

# Investigating Ecological Impacts on selected Traffic Management Methods

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## Emissions Modelling

- HBEFA-based microscopic emission model, including CO<sub>2</sub>, CO, HC, NO<sub>x</sub> und PM<sub>x</sub>, as well as fuel consumption
- Integration into the traffic simulation package SUMO, both as output and for visualisation
- ➔ Investigations on ecological impacts of traffic management methods

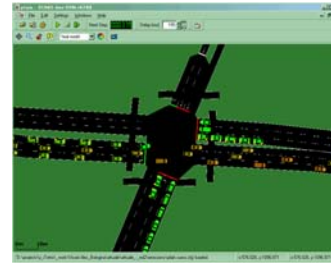


Fig. 1: Visualisation of single vehicles' current CO2 emissions

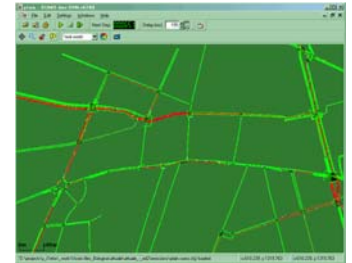


Fig. 2: Visualisation of the current fuel consumption on the road network's lanes

## Travel Time vs. Emissions

### ECO-Routing

Attempt to reduce traffic emissions by weighting routes by produced emissions, not travel time.

The Pearson-correlation between the investigated measures shows

- high dependency
- but also some potential to reduce a certain pollutant

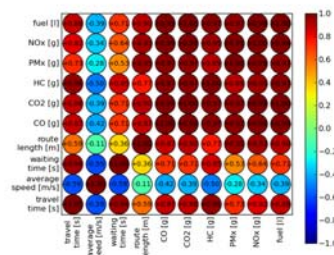


Fig. 3: Pearson-correlation of investigated measures

### Route Choice

Large-scale simulation results show that the overall emission of a certain pollutant can be slightly (~2-3%) reduced by using this pollutant's emissions as a weight during routing.

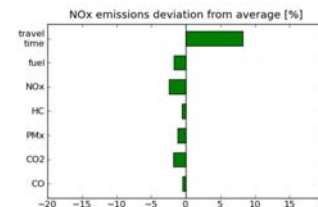


Fig. 4: Deviation of NOx emission from the average of different all simulation runs

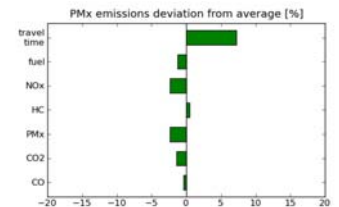


Fig. 5: Deviation of PMx emission from the average of different all simulation runs

## Traffic Lights Controlling

- major result: a strong, mostly linear correlation between the delay time and the amount of emissions of CO<sub>2</sub>, CO, HC, NO<sub>x</sub> und PM<sub>x</sub> exists
- ➔ it seems to be possible to optimize against the delay time only; there is no need to optimize against a set of measures
- noise emission is also growing with growing delay time, though not linear

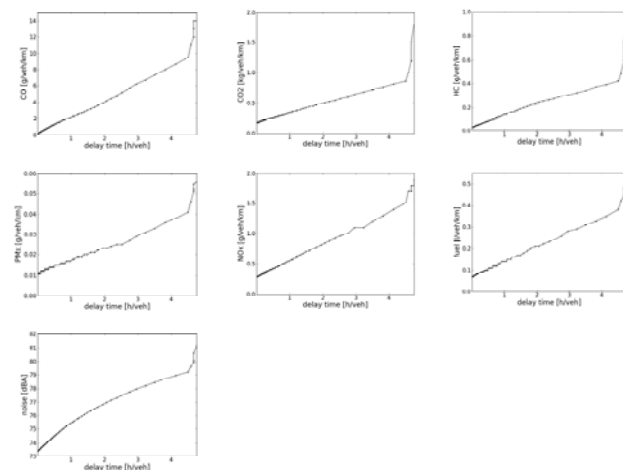


Fig. 6: Dependency between the delay time and the evaluated measures (pollutant emission amount, fuel consumption, and noise emission)

