New method for greenhouse gas predictions

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Pulp and paper producers are among Canada's most important industries and also one of the largest producers of wastewater. Estimating the greenhouse gas emissions in this wastewater has become a priority for the industry.

Until now, greenhouse gas emission estimates have been limited by the mathematical models used to predict them. Researchers at Concordia University have recently developed a new dynamic method to better predict the emission content of these gases. Their findings, published in Environmental Science and Pollution Research, have implications not only for the pulp and paper industry, but also for any business wishing to reduce its carbon footprint.

"Currently used steady-state models are able to give an overall prediction but dynamic models can estimate the variation in greenhouse gas emissions in response to changes in the wastewater management system. Dynamic models are therefore more accurate and provide more information," says Laleh Yerushalmi, an adjunct professor at Concordia's Department of Building, Civil and Environmental Engineering and study co-author.

Knowledge can lead to improved emission control

The study compared steady-state and dynamic mathematical modelling predictions with actual values of greenhouse gas emissions in wastewater systems. Both models gave accurate results of overall gas emissions. However, only the dynamic model was able to estimate changes in

emissions in response to a changing environment. The dynamic model could also be used to predict other outputs, such as energy consumption and generation.

"With dynamic modeling, we can better understand the behaviour of the treatment plant over time," says senior author Fariborz Haghighat, professor in Concordia's Department of Building, Civil and Environmental Engineering and Concordia Research Chair in Energy and Environment. "With this knowledge, we can then recommend a strategy to reduce the emission of greenhouse gas and also improve energy efficiency."

"Models such as this are used to simulate the behaviour of a particular management system either in the early stages of system design or in later development to incorporate changes," adds Yerushalmi. "We want to make sure that we use the most accurate method possible and the dynamic model is best predictor yet."

More information: www.springer.com/environment/journal/11356

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