Summary

When developing a transport outlook it is important to take into account the interactions between land use and transport. The feedback cycle between transport and land use is as follows: on the one hand the location choice of people and economic activities is one of the determinants of the transport flows. On the other hand, the characteristics and the performance of the transport system will have an impact on the development of the land use. Accessibility is one of the factors influencing the location of people and businesses. In addition, the transport infrastructure and transport flows may also have other spatial effects (e.g. environmental) that may determine the attractiveness of a particular location. In order to study these aspects, VITO is developing the ATLAS model. The aim is to construct a model that functions at the system level and that can be used to set up coordinated policy measures in three policy domains (transport, land use and environment), using long run scenario exercises.

This report describes the results of the MIRA R&D-project on "Linking a land use model with a transport model for calculating future scenarios". The objective of the study is twofold. First, the study aims to feed data on transport in Flanders from the Flemish Traffic Centre to the ATLAS model. Secondly, the project aims to explore the potential contribution of the ATLAS model to the construction of future scenarios.

To this end, the report describes the general design of the ATLAS model. The model consists of two integrated parts: a spatial dynamic land use model and a transport model. The ATLAS model is designed so that both parts can be used as stand-alone models or as an integrated model. In the integrated version, the transport model is embedded in, and thus called by the land use model. In that case, a number of modules in the stand-alone version of the land use model are (de)activated.

Spatial dynamic land use model

The spatial dynamic land use model is the existing “RuimteModel Vlaanderen”. It is a high resolution spatial simulation model and is used to assess the impact of different policies on future land use. It combines the effects of exogenous socio-economic developments, and of existing and planned policies (spatial planning and transport policy) in the context of scenarios for possible developments in Flanders, Belgium, Europe or the rest of the world. In addition, it evaluates the policy choices in terms of social, economic and environmental criteria by spatially explicit sustainability indicators.

The model comprises three interdependent levels: the global, regional and local level. The global level takes into account different scenarios for the growth (positive or negative) of the population and the number of persons employed in aggregate economic sectors. The regional model divides this growth over the various NUTS3 zones (“arrondissementen”). The growth in the residential and economic sectors is the basis for the demand for land by type of land use in each NUTS3 zone. This is a starting point for the local model. The latter model assigns the growth in each district to individual cells of 1 ha.

A feedback exists between the change in the land use patterns and the quality of the remaining search space at the local level and what happens at the regional level, because this will determine the attractiveness of the NUTS3 zones and therefore the location of persons and activities. The allocation takes into account the "neighbourhood effect" (distance dependent attraction / repulsion between the land use in each cell and land use in neighbouring cells), the suitability of the cell for each activity, policies and accessibility. The accessibility is determined in the transport model.

Transport model

The transport model is an aggregated model for passenger transport in Flanders. The model operates at the level of traffic zones, which are an aggregate of the cells in the land use model. In each year it starts from the location of the population and jobs and the characteristics of the traffic zones, as defined in the land use model. It takes the evolution of the vehicle fleet along as an exogenous factor. Based on these inputs it determines: (i) the number of trips for three trip purposes: commuting, school and “other purposes”, (ii) the origin and destination of the trips; (iii) the modal choice and timing (iv) the route between each origin and destination; (v) the emissions and energy consumption associated with the transport flows. The model also determines accessibility indicators, which will partly determine the land use.

The ATLAS-approach is innovative because it takes into account the interaction between the transport and land use model, such that the mutual influencing of changes in the transport system and changes in land use can be incorporated in the development of long term outlooks.

In addition, the report describes how the data of the Flemish Traffic Centre, among other data, were included in the model.

Finally, the report discusses the type of scenario exercises that can be performed with the ATLAS model. The model can be used to assess the impact of global demographic and economic trends on the transport flows (and the associated emissions and energy consumption) and land use. In addition, it can be used to evaluate the effects of spatial policy and various forms of transport policies (pricing, regulation and infrastructure) on the transport flows and land use. This is illustrated by a first model testrun.