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# Modelling choices in Green Vehicle Routing

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## Abstract

The subject of this presentation concerns models used to plan routes for road freight vehicles where environmental effects are taken into account. Greenhouse Gas (GHG) emissions for conventionally powered vehicles will be considered.

The types of models that are used to estimate GHG emissions are presented and compared in terms of the inputs needed and their complexity. Their use within vehicle routing models will be explored particularly considering the role of the speeds of the vehicles within the models.

For illustration, a model is presented for routing a fleet of delivery vehicles that minimizes the fuel emissions in a road network where speeds depend on time. In this model, the path for each vehicle between customers must be determined, and also the speeds of the vehicles along each road in their paths are treated as decision variables. The vehicle routes are limited by the capacities of the vehicles and there are time constraints on the total length of each route. The objective is to minimize the total emissions in terms of the amount of GHG emissions produced, measured by the equivalent weight of CO<sub>2</sub> (CO<sub>2</sub>e).

A column generation based tabu search algorithm is adapted to solve the problem. The method is tested with real traffic data from a London road network. The results are analyzed to show the potential saving from the speed adjustment process.

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