Researchers examine world's potential to produce biodiesel

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What do the countries of Thailand, Uruguay and Ghana have in common? They all could become leading producers of the emerging renewable fuel known as biodiesel, says a study from the University of Wisconsin-Madison Nelson Institute for Environmental Studies.

The ease of manufacturing biodiesel from vegetable oils and animal fats has made it one of the most promising, near-term alternatives to fossil fuels. Seeking to understand which nations are best positioned today to enter the burgeoning biodiesel market, researchers Matt Johnston and Tracey Holloway of the Nelson Institute's Center for Sustainability and the Global Environment (SAGE) ranked 226 countries according to their potential to make large volumes of biodiesel at low cost.

Reported online today (Oct. 17) in *Environmental Science and Technology*, the analysis uncovered many of the usual suspects, including the United States, a top soybean grower; and Brazil, already a major biodiesel producer. The Netherlands, Germany, Belgium and Spain also cracked the top ten in overall volume potential.

But the researchers say the study's true motivation was to identify developing countries that already export significant amounts of vegetable oil for profit, but may not have considered refining it into biodiesel. By exporting biodiesel - a higher value commodity - these countries could improve their trade balances, says Johnston, or use the fuel to offset their own energy needs.

"A lot of these countries don't have any petroleum resources and so they're having to import petroleum," he says. "At the same time, they're exporting vegetable oil that they could be turning into biodiesel and using domestically."

Overall, the study ranked Malaysia, Thailand, Colombia, Uruguay and Ghana as the developing nations most likely to attract biodiesel investment, not only because of their strong agricultural industries, but also due to their relative safety and stability, lack of debt, among other economic factors.

Johnston emphasizes, however, that the set of criteria he and Holloway used is just one among many.

"As long as they're profitable and have large volumes of vegetable oils, all the countries on our list - even if they aren't on our top ten list - they could do this," he says.

The idea for the analysis first struck Johnston on a visit to a remote island of Fiji, where people rely primarily on petroleum diesel to run generators for electricity. Transported in by boat, the fuel cost the equivalent of $20 per gallon. Meanwhile, the islanders were growing coconuts and processing them into oil that sold for 50 cents a liter.

"The price disparity was just incredible," says Johnston, "and it prompted me to think about where else in the world countries might have this biofuels potential, but not necessarily realize it."

At the same time, many agencies - chief among them the United Nations - have raised concerns about the biofuel industry's possible impact on the world's poor, as vegetable oils, now used for food, are increasingly diverted to fuel production. Rampant growth of biofuels could also negatively affect the environment; a soaring demand for palm oil, for

example, has already led to deforestation in Southeast Asia.

By highlighting the places in the world where biodiesel development will likely happen, Johnston and Holloway hope their analysis will help people foresee these problems and make plans to mitigate them.

"We're not saying, 'There's all this potential out there, go get it,'" says Johnston. "Instead, we're looking at which vegetable oil feed stocks are most likely to be affected and which countries will most likely be doing this at a large-scale. That way, we can anticipate some of the impacts, as opposed to having to react after the fact."

Of all the vegetable oils and animal fats examined in the study, soybean and palm oil were by far the most common. In fact, the world's top five soybean and palm oil producers - Malaysia, Indonesia, Argentina, the United States and Brazil - accounted for 80 percent of the potential global biodiesel production, the researchers found.

Based on current export volumes of vegetable oil from 119 countries, Johnston also estimated that a grand total of 51 billion liters of biodiesel could be produced annually - enough to meet roughly 4-5 percent of the world's existing demand for petroleum diesel. Yet, although interesting, these numbers aren't the main point.

"We're not suggesting that all exported vegetable oil should be converted into biodiesel, because that would fundamentally upset the food supply," says Holloway. "We're looking at this more from each individual country's perspective: They're already exporting one thing, could they be exporting something else?"

Because the study employed data from online, public sources - primarily the Food and Agriculture Organization of the United Nations Statistics Division - Holloway points out that any country could repeat the

calculations or do its own analysis of the biodiesel opportunity. And she and Johnston hope they will.

"I'd love to see some of these development opportunities come to fruition for some of these countries," Johnston says.

Source: University of Wisconsin-Madison