab Environmental Energy Technologies Division (EETD) say that the color of your car affects your car's fuel economy and how seriously you contribute to pollution. A light-colored shell reflects more sunlight than a dark car shell. The cooler the color, the cooler the cabin air, and the less of a need to run your air conditioner.

Ronnen Levinson, scientist in the Heat Island Group at Lawrence Berkeley National Laboratory, is lead author of the study. The research was published in *Applied Energy*.

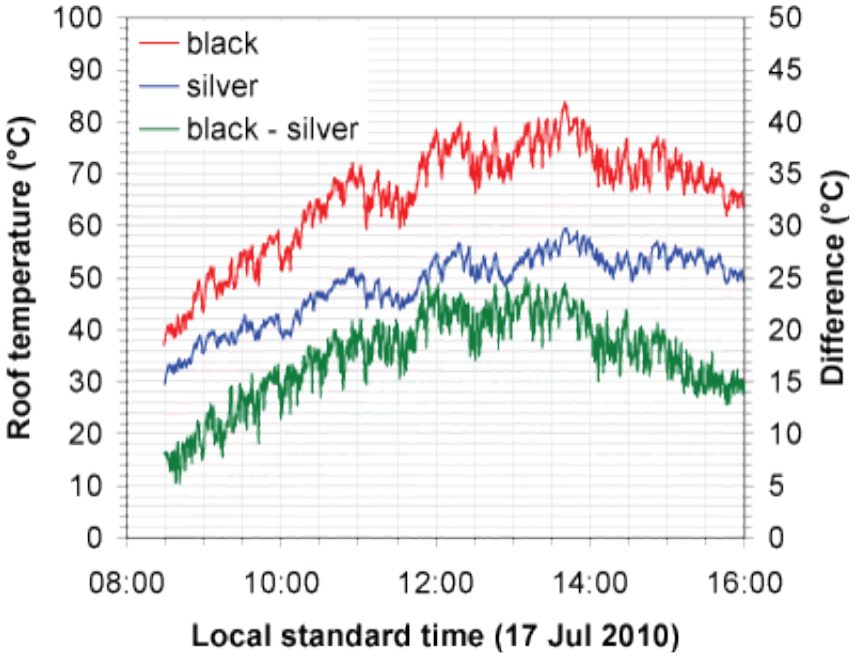
The researchers had two cars in the sun for an hour, one black and the other silver, parked facing south, in Sacramento, California. The silver Honda Civic (shell SR 0.57) had a cabin air temperature of about 5-6°C

(9-11°F) lower than an identical black car (shell SR 0.05).

A silver (or white) shell would allow for a lower-capacity air conditioner as well. The cars were run through five identical cycles of soaking in the sun. Each cycle consisted of an hour with the air conditioners off, followed by a half hour of cooling with the air conditioners running at maximum. The researchers measured the roof, ceiling, dashboard, windshield, seat, door, vent air and cabin air temperatures in each car along with weather conditions in the lot.

Overall, the numbers compiled in this car-color exercise found that using white or silver paint instead of black paint would raise fuel economy by 0.44 mpg (2.0 percent); would decrease carbon dioxide emissions by 1.9 percent, and reduce other automotive emissions by about 1 percent.

Air conditioning in cars not only decreases fuel economy but also increases tailpipe emissions of greenhouse gases and air pollutants. In this sense, cool-color cars influence both the driver and the planet.



Comparison of roof surface temperatures measured during soaking and cooling trials.

The numbers continue to take on special significance when extended nationwide. An improvement of 2 to 2 percent in fuel economy, scaled to the fleet of light-duty vehicles in the United States, represents savings of gallons of gas in the billions, if these design changes are adopted by the automotive industry.

White, silver, and other light colors are coolest, reflecting about 60 percent of sunlight but there are dark "cool" colors that can also stay cooler than traditional dark colors. When dark surfaces are needed for aesthetics or to reduce brightness, one can use special "cool-colored" materials that stay moderately cool by reflecting only the invisible component of sunlight. Solar reflective paints can decrease the ‘soak' temperature of the air in a car that has been parked in the sun.

Manufacturing designers looking more closely into recipes for pigmented coatings that maximize solar reflectance colors would find plenty of interesting research into cool colors at the Berkeley Lab. Its researchers have been looking into roofs and cool colors for some years. They have been measuring the solar spectral reflectance (reflectance versus wavelength over the solar spectrum) of commercially available pigments. The research team has developed a pigment database describing a variety of colors, including browns, blues, purples, greens, and reds, that are cool, in that they are highly reflective to near-infrared radiation.

More information: eetd.lbl.gov/news-archives/news-cool-cars.html
eetd.lbl.gov/newsletter/nl19/eetd-nl19-1-cool.html

Paper reference: "Potential benefits of solar reflective car shells: Cooler cabins, fuel savings and emission reductions." Ronnen Levinson, Heng Pan, George Ban-Weiss, Pablo Rosado, Riccardo Paolini, and Hashem Akbari, was recently published in the journal *Applied Energy* (Volume 88, pp. 4343–4357).