Caution needed with new greenhouse gas emission standards

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Policy makers need to be cautious in setting new 'low-carbon' standards for greenhouse gas emissions for oil sands-derived fuels as well as fuels from conventional crude oils University of Calgary and University of Toronto researchers say in a paper published in the journal *Environmental Science & Technology*.

The researchers, using for the first time confidential data from actual oil sands operations, did a 'well-to-wheel' lifecycle analysis of greenhouse gas emissions from transportation fuels produced by Alberta oil sands operations compared with conventional crude oils.

They found that lifecycle greenhouse gas (GHG) emissions vary widely across both actual surface mining and in situ oil sands operations and conventional crude cases reported in the scientific literature, depending on individual project operating conditions, technology used and other factors.

"Our study suggests it is not productive to get bogged down in a debate over whether fuels derived from the oil sands emit five per cent or 20 per cent more GHG emissions than fuels produced from conventional oils," says Joule Bergerson, who led the University of Calgary group for the study, with Heather MacLean who led the University of Toronto group.

"We need to focus instead on finding a transparent, consistent and reliable way of accounting for and reporting well-to-wheel greenhouse

gas emissions across the industry and the entire economy."

The research team developed a new model called GHOST (GreenHouse gas emissions of current Oil Sands Technologies), which accounted for the 'upstream' GHG emissions associated with the recovery, extraction, dilution, transportation and upgrading of bitumen. This data was combined with information in the scientific literature on 'downstream' emissions from refining, fuel delivery, vehicle refueling and vehicle use, to arrive at the comprehensive lifecycle analysis.

The team's findings overall supported the widespread perception that the production of transportation fuels from the oil sands is more GHG-intensive than production of fuels from conventional crude oil. However, the findings also show that some lower-emitting oil sands operations actually can outperform higher-emitting conventional crude cases in terms of GHG emissions intensity (the amount of carbon dioxide emitted per barrel of fuel produced).

"The key message here is that there are large, and overlapping, ranges of potential well-to-wheel GHG emissions performance of both oil sands and conventional crudes. Therefore, ranges rather than point estimates should be utilized to represent this performance," says Bergerson, an assistant professor of chemical and petroleum engineering in the Institute for Sustainable Energy, Environment and Economy and the Schulich School of Engineering.

Policies such as low-carbon fuel standards and a focus on reducing oil sands operating emissions alone is an initial step but will not be sufficient to achieve meaningful long-term environmental policy goals, the researchers said in the study.

Vehicle operation, say researchers, made up 64 to 74 per cent of the wheel-to-well GHG emissions in the oil sands operations. California's

Low Carbon Fuel Standard, which requires a reduction in the state's transportation fuels of at least 10 per cent by 2020, "will be complicated by the overlapping ranges of emissions associated with oil sands and conventional crude pathways."

The wide range of potential emissions intensities for oil sands and conventional crude oils suggests that treating all oil sands, whether surfacing mining or in situ, or all conventional crudes as having the same level of emissions may lead to "unintended consequences," say researchers.

Provided by University of Calgary