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Energy Demand 2000-2025 for Housing in Germany – taking Account of Building Material and Technical Infrastructure

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The contribution will present findings from Scenarios for the housing sector in Germany 20 years ahead. The authors developed together with Stefan Siedentop a software tool (BASiS-2) jointly with the Institute for applied Ecology (Project leader Matthias Buchert) and the TU Dresden.

BASiS-2 contains in its database housing types, their quantity structure, land use and induced mass flow by technical infrastructure for residential areas as well as the energy demand linked to these assets. The building types were allocated to the seven urban structural units. Further differentiations were needed to reflect the different development paths in the post-war-period in East- and West-Germany and regional particularities. Furthermore, in order to picture the future housing situation two scenarios (Reference and Sustainability) were developed. Key factors had to be defined and assumptions made on the variables. This was done in an intensive dialog with experts on urban- and housing issues. The assumptions of the scenarios were cross checked with the Federal Environmental Agency of Germany (UBA).

Due to the integrated modelling, it is possible to estimate the resource consumption until 2025 for residential purpose along different fractions (wood, metal, minerals) or branches (brick-industry, aluminium industry etc.) to estimate relevant emissions like CO_2, SO_2 etc. and to estimate the future land use (green field, brown field etc.). The model BASiS-2 allows furthermore to spot the essential influencing factors of alternative paths and options by isolating specific variables of the scenario.

The contribution will present in its first part the methodology of urban structure type

approach. Urban structural types are defined as areas with physiognomic homogeneous character, which are marked in the built-up area by a characteristic formation of buildings and open spaces. These types can be linked to characteristic infrastructure elements, buildings, -products, materials and primary resource consumption. It is possible to recognize these features in cadastral plans, by area photography or by using satellite data. The presentation will focus on the possibilities to use the urban structural unit approach to describe the existing housing stock, its development and the use and resources and buildings activities by branches.

In the second part of presentation concrete findings for the German housing stock will illustrate the difference between the two development paths. The CO2 emissions due to construction/refurbishment activities for buildings and infrastructure (included the emission by process-chains for building materials) will sum up to 45 Mio.Tonnes (Reference) or 30 Mio.Tonnes (sustainability). The major proportion is determined by heating demand. It will drop from 184 Mio.Tonnes to 148 resp. 78 Mio.Tonnes CO2 per year. In sensitivity analyses it can be shown, that the heating supply structure (fuel mix, technologies) is of the same importance than the improvement of the thermal envelope. The Sustainability scenario assumes a high market penetration of wood-burning appliances (or other regenerative sources) for multi unit residential buildings (MURBs) from zero today to 14% in 2025. And although district and local heat in East-Germany will decrease, its contribution in West-Germany will increase from today 13% to 30% in 2025.

The findings from BASiS-2 for the German development on average level need to be differentiated for shrinking and growing regions/municipals of Germany. A presentation by Karin Gruhler at this conference will deliver a contrast picture, when looking at the federal state of Saxony under stress of decline of population.