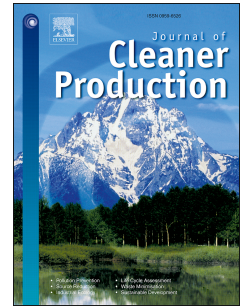


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An optimization model for fleet management with economic and environmental considerations, under a cap-and-trade market

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Abstract

The objective of traditional fleet optimization models has been to find the economic life of the assets, neglecting their environmental impacts. However, due to the effect of carbon pricing schemes, in addition to the international concerns about global warming and carbon emissions, it is essential for affected fleet owners to incorporate environmental burdens into their asset management systems. The contribution of this paper is twofold. First, a fleet optimization model is proposed, which factors in the environmental impacts of a fleet of assets over a finite horizon, in addition to its total cost of ownership. As an indicator of environmental impacts, the greenhouse gas (GHG) emissions associated with the fleet ownership is considered. GHG emissions are converted into a monetary value, using the expected price of carbon in Ontario's cap-and-trade program, as a new member of Western Climate Initiative (WCI) market. Thus, the second contribution of this study is to develop a model to predict the price of carbon in this market. The optimization model is then applied to a fleet of excavators located in Ontario, Canada, and the price of carbon in WCI market is forecasted over the planning horizon of the optimization model.

Keywords: Fleet, Asset replacement, Optimization, Greenhouse gas (GHG) emissions, Carbon price, Ontario's cap-and-trade

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