

# **Development of built-up and traffic area in Germany 1993 to 2001**

**Approaches to an environmental economic analysis**

By

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## Approaches to an environmental economic analysis

### 1. Introduction

The type and intensity of land use is an important structural pressure by economic activities on the environment. Land is an unconditionally scarce, non-renewable resource. In the present paper results are presented of the German Environmental Economic Accounts on built-up and traffic area by economic activities. It is demonstrated that the data can be used for different approaches of environmental-economic analysis which are already known from investigating the development of other environmental variables like energy or air emissions.

Under German conditions two types of land accounts seem to be of special importance, firstly comprehensive ecosystem accounts covering the appearance and quality of ecosystems and secondly special accounts on built-up and traffic area which link the area use with the causing economic activities.

The German Statistical Office has developed a concept for a survey called Ecological Area Sampling to cover the appearance and quality of ecosystems as a primary data base for an ecosystem accounting<sup>1</sup>. The feasibility of the survey had already been successfully tested in a pilot study. But mainly due to budgetary constraints at present the chance is rather low to put that survey into practice. But to cover this issue at least partially we are developing an approach in the framework of a more comprehensive project on agriculture and environment to measure the intensity of pressures on agricultural ecosystems by the different agricultural production processes<sup>2</sup>.

The use of area as built-up and traffic area is a rather intensive type of land use requiring special attendance. Use of area as built-up and traffic area can lead to negative consequences for the water supply, for species diversity, soil functions and the microclimate. During the last decades there was a rather continuous increase of built-up and traffic area in Germany. The reasons for the increase, from a regional perspective, are the expansion of cities into the surrounding countryside, the growing functional and spatial separation of housing, working and public and recreational facilities, and increasing mobility. In Germany as a densely populated country the constant increase of built-up and traffic area is viewed as an environmental problem in particular.

Therefore observation and control of the development of area use for built-up and traffic purposes play a pivotal role in the National Strategy for Sustainable Development of the German Government passed in 2002. The respective headline indicator in the strategy is the average daily increase of built-up and traffic area. This indicator is fully embedded into the data set of the German Environmental Economic Accounting, i.e. the underlying data for this individual indicator are part of a comprehensive accounting framework (economic, environment and social accounts) that integrates a substantial part of the relevant topics of

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<sup>1</sup> See: Seibel, S./Hoffmann-Kroll, R./Schäfer, D. (1997): Land use and biodiversity indicators from ecological area sampling – results of a pilot study in Germany, in: Statistical Journal of the United Nations ECE 14.

<sup>2</sup> First results of this approach have already been published in: D. Schäfer, E. Krack-Roberg, R. Hoffmann-Kroll (2003): Results of the German Environmental Economic Accounting on the use of land for economic activities. Summary report. Online publication, Federal Statistical Office of Germany.  
[http://www.destatis.de/allg/e/veroe/bodennutz\\_e.htm](http://www.destatis.de/allg/e/veroe/bodennutz_e.htm)

the strategy<sup>3</sup>. A policy for sustainable development is characterised by not only looking on how far the goals for the individual indicators can be achieved, but has to have in mind the interdependencies between the topics and the simultaneous achievement of different economic, environmental and social goals. Decisions on measures aiming at the improvement of one indicator at the same time have to consider the effects that may occur on the other relevant goals of the overall strategy for sustainable development.

The approaches discussed below for an analysis of the use of built-up and traffic area are ex post approaches mainly directed at investigating the environmental-economic link. But to some extent also social variables are included. However a comprehensive analytical integration of the different relevant topics for a sustainability analysis can only be achieved by ex ante scenario-modelling approaches. The accounting data used below are also the central data bases for that type of modelling approaches. The econometric models yield scenarios for future developments and the simulation of effects of political measures on the target variable and on the economy in general. Such calculations are an essential tool for a target orientated policy for sustainable development.

## **2. General development of built-up and traffic area**

The built-up and traffic area accounted for 12.3 % of the total area in Germany in the year 2001. The built-up and traffic area is comprised of building and adjacent open area, recreation area, plant area (without exploitation area), cemeteries and traffic area. The largest percentage of the total area was used for agriculture (53.5 %), followed by forest area (29.5 %). Water areas cover 2.3 % and other areas (e.g. exploitation area, wasteland) account for 2.4 % (see table). In the following in this paper for simplifying reasons the term area is also used as a synonym for the term of built-up and traffic area.

The average daily increase in built up and traffic area is, as mentioned above, one out of 21 headline indicators of the National Strategy for Sustainable Development. According to the target value in the strategy for this indicator the daily increase should be reduced to 30 ha per day until the year 2020. In past years, the indicator showed an increase from 120 ha per day during the period 1993 to 1997 to 131 ha per day in 2000. The current figures for the last two years now reveal a drop to 117 ha per day in 2002 and 105 ha per day in 2003 (diagram 1). Therefore the current development of built up and traffic area is moving into the desired direction only for the last two years. This change, however, primarily goes back to the distinct drop in capital formation in construction and therefore cannot be viewed as an established change in the trend, but is a result of the current economic decrease. While during the periods 1993-1996 and 1997-2000, an average of € 255 billion Euro and € 246 billion Euro respectively were invested per year (prices of 1995), capital formation dropped to € 231 billion Euro in the year 2001. This trend continued with € 217 billion Euro in the year 2002. The growth rate of Gross Domestic Product which was in the previous years in the range of 2 % to 3 % per year went down to 0.8 % in 1991 and 0.2 % in 1992.

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<sup>3</sup> See: Schoer, Karl (2003): The Role of the National Accounts and its Satellite Systems for the German National Strategy for Sustainable. Paper prepared for the OECD meeting: Accounting Frameworks to Measure Sustainable Development,, Paris, May 14-16 2003. [http://www.destatis.de/allg/e/veroe/proser4senv\\_e.htm](http://www.destatis.de/allg/e/veroe/proser4senv_e.htm)

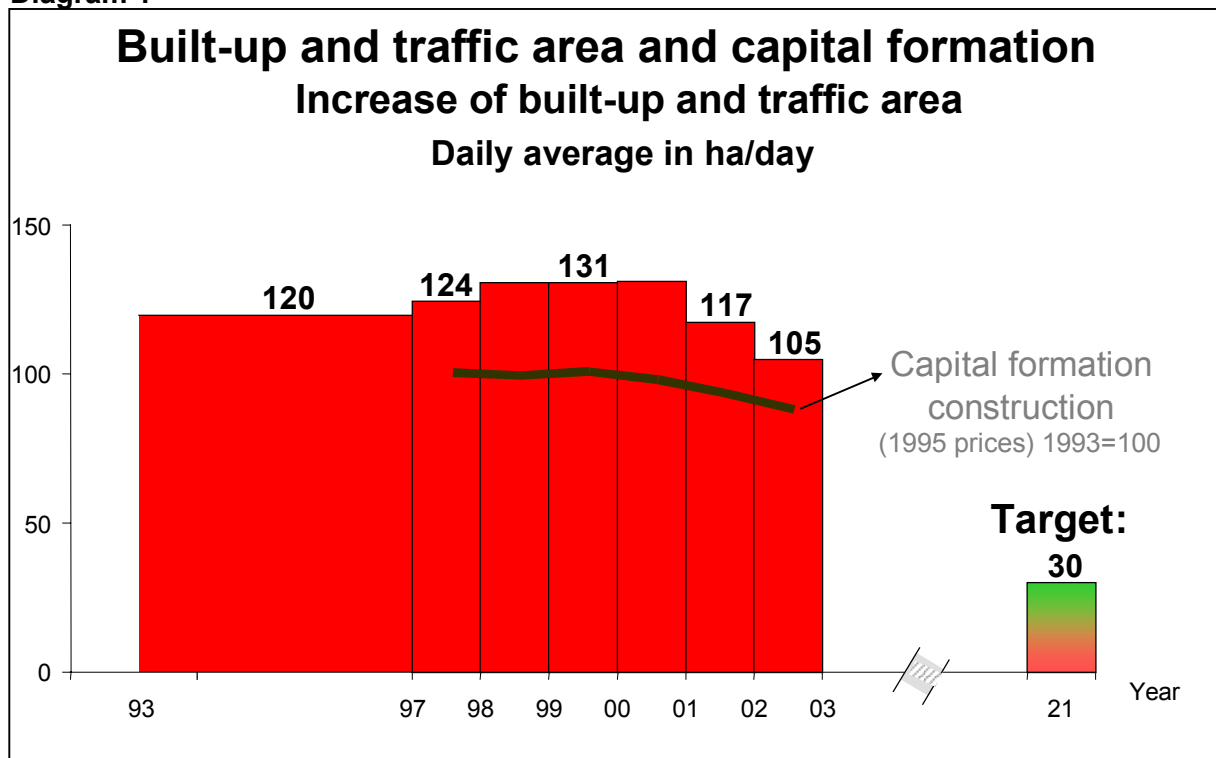
**Table: Land use by categories 1993 to 2003**

Area in km<sup>2</sup>

Land use	1993	1997	2001	2002	2003
Building and adjacent open area	20.733	21.937	23.081	23.299	23.503
Plant area (excl. exploitation area)	550	620	732	759	784
Recreation area	2.255	2.374	2.659	2.759	2.831
Traffic area	16.441	16.786	17.118	17.199	17.280
including:					
road, path, square	14.815	15.005	15.264	.	.
Agricultural area	195.112	193.075	191.028	.	.
Forest	104.536	104.908	105.314	.	.
Sheet of water	7.837	7.940	8.085	.	.
Area of other use	7.630	7.497	7.219	.	.
including:					
cemetery	327	335	350	351	352
wasteland	2.452	.	2.666	.	.
<b>Total area</b>	<b>356.970</b>	<b>357.030</b>	<b>357.031</b>	<b>357.033</b>	<b>357.037</b>
<b>Memorandum item:</b>					
<b>Built-up and traffic area</b>	<b>40.305</b>	<b>42.052</b>	<b>43.939</b>	<b>44.367</b>	<b>44.750</b>

1) Figures refer to the 31.12. of the previous year.

**Diagram 1**



### 3. Analysis of built-up and traffic area by economic activities

#### 3.1 Calculation of land use figures in a break-down by economic activities

Economic development is the crucial driving-force for the increasing utilisation of built-up and traffic area. The relationship between economic growth and area use can be described by the term of area productivity, defined as the quotient of Gross Domestic Product (in prices of 1995) and built-up and traffic area. Area productivity rose between 1993 and 2002 by 4.5 %. This increase in productivity is the result of an economic growth of 15,0 % between 1993 and 2002 and the increase in built-up and traffic area by 10.1 % during the same period.

The development of area use in absolute terms as well as the respective productivity provides a general problem description, which can be used very well in the political communication process. However, analysis towards detecting the reasons for the development observed has to go into further details. In the environmental economic accounts area used for production purposes is viewed as a production factor which – in analogy to the factors labour and capital – contributes to the output. In addition the environmental factor area is also used directly by private households for the consumption activities housing, recreation and mobility.

If one accepts the notion of a strong relationship between area use and economic factors, especially the economic structure of area use - i.e. what amount of area is used by which economic activity - and the intensity or efficiency of area use for the individual economic activities are of particular interest. Therefore an environmental-economic analysis requires a data base which provides information on the relationship between area use and production as well as on area use and consumption in a detailed break down by economic activities. The economic activities are described comprehensively in the National Accounts in monetary terms. The break down used for the input-output tables is of special importance for the type of analysis required in this connection.

As there is no survey available in Germany that directly provides data fitting to the already existing economic data, it was the task for the accountants to create such data on built-up and traffic area. For this purpose an approach was developed for estimating data on built-up and traffic area by area use categories and in a detailed break down by economic activities according to the about 70 homogeneous branches of production of the input-output tables and in addition for the consumption of private households.

For calculating those figures the land use survey is the principal source, but it has to be supplemented by various other data<sup>4</sup>. A comprehensive land use survey is carried out in Germany every four years – most recently in 2001 (reference day is always the 31.12. of the previous year). The full survey is supplemented by an annual less detailed survey of the built-up and traffic area. The 30 land use categories reported in the land use survey are the most important basis for allocating the built-up and traffic area to economic activities (production branches and private households). The area is assigned to the economic activities according to the user and not according to the owner concept. Applying the user concept means for example that the area used for housing purposes, which in the standard National Accounts belongs to the production branch of housing leasing, is allocated in the land accounts directly to private households. Government-owned areas such as roads, which are provided free of charge or for a fee to identifiable individual users, are also assigned to these users. This conceptual difference has to be regarded, if physical data of the Environmental Economic Accounts are combined with monetary data from the National Accounts.

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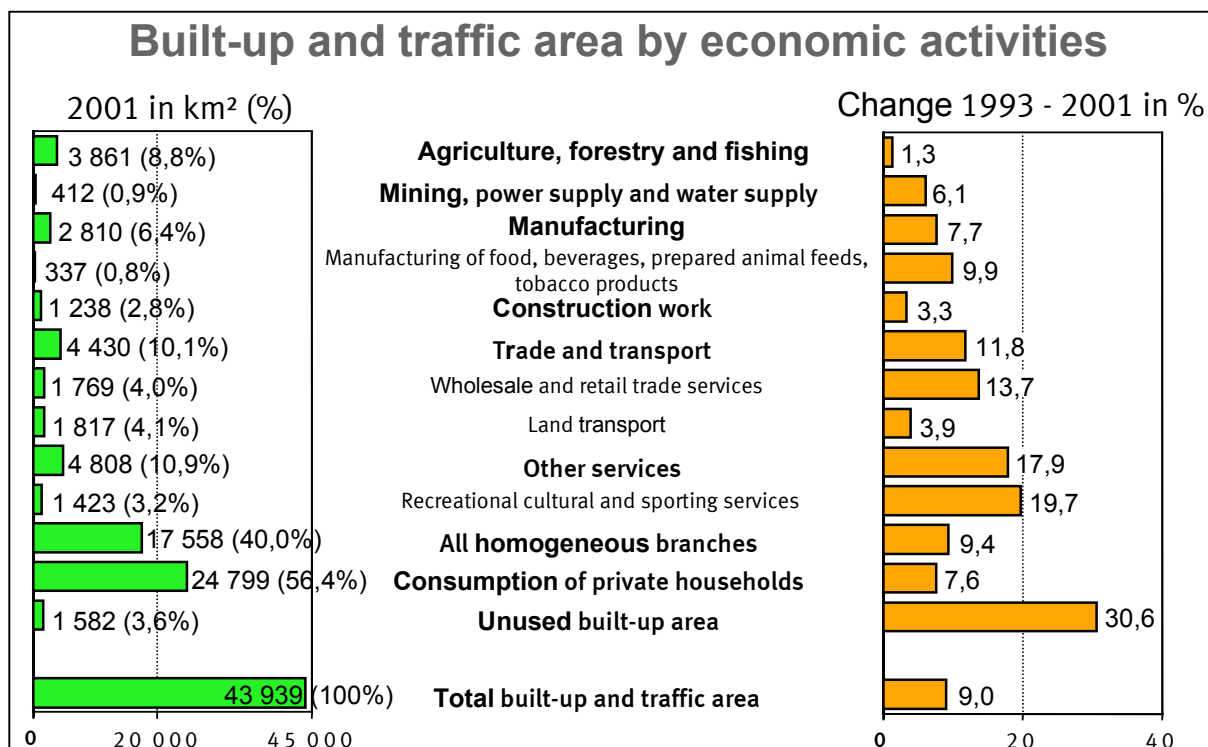
<sup>4</sup> For the calculation method see: See: : D. Schäfer, E. Krack-Roberg, R. Hoffmann-Kroll (2003)

For the calculations only in less than half of the cases specific area use categories can be entirely allocated to one single economic activity. For allocating the remaining categories a number of auxiliary sources are used. Roughly 100 distribution keys were derived for assigning the land to the individual economic activities. Due to the resulting process-related estimation uncertainties, the calculated figures, in particular in more in-depth sub-allocation by production branches, have to be interpreted carefully.

### 3.2 Structure of area use by economic activities

Diagram 2 shows the built-up and traffic area in a selected break down by economic activities for the year 2001. More than 56 % of the total area (24,799 of 43,939 km<sup>2</sup>) are used by private households, 40 % are utilised by the various production branches and 3.6 % are unused. Among the production branches the services are dominating (21 percent points) with about the same magnitude of order for trade and transport (10.1 percent points) and other services (10.9 percent points). In the first group the branches land transport (4.1 percent points) and trade (4.0 percent points) are dominating. In the second group the branch recreational, cultural and sporting services is most important with 3.2 percent points mainly comprised of golf courses and other sporting facilities. The production industries together cover about half of the area for services (10.2 %, out of which the manufacturing industries have a share of 6.4 percent points). The construction industry accounts for 2.8 percent of the built-up and traffic area and mining, power and water supply use 0.9 %. The branch agriculture and forestry occupies 8.8 %.

Diagram 2



Regarding the development of land use by economic activities between 1993 and 2001 the following statements can be made: the total area increased during this period by 9 %, of which the built-up area was expanded by more than 12 % whereas the traffic area grew only by 4 %.

All of the summarised branches, which are shown in the diagram, have seen an increase in their total area use. The growth is most distinct for the branch of recreational, cultural and sporting services with an increase of nearly 20 %; followed by the wholesale and retail trade services (nearly 14 %). Below-average increases can be observed for the branches agriculture, forestry and fishing (1 %), construction industry (3 %) and land transport (4 %). For the remaining production branches the growth ranges from approx. 6 % to 10 %. The private households with an increase of nearly 8 % are within this range. Contrasting these figures, the distinctly over-proportional growth of unused built-up area of 30.6 % is noteworthy. Unused areas are comprised among others of sites under construction, areas with unused buildings and unused plant sites. The high increase in unused built-up area may hint to considerable regional and structural disparities, with locations characterised by further growing demand for built-up area and locations with low or even decreasing demand.

In absolute terms the built-up and traffic area increased by 3,634 km<sup>2</sup> between 1993 and 2001, which comes to an average of 124.4 ha per day. The private households account with 60.0 ha per day for nearly half of this change.

### 3.3 Productivity of area use by economic activities

If we link the illustrated branch-specific area-use data with the gross value added of the production branches or with the consumption expenditures of the private households respectively, we can calculate branch-specific area productivity or intensity rates in analogy to area productivity on the overall economic level.

Diagram 3:

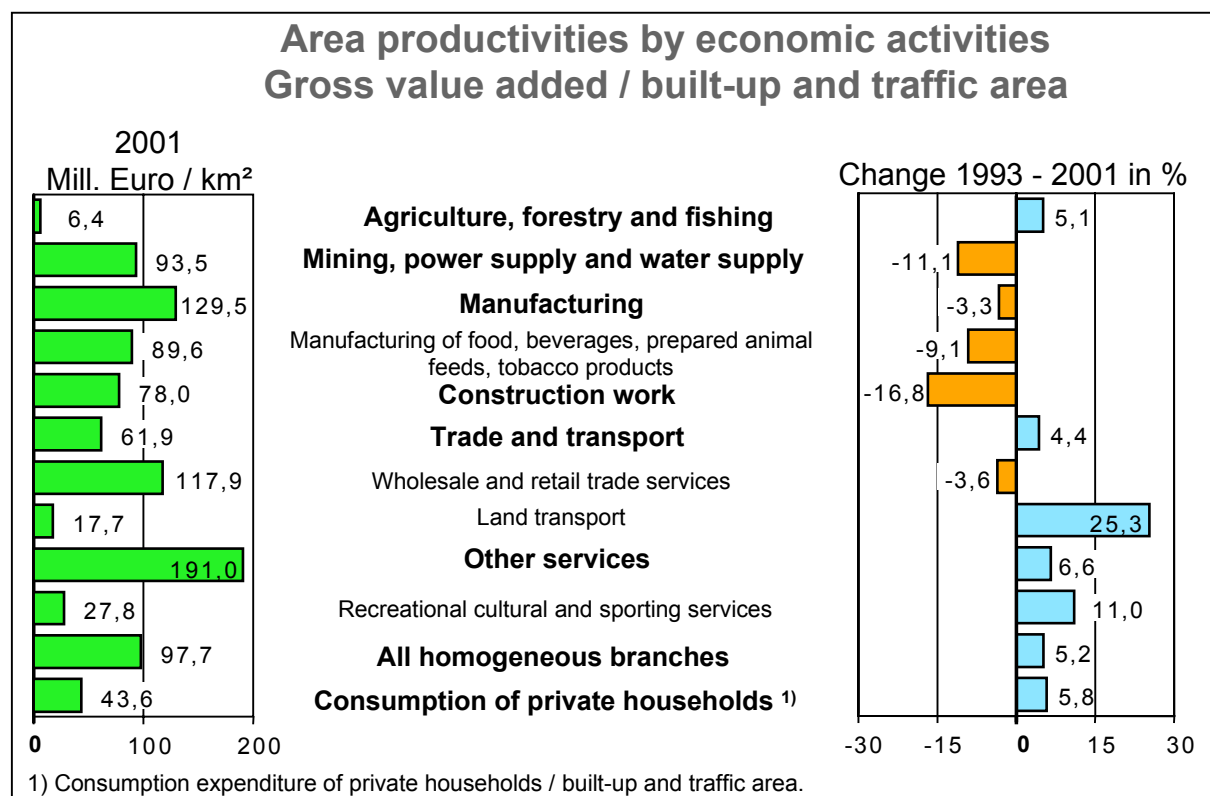


Diagram 3 shows the results for the summarised branches as well as for individual branches, which are important in terms of area use. The average for all homogeneous branches of

production is 98 Euro per km<sup>2</sup>. An above average productivity rate can be observed for the summarised branch other services with 191 million Euro per km<sup>2</sup>. Considerably below average are the productivity rates for agriculture, forestry and fishing (6 Euro per km<sup>2</sup>, land transport (18 Euro per km<sup>2</sup>) and for the branch recreational, cultural and sporting services (28 Euro per km<sup>2</sup>). For private households the ratio consumption expenditures to built-up and traffic area is 44 Euro per km<sup>2</sup>.

Between 1993 and 2001 the area productivity increased for the total of the production branches by 5 %. The private households expanded their consumption expenditure per area by nearly 6 %.

Among the production branches the development of area productivity was rather different. On the one hand there was an increase for most of the service branches and the branch of agriculture, forestry and fishing, and on the other hand decreases could be observed for the goods producing branches. Most distinct is the growth of area productivity for the land transport branch with 25 %. This is reflecting the fact that the road network has not been expanded according to the growth in volume of especially goods transports during the period under consideration. This resulted into a more intensive usage of existing roads. A comparatively high increase in area productivity can also be stated for the branch of recreational, cultural and sporting services (11 %). Decreases can be observed for mining, power supply and water supply (11 %), which is mainly due to the development in the mining industry, for manufacturing (3 %), construction (17 %) as well as for wholesale and retail trade services (4 %). Apparently the decreases in production for mining and construction did not have an effect on area use up to now. For trade the figures may reflect a growing tendency for establishing premises in the open countryside.

### **3.4 Structure of area use by products of final use**

The available differentiation of the built-up and traffic area by economic activities (production branches or private households) enables secondary analyses. In the following, we present two of these and their respective results. In the tables discussed above the direct area use by production branches and private households was shown. Another possible perspective of looking at the area use is to assign the area to the goods of final use as they are shown in the National Accounts. Those data can be obtained by linking data on direct area use differentiated by economic activities with the identically structured monetary input-output tables in the National Accounts.

Only a part of the produced products is used directly by the final users (e.g. private and public consumption, capital formation or exports). A part of the goods and services produced by the different branches flows into subordinate levels of the production chain ("intermediary use"). The direct area use connected with the production of the products for final use has to be supplemented by these indirect uses. The area use connected with the production of the intermediate products is assigned to the respective final products by utilising the interrelationship between the branches as it is shown in the monetary input-output tables<sup>5</sup>

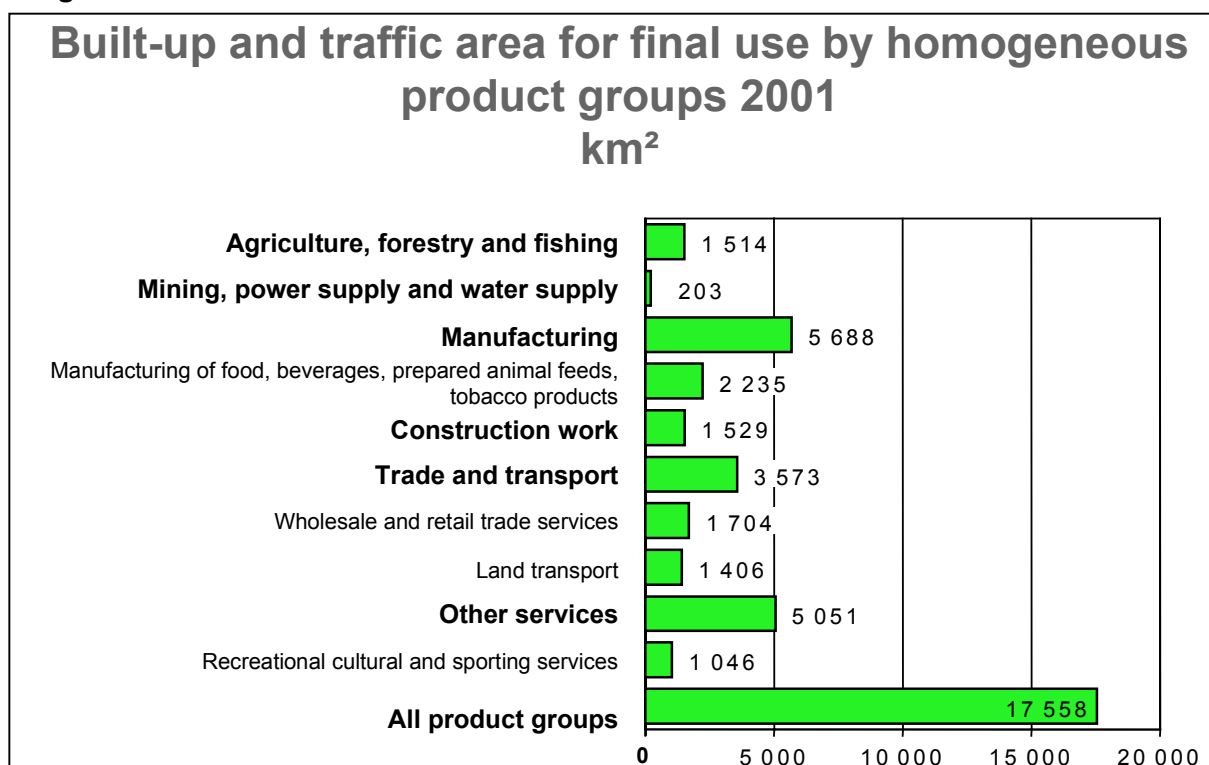
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<sup>5</sup> See Schoer, K (1999): Energy use of private households by purposes of final consumption. Paper prepared for the Joint ECE/Eurostat Work Session on Methodological Issues of Environment Statistics, Ma'ale Hachamisha, Israel, 11-14 October 1999.

[http://www.destatis.de/allg/e/veroe/proser4senv\\_e.htm](http://www.destatis.de/allg/e/veroe/proser4senv_e.htm)



Diagram 4:



In the following analysis the focus is on products of final use. That means, only that area directly used by the production branches is allocated to the products of final use. The area utilised directly by the private households is not regarded. But get a full picture of area use for private consumption, the area category had also to be included.

The results obtained from the input-output model can be differentiated by final use categories as well as by product groups. Below only the results by product groups are shown for the year 2001 in diagram 4. Out of the total built-up and traffic area directly used for production purposes (17,558 km<sup>2</sup>) nearly one third is used for the processing of the goods of the manufacturing industries (32 %). The product group of food and beverages is clearly dominant in this category by utilising nearly 13 percent points. The products of the aggregated branch other services account for an area use of 29 %. Thereof the branch of recreational, cultural and sporting services accounts for 6 percent points. Considerable proportions of the total area are also used for the production of products from agriculture, forestry and fishing (9 %), construction (9 %), wholesale and retail trade services (10 %) and land transport (8 %).

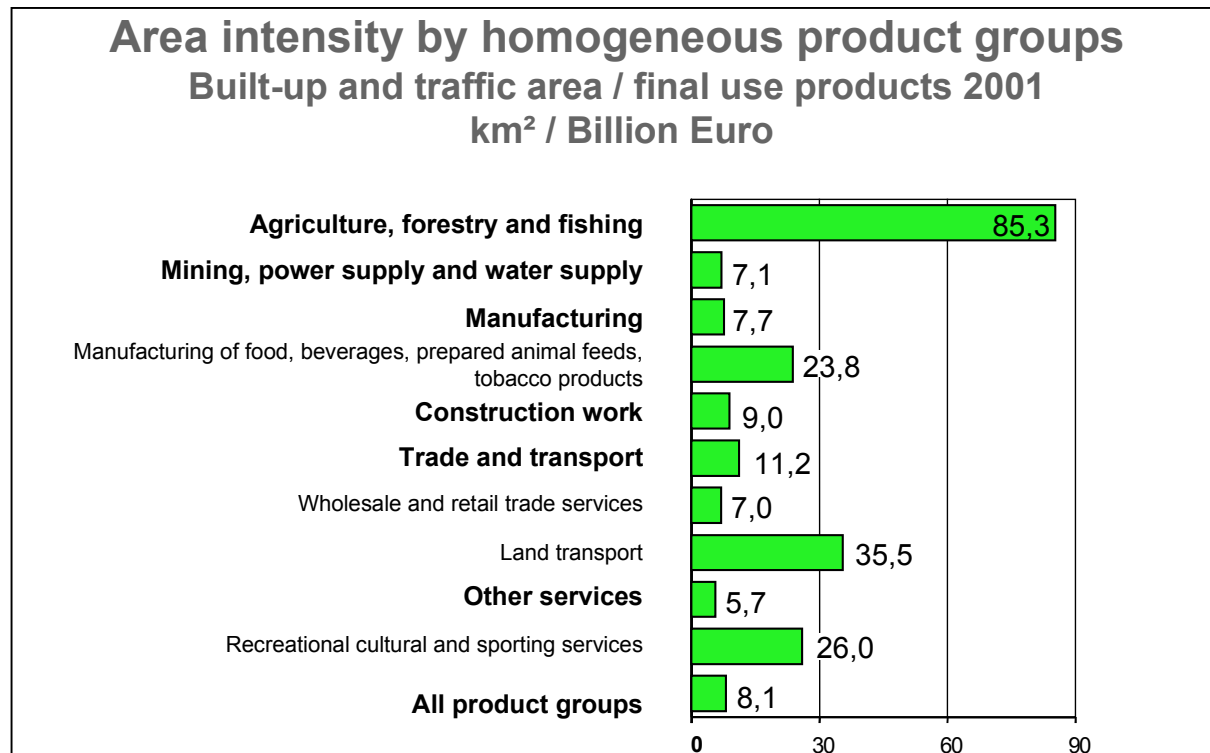
### 3.5 Intensity of area use by products of final use

Similar to the calculation of branch-specific area productivity rates, we can calculate specific ratios expressing the area intensity of product groups. The area intensity for product groups can be measured by the following ratio: built-up and traffic area to expenditure for final uses

Diagram 5 shows the results for 2001. The average area intensity (all product groups) is 8 km<sup>2</sup> per billion Euro. The area intensity for the final use products is far above average for the following branches: agriculture, forestry and fishing (85 km<sup>2</sup> per billion Euro), manufacturing

of food and beverages (24 km<sup>2</sup> per billion Euro), land transport (36 km<sup>2</sup> per billion Euro) and recreational, cultural and sporting services (26 km<sup>2</sup> per billion Euro). On the basis of this type of data the effect of changing patterns of final uses on use of built-up and traffic area can be assessed.

**Diagram 5:**



### 3.5 Decomposition of change in area use by influencing factors

The data on built-up and traffic area in a detailed break down by economic activities can also be utilised to estimate the influence of different factors on the overall development of the area use. A tool that can be used for this purpose is the decomposition analysis. Decomposition is a mathematical tool used to describe the degree to which the input or withdrawal of individual influencing factors may be responsible for trends in the dependent overall impact. The starting point is a depiction of the dependent value (in the present case built-up and traffic area) as a product of the observed influencing values. Decomposition analysis transfers this multiplicative starting equation into an additive equation that disassembles the observed time series showing the change of area use into the effects of the individual influencing factors. Each individual effect describes how area would have developed if only the factor under consideration would have changed<sup>6</sup>. The individual effects may have different signs: The negative effect of a factor may be compensated for by the positive impact of other factors. In the interpretation of the results, account should be taken of the limits posed by such an analysis. Thus, for instance, the influencing factors included in the analysis are externally defined, and it is presumed that the individual factors do not influence one another. To this extent, the results can merely provide a rough assessment of the magnitudes that are relevant in each case.

<sup>6</sup> See: Seibel S. (2003): Decomposition analysis of carbon-dioxid emission changes in Germany - conceptual frameworks and empirical results, Working papers and studies, European Communities.  
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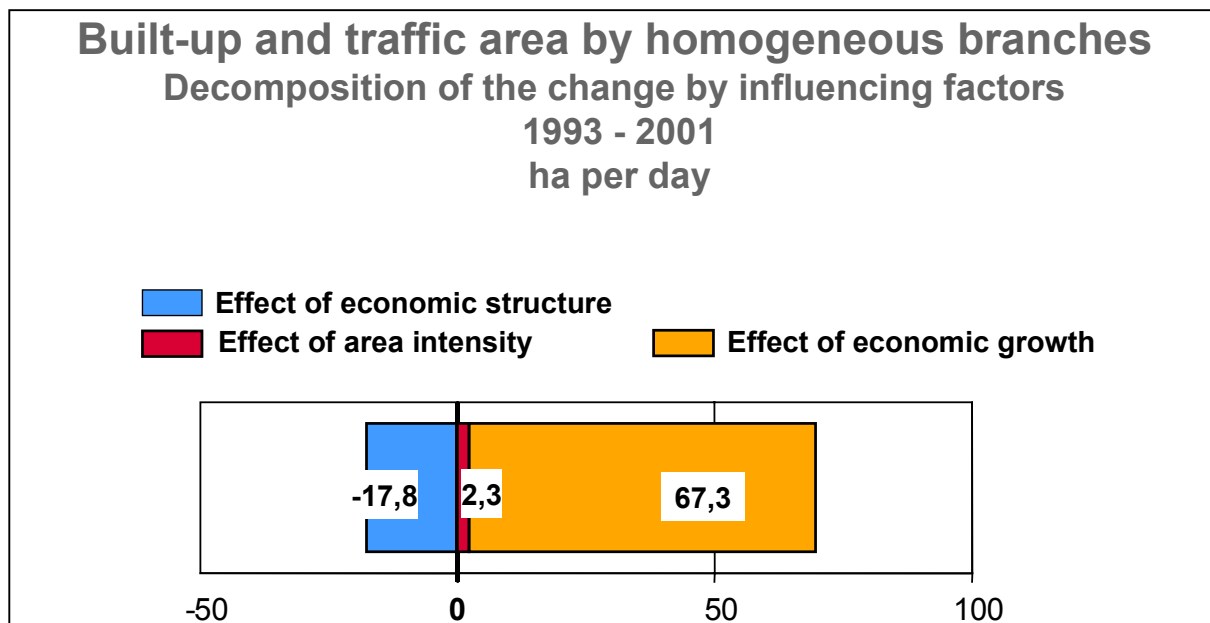
In the analysis below the development of area use for branches of production on the one hand and for private households on the other hand are analysed separately, since for both entities there are different relevant influencing factors.

With regard to the production branches three factors in particular are considered to be of particular interest:

- the area intensity of the individual production branches as an approximate measure of efficiency of area use. The intensity is measured as the ratio of built-up and traffic area per gross value added of the respective branch,
- the economic structure, expressed as the percentage of the branch-specific gross value added to the total gross value added, and
- economic growth, quantified by the development of the total gross value added

The results of the decomposition analysis of the area used for production are shown in diagram 6. Between 1993 and 2001 the total area under consideration increased on an average by 59 ha per day. Both economic growth and the development of area intensity led arithmetically to an increase of area use. The growth effect on an average accounted for 67 ha per day and the influence of the intensity effect was 2 ha per day. Against this the structural change led to an abatement of area use by 18 ha per day. The abating effect of the economic structure is reflecting the increasing relative importance of more area-extensive branches and the parallel drop in area-intensive production branches. It is rather remarkable that the compound effect of the development of the area efficiency in the individual branches had an burdening impact on overall area use. Such the improvement of the overall productivity goes only back to a structural effect.

**Diagram 6**



If we carry out the same analysis separately for the categories of settlement and traffic area, a differentiated picture is revealed with regard to the effect of area intensity. While the development of branch-specific area intensity has an abating effect in the case of traffic areas (-11.6 ha per day), in the case of settlement area it is clearly burdening (+13.8 ha per day). This reveals that the above-described intensity-related additional burden of 2 ha per day regarding the built-up and traffic area together was the result of the unfavourable tendency for built-up areas in spite of favourable development of traffic area intensities. This is all the more valid since a part of the expansion of traffic area was not due to increasing the transport capacity of the road system, but was caused by roads for developing new built-up areas.

For the private households, in order to obtain as close a relationship as possible between area use and the influencing factors studied, analysis was restricted to the building and adjacent open areas utilised for housing purposes. Especially the use of traffic area by private household was not investigated further with the tool of decomposition analysis. Three influencing factors or factor complexes were taken into account in the examinations:

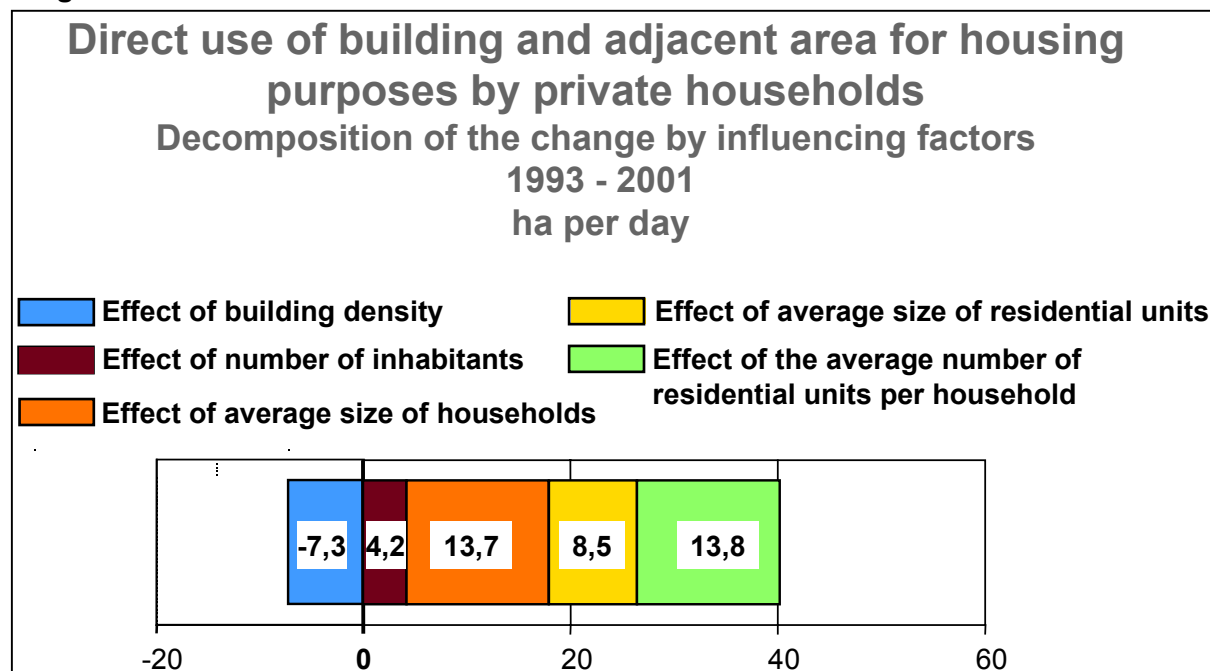
- Firstly, area use by private households is steered by a demographic component – the increase in the number of households, whereby this results from the two influencing factors of population development and the development of the average household size (persons per household).
- Secondly, there is a factor complex that indicates how much living space is occupied by household on average. This factor can be differentiated in the two factors of the average number of residential units per household and the average size of the residential units. .
- Lastly, area use is influenced by the building density, operationalised in the analysis via the quotient of building and adjacent open area used for housing purposes to living space.

Both the living space and the number of residential units include utilised and unutilised residential units, which must be taken into account in the interpretation.

The demographic development – increasing population in private households linked with a trend towards smaller households – is a burden on area use, as well as the increasing number of residential units per household and the tendency towards larger residential units. On the other hand, increasing building density has an abating effect. The population in private households increased from 81,428 in the year 1993 by 1.4 % to 82,575 in the year 2001. The number of households grew markedly faster – by 6.1 % - from 36,230 to 38,456. The average number of residential units per household in 1993 was approx. 0.95 and grew by 2001 to 1.00, which is mainly the arithmetical effect of empty standing residences increasing from 1,2 million in 1993 to 3,2 millions in 2002. The average residence size increased from 82.2 m<sup>2</sup> to 84.6 m<sup>2</sup>. The quotient of building and adjacent open area used for housing purposes to living space dropped from approx. 2.94 in the year 1993 to 2.87 in the year 2001 – as the result of an increased building density.

The decomposition analysis quantifies the effects that were foreseeable qualitatively before the investigation (Diagram 7).

Diagram 7:



The overall growth of building and adjacent open area used for housing purposes was 32,8 ha per day on an average between 1993 and 2001. The demographic development, the growing number of residential units per households and the increase in the average size of residential units account all together for an increase in area use of 40.2 ha per day. Against this the increasing building density with an abating effect of 7.3 ha per day was comparatively insignificant. The individual effects were as follows: population growth 4.2 ha per day, decrease in household size 13.7 ha per day, increase in the average size of residential units 8.5 ha per day and increase in number of residential units per household 13.8 ha per day.

#### 4. Conclusions

The overall figures of the indicator on the development of built-up and traffic area of the National Strategy for Sustainable Development suggest that there was an increasing area productivity during the period 1993 to 2001. But the detailed analysis of the development on the basis of the data of the environmental economic accounts revealed that improvement of area-use efficiency played only a rather minor role in achieving this result. As far as production was concerned there was rather a slight decrease in the compound of area efficiency of the individual branches and the improvement of the overall productivity goes only back to a structural effect caused by the growing relative importance of less area intensive branches. Regarding the area use by private households an efficiency effect could be observed with respect to growing building density of the housing areas. But this effect was by far outnumbered by a number of opposite effects, like demographic development and increasing individual claims for living space. And also the recent decrease in the pace of the annual or daily growth of area use appeared not to be an established change in the trend in the light of an environmental economic analysis, but rather an effect of current economic decrease.

## Built-up and traffic area 1993

km<sup>2</sup>

Row No.	CPA 1)	Homogenous branches	Built-up area				Traffic area		Total Built-up and Traffic area	Row No.	
			Building and adjacent open area	Plant area 2)	Recreation area	Cemetery	Total	Total			of which: road, path, square
1	01	Products of agriculture, hunting and related services 3)	2680	1	0	0	2681	620	620	3301	1
2	02	Products of forestry, logging and related services	180	0	0	0	180	329	329	508	2
3	05	Fish and other fishing products, services incidental to fishing	1	0	0	0	1	1	1	2	3
4	10	Coal and lignite; peat	50	41	0	0	91	3	3	94	4
5	11	Crude petroleum and natural gas; services incidental to oil and gas extraction	6	1	0	0	6	0	0	7	5
6	12	Uranium and thorium ores	0	0	0	0	0	0	0	0	6
7	13	Metal ores	0	0	0	0	0	0	0	0	7
8	14	Other mining and quarrying products	15	50	0	0	65	5	5	70	8
9	15.1 - 15.8	Food products	192	6	0	0	198	43	43	241	9
10	15.9	Beverages	34	1	0	0	35	25	25	60	10
11	16	Tobacco products	3	0	0	0	3	2	2	5	11
12	17	Textiles	42	1	0	0	43	9	9	52	12
13	18	Wearing apparel; furs	29	0	0	0	29	7	7	35	13
14	19	Leather and leather products	9	0	0	0	9	2	2	11	14
15	20	Wood and products of wood, cork (except furniture) and plaiting materials	68	0	0	0	68	18	18	86	15
16	21.1	Pulp, paper and paperboard	21	7	0	0	28	6	6	34	16
17	21.2	Articles of paper and paperboard	35	1	0	0	36	7	7	43	17
18	22.1	Books, newspapers and other printed matter and recorded media	41	0	0	0	41	30	30	71	18
19	22.2 - 22.3	Printing services, reproduction services of recorded media	70	1	0	0	70	12	12	82	19
20	23	Coke, refined petroleum products and nuclear fuels	10	10	0	0	20	3	3	22	20
21	24.4	Pharmaceutical products	33	1	0	0	33	7	7	40	21
22	24 (ohne 24.4)	Chemical products, except pharmaceutical products	126	14	0	0	140	20	20	160	22
23	25.1	Rubber products	28	0	0	0	28	2	2	30	23
24	25.2	Plastic products	92	1	0	0	93	9	9	102	24
25	26.1	Glass and glass products	19	0	0	0	19	6	6	25	25
26	26.2 - 26.8	Other non-metallic mineral products, except glass and glass products	61	4	0	0	65	24	24	89	26
27	27.1 - 27.3	Iron and steel, ferro-alloys and tubes	54	40	0	0	93	12	12	105	27
28	27.4	Basic precious metals and metals clad with precious metals	23	1	0	0	24	8	8	33	28
29	27.5	Foundry work services	29	1	0	0	30	4	4	35	29
30	28	Fabricated metal products, except machinery and equipment	195	2	0	0	197	39	39	236	30
31	29	Machinery and equipment n.e.c.	268	2	0	0	271	44	44	315	31
32	30	Office machinery and computers	18	0	0	0	18	5	5	23	32
33	31	Electrical machinery and apparatus n.e.c.	118	1	0	0	119	29	29	148	33
34	32	Radio, television and communication equipment and apparatus	48	1	0	0	48	11	11	59	34
35	33	Medical, precision and optical instruments, watches and clocks	83	1	0	0	83	11	11	94	35
36	34	Motor vehicles, trailers and semi-trailers	141	2	0	0	143	45	45	188	36
37	35	Other transport equipment	36	0	0	0	37	5	5	41	37
38	36	Furniture; other manufactured goods n.e.c.	78	1	0	0	78	21	21	99	38
39	37	Secondary raw materials	2	12	0	0	14	27	27	41	39
40	40.1, 40.3	Electrical energy, steam and hot water	139	41	0	0	180	16	16	197	40
41	40.2	Gas	0	0	0	0	0	4	4	4	41
42	41	Collected and purified water, distribution services of water	8	6	0	0	14	2	2	16	42
43	45.1 - 45.2	Site preparation work, structural and civil engineering work	410	80	0	0	489	216	216	705	43
44	45.3 - 45.5	Building installation and building completion work	380	2	0	0	382	111	111	492	44
45	50	Trade and repair services of motor vehicles; retail sale of automotive fuel	173	1	0	0	174	90	90	264	45
46	51	Wholesale trade and commission trade services	238	50	0	0	288	353	353	641	46
47	52	Retail trade services; repair services of personal and household goods	493	0	0	0	493	158	158	651	47
48	55	Hotel and restaurant services	243	0	70	0	313	21	21	334	48
49	60.1	Railway transport services	41	0	0	0	41	1304	2	1344	49
50	60.2 - 60.3	Other land transport services; transport services via pipelines	0	0	0	0	0	405	405	405	50
51	61	Water transport services	2	0	0	0	2	0	0	3	51
52	62	Air transport services	1	0	0	0	1	0	0	2	52
53	63	Supporting and auxiliary transport services; travel agency services	247	1	0	0	247	406	122	653	53
54	64	Post and telecommunication services	37	1	0	0	38	71	71	109	54
55	65	Financial intermediation services	37	0	0	0	37	10	10	47	55
56	66	Insurance and pension funding services, except social security services	18	0	0	0	18	7	7	25	56
57	67	Services auxiliary to financial intermediation	3	0	0	0	3	7	7	10	57
58	70	Real estate services 4)	12	0	0	0	12	12	12	25	58
59	71	Renting services of machinery and equipment without operator	2	0	0	0	2	14	14	16	59
60	72	Computer and related services	11	0	0	0	11	28	28	39	60
61	73	Research and development services	61	0	0	0	61	9	9	70	61
62	74	Other business services	121	5	0	0	126	211	211	338	62
63	75.1 - 75.2	Public administration and defence services	337	0	0	0	337	110	70	448	63
64	75.3	Computusocial security services	8	0	0	0	8	3	3	11	64
65	80	Education services	413	0	0	0	413	212	212	625	65
66	85	Health and social work services	351	0	0	0	351	56	56	407	66
67	90	Sewage and refuse disposal services, sanitation and similar services	90	110	0	0	199	18	18	217	67
68	91	Membership organisation services n.e.c.	131	0	0	0	131	7	7	138	68
69	92	Recreational, cultural and sporting services	248	0	867	0	1115	74	74	1188	69
70	93	Other services	2	0	0	0	2	32	32	35	70
71	95	Private households with employed persons	0	0	0	0	0	0	0	0	71
72	99	Services of extraterritorial organisations and corporations	0	0	0	0	0	0	0	0	72
73		<b>All homogenous branches</b>	<b>9193</b>	<b>501</b>	<b>937</b>	<b>0</b>	<b>10631</b>	<b>5418</b>	<b>3792</b>	<b>16048</b>	<b>73</b>
74		<b>Consumption of private households</b>	<b>10378</b>	<b>0</b>	<b>1318</b>	<b>327</b>	<b>12022</b>	<b>11023</b>	<b>11023</b>	<b>23045</b>	<b>74</b>
75		of which: Housing	8351	0	0	0	8351	0	0	8351	75
76		<b>All homog. branches and Consumption of private households</b>	<b>19571</b>	<b>501</b>	<b>2255</b>	<b>327</b>	<b>22653</b>	<b>16441</b>	<b>14815</b>	<b>39094</b>	<b>76</b>
77		<b>Unused built-up area</b>	<b>1163</b>	<b>49</b>	<b>0</b>	<b>0</b>	<b>1211</b>	<b>0</b>	<b>0</b>	<b>1211</b>	<b>77</b>
78		<b>Total</b>	<b>20733</b>	<b>550</b>	<b>2255</b>	<b>327</b>	<b>23864</b>	<b>16441</b>	<b>14815</b>	<b>40305</b>	<b>78</b>

1) Classification of homogenous branches comparable with the Classification of Products by Activity in the EU (Edition 1993).

2) Excluding mineral extraction sites.

3) The area of fruit and vegetable garden is allocated to the domestic final consumption.

4) The area of residential building is allocated to the domestic final consumption.

## Built-up and traffic area 1997

km<sup>2</sup>

Row No.	CPA 1)	Homogenous branches	Built-up area					Traffic area		Total Built-up and Traffic area	Row No.
			Building and adjacent open area	Plant area 2)	Recreation area	Cemetery	Total	Total	of which: road, path, square		
1	01	Products of agriculture, hunting and related services3)	2822	1	0	0	2823	611	610	3434	1
2	02	Products of forestry, logging and related services	207	0	0	0	207	335	335	542	2
3	05	Fish and other fishing products; services incidental to fishing	1	0	0	0	1	1	1	2	3
4	10	Coal and lignite, peat	50	43	0	0	92	2	2	95	4
5	11	Crude petroleum and natural gas; services incidental to oil and gas extraction	6	1	0	0	7	0	0	7	5
6	12	Uranium and thorium ores	0	0	0	0	0	0	0	0	6
7	13	Metal ores	0	0	0	0	0	0	0	0	7
8	14	Other mining and quarrying products	14	46	0	0	60	4	4	65	8
9	15.1 - 15.8	Food products	217	7	0	0	224	34	34	259	9
10	15.9	Beverages	36	1	0	0	37	21	21	58	10
11	16	Tobacco products	3	0	0	0	3	1	1	5	11
12	17	Textiles	42	1	0	0	42	7	7	49	12
13	18	Wearing apparel; furs	9	0	0	0	27	5	5	32	13
14	19	Leather and leather products	9	0	0	0	10	1	1	11	14
15	20	Wood and products of wood, cork (except furniture) and plaiting materials	74	1	0	0	75	17	17	91	15
16	21.1	Pulp, paper and paperboard	22	9	0	0	31	5	5	36	16
17	21.2	Articles of paper and paperboard	40	1	0	0	41	6	6	46	17
18	22.1	Books, newspapers and other printed matter and recorded media	55	0	0	0	55	33	33	88	18
19	22.2 - 22.3	Printing services, reproduction services of recorded media	69	1	0	0	70	9	9	78	19
20	23	Coke, refined petroleum products and nuclear fuels	10	11	0	0	21	2	2	24	20
21	24	Pharmaceutical products	37	1	0	0	38	6	6	43	21
22	24 (ohne 24.4)	Chemical products, except pharmaceutical products	129	17	0	0	147	17	17	163	22
23	25.1	Rubber products	30	0	0	0	31	2	2	32	23
24	25.2	Plastic products	103	1	0	0	105	8	8	112	24
25	26.1	Glass and glass products	21	0	0	0	21	6	6	27	25
26	26.2 - 26.8	Other non-metallic mineral products, except glass and glass products	64	5	0	0	69	22	22	91	26
27	27.1 - 27.3	Iron and steel, ferro-alloys and tubes	57	36	0	0	93	10	10	103	27
28	27.4	Basic precious metals and metals clad with precious metals	25	1	0	0	26	7	7	33	28
29	27.5	Foundry work services	30	1	0	0	32	4	4	35	29
30	28	Fabricated metal products, except machinery and equipment	214	3	0	0	216	36	36	253	30
31	29	Machinery and equipment n.e.c.	292	3	0	0	295	41	41	336	31
32	30	Office machinery and computers	19	0	0	0	19	5	5	24	32
33	31	Electrical machinery and apparatus n.e.c.	125	1	0	0	126	27	27	153	33
34	32	Radio, television and communication equipment and apparatus	48	1	0	0	49	10	10	59	34
35	33	Medical, precision and optical instruments, watches and clocks	89	1	0	0	90	9	9	99	35
36	34	Motor vehicles, trailers and semi-trailers	176	3	0	0	179	42	42	221	36
37	35	Other transport equipment	36	0	0	0	37	4	4	41	37
38	36	Furniture; other manufactured goods n.e.c.	83	1	0	0	84	19	19	102	38
39	37	Secondary raw materials	3	14	0	0	17	26	26	43	39
40	40.1, 40.3	Electrical energy, steam and hot water	148	46	0	0	194	16	16	210	40
41	40.2	Gas	0	0	0	0	0	4	4	4	41
42	41	Collected and purified water, distribution services of water	8	7	0	0	16	2	2	18	42
43	45.1 - 45.2	Site preparation work, structural and civil engineering work	418	82	0	0	501	234	234	735	43
44	45.3 - 45.5	Building installation and building completion work	422	2	0	0	424	124	124	548	44
45	50	Trade and repair services of motor vehicles; retail sale of automotive fuel	193	1	0	0	194	98	98	292	45
46	51	Wholesale trade and commission trade services	254	59	0	0	314	328	328	642	46
47	52	Retail trade services; repair services of personal and household goods	520	0	0	0	520	149	149	669	47
48	55	Hotel and restaurant services	262	0	76	0	339	22	22	361	48
49	60.1	Railway transport services	44	0	0	0	44	1265	1	1308	49
50	60.2 - 60.3	Other land transport services; transport services via pipelines	0	0	0	0	0	467	467	467	50
51	61	Water transport services	3	0	0	0	3	0	0	3	51
52	62	Air transport services	2	0	0	0	2	0	0	2	52
53	63	Supporting and auxiliary transport services; travel agency services	266	1	0	0	267	449	173	716	53
54	64	Post and telecommunication services	36	1	0	0	37	75	75	112	54
55	65	Financial intermediation services	40	0	0	0	40	8	8	47	55
56	66	Insurance and pension funding services, except social security services	19	0	0	0	19	5	5	24	56
57	67	Services auxiliary to financial intermediation	3	0	0	0	3	5	5	8	57
58	70	Real estate services4)	14	0	0	0	14	14	14	28	58
59	71	Renting services of machinery and equipment without operator	2	0	0	0	2	18	18	20	59
60	72	Computer and related services	12	0	0	0	12	32	32	44	60
61	73	Research and development services	64	0	0	0	64	11	11	75	61
62	74	Other business services	127	6	0	0	133	232	232	365	62
63	75.1 - 75.2	Public administration and defence services	332	0	0	0	332	120	80	452	63
64	75.3	Compulsory social security services	9	0	0	0	9	3	3	11	64
65	80	Education services	407	0	0	0	407	269	269	676	65
66	85	Health and social work services	350	0	0	0	350	64	64	413	66
67	90	Sewage and refuse disposal services, sanitation and similar services	97	135	0	0	232	22	22	254	67
68	91	Membership organisation services n.e.c.	131	0	0	0	131	6	6	138	68
69	92	Recreational, cultural and sporting services	259	0	915	0	1174	81	81	1255	69
70	93	Other services	3	0	0	0	3	37	37	39	70
71	95	Private households with employed persons	0	0	0	0	0	0	0	0	71
72	99	Services of extraterritorial organisations and corporations	0	0	0	0	0	0	0	0	72
73		<b>All homogenous branches</b>	9728	556	991	0	11274	5554	3973	16829	73
74		<b>Consumption of private households</b>	10941	0	1383	335	12659	11231	11227	23891	74
75		of which: Housing	8748	0	0	0	8748	0	0	8748	75
76		<b>All homog. branches and Consumption of private households</b>	20669	556	2374	335	23934	16786	15201	40719	76
77		<b>Unused built-up area</b>	1269	65	0	0	1333	0	0	1333	77
78		<b>Total</b>	21937	620	2374	335	25267	16786	15201	42052	78

1) Classification of homogenous branches comparable with the Classification of Products by Activity in the EU (Edition 1993).

2) Excluding mineral extraction sites.

3) The area of fruit and vegetable garden is allocated to the domestic final consumption.

4) The area of residential building is allocated to the domestic final consumption.

## Built-up and traffic area 2001

km<sup>2</sup>

Row No.	CPA 1)	Homogenous branches	Built-up area				Traffic area		Total Built-up and Traffic area	Row No.	
			Building and adjacent open area	Plant area 2)	Recreation area	Cemetery	Total	Total			of which: road, path, square
1	01	Products of agriculture, hunting and related services3)	2730	1	0	0	2731	594	594	3325	1
2	02	Products of forestry, logging and related services	200	0	0	0	200	333	333	534	2
3	05	Fish and other fishing products; services incidental to fishing	1	0	0	0	1	0	0	2	3
4	10	Coal and lignite; peat	39	43	0	0	82	2	2	84	4
5	11	Crude petroleum and natural gas; services incidental to oil and gas extraction	5	6	0	0	11	0	0	11	5
6	12	Uranium and thorium ores	0	0	0	0	0	0	0	0	6
7	13	Metal ores	0	0	0	0	0	0	0	0	7
8	14	Other mining and quarrying products	14	52	0	0	66	4	4	69	8
9	15.1 - 15.8	Food products	241	8	0	0	249	30	30	279	9
10	15.9	Beverages	34	1	0	0	35	19	19	54	10
11	16	Tobacco products	3	0	0	0	3	1	1	5	11
12	17	Textiles	40	1	0	0	40	6	6	46	12
13	18	Wearing apparel; furs	20	0	0	0	20	4	4	24	13
14	19	Leather and leather products	8	0	0	0	8	1	1	9	14
15	20	Wood and products of wood, cork (except furniture) and plaiting materials	70	1	0	0	70	15	15	85	15
16	21.1	Pulp, paper and paperboard	23	11	0	0	33	4	4	37	16
17	21.2	Articles of paper and paperboard	35	2	0	0	37	5	5	41	17
18	22.1	Books, newspapers and other printed matter and recorded media	45	0	0	0	45	37	37	82	18
19	22.2 - 22.3	Printing services, reproduction services of recorded media	63	1	0	0	64	7	7	72	19
20	23	Coke, refined petroleum products and nuclear fuels	11	13	0	0	24	2	2	26	20
21	24.4	Pharmaceutical products	45	1	0	0	47	6	6	52	21
22	24 (ohne 24.4)	Chemical products, except pharmaceutical products	108	19	0	0	127	17	17	144	22
23	25.1	Rubber products	31	0	0	0	31	2	2	33	23
24	25.2	Plastic products	117	1	0	0	118	8	8	126	24
25	26.1	Glass and glass products	22	0	0	0	22	5	5	27	25
26	26.2 - 26.8	Other non-metallic mineral products, except glass and glass products	60	6	0	0	66	19	19	85	26
27	27.1 - 27.3	Iron and steel, ferro-alloys and tubes	51	41	0	0	92	10	10	102	27
28	27.4	Basic precious metals and metals clad with precious metals	24	1	0	0	25	7	7	32	28
29	27.5	Foundry work services	33	2	0	0	35	4	4	38	29
30	28	Fabricated metal products, except machinery and equipment	227	3	0	0	231	38	38	268	30
31	29	Machinery and equipment n.e.c.	307	3	0	0	310	48	48	358	31
32	30	Office machinery and computers	16	0	0	0	16	5	5	21	32
33	31	Electrical machinery and apparatus n.e.c.	131	1	0	0	132	30	30	162	33
34	32	Radio, television and communication equipment and apparatus	54	1	0	0	55	11	11	66	34
35	33	Medical, precision and optical instruments, watches and clocks	90	1	0	0	91	9	9	101	35
36	34	Motor vehicles, trailers and semi-trailers	197	4	0	0	200	48	48	248	36
37	35	Other transport equipment	40	0	0	0	41	5	5	46	37
38	36	Furniture; other manufactured goods n.e.c.	78	1	0	0	79	17	17	97	38
39	37	Secondary raw materials	3	16	0	0	19	24	24	44	39
40	40.1, 40.3	Electrical energy, steam and hot water	157	50	0	0	207	16	16	223	40
41	40.2	Gas	0	0	0	0	0	4	4	4	41
42	41	Collected and purified water, distribution services of water	9	8	0	0	17	2	2	19	42
43	45.1 - 45.2	Site preparation work, structural and civil engineering work	393	92	0	0	485	218	218	704	43
44	45.3 - 45.5	Building installation and building completion work	409	3	0	0	412	122	122	534	44
45	50	Trade and repair services of motor vehicles; retail sale of automotive fuel	233	1	0	0	234	122	122	356	45
46	51	Wholesale trade and commission trade services	285	67	0	0	352	315	315	667	46
47	52	Retail trade services; repair services of personal and household goods	603	0	0	0	603	144	144	747	47
48	55	Hotel and restaurant services	297	0	82	0	380	25	25	405	48
49	60.1	Railway transport services	49	0	0	0	49	1320	2	1370	49
50	60.2 - 60.3	Other land transport services; transport services via pipelines	0	0	0	0	0	447	447	447	50
51	61	Water transport services	3	0	0	0	3	0	0	3	51
52	62	Air transport services	2	0	0	0	2	0	0	2	52
53	63	Supporting and auxiliary transport services; travel agency services	295	1	0	0	295	542	253	838	53
54	64	Post and telecommunication services	38	1	0	0	39	84	84	123	54
55	65	Financial intermediation services	45	0	0	0	45	8	8	53	55
56	66	Insurance and pension funding services, except social security services	21	0	0	0	21	6	6	27	56
57	67	Services auxiliary to financial intermediation	4	0	0	0	4	6	6	9	57
58	70	Real estate services4)	16	0	0	0	16	16	16	31	58
59	71	Renting services of machinery and equipment without operator	3	0	0	0	3	20	20	23	59
60	72	Computer and related services	16	0	0	0	16	36	36	51	60
61	73	Research and development services	67	0	0	0	67	13	13	80	61
62	74	Other business services	153	7	0	0	160	249	248	408	62
63	75.1 - 75.2	Public administration and defence services	351	0	0	0	351	121	81	471	63
64	75.3	Compulsory social security services	9	0	0	0	9	2	2	11	64
65	80	Education services	430	0	0	0	430	336	336	766	65
66	85	Health and social work services	365	0	0	0	365	65	65	430	66
67	90	Sewage and refuse disposal services, sanitation and similar services	107	172	0	0	278	22	22	300	67
68	91	Membership organisation services n.e.c.	142	0	0	0	142	7	7	149	68
69	92	Recreational, cultural and sporting services	304	0	1030	0	1334	89	89	1423	69
70	93	Other services	3	0	0	0	3	43	43	46	70
71	95	Private households with employed persons	0	0	0	0	0	0	0	0	71
72	99	Services of extraterritorial organisations and corporations	0	0	0	0	0	0	0	0	72
73		<b>All homogenous branches</b>	<b>10027</b>	<b>643</b>	<b>1112</b>	<b>0</b>	<b>11782</b>	<b>5776</b>	<b>4127</b>	<b>17558</b>	<b>73</b>
74		<b>Consumption of private households</b>	<b>11561</b>	<b>0</b>	<b>1546</b>	<b>350</b>	<b>13457</b>	<b>11342</b>	<b>11339</b>	<b>24799</b>	<b>74</b>
75		of which: Housing	9309	0	0	0	9309	0	0	9309	75
76		<b>All homog. branches and Consumption of private households</b>	<b>21589</b>	<b>643</b>	<b>2659</b>	<b>350</b>	<b>25240</b>	<b>17118</b>	<b>15466</b>	<b>42357</b>	<b>76</b>
77		<b>Unused built-up area</b>	<b>1492</b>	<b>90</b>	<b>0</b>	<b>0</b>	<b>1582</b>	<b>0</b>	<b>0</b>	<b>1582</b>	<b>77</b>
78		<b>Total</b>	<b>23081</b>	<b>732</b>	<b>2659</b>	<b>350</b>	<b>26821</b>	<b>17118</b>	<b>15466</b>	<b>43939</b>	<b>78</b>

1) Classification of homogenous branches comparable with the Classification of Products by Activity in the EU (Edition 1993).

2) Excluding mineral extraction sites.

3) The area of fruit and vegetable garden is allocated to the domestic final consumption.

4) The area of residential building is allocated to the domestic final consumption.