Applying auto industry's fuel-efficiency standards to agriculture could net billions

October 15 2018

Credit: CC0 Public Domain

Adopting benchmarks similar to the fuel-efficiency standards used by the auto industry in the production of fertilizer could yield $5-8 billion in economic benefits for the U.S. corn sector alone, researchers have

concluded in a new analysis.

The work, appearing in the journal *Nature Sustainability* and authored by New York University's David Kanter and Princeton University's Tim Searchinger, examines the potential impact of a policy to reduce nitrogen emissions in fertilizer—one modeled on the Corporate Average Fuel Economy (CAFE) standards that are used to increase the fuel efficiency of vehicles in the U.S.

"A CAFE-style approach to reducing nitrogen pollution could provide powerful incentives for fertilizer manufacturers to learn where and how enhanced-efficiency fertilizers work best, and ultimately to develop more technically sophisticated nitrogen products tailored to specific crops, climates, and soil conditions," they write.

Nitrogen pollution represents a significant environmental concern, scientists have concluded, and comes mainly from the inefficient use of fertilizer and manure on farms. Others have found policies to address this pollution source to be largely ineffective, largely because of the challenges in both changing farming practices and in monitoring and enforcement.

"Moreover, the farm lobby is an extremely powerful political force in many countries," observe Kanter, a professor in NYU's Department of Environmental Studies, and Searchinger, a research scholar at Princeton's Woodrow Wilson School of Public and International Affairs. "Consequently, new policy options for addressing this environmental issue need to be explored."

In their analysis, the researchers turned to U.S. fuel efficiency standards, which focus on the car industry instead of consumers, and evaluated whether the fertilizer industry could be a newfound regulatory focus of nitrogen policies.

Specifically, they evaluated the potential impact of a requirement to steadily increase the proportion of enhanced efficiency fertilizer sold with traditional fertilizer—with the implicit aim of incentivizing technology development in this industry. India implemented such requirements in 2015.

As with cars, the price of enhanced-efficiency fertilizers (EEF) could be more costly to growers; however, they could also potentially bolster profits because lower amounts are needed to grow crops—in the same way fuel-efficient cars require less gasoline. EEFs, already produced by several major fertilizer companies, have been shown to reduce nitrogen losses and improve yields—yet EEFs are currently used on only about 12 percent U.S. corn cropland.

In their analysis, the researchers adopted a case study—the U.S. corn industry, which devotes approximately 33 million hectares of American cropland to corn production and has the highest nitrogen application rate of any major crop in the U.S.

To estimate the impact of wider usage of EEFs, they examined, over a 10-year period and using different scenarios, how a CAFE-style standard mandating that EEFs compose higher percentages of nitrogen fertilizer sales—e.g., 20 percent of sales by 2020 and 30 percent by 2030—would affect incomes from higher yields and increased fertilizer costs.

Their results showed that higher efficiency standards, depending on the standard set, could produce net economic benefits of $5-$8 billion per year by 2030. These benefits include both a combination of farmer and industry profits as well as environmental and human health gains from avoided nitrogen pollution, the researchers explain.

Specifically, farm profits are due to slight boosts in yield, which offset the increased cost of EEF use, while industry profits arise from

increased sales of EEFs, which have a higher profit margin.

The researchers add that the impact of such standards for fertilizer could be felt more immediately than that for cars—CAFE requirements apply only to newly sold cars, which have an average fleet turnover of nearly 16 years, while fertilizer is bought annually, so improved products will have an instantaneous effect.

"A state could pioneer such an approach—possibly California, which has already adopted ambitious climate goals across all sectors," Kanter and Searchinger propose. "Although the heterogeneity of agricultural, climatic, and political systems across the world requires a range of policy approaches to address the nitrogen pollution issue, industry-focused technology-forcing policies could be a promising option for reducing nitrogen losses, even as we push our planet to produce far more food."

More information: "A Technology Forcing Approach to Reduce Nitrogen Pollution," *Nature Sustainability* (2018).

Provided by New York University