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Subject: PRG FRIDAY FOCUS:: July 4th Travel Week -MIT Experts Say Better Pavement Means Better Fuel Econ/Less Emissions

As we begin the July 4th travel season today, I wanted to remind you of the great work and important research our friends at the [MIT Concrete Sustainability Hub](#) are conducting on Pavement-Vehicle Interactions – studies about how we can lower fuel consumption and vehicle emissions by taking a new approach to building and maintaining our roadways. It is a perfect add-in to any stories you or your colleagues may be considering on the heavy travel week this July 4th. If you are currently on the Chesapeake Bay Bridge right now – like my kids – you know EXACTLY what I mean... Slow, Slow, slow....

Wasted Energy

All vehicles, whether gasoline, diesel, or electric, use energy to move—but some of that energy is wasted. The quality of the roads we drive on every day impacts the amount of fuel we use, as well as the associated greenhouse gas emissions. On roads with poor surface conditions or inadequate structural properties (like many in our favorite District) vehicles consume additional fuel beyond what's needed to move.

This wasted fuel is known as excess fuel consumption, and it has a significant impact on fuel economy and vehicle emissions.

Pavement Improvements Help Reduce Fuel Consumption

MIT Concrete Sustainability Hub (CSHub) researchers study pavement-vehicle interaction (PVI) in an effort to understand and quantify the impacts of excess fuel consumption. MIT's research focuses on three key factors:

1. **ROUGHNESS:** whether the road is bumpy or smooth. Roughness, commonly seen and felt as the presence of cracks and potholes, has a significant impact on passenger vehicles.
2. **TEXTURE:** the abrasiveness of the road surface, which can be seen and heard when driving.
3. **DEFLECTION:** the bending of a pavement under the weight of a vehicle. Deflection is present from the initial construction, and depends on pavement design. Think of the difference between walking or riding on sand versus a paved surface.

Solutions Mean Better Fuel Efficiency, Less Emissions

CSHub studies suggest that excess fuel consumption can be significantly reduced by building stiffer roads and maintaining smoother pavements—benefiting states and municipalities alike through reductions in emissions and fuel costs to drivers. And it reduces road wear costs on vehicles and tires, while improving driving comfort.

Pavement Improvement Case Study

QUANTIFYING FUEL WASTE ON U.S. ROADWAYS: The impacts of excess fuel consumption depend on a variety of factors, including location, traffic levels, pavement designs, and maintenance schedules. MIT has done case studies examining real roadway networks, including in California and Virginia:

- **California:** Using data collected by the California Department of Transportation (Caltrans) through the use of GPS and ground-penetrating radar, MIT conducted an analysis of the state's entire 50,000 lane-mile system and found excess fuel consumption of 1 billion gallons over a 5-year period. The collaboration showed that PVI, including roughness and deflection, accounts for 1 percent of overall fuel consumption on California highways.

- **Virginia:** A study of the Commonwealth’s interstate highway system—some 5,000 lane miles in total—identified 1 million tons of CO2 associated with EFC emissions over a 7-year period. Researchers also determined that only 1.3 percent of the interstate network is responsible for 10 percent of its total greenhouse gas emissions, meaning rehabilitation of those few lane miles could result in significant environmental improvements.

Who Can Help

If you’re looking for a resource to discuss the impact of pavement interaction on fuel economy and emissions, MIT’s Jeremy Gregory (jgregory@mit.edu) is available to address the key issues, impacts and examples surrounding improved pavements and infrastructure ... and how this affects American communities and drivers.

[MIT’s Concrete Sustainability Hub \[cshub.mit.edu\]](http://cshub.mit.edu) is pushing the frontier of academic research into building materials, with implications for policymakers, communities, the transportation industry, fleets and the millions of American drivers hitting the roads over July 4th and all summer.

For more info, drop me a note, reach out to Jeremy or connect with MIT communications person Anne Wilson Yu. You can reach her at awwilson@mit.edu

Where to Look

<https://cshub.mit.edu/pavements/pvi>

<https://cshub.mit.edu/>

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If you or any of your colleagues are covering this crazy, upcoming July 4th travel week and looking for good fuel economy/emissions sidebar, please let us know and we can help.

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