

Paper for the Input-Output Meeting on the Managing the Environment at Sevilla 9 – 11 July 2008

Environmental Impacts of Household Consumption in Germany 1995 - 2005

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1. Economic activities of private households and energy consumption

Private households use energy directly or indirectly. Direct energy consumption is related to housing and recreation activities of households and to private transports. Energy is used for heating and warm water, for cooking and cleaning, for communication and entertainment and for households own transport activities.

Indirect energy consumption – embodied energy – is related to household's final consumption of goods and indicates how much energy is needed for manufacturing consumer goods (products and services) by domestic industries or abroad. Embodied energy can be estimated by applying the energetic input-output analysis.²

Moreover private households through other activities are responsible for a further demand for energy. They are consuming goods and services produced by non-profit institutions (NPISHs) and general government for individual consumption. E.g. education services are provided by general government or NPISHs for actual individual consumption (cf. table A1 in the annex, row no. 5-6). For providing these services energy is needed, mainly for heating and for lighting the buildings. Also in hospitals and homes for elderly people a high amount of energy is consumed, which could be assigned to private households also.

Besides these activities residential households have additional energy consumption abroad. Energy is directly consumed in own residential homes or used for individual transports with rented or own cars (table A1, no.7-9). Furthermore energy consumption is caused by consuming products and services abroad either as a tourist or a business man. What matters most is energy needed to provide the services of hotels and restaurants to tourists.

Table A1 on the classification of activities of private households gives an overview on the various definitions of household activities (in relation to the national accounts definitions) and the scope of the measurement within the German environmental-economic accounts (EEA). It shows – cf. column “status” - what is already measured and which results are already available (marked with “X”), what is in preparation at present (“Y”) and which calculations are scheduled for the future (“Z”).

The calculations on embodied energy had to be related to the domestic purchases of households because the input-output tables (IOT) for Germany at present are only available in that delimitation. The inclusion of expenditures of residents abroad (and the exclusion of expenditures of non-residents on the territory) has not been feasible yet, because of a lack in data on the type (commodity group) of these expenditures. However additional calculations had been done with

¹ Federal Statistical Office of Germany, Division of Environmental-Economic Accounts (EEA).
Acknowledgment to Ms. Christine Flachmann who carried out the calculations.

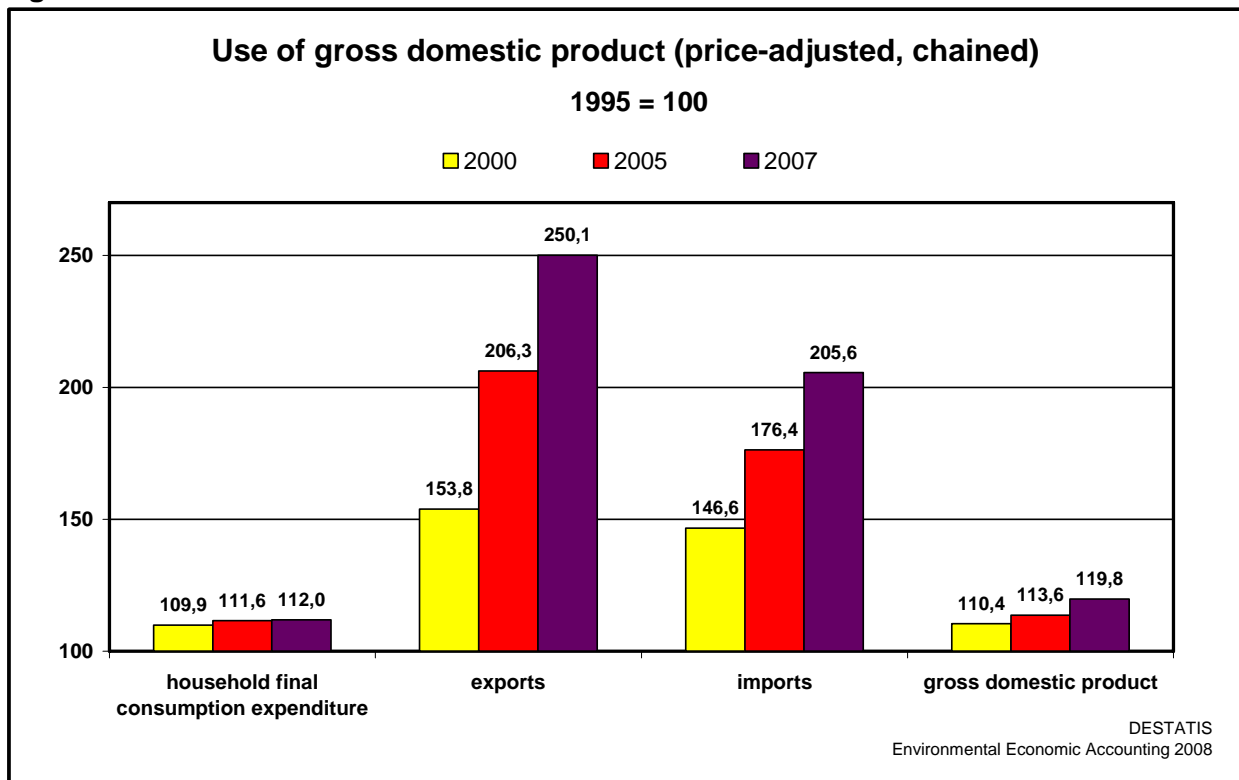
² A description of the compilation of a hybrid I/O-table for Germany and its use for the measurement of embodied energy was given by Mayer (2007) in a paper for the 16-th Input-Output Conference at Istanbul :

regard to transport of goods. Borderline purchases of petrol (table A1, no. 7) have been considered and transport activities beyond the national border linked with the import of consumer goods were looked at in more detail.

Table A2 (in the annex) shows the actual figures and indicators for final consumption expenditures of private households and other final uses of GDP up to the year 2007. Due to the availability of IOT calculations on embodied energy and carbon dioxide emissions were carried out for the years 1995, 2000 and 2005³.

Final consumption expenditures (FCE) of private households (price-adjusted) increased from 1995 to 2007 by 12 % (figure 1). Imports and exports show a remarkable above-average growth. Imports doubled between 1995 and 2007 and exports increased even more (+150 %).

Figure 1



The figures for imports and exports show that imports have got more significance on the domestic market. Imports have substituted domestic output both on the market for finished products and among the materials and supplies used for intermediate consumption. On the other hand exports have increased even more. Partly the increase of exports comes along with an increased share of imports in the production of exports.⁴ With the help of input-output analysis and on basis of the calculations on energy flows and on carbon dioxide emissions by industries total energy consumption and emissions caused by final domestic uses and by exports can be estimated.⁵ In the following chapter results for embodied energy of final use categories is looked at. In chapter 3 final consumption expenditures of households with regard to embodied energy and carbon dioxide are analyzed in more detail.

³ For 2005 preliminary data were used.

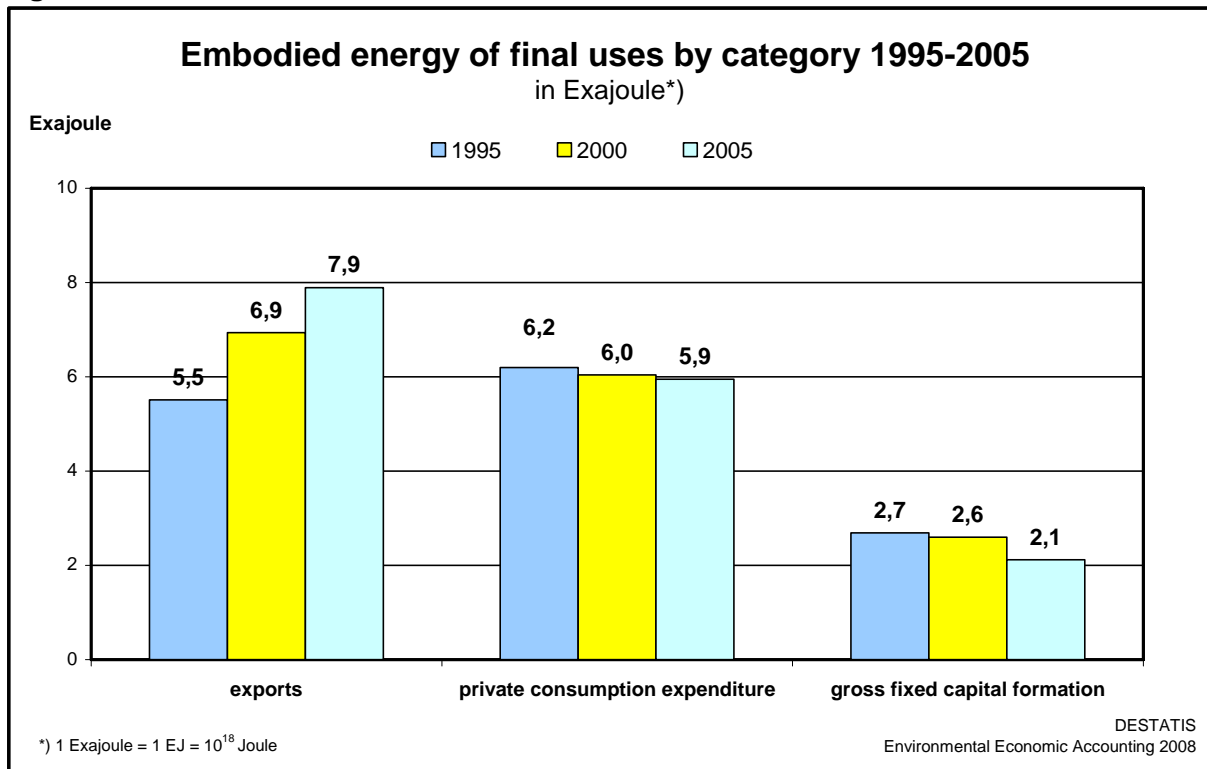
⁴ Cf. Loschky, A., Ritter, L (2007): Konjunkturmotor Export in: Wirtschaft und Statistik no 5/2007, p 478-488.

⁵ Environmental pressures from German imports and exports were analyzed in a paper for the 93rd DGINS conference at Budapest (20-21 September 2007) by Schoer et. al (2007).

2. Embodied energy of domestic consumption and exports

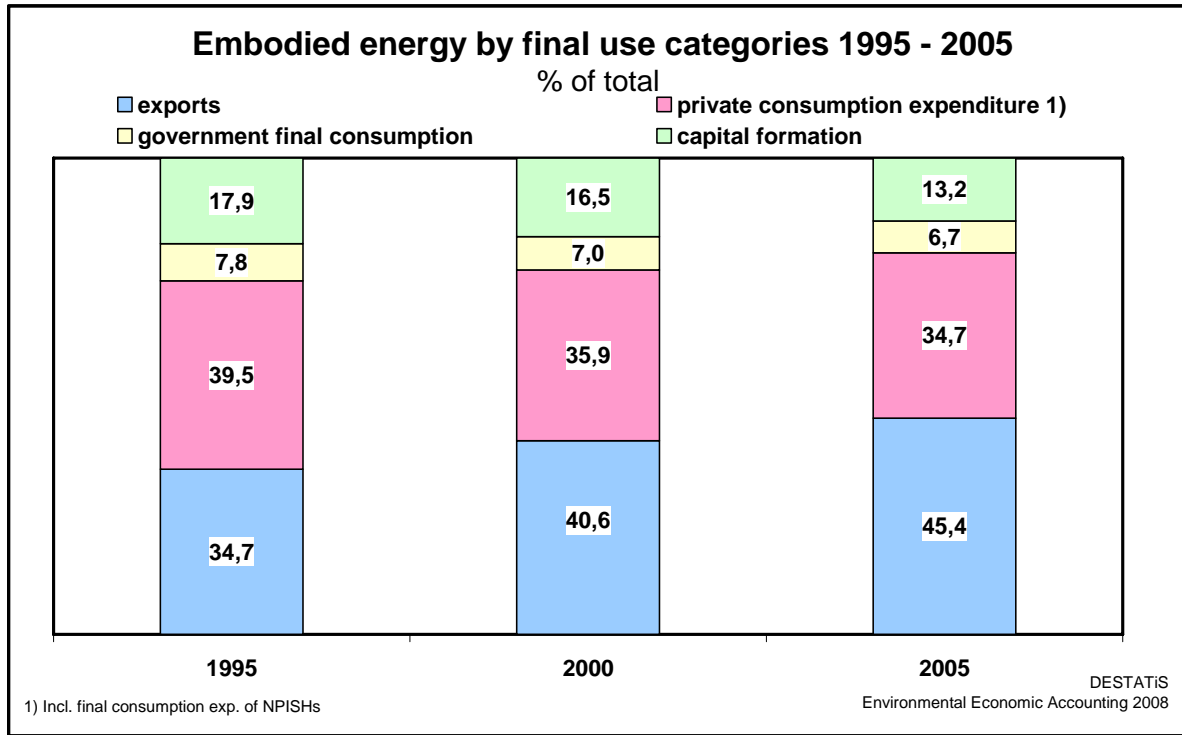
Figure 2 shows how much energy is used for the production of consumer goods, fixed capital formation and exports (cf. annex: table A3). Despite an increased volume of domestic FCE of private households of 11.6 % from 1995 to 2005 embodied energy decreased by 4 % from 6.2 EJ (1995) to 5.9 EJ (2005). Obviously increased energy efficiency in the production of consumer goods has more than compensated the expansive effect from the increase of expenditures. Embodied energy of capital formation also decreased by about 20 % – from 2.7 EJ (1995) to 2.1 EJ (2005). The massive expansion of exports led to an increase in energy use for exports. Embodied energy of exports raised by 43 % from 5.5 EJ (1995) to 7.9 EJ (2005).

Figure 2:



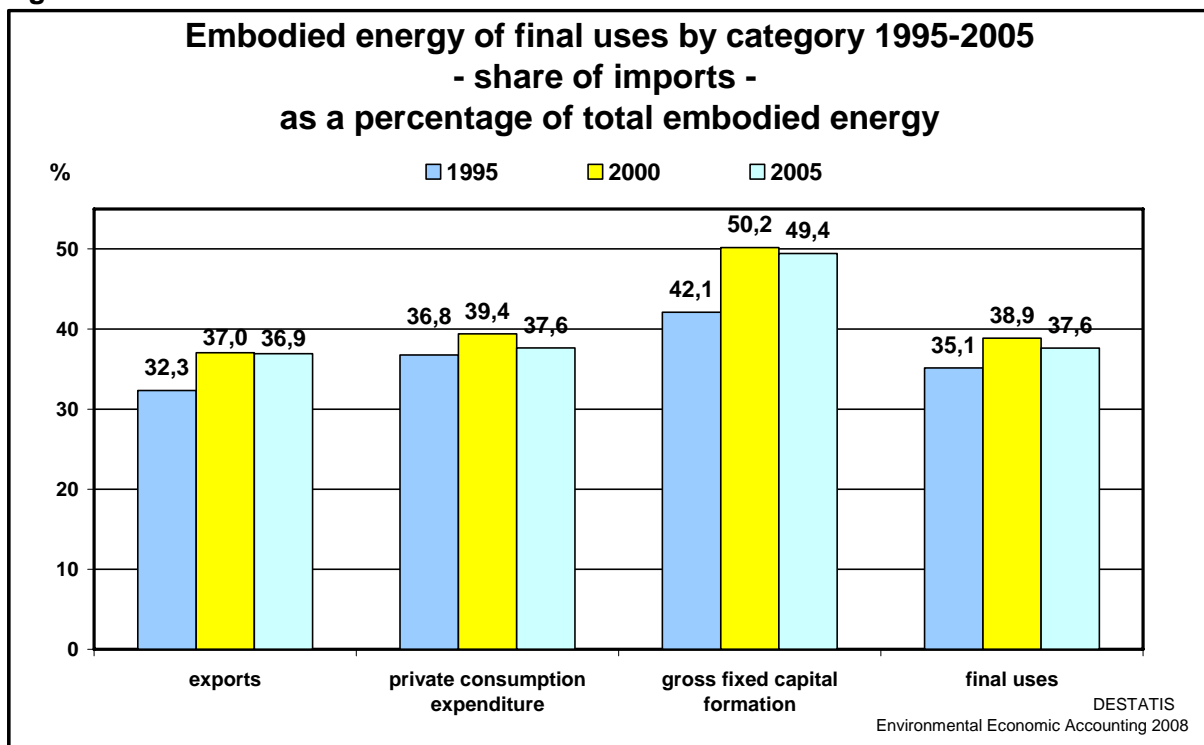
The share of embodied energy of private consumption expenditure on total embodied energy of final uses in 2005 adds up to 34.7 %. Since 1995 this share declined by more than 5 % points. At the same time the share of exports raised to 45.4 % which is an increase of more than 10 %-points. This indicates an increased significance of exports for energy consumption – and CO₂ emissions - for the German economy.

Figure 3:



For the production of final uses in 2005 a total of 17.4 EJ of primary energy was needed, 6.5 EJ for the production of imports and 10.8 EJ in domestic production (cf. table A4 in the annex). The ratio of imports to final uses increased from 35.1 % (1995) to 37.6 % (2005) (cf. figure 4).

Figure 4:



Fixed capital formation has a relatively high import content of about 50 %. The import ratio of FCE of households slightly increased to 37.6 % (2005).

The import ratios for embodied energy are higher than the corresponding ratios for the expenditures. The reason for this is that purchases from domestic production incorporate a higher amount of services compared to imports. Because products in general have a higher content in energy compared to services, imports show a relatively higher content of energy compared to domestic output. (import ratios including those for expenditures for final uses are also presented in table A4 of the annex).

3. Embodied energy and carbon dioxide emissions of consumer goods

Row 1 to 13 of table 1 show results for the direct energy consumption of private households in a breakdown to energy sources. Consumption of petrol is also listed separately (row 10), in order to calculate (final) energy consumption according to the definition used in the national energy balance (row 13). Total (direct) energy consumption of households declined by 0.2 % from 1995 to 2005. With regard to the different energy sources changes in consumption are differing much indicating a substitution of energy sources. E.g. consumption of coal and light heating oil decreased substantially whereas consumption of natural gas and biomass expanded sharply. Also consumption of electricity increased significantly, which in turn requires an increased use of primary energy sources (cf. table 2, row 2).

Rows 14 to 17 show results for embodied energy of final consumption expenditures of households. Total embodied energy decreased by 4 %, especially due to a decline in embodied energy of products, whereas total embodied energy of energy demand remained unchanged.

Table 1:
Energy consumption of private households and embodied energy of household final consumption expenditure in Germany 1995-2005

No.	Energy source / commodity	1995	2000	2005	Change 2005/ 1995	1995	2000	2005	Diff. 2005/ 1995
		petajoule			%	% of total			%- pts.
A	Direct energy consumption of private households								
1	Coal	104	48	32	-68,7	2,7	1,3	0,8	-1,8
2	Petrol	1108	1090	981	-11,4	28,5	28,6	25,3	-3,2
3	Diesel	205	206	275	33,7	5,3	5,4	7,1	1,8
4	Light heating oil	868	749	656	-24,5	22,3	19,6	16,9	-5,4
5	Natural gas	883	948	1086	23,0	22,7	24,8	28,0	5,3
6	Biomass (fuel wood) and other renewable en.	96	174	214	122,0	2,5	4,6	5,5	3,0
7	Electricity	458	470	509	11,1	11,8	12,3	13,1	1,3
8	District heating	171	131	131	-23,2	4,4	3,4	3,4	-1,0
9	Total	3893	3815	3884	-0,2	100	100	100	
	including:								
10	Petrol/diesel	1313	1296	1256	-4,4	33,7	34,0	32,3	-1,4
11	Total energy without fuels <i>for information:</i>	2580	2520	2628	1,9	66,3	66,0	67,7	1,4
12	Transfer light heating oil to service sector	76	67	57	-24,7				
13	Final energy (EB) (=9-10+12) <i>Total final energy consumption (EB)</i> <i>Total energy consum. of households (% of total)</i>	2656 9322 41,8	2587 9235 41,3	2686 9239 42,0	1,1 -0,9				
B	Embodied energy of domestic private consumption expenditures of households								
14	Total	6194	6043	5947	-4,0	61,4	61,3	60,5	-0,9
	of these:								
15	Energy sources	1353	1238	1350	-0,2	21,8	20,5	22,7	0,9
16	Products (ex. energy)	2669	2570	2393	-10,3	43,1	42,5	40,2	-2,9
17	Services	2172	2235	2204	1,5	35,1	37,0	37,1	2,0
						100	100	100	
C	Total energy consumption of households (A+B)	10087	9859	9832	-2,5	100	100	100	
D	Embodied energy of individual consumption expenditures of other sectors	275	287	308	12,2				
20	Non-profit institutions serving households Individual consumption expenditures of general government	83	79	81	-2,2				
21	Education	67	71	79	18,3				
22	Health services	115	127	139	21,3				
23	Services of culture, sports, entertainment	10	10	9	-13,4				
24	Total	192	207	227	18,5				

EB: national energy balance

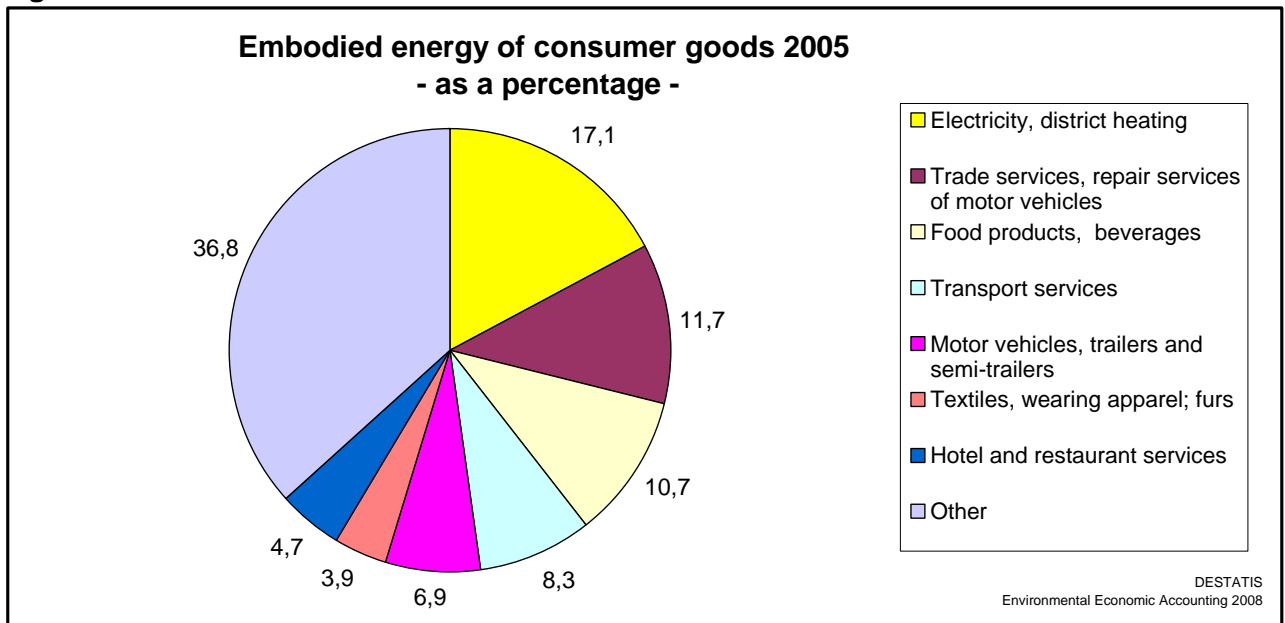
Source: Federal Statistical Office of Germany, Environmental-Economic Accounts 2008.

Besides the figures for direct energy consumption and embodied energy of households table 1 also shows figures for embodied energy of expenditures of NPISHs and general government for individual consumption of households (rows 18 to 24). In the period 1995-2005 especially embodied energy of health services and services in education show a substantial increase of about 20 %.

Table A5 in the annex presents figures for expenditures and embodied energy of FCE in a commodity breakdown. The figures for the expenditures by commodity group come from the input-output tables. Purchases are valued at basic prices and the IOT have a separate entry for the trade services (CPA 50-52). On basis of figures for the inputs of trade services (with special emphasis on the energy consumption of trade) and on the use of trade services by private households embodied energy of these services was estimated.

The greatest share of embodied energy is related to the demand for electricity and district heating (17.1 %, cf. figure 5). It comprises only the losses in the generation of electricity and district heating, but not the volume of electricity used by households. Energy needed to provide trade services to private households follows at second place with a share of 11.7 %. That item includes not only energy consumed directly by trade - for instance for heating and lighting the showrooms - but also e.g. energy needed by forwarding agencies for transportation of products to the suppliers.

Figure 5:



The following table shows results for expenditures, embodied energy and carbon dioxide emissions in a commodity breakdown. In that table expenditures are valued at purchaser prices. Trade services, embodied energy and CO₂ emissions of these services are attributed to the products purchased by private households. In order to transfer those trade services to the corresponding products more detailed analysis had to be done for different trade services, especially for certain sub-sectors. E.g. trade with food products requires more energy than other trade services. Therefore detailed results of a survey providing figures on energy-intensity within trade were used.⁶

⁶ Study „Energieverbrauch der privaten Haushalte und des Sektors Gewerbe, Handel, Dienstleistungen (GHD)“ (Fraunhofer-Institut et. al.2004).

Table 2:
Consumption expenditures of households and embodied energy and CO2 of consumer goods 1995-2005

No.	Commodity groups	Consumption expenditures ^{*)}				Embodied energy				Embodied CO2			
		1995	2000	2005	2005/ 1995	1995	2000	2005	2005/ 1995	1995	2000	2005	2005/ 1995
		bn. Euro		%	petajoule		%	mn. tons		%			
1	Total	1.013	1.150	1.260	24,3	6.194	6.043	5.947	-4,0	416	386	374	-10,1
	of these:												
2	Electricity, district heating	22	20	27	25,2	953	924	1.016	6,7	97	89	92	-5,6
3	Food products, beverages	112	118	125	11,2	927	840	853	-8,0	57	49	49	-14,0
4	Motor vehicles, trailers	55	60	69	26,1	407	470	460	13,1	25	27	26	5,7
5	Coke, refinery products	37	49	55	47,7	343	273	285	-16,8	20	16	15	-26,0
6	Hotel and restaurant services	54	62	64	18,3	288	290	278	-3,5	18	17	16	-9,0
7	Services of airlines	7	9	10	45,9	187	205	224	19,7	13	14	15	17,6
		% of total		%- points	% of total		%- points	% of total		%- points			
1	Total	100	100	100		100	100	100		100	100	100	
	of these:												
2	Electricity, district heating	2,2	1,7	2,2	0,0	15,4	15,3	17,1	1,7	23,3	23,0	24,5	1,2
3	Food products, beverages	11,1	10,3	9,9	-1,2	15,0	13,9	14,3	-0,6	13,7	12,7	13,1	-0,6
4	Motor vehicles, trailers	5,4	5,2	5,5	0,1	6,6	7,8	7,7	1,2	5,9	7,1	7,0	1,0
5	Coke, refinery products	3,7	4,3	4,3	0,7	5,5	4,5	4,8	-0,7	4,9	4,2	4,0	-0,9
6	Hotel and restaurant services	5,3	5,4	5,1	-0,3	4,6	4,8	4,7	0,0	4,3	4,5	4,4	0,1
7	Services of airlines	0,7	0,7	0,8	0,1	3,0	3,4	3,8	0,7	3,1	3,7	4,1	1,0
8	Subtotal	28,2	27,6	27,7	-0,5	50,1	49,7	52,4	2,3	55,3	55,2	57,2	1,8

*) Total domestic expenditures at current purchasers prices.

Source: Federal Statistical Office of Germany, Environmental-Economic Accounts.

Like the results from the calculations at basic prices the results at purchaser prices show that the demand for electricity and district heating requires the highest amount of energy (2005: 17.1 %). Food products follow with a share of 14.3 % and the demand for vehicles and trailers with 7.7 %. Between 1995 and 2005 there is a significant increase in the energy content of electricity, vehicles and services of airlines. Other products have lost shares.

Embodied CO2 emissions of consumer goods show a larger decrease of 10.1 % from 1995 to 2005 than embodied energy. This is mainly due to a decline of embodied CO2 emissions of electricity, food products and refinery products. With regard to branches generation of electricity contributes by far most to CO2 emissions. In 2005 power plants emitted 48 % of all carbon dioxide emissions attributable to FCE. Despite an increase in direct demand for electricity of 11.4 % (1995-2005, cf. table 1), CO2 emissions decreased by 5.6 %. That means efficiency in the generation of electricity with respect to CO2 emissions improved significantly. CO2-coefficients of domestic electricity generation (CO2 per output in joule) decreased by 11 % (1995-2005). This was due to a more favourable energy-mix using more renewable energy - especially wind energy and biomass - and to an improvement in the thermal efficiency of power plants.

Table 3 shows the composition of embodied energy of consumer goods according its location: on the one hand there is the energy use in domestic production. On the other hand energy is used abroad for producing imported final consumer goods or materials and supplies which are used in domestic production of consumer goods. The import ratio for embodied energy has increased from 36.8 % (1995) to 38.3 % (2006). Energy used abroad allocates almost evenly in energy used for the production of final consumer goods and energy used for producing imported materials and supplies. However the former item increased in that period much faster – by 16.5 % -compared to the latter one, which showed a decrease of 11.5 %. Total embodied energy of imports remained almost constant whereas embodied energy of domestic products fell by 6.2 %.

Table 3:
Energy used for producing domestic and imported consumer goods

Year	Energy consumption					Energy consumption				
	do- mestic produc- tion	abroad for manufacturing			total	do- mestic produc- tion	abroad for manufacturing			total
		imported materials and supplies for production of consumer goods	import of final goods	imports sum			imported materials and supplies for production of consumer goods	import of final goods	imports sum	
	petajoule					% of total				
1995	3917	1330	947	2277	6194	63,2	21,5	15,3	36,8	100
2000	3662	1282	1099	2381	6043	60,6	21,2	18,2	39,4	100
2005	3672	1177	1104	2280	5952	61,7	19,8	18,5	38,3	100
	change %									
2005 / 1995	-6,2	-11,5	16,5	0,1	-3,9					

Source: Federal Statistical Office of Germany, Environmental-Economic Accounts.

From 1995 to 2005 (domestic) private consumption expenditures (price-adjusted) show an increase of volume of 11.6 % (cf. table 4). Taking into account a drop of embodied energy of 4 %, total energy intensity (energy per expenditure) shows a reduction of 14 %. Looking at the figures for certain commodity groups one has to bear in mind that energy intensity not only depends upon the energy intensity at the final production level, but is also influenced by the energy efficiency of branches on the forward linkages. This is the reason why improved energy intensity can not be assigned to one industry only.

Table 4:
Embodied energy of consumer goods and energy-intensity of individual consumption expenditures of private households

No.	Commodity groups	Embodied energy				Domestic consumption expenditures 1)				Energy-intensity		
		1995	2000	2005	2005/ 1995	1995	2000	2005	2005/ 1995	1995	2005	2005/ 1995
		petajoule				bn. Euro				kJ/€ 2)		
1	Total	6.194	6.043	5.947	-4,0	1046,3	1149,7	1168,1	11,6	5,9	5,1	-14,0
	of these:											
2	Electricity, district heating	953	924	1.016	6,7	21,2	19,7	22,0	3,8	45,0	46,3	2,8
3	Food products, beverages	927	840	853	-8,0	113,5	118,3	118,0	3,9	8,2	7,2	-11,4
4	Motor vehicles, trailers	407	470	460	13,1	56,8	59,6	65,9	16,1	7,2	7,0	-2,6
5	Coke, refinery products	343	273	285	-16,8	50,5	49,4	44,2	-12,4	6,8	6,4	-5,1
6	Restaurant and hotel services	288	290	278	-3,5	57,5	62,0	59,0	2,5	5,0	4,7	-5,9
7	Services of airlines	187	205	224	19,7	6,7	8,5	7,7	15,0	27,7	28,9	4,1

1) At purchaser prices (price-adjusted, chained, reference year 2000)

2) kJ = kilo Joule

Source: Federal Statistical Office of Germany, Environmental-Economic Accounts.

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Annex

Table A1: Classification of activities of private households related to consumption expenditures and energy consumption

No.	Activities	Classification in national accounts	Classification in the EEA *)	Status	Example
1	Housing	a) Consumption expend. of domestic households on the territory - Expenditures for energy Electricity, gas and other fuels	Direct and indirect energy consumption of private hhs. on the territory Direct energy consumption	X	Heating, warm water for shower and cooking, electrical appliances, operation of equipment for entertainment and communication
2	Private transport	Expenditures for fuels	Direct energy consumption	X	Operation of hhs own cars and of rental cars
3	Consumption of domestic and imported goods	Other purchases	Indirect energy consumption (embodied energy)	X	Energy used at the man. of goods
4	Purchases of transport services	of which: purchases of national transport services	Indirect national energy consumption	X	Public transport, domestic flights
5	School attendance, attendance of sport and cultural institutions, stay in hospitals	b) Final consumption exp. of NPISHs	Indirect national energy consumption	X	Energy consumption of kindergardens, schools, hospitals, care homes, sports facilities
6		c) Individual consumption expenditures of general government	Indirect national energy consumption	X	
7	Overseas trip of residents	d) Expenditures of residents abroad Part of expenditures of residents abroad	Direct energy consumption abroad	Y	Refuelling abroad, vacation trips
8	Housing abroad (property ownership)	Part of expenditures of residents abroad	Direct energy consumption abroad	Z	Dwelling in second-home
9	Other expenditures abroad	Part of expenditures of residents abroad	Indirect energy consumption abroad	Z	Exp. at journeys (e.g. for restaurants)
10	Energy purchases on the terr.	e) Expenditures of non-residents on the terr. Part of exp. of non-residents	Direct energy consumption on the terr.	Y	Refuelling by non-residents
11	Other purchases of non-residents	Part of exp. of non-residents	Indirect energy consumption on the terr.	Z	
		Individual consumption expenditure of resident households (f=a+d-e) Final consumption expenditure (g=f+b) Individual consumption expenditure (h=g+c) Imported services		Z	
12	Transport of imported products for final consumption	Gross fixed capital formation in construction (dwellings, roads)	Direct energy consumption abroad	Y	Transportaufwand auferhalb Deutschlands
13	Construction	machinery and equipment for the man. of consumer goods	Indirect energy consumption of construction	X	Embodied energy of construction materials
14	Manufacture of consumer goods		Indirect energy consumption of machinery and equipment	X	Embodied energy of machinery

Z: scheduled

Y: work in progress

X: already captured in EEA

*) EEA: Environmental-Economic Accounts

Table A2:
Final consumption expenditure (FCE) and use of gross domestic product (GDP)

		1995	2000	2005	2006	2007
		bn. Euro				
1	= Domestic FCE of private households	1013,3	1149,7	1260,0	1291,1	1304,4
2	+ FCE of residents abroad	39,9	51,8	54,3	56,5	59,5
3	- FCE of non-residents on the territory	15,6	21,1	24,2	26,1	26,1
4	= FCE of private households	1037,6	1180,3	1290,2	1321,6	1337,8
5	+ FCE of NPISHs	29,6	33,8	36,3	35,9	36,6
6	= Final consumption expenditures	1067,2	1214,2	1326,4	1357,5	1374,4
7	+ Individual CE of general government	205,6	224,8	246,8	253,4	261,9
8	= Final consumption expenditure	1272,8	1439,0	1573,2	1610,9	1636,3
		memory item:				
9	+ Actual collective consumption	156,2	167,1	174,7	172,5	174,2
10	+ Gross capital formation	410,8	449,2	383,4	412,4	442,5
11	= Domestic use	1839,8	2055,3	2131,3	2195,8	2253,0
12	+ Net exports	8,7	7,3	113,3	126,4	170,9
13	Exports	442,8	688,4	918,0	1046,5	1133,0
14	minus: imports	434,1	681,1	804,7	920,1	962,2
15	= Gross domestic product	1848,5	2062,5	2244,6	2322,2	2423,8
		% of GDP				
1	Domestic FCE of private households	54,8	55,7	56,1	55,6	53,8
6	Final consumption expenditures	57,7	58,9	59,1	58,5	56,7
7+9	Government FCE	19,6	19,0	18,8	18,3	18,0
10	Gross capital formation	22,2	21,8	17,1	17,8	18,3
12	Net exports	0,5	0,4	5,0	5,4	7,0
13	Exports	24,0	33,4	40,9	45,1	46,7
		Final consumption expenditures (price-adjusted, chained)				
		1995=100				
1	Domestic FCE of private households	100	109,9	111,6	112,8	112,0
6	Final consumption expenditures	100	109,3	110,8	112,0	111,4
10	Gross capital formation	100	108,6	94,2	99,9	104,2
13	Exports	100	153,8	206,3	232,0	250,1
14	Imports	100	146,6	176,4	196,1	205,6
15	Gross domestic product	100	110,4	113,6	116,9	119,8

Source: Federal Statistical Office (subject-matter 18, series 1.4, 2007).

**Table A3:
Supply and use of energy in Germany 1995-2005 (Petajoule)**

		1995	2000	2005	1995	2000	2005	1995	2000	2005
		Direct			Indirect 1)			Cumulated 2)		
		petajoule			petajoule			petajoule		
1	Domestic production	12.560	12.099	12.852				12.560	12.099	12.852
2	+ Imports 1)	11.067	12.200	12.973	5.580	6.634	6.536	16.647	18.835	19.510
3	= Supply	23.626	24.300	25.825	5.580	6.634	6.536	29.206	30.934	32.362
4	- Transformation output/do. primary energy	8.232	8.294	8.680				8.232	8.294	8.680
5	= Supply of primary energy	15.395	16.005	17.145	5.580	6.634	6.536	20.975	22.640	23.681
6	- Homogeneous branches	10.298	10.435	10.842	-10.298	-10.435	-10.842	0	0	0
7	= Final uses	5.097	5.571	6.303	15.878	17.069	17.379	20.975	22.640	23.681
8	- Export and ship bunkers 3)	1.189	1.759	2.062	5.510	6.936	7.894	6.699	8.695	9.955
9	= Final domestic uses	3.907	3.812	4.241	10.368	10.133	9.485	14.275	13.945	13.726
10	Of which:									
11	Consumption of private households	3.893	3.816	3.884	6.194	6.043	5.947	10.087	9.859	9.832
12	Consumption of non profit institutions				84	80	82	84	80	82
13	Government final consumption				1.241	1.192	1.161	1.241	1.192	1.161
14	Gross fixed capital formation				2.688	2.598	2.121	2.688	2.598	2.121
15	Changes in stocks/statistical discrep.	15	-4	357	162	220	174	177	217	530
		% of total supply			% of final uses			% of total use		
1	Domestic production							43,0	39,1	39,7
2	Imports	71,9	76,2	75,7	35,1	38,9	37,6	57,0	60,9	60,3
3	Supply							100,0	100,0	100,0
4	Transformation output/dom. primary energy	28,1	23,8	24,3						
5	Supply of primary energy	100	100	100						
6	Homogeneous branches	66,9	65,2	63,2	64,9	61,1	62,4			
7	Final uses	33,1	34,8	36,8	100	100	100	100	100	100
8	Export and ship bunkers	7,7	11,0	12,0	34,7	40,6	45,4	31,9	38,4	42,0
9	Final domestic uses	25,4	23,8	24,7	65,3	59,4	54,6			
10	Of which:									
11	Consumption of private households	25,3	23,8	22,7	39,0	35,4	34,2	48,1	43,5	41,5
12	Consumption of non profit institutions				0,5	0,5	0,5	0,4	0,4	0,3
13	Government final consumption				7,8	7,0	6,7	5,9	5,3	4,9
14	Gross fixed capital formation				16,9	15,2	12,2	12,8	11,5	9,0
15	Changes in stocks				1,0	1,3	1,0	0,8	1,0	2,2
		1995=100			1995=100			1995=100		
1	Domestic production	100	96,3	102,3						
2	+ Imports	100	110,2	117,2	100	118,9	117,1	100	113,1	117,2
3	= Supply	100	102,9	109,3						
4	- Transformation output/do. primary energy	100	100,8	105,5				100	100,8	105,5
5	= Supply of primary energy	100	104,0	111,4				100	107,9	112,9
6	- Homogeneous branches	100	101,3	105,3	100	101,3	105,3			
7	= Final uses	100	109,3	123,7	100	107,5	109,5	100	107,9	112,9
8	- Export and ship bunkers	100	147,9	173,4	100	125,9	143,3	100	129,8	148,6
9	= Final domestic uses	100	97,6	108,5	100	97,7	91,5			
10	Of which:									
11	Consumption of private households	100	98,0	99,8	100	97,6	96,0	100	97,7	97,5
12	Consumption of non profit institutions				100	95,4	98,2	100	95,4	98,2
13	Government final consumption				100	96,1	93,6	100	96,1	93,6
14	Gross fixed capital formation				100	96,6	78,9	100	96,6	78,9

1) Embodied energy of goods for final uses.

2) Cumulated = direct + indirect.

3) Without re-exports.

Source: Federal Statistical Office of Germany, Environmental-Economic Accounts.

Table A4
Embodied energy of final uses in Germany 1995-2005

Categories	1995	2000	2005	1995	2000	2005 2)
	Embodied energy			Expenditures 1)		
	domestic output plus imports					
	petajoule			bn. Euro		
Total final uses	15878	17069	17379	2105,3	2534,7	2833,4
Exports	5510	6936	7894	430,1	670,6	896,7
Final national uses	10368	10133	9485	1675,2	1864,1	1936,7
Of these:						
Private consumption expenditure	6194	6043	5952	905,6	1024,4	1126,9
Final consumption expenditure of NPISHs	84	80	82	29,6	33,8	36,2
Government final consumption expenditure	1241	1192	1161	358,7	387,9	417,6
Fixed capital formation	2688	2598	2121	375,9	411,2	363,5
Inventories	162	220	169	5,4	6,8	-7,5
	imports					
	petajoule			bn. Euro		
Total final uses	5580	6634	6536	162,2	273,8	322,4
Exports	1782	2569	2914	42,6	94,0	137,2
Final national uses	3798	4065	3622	119,6	179,8	185,2
Of these:	0	0	0			
Private consumption expenditure	2277	2381	2280	73,5	105,7	117,2
Final consumption expenditure of NPISHs	17	18	17	0,0	0,0	0,0
Government final consumption expenditure	291	313	285	2,1	4,0	5,6
Fixed capital formation	1131	1304	1048	37,8	66,1	59,2
Inventories	82	49	-8	6,2	3,9	3,2
	imports as a % of total use					
Total final uses	35,1	38,9	37,6	7,7	10,8	11,4
Exports	32,3	37,0	36,9	9,9	14,0	15,3
Final national uses	36,6	40,1	38,2	7,1	9,6	9,6
Of these:						
Private consumption expenditure	36,8	39,4	38,3	8,1	10,3	10,4
Final consumption expenditure of NPISHs	20,7	22,8	20,5	0,0	0,0	0,0
Government final consumption expenditure	23,4	26,3	24,5	0,6	1,0	1,4
Fixed capital formation	42,1	50,2	49,4	10,1	16,1	16,3

1) At basic prices excl. net taxes on products

2) Preliminary results.

Source: Federal Statistical Office of Germany, Environmental-Economic Accounts 2008.

Table A5:
Household final consumption expenditure and embodied energy 1995-2005

CPA	Commodity groups	Consumption expenditures 1)				Embodied energy			
		1995	2000	2005	05/95	1995	2000	2005	05/95
		bn. Euro		ch. %		petajoule		ch. %	
	Total.....	905,6	1024,4	1126,9	24,4	6194	6043	5947	-4,0
	Energy sources.....	33,7	39,3	52,5	55,6	1353	1238	1350	-0,2
10	Coal and lignite; peat.....	0,4	0,3	0,4	-13,4	6	2	2	-71,1
11	Crude petroleum and natural gas.....	2,9	3,2	5,6	92,0	52	40	47	-8,5
23	Coke, refined petroleum products.....	9,4	16,0	19,8	110,4	343	273	285	-16,8
40.1-3	Electricity, district heating.....	21,0	19,7	26,8	27,5	953	924	1016	6,7
	Products (without energy).....	271,7	290,4	292,0	7,5	2669	2570	2393	-10,3
01	Agricultural products.....	13,6	15,7	16,5	21,4	134	131	139	3,7
15	Food products, beverages.....	73,3	75,2	77,6	5,8	727	637	638	-12,3
17,18	Textiles, wearing apparel; furs.....	28,6	29,0	24,8	-13,2	330	296	232	-29,8
21,22	Pulp, paper, printed matter and recorded media....	18,6	21,0	21,2	14,0	127	126	126	-0,9
24	Chemicals (not incl. pharmaceuticals).....	11,7	12,6	15,2	29,9	239	245	221	-7,3
25	Rubber and plastic products.....	7,0	7,5	6,6	-6,3	123	122	100	-18,3
30-33	Computers, electrical machinery n.e.c., radio, TV and communication equipment	11,3	15,5	13,1	15,2	68	85	65	-4,3
34	Motor vehicles, trailers and semi-trailers.....	42,4	45,6	52,1	22,9	360	416	409	13,8
36-37	Furniture; jewellery, musical instruments..... other manufactured goods n.e.c.....	21,3	21,6	20,5	-3,9	154	142	142	-7,7
	Services.....	600,2	694,8	782,3	30,4	2172	2235	2204	1,5
50-52	Trade services, repair services of motor vehicles..	162,7	183,8	196,8	20,9	702	696	694	-1,1
55	Hotel and restaurant services.....	48,3	56,5	58,0	20,0	288	290	278	-3,5
60-63	Transport services.....	30,1	34,0	36,0	19,5	487	494	494	1,5
85	Health and social work services.....	31,1	41,6	53,7	72,9	54	69	79	46,9
65-95	Other services.....	327,9	378,9	437,9	33,5	641	686	659	2,7
		% of total		%-pts.		% of total		%-pts.	
	Total.....	100,0	100,0	100,0		100,0	100,0	100,0	
	Energy sources.....	3,7	3,8	4,7	0,9	21,8	20,5	22,7	0,9
10	Coal and lignite; peat.....	0,0	0,0	0,0	0,0	0,1	0,0	0,0	-0,1
11	Crude petroleum and natural gas.....	0,3	0,3	0,5	0,2	0,8	0,7	0,8	0,0
23	Coke, refined petroleum products.....	1,0	1,6	1,8	0,7	5,5	4,5	4,8	-0,7
40.1-3	Electricity, district heating.....	2,3	1,9	2,4	0,1	15,4	15,3	17,1	1,7
	Products (without energy).....	30,0	28,3	25,9	-4,1	43,1	42,5	40,2	-2,9
01	Agricultural products.....	1,5	1,5	1,5	0,0	2,2	2,2	2,3	0,2
15	Food products, beverages.....	8,1	7,3	6,9	-1,2	11,7	10,5	10,7	-1,0
17,18	Textiles, wearing apparel; furs.....	3,2	2,8	2,2	-1,0	5,3	4,9	3,9	-1,4
21,22	Pulp, paper, printed matter and recorded media....	2,1	2,0	1,9	-0,2	2,0	2,1	2,1	0,1
24	Chemicals (not incl. pharmaceuticals).....	1,3	1,2	1,3	0,1	3,9	4,1	3,7	-0,1
25	Rubber and plastic products.....	0,8	0,7	0,6	-0,2	2,0	2,0	1,7	-0,3
30-33	Computers, electrical machinery n.e.c., radio, TV and communication equipment	1,3	1,5	1,2	-0,1	1,1	1,4	1,1	0,0
34	Motor vehicles, trailers and semi-trailers.....	4,7	4,5	4,6	-0,1	5,8	6,9	6,9	1,1
36-37	Furniture; jewellery, musical instruments..... other manufactured goods n.e.c.....	2,3	2,1	1,8	-0,5	2,5	2,3	2,4	-0,1
	Services.....	66,3	67,8	69,4	3,2	35,1	37,0	37,1	2,0
50-52	Trade services, repair services of motor vehicles..	18,0	17,9	17,5	-0,5	11,3	11,5	11,7	0,3
55	Hotel and restaurant services.....	5,3	5,5	5,1	-0,2	4,6	4,8	4,7	0,0
60-63	Transport services.....	3,3	3,3	3,2	-0,1	7,9	8,2	8,3	0,5
85	Health and social work services.....	3,4	4,1	4,8	1,3	0,9	1,1	1,3	0,5
65-95	Other services.....	36,2	37,0	38,9	2,7	10,4	11,4	11,1	0,7

1) Household final consumption expenditure on the territory at basic prices excl. net taxes on products.

Source: Federal Statistical Office of Germany, Environmental-Economic Accounts 2008.