CHAPTER 58

Munich

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The MATSim scenario for the Munich metropolitan area was set up during 2010.[1] The main goal was, and is, simulation of local air pollutant and global greenhouse gas emissions and how their levels change with different policy measures—on aggregated and spatially disaggregated levels. Thus the scenario was used for development and testing of the EMT (Emission Modeling Tool, see Chapter 36). For an example illustrating where overall NO_2 private car and freight vehicle emissions are produced over one day, see Figure 58.1.

Network information from VISUM was converted into MATSim format, resulting in a network of 17 888 nodes and 41 942 links. This transport supply was then linked to travel demand from different sources; an inner-urban traffic activity-based demand from survey data was created, based on MiD (Mobilität in Deutschland (MiD 2002, Follmer et al., 2004)). This synthetic population segment consisted of roughly 1.4 million individuals, with detailed vehicle information for every household. Commuters and reverse commuters were modeled with data provided by the German Federal Employment Office (Böhme and Eigenhüller, 2006). This part of the population consisted of approximately 0.5 million individuals, with 0.3 million commuting to Munich for work. The rest lived in Munich and commuted to their workplace outside the city. Freight traffic was also introduced into the model using data from the German Ministry for Transport (BVU Beratergruppe Verkehr + Umwelt GmbH und Intraplan Consult GmbH, 2007). This consisted of roughly 0.15 million freight vehicles, performing one commercial trip per day.

The scenario was used for several case studies: Hülsmann et al. (2011) used a single street corridor to validate simulated travel times and emission levels against actual data obtained from a test vehicle. Kickhöfer et al. (2013) investigated the relationship between the price elasticities of car travel demand and air pollutant emissions. Hülsmann et al. (2013) identified city areas with

[1] Detailed descriptions of the scenario can be found in Kickhöfer et al. (2013) and Kickhöfer (2014).

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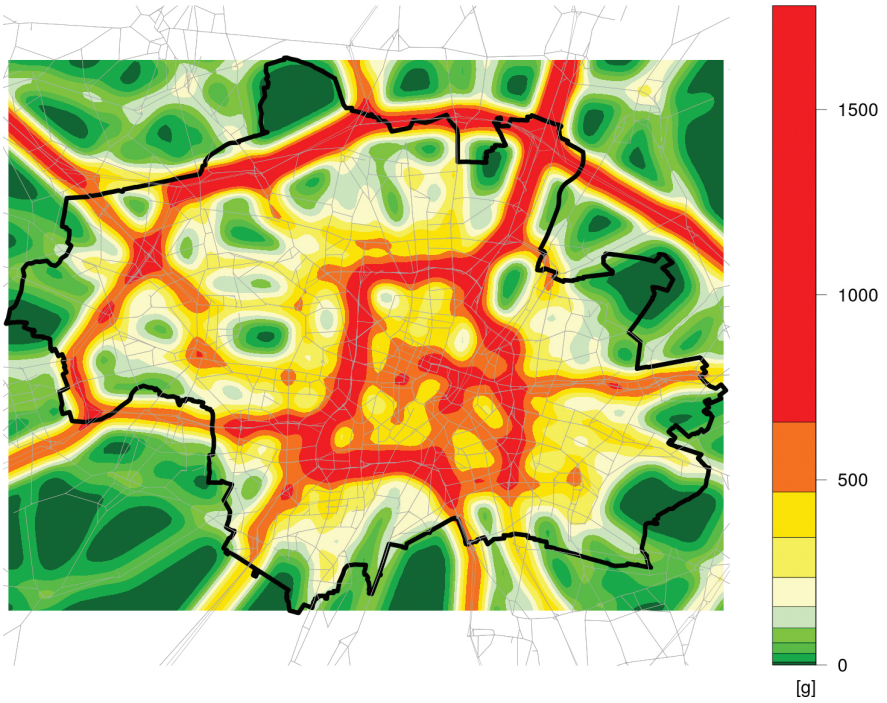

Figure 58.1: NO_2 emissions in Munich

high air pollution concentration. They defined these areas as "hotspots", exceeding the EU limits for NO_2 (Nitrogen Dioxide). The authors raised toll levels incrementally for vehicles passing these hotspots, until high pollution concentrations disappeared, to estimate true threshold value EU avoidance costs. Kickhöfer and Nagel (2013) derived time-dependent, vehicle-specific, first-best air pollution tolls to create a benchmark for real-world policy evaluation. Kickhöfer and Kern (2015) went one step further and calculated time-dependent, vehicle-specific air pollution *exposure* tolls.