

Charting a course toward cleaner cars

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(PhysOrg.com) -- The emissions from cars and light trucks account for 16 percent of the total greenhouse gas (GHG) emissions in the United States, and these vehicles use 47 percent of all the petroleum consumed in this country. Without strong action, those numbers are expected to keep rising, but reducing the nation's impact on global climate change and dependence on oil imports has presented a daunting task. Now, a new MIT report outlines a set of policies that could accomplish that goal in the next few decades.

The recommended policies would require manufacturers to make more [fuel-efficient cars](#), and encourage consumers to buy them and then drive them in a fuel-efficient manner. Meanwhile, the report calls for the nation to develop a comprehensive strategy on fuels, setting long-term

targets that account for the life-cycle emissions as well as production, distribution and vehicle requirements for each possible fuel.

“If we’re serious about reducing petroleum consumption and GHG emissions, we need to look at the whole system — at everyone who makes, buys, and uses vehicles and their associated fuels,” says John Heywood, professor of mechanical engineering, emeritus. “All the pieces are interrelated, and we need them to work together. For example, tighter regulations can push industry toward higher fuel economy, but then we need to create incentives for consumers to buy those cars, which may be smaller, lighter and more expensive than they’re used to.”

For [policymakers](#) in Washington, taking a systems view is difficult because of the politics involved. Interest groups are constantly diverging into separate camps and lobbying for separate policies.

To help demonstrate how a systems approach could work, Heywood turned to 10 of his graduate students in the Sloan Automotive Laboratory who study different aspects of the transportation problem — from technology and fuels options to [consumer behavior](#) to the impacts of specific policies. Heywood issued this group a challenge: come up with a sensible, effective and realistic policy portfolio.

Guided by Heywood and feedback from several outside experts, graduate students Valerie Karplus and Donald MacKenzie of MIT’s Engineering Systems Division integrated the group’s ideas into a report called “An Action Plan for Cars.” The study was supported in part by the MIT Energy Initiative.

The first group of policies aims to reduce the fuel consumption of new vehicles. The report recommends that the U.S.:

- Continue to tighten the Corporate Average Fuel Economy (CAFE)

standards for the fuel economy of new cars—well beyond the current 2016 target of 34.1 mpg.

- Establish a “feebate” system under which buyers of new cars would get a rebate if they choose fuel-efficient models, or pay a fee if they go for gas-guzzlers.
- Increase taxes on motor fuels by 10 cents per gallon each year for at least the next 10 years.

To make rising fuel taxes more palatable, drivers would see reductions on their income taxes or payroll taxes. But some of the revenue would be used to improve the U.S. transportation infrastructure. “Our roads and bridges are in real need of maintenance and improvement,” says Heywood.

Other policies would help consumers buy and drive more wisely by giving them more information, including a clear presentation on [fuel-economy](#) stickers of miles per gallon for both highway and city driving. In addition, the report suggests teaching people better driving behaviors: Driving at a steady speed and avoiding rapid braking and accelerating can reduce fuel use by 10 percent or more compared with more aggressive driving.

As for fuels, Heywood notes that current initiatives, laws and requirements are “piecemeal.” The MIT team recommends that all transportation fuels should be evaluated on the basis of their full life-cycle GHG emissions. “While that may seem obvious, the devil is in the details on this one,” says Karplus. For example, growing biofuels in place of food crops in Iowa may push up food imports from Brazil, where the need for added agricultural land could lead to destruction of rainforest, and thus loss of an important absorber of atmospheric carbon dioxide. And although electric vehicles emit no tailpipe emissions, recharging their batteries may increase electricity generation from GHG-emitting power plants.

The report suggests a high-level strategy to identify fuels and technologies that can best contribute to displacing petroleum and reducing GHG emissions. That policy should address the need for developing fuel production capacity, distribution infrastructure and compatible vehicles at the same time.

Heywood says the report is meant to demonstrate a set of integrated policies that can help us “define where we want to get to, decide whether a given path shows potential for getting us there and then plan so that we can both get moving and get wiser.”

David Friedman, research director of the Clean Vehicles Program for the Union of Concerned Scientists, says that "American transportation and energy policy has suffered from a fundamental flaw: we haven't had one. Instead we've had a policy of either ignoring the problems or casting about for silver bullets and magic wands to solve them. The MIT team takes on this flaw with their outline of a comprehensive approach” to the problems. “Many of the recommendations,” he says, “deserve significant attention from the president and leaders in Congress who are fighting to create new jobs and a clean energy future.”

Karplus adds: “We aren’t necessarily saying to adopt this set of policies exactly as written, but we’re demonstrating how Washington can think about policies in a way that considers how they might best work together.”

Provided by Massachusetts Institute of Technology

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