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Environmental Impacts from Housing and Land-Based Mobility Demand of Households on a Regional Level

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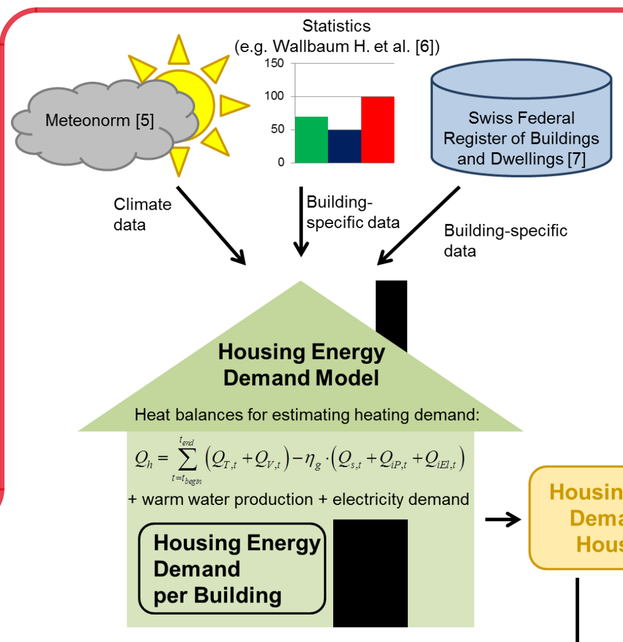
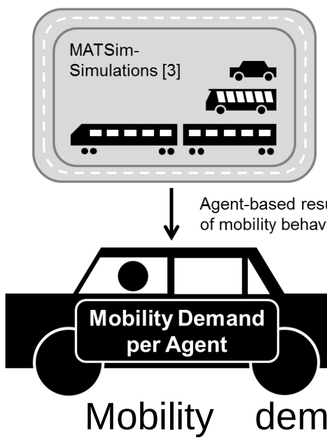
Goal

A model for the **life cycle assessment of housing and mobility demand** of individual households [1] **was applied to the Swiss canton of St. Gallen (SG)** in order to quantify the environmental impacts induced by these two key consumption areas and to study patterns of household behaviour on a regional scale.

Housing Demand Model

Energy demand for housing was assessed by simplified energy balances and data retrieved mainly from publicly accessible databases ([5]-[7]). This building stock model was evaluated beforehand [2].





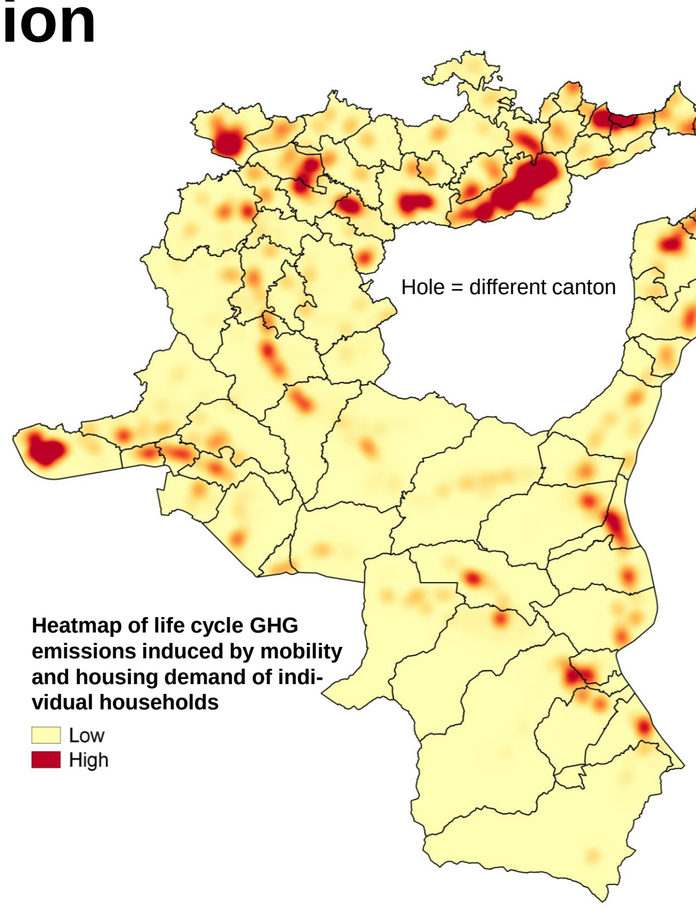
Mobility Demand Model

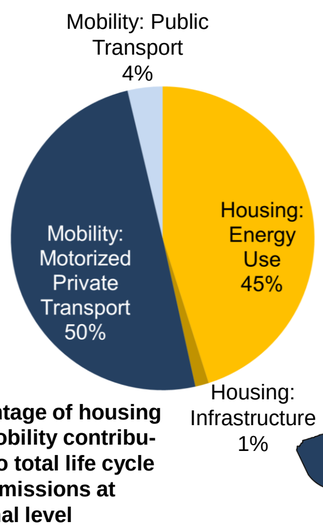
Mobility demand for land-based traffic modes was evaluated based on results of MATSim, an agent-based transport simulation [3]. MATSim has been implemented and validated for Switzerland [4] and provides mobility patterns of Swiss inhabitants.

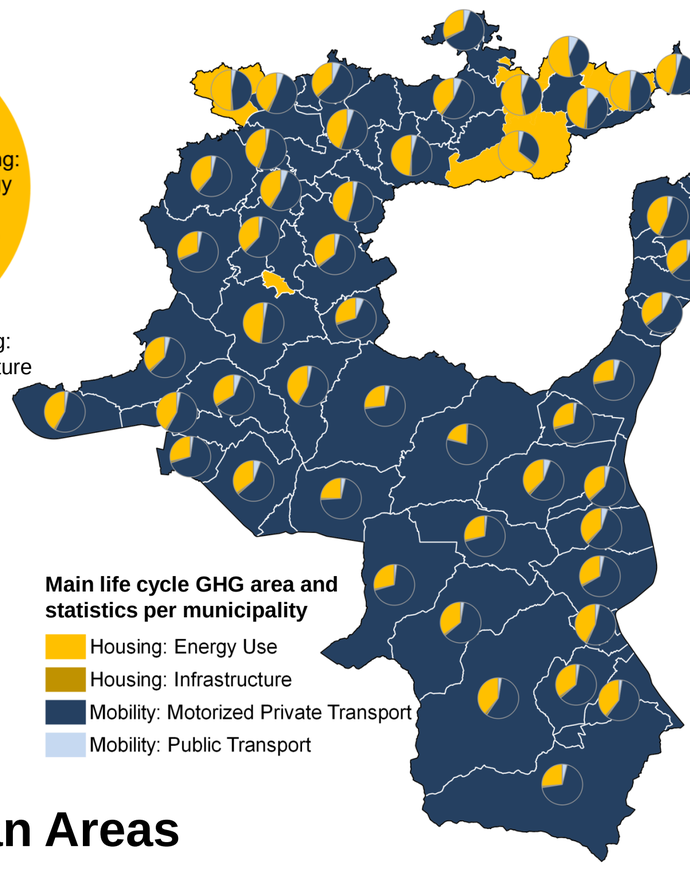
Results & Discussion

Overall Perspective

- Higher total emissions in densely populated areas, but similar per capita
- Mobility and housing are of similar importance in terms of GHG
- Motorized private transport (MPT) dominates mobility-related emissions
- Energy use (especially space heating) dominates housing-related emissions

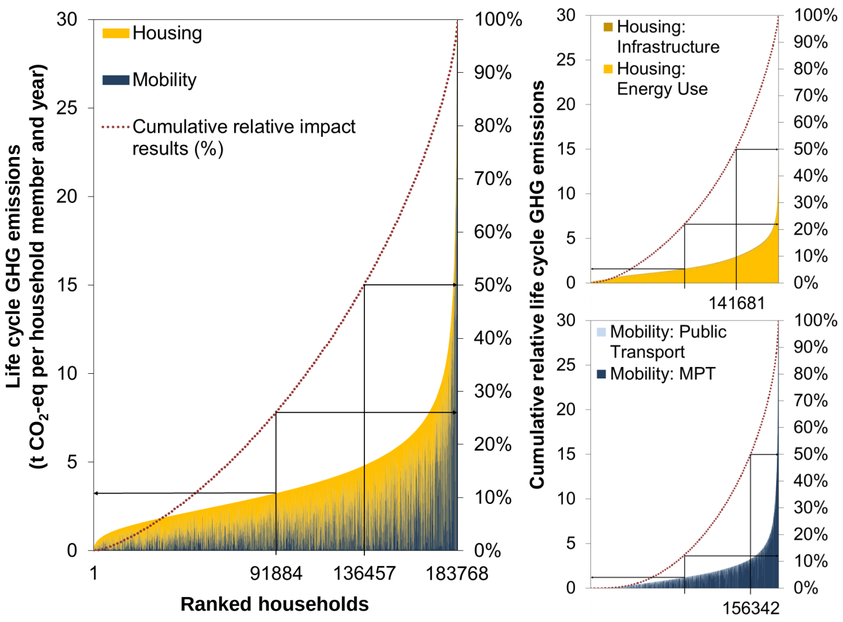






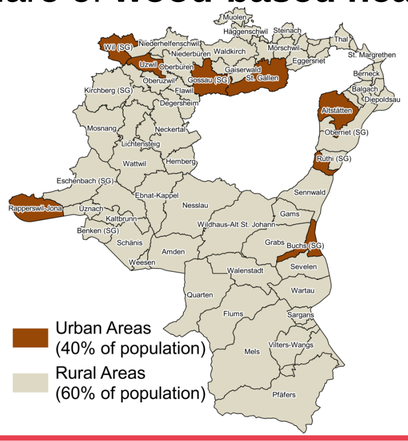
Individual Households

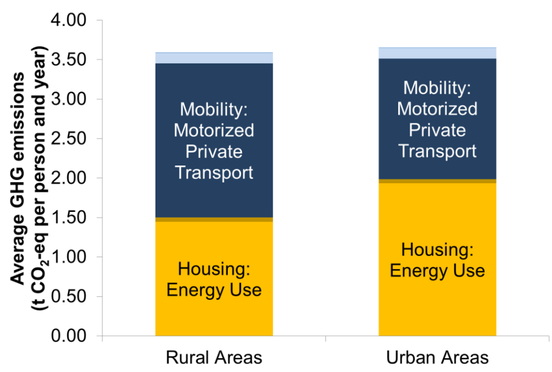
- Per capita household GHG emissions induced by housing and mobility
- Approximately **26% of the households** are responsible for about **50% of the environmental impacts** from housing and mobility
- **Inequality** in the distribution of emitted GHG among individual households is **larger for mobility** than for housing



Rural vs. Urban Areas

- **Country** people show **larger mobility demands** and their modal split consists of **higher shares of car-driven kilometres**
- **Larger GHG emissions** induced by **space heating in urban areas**; reason: a high percentage of urban buildings is supplied by **natural gas**, while dwellings in the countryside show a high share of **wood-based heating systems**





Conclusions & Outlook

The application of the model to a large region revealed interesting differences of behaviour patterns between individual households, different regions and different consumption areas. This shows the importance of bottom-up models in order to derive environmental strategies tailored to the specific problems of a region or a municipality. In a next step, detailed analyses shall support the search for such targeted measures which aim at lowering environmental impacts.

Acknowledgements & References

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