

# Chapter 4

## The direct and indirect energy requirements of Dutch households<sup>1</sup>

### ► Abstract

One way of reducing CO<sub>2</sub> emissions is to reduce direct and indirect household energy requirements. Before discussing how this can be done, we need to have quantitative information about these energy requirements. This chapter aims to provide that information. The total average energy requirement per household in the Netherlands in 1990 was 240 GJ, of which 54% was indirect. Of this total, 17% was required for food, 8% for household effects, 4% for the house, 3% for clothing and footwear, 2% for hygiene, 5% for medical care, 2% for education, 8% for recreation, 1% for communication, 4% for transport (excluding petrol), 9% for petrol, 25% for heating energy and 12% for electricity. Among the analysed socio-economic variables, the net income was found to have the most important relationship with the total energy requirement. The elasticity of the energy requirement with respect to income was found to be 0.63. There is, however, a considerable spread in energy requirement within a particular income class (standard deviation about 20%).

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<sup>1</sup> This study is a slightly adapted version of Vringer, K. and Blok, K. 'The direct and indirect energy requirement of households in the Netherlands', *Energy Policy* 23, 10 (1995) pp 893-910.

## **1 ► Introduction**

The use of fossil energy sources is one of the main causes of CO<sub>2</sub> emissions. One way of reducing CO<sub>2</sub> emissions is to reduce household energy requirements by influencing the consumption pattern. A household uses not only direct energy in the form of natural gas, electricity and petrol but also indirect energy embodied in consumer goods such as food, furniture and services. Van Engelenburg et al. (1991) estimated the direct energy requirement of households to be about half the total domestic energy requirement. This means that the indirect energy requirement can be all but ignored.

The aim of this study is to obtain an overview of the total energy requirement of households and the energy requirement per consumption category. We also attempted to quantify the relationship of net household income, household expenditure, age and number of household members to the total energy requirement of households. To obtain an overview of the cumulative energy requirement of Dutch households, we analysed the total consumption package for its cumulative energy requirement. The energy intensities of about 350 basic consumption categories were calculated using a hybrid energy analysis method. The energy requirement of Dutch households was calculated by combining the 350 energy intensities with data from the Household Expenditure Survey of 1990. In this survey the expenditure data was collected of 2767 representative Dutch households in 1990. What resulted was an overview of the total energy requirement of Dutch households.

In this chapter, we first describe the method, review the expenditure survey, and give definitions of the terms we use, along with some details on the hybrid energy analysis method. We then present the results on the energy requirement and household expenditure, energy intensity, net household income, the number of household members and age of the first respondent.

All monetary quantities are expressed in Dutch guilders (1990) (1 Dfl.  $\cong$  0.6 US\$ in 1995).

## 2 ► Method

We started by reviewing the expenditure survey and describing how we determined the cumulative energy requirement of the consumption items. We then considered how the energy requirement of households was calculated.

### 2.1 ► The Household Expenditure Survey

The Household Expenditure Survey of 1990 (CBS, 1992a) is based on a representative sample consisting of 2767 Dutch households whose expenditure was recorded in a detailed manner. All purchases exceeding Dfl. 25 were noted by each household for one year. All purchases were noted by each household for about two weeks. The amount of natural gas, electricity and water used (expressed in physical units) as well as some other physical parameters (like the floor space of the rooms of the house) were recorded (CBS, 1992b). The household expenses were extrapolated to a whole year. The total consumption of the households in the expenditure survey was divided into about 350 basic consumption categories. These categories are listed in Appendix 4A.

The most important definitions in the expenditure survey:

- *Household*: defined as a single person or group of persons who live together domestically and run a household together. People living in homes for the elderly and tramps are not included in the survey. A lodger and a family living independently in the same house are counted as two households. A lodger living with the family forms a part of the family-household. One person living alone in a separate dwelling is also defined as a household.
- *Net income*: the sum of income from employment, enterprise, capital, social security benefits and other income such as subsidies for house rental, state assistance with mortgages and employers' contribution to the state medical insurance scheme, minus pension contributions, social security contributions and income tax. All the incomes of the individual household members are added up.
- *Total household expenditure*: defined as the financial value of acquired goods and services for non-productive goals, including value added tax. Purchases in general are accompanied by financial transactions, but also included is the consumption of free products e.g. fruit from one's own garden or presents received from other households. Not all of these household expenditures were included in our

analyses. Because of a lack of specified data in the expenditure survey the following categories are excluded: transfers to third parties (like local taxes, examination-, school- and lecture-fees), payments to other households, investments and payments by instalment, subscriptions to trade unions, gifts to charity and legal charges (CBS, 1992b). In this chapter the remainder is indicated as 'household expenditure' or simply as 'expenditure'. Note that the 'total household expenditure' is not equal to the 'net income'. The difference is caused by loans received and savings made (see Table 4-1).

**Table 4-1** Average net household income, total household expenditure, household expenditure and expenditure included in this study of Dutch households in 1990 (1 Dfl.  $\equiv$  0.6 US\$, 1992).

	<b>Total (Dfl.)</b>	<b>Percentage of net income</b>
Average net income	45601	100
Total household expenditure	42646	93
Household expenditure (used in this chapter)	40107	88
• Expenditure included in our analysis	39449	87
• Expenditure for which no energy requirement is determined	658	1

## **2.2 ► Determining the cumulative energy requirement of the consumption items**

The 350 basic consumption categories in the expenditure survey are aggregated into 13 main consumption categories; food, household effects, house, clothing & footwear, hygiene, medical care, education, recreation, communication, transport, petrol, heating and electricity. The main category 'heating' does not only include expenditure on fuel for heating the house, but also expenditure on collective and district heating of the house. The main category, 'household effects', includes expenditure on the maintenance of the house, garden and flowers, stoves, boilers, central heating systems, furnishing, tools and all kinds of household machines such as washing-machines and food-mixers.

To determine the cumulative energy requirement of a consumption item we used a hybrid energy analysis method (Van Engelenburg et al, 1994). This hybrid energy analysis method allows relatively easy calculation of the cumulative energy requirement of a consumption item in a fairly accurate way. This is achieved by combining the best elements of two existing methods for determining the cumulative energy requirement of goods and services: process analysis and input–output analysis.

The cumulative energy requirement is calculated in ten steps. The first step is to construct a flow chart of the production network for the consumption item. A mass balance and a financial balance of the product's life cycle are determined in steps 2 and 3. In steps 4 to 10, figures are allocated to the requirement that various activities make on primary energy carriers. These activities comprise the production of the basic materials and residual goods, the production of the goods themselves, and the capital goods, trade and transport and waste disposal. Finally, the various contributions that these activities make to the cumulative energy requirement are aggregated. The energy analysis method, as described by Van Engelenburg et al. (1994), has been incorporated in a computer program, together with databases containing a data set for the Netherlands called the Energy Analysis Program (Wilting, 1992). The output of the Energy Analysis Program is the total cumulative energy requirement per item (expressed in megajoules (MJ) per physical unit of product). The energy intensity is defined as the total primary energy requirement of a product divided by the total consumer price of the product and is expressed in MJ/Dfl. The energy intensity has been calculated for 350 basic consumption categories by Kok et al. (1993) (food), De Paauw and Perrels (1993) (clothing & footwear, hygiene, medical care, education, recreation, communication, transport and petrol), Vringer and Blok (1993) (house) and Vringer et al. (1993) (household effects). The energy intensities can be found in Appendix 4A. The basic consumption categories may be fairly uniform (e.g. tea) or very non-uniform (e.g. living-room furniture). For the non-uniform categories we take an estimated average of the products that belong to the consumption category. For the uniform categories we choose a standard product with a standard price.

The energy requirement of a household (E) can now be calculated according to equation (1), because both the expenditure ( $S_i$ ) per category i and the energy intensities ( $\varepsilon_i$ ) of the consumption categories are known:

$$E = \sum_{i=1}^{350} (\varepsilon_i * S_i) \quad (1)$$

This calculation method is not used to calculate the energy requirement of the house and the amount of natural gas and electricity used. The energy requirement for these consumption categories is calculated on the basis of physical quantities. To calculate the energy requirement connected with the natural gas and electricity used, we start from the physical units ( $m^3$  and kWh) used, as recorded in the expenditure survey.

Rent depends not only on the size of the house (which is directly related to the energy requirement), but also on the condition and location of the house, price of the ground and other infrastructural components. Therefore, rent is not considered to be a good indicator of the energy requirement of a house. Instead, the energy requirement of the house is calculated on the basis of the area of living space, as recorded in the expenditure survey (Vringer and Blok, 1993)<sup>2</sup>. Deviations from the average energy intensity may also occur with regard to other consumption categories (see also 'Discussion' in this chapter).

The direct energy requirement of a household is defined in this chapter as the sum of the primary energy required to obtain the energy carriers (petrol, electricity, natural gas) and their energy content. Similarly the indirect energy requirement of a household is defined as the total primary energy required to obtain all the other products and services included in this study. The total energy requirement of households is the sum of the direct energy requirement and the indirect energy requirement.

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2 The minimum number of households in this analysis is put at 25 households per measurement point.

### 3 ► Results

Table 4-2 gives the average energy requirement of the Dutch households with respect to the main categories. More extended results can be found in Appendix 4A.

**Table 4-2** Total energy requirement and energy intensity of an average Dutch household in 1990 per main category and the total, direct and indirect energy requirement.

	Energy requirement		Energy intensity
	(GJ)	(% of total)	(MJ/Dfl.)
<b>Total</b>	<b>240</b>	<b>100</b>	<b>6.3</b>
<b>Indirect energy requirement</b>	<b>130</b>	<b>54</b>	<b>3.5</b>
Food	41	17	5.6
Household effects	19	8	5.5
House	9	4	1.4
Clothing & footwear	8	3	2.7
Hygiene	5	2	4.1
Medical care	12	5	3.4
Education	5	2	4.2
Recreation	19	8	3.7
Communication	1	1	1.7
Transport	9	4	3.6
<b>Direct energy requirement</b>	<b>110</b>	<b>46</b>	<b>45.0</b>
Petrol	22	9	22.4
Heating	60	25	57.8
Electricity	28	12	46.5

The average Dutch household uses 240 GJ per year, 46% of which is in the form of direct energy carriers (natural gas and other energy carriers for space heating purposes, petrol and electricity) and 54% of which is the indirect energy requirement (goods and services). The year 1990 was a fairly warm year in the Netherlands. If the average temperature in the Netherlands between 1950 and 1980 is taken as a reference for the outside temperature, the energy requirement in 1990 for heating has to be multiplied by 1.17 (Farla, 1993). If the average outside temperature is taken into account, then the total energy requirement of households increases from 240 GJ

to about 250 GJ per year per household. The category 'petrol' is probably underreported in the expenditure survey (CBS, 1992c). According to CBS (1992d) private cars in the Netherlands in 1990 used 212 PJ, of which about 25% was for business purposes. From these figures we calculated that the energy requirement connected with petrol amounts to about 26 GJ per household, which is 4 GJ more than the energy requirement found on the basis of the expenditure survey.

In 1990 the Netherlands had 6.13 million households and 14.9 million inhabitants (CBS, 1992e). Therefore the total allocated energy requirement of households in the Netherlands in 1990 was 1470 PJ per year or 99 GJ per person. The total direct energy use in the Netherlands in 1990 was about 2900 PJ (CBS, 1991). The difference between the total energy requirement in the Netherlands and the total energy requirement of households in the Netherlands can be attributed to the consumption via public services (paid by taxes) and the net export of products embodying energy, mainly in the form of products from the basic chemical industry.

We will now proceed to discuss the relationship between energy requirement and household expenditure, net household income, number of household members and the age of the first respondent.

### **3.1 ► Energy requirement, household expenditure and energy intensity**

Figure 4-1 shows the relationship between the total energy requirement and the household expenditure. In order to make the distribution of the total energy requirement more understandable, we used percentile lines (see Figure 4-1). These lines are constructed as follows: households in the expenditure survey are divided into deciles according to the level of expenditure, so that 10% of the households are represented in every expenditure group. For these 10 deciles we computed the 10, 25, 50, 75 and 90 percentile values of the total energy requirement. Next the percentile values were plotted as a function of the weighted mean of the expenditure deciles. The boxes on the 50 percentile line (median) mark the weighted mean expenditures through which the lines are drawn. Figure 4-1 shows that the relative deviation from the 50 percentile line does not vary with household expenditure, so it is not surprising that the energy requirement increases with household expenditure, as we see in Figure 4-1.



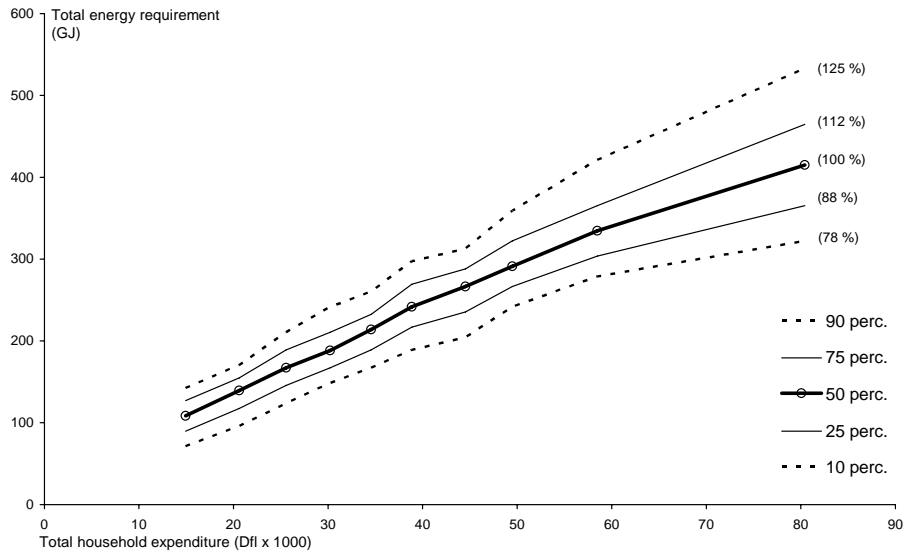


Figure 4-1 Total energy requirement plotted against household expenditure.

However, the relationship is not proportional. To explore this further, we calculated the elasticity of the energy requirement, in relation to expenditure level. This elasticity is defined according to equation (2).

$$E_{tot} = c * S_{tot}^{\alpha} \quad (2)$$

in which:

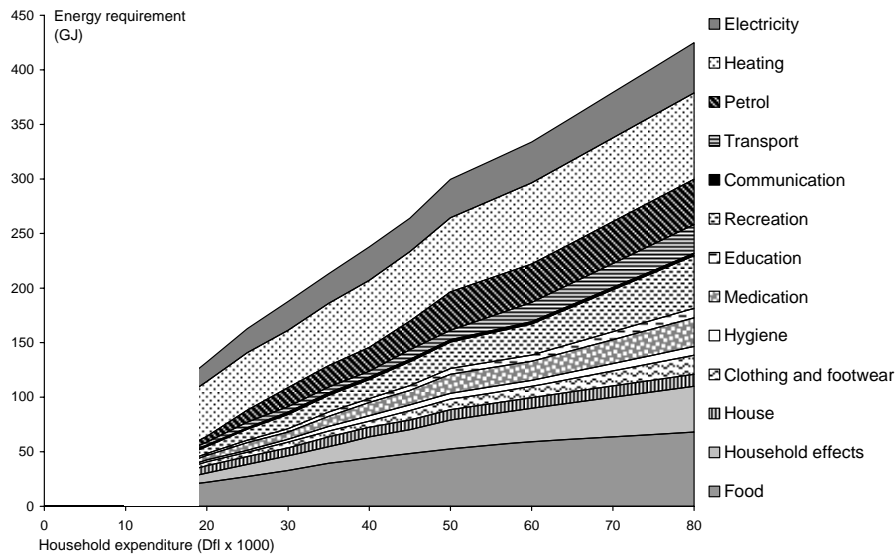
$E_{tot}$  = total energy requirement

$S_{tot}$  = household expenditure

$\alpha$  = elasticity

$c$  = a constant

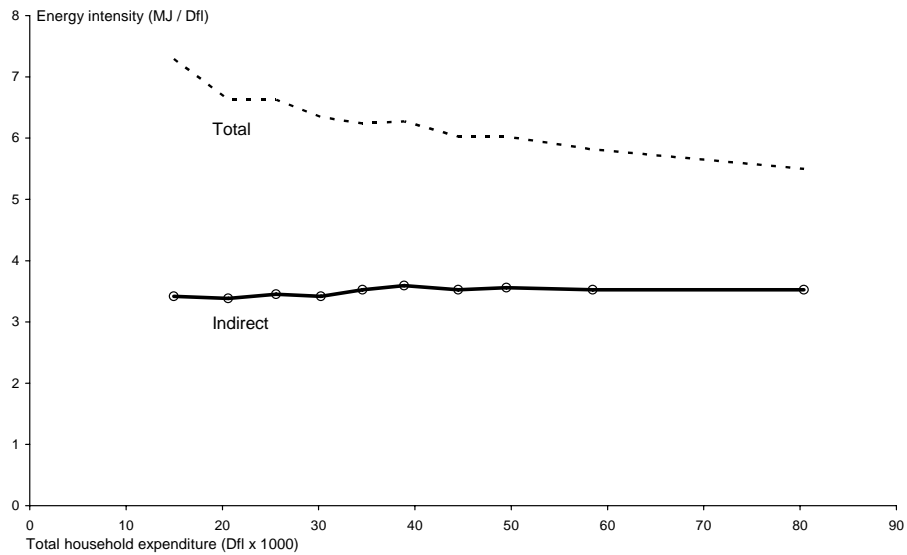
The elasticity is calculated by fitting the mean values of the energy requirement for the ten expenditure levels according to the least squares method. Then a value of 0.83 is found for the elasticity.



**Figure 4-2** The energy requirement of the main categories plotted against household expenditure.

In Figure 4-2 the fractions of the energy requirement per main category are plotted against the household expenditure. The energy requirement of all the main categories increases with increasing household expenditure.

Figure 4-3 shows the relationship between energy intensity and household expenditure. The average total energy intensity over all the expenditure categories is 6.3 MJ/Dfl. The total energy intensity decreases from 7.3 MJ/Dfl. to 5.5 MJ/Dfl. when the net household income increases from about Dfl. 15,000 to 80,000. The energy intensity for the indirect energy requirement remains fairly stable (approx. 3.5 MJ/Dfl.), even when the household expenditure increases. The decrease in the total energy intensity with increasing expenditure is due to the decreased proportion of the expenditure on direct energy. The energy intensity of the main categories, food, education and house, decreases (by about 0.5 MJ/Dfl. for each category) when the household expenditure increases from about Dfl. 15,000 to 80,000. The energy intensities of the main categories, household effects, communication and recreation,

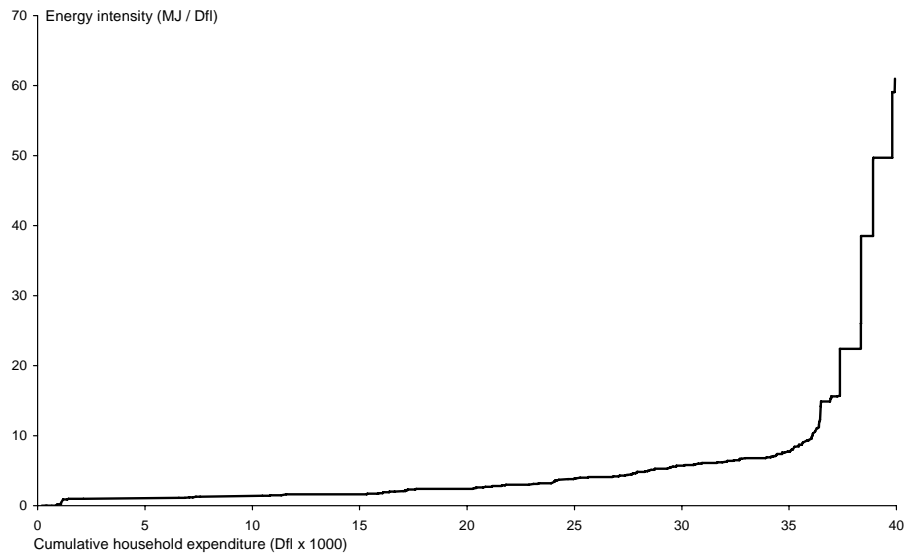


**Figure 4-3** Energy intensity plotted against household expenditure.

increase (by about 0.5 MJ/Dfl.) when the household expenditure increases over the same range.

The energy intensity of the main category, transport, decreases from 6 to 3 MJ/Dfl. when the household expenditure increases from about Dfl. 15,000 to 80,000. This is due to the fact that the proportion of the expenditure on public transport decreases and the proportion of the expenditure on cars increases.

In Figure 4-4 the cumulative household expenditure of an average household is depicted in order of increasing energy intensity and is plotted against energy intensity. Figure 4-4 gives a picture of the distribution of the energy intensities over the amount of money spent. About Dfl. 15,000 of the household expenditure of an average Dutch household in 1990 was used for energy-extensive products and services with an energy intensity from 0 to 2 MJ/Dfl. The energy intensity increases from 2 to 10 MJ/Dfl. for the next Dfl. 20,000. For the last Dfl. 5,000 the energy intensity increases rapidly from 10 to 60 MJ/Dfl. This energy-intensive category



**Figure 4-4** Energy intensity plotted against cumulative expenditure.

includes not only the energy carriers but also flowers and various food products such as glasshouse vegetables, fats and frozen food.

### 3.2 ► Energy requirement and net household income

The relationship between energy requirement and net household income is given in Figure 4-5 in the same way as the relationship to expenditure was given in Figure 4-1. Figure 4-5 shows that a growth in net household income goes hand in hand with a growth in the energy requirement. The spread is larger than the spread shown in Figure 4-1 because of differences between income and expenditure.

On the basis of the values shown in Figure 4-5 the elasticity of the energy requirement related to net income is calculated at 0.63. This elasticity is lower than the elasticity of the energy requirement relating to expenditure due to the fact that households with a higher net income spend a smaller part of their net income than households with a lower net income; the figures vary from 70% income for the highest income group to 122% for the lowest income group. The difference does not have anything to do with the part of the total household expenditure not included in our analysis; this part is, in fact, almost the same for all the income groups, namely about 7%.

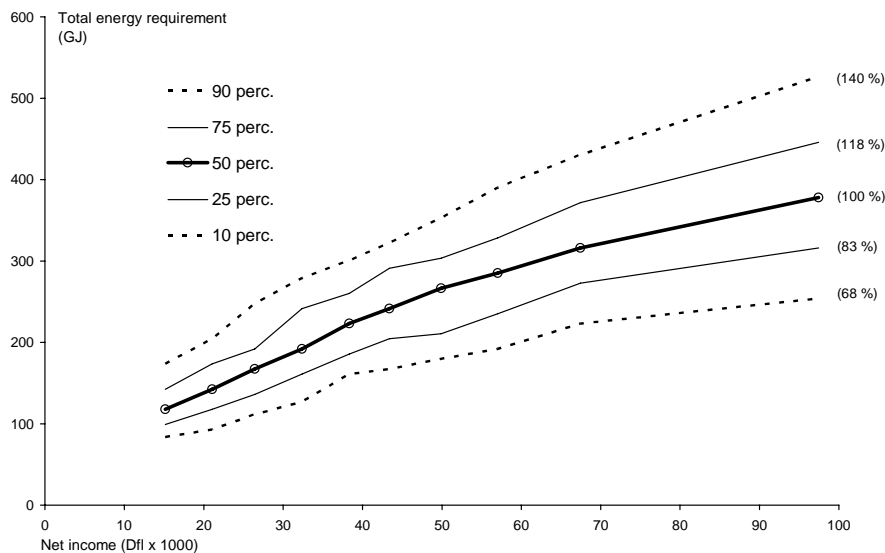
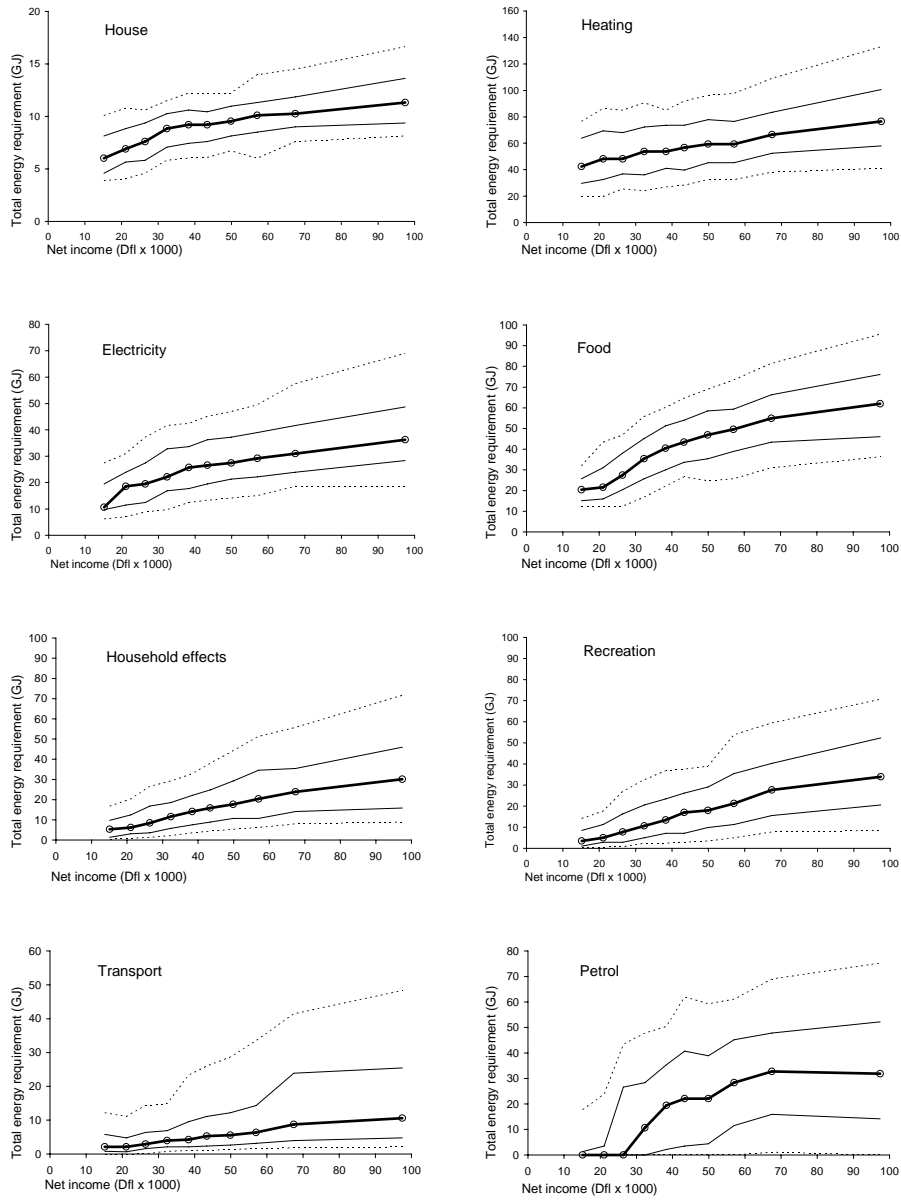


Figure 4-5 Total energy requirement plotted against net household income.

*The direct and indirect energy requirements of Dutch households*



**Figure 4-6** Energy requirement for several main consumption categories versus the net household income. Note that the vertical axes have a different scale.

The energy requirement of the main categories plotted against the net household income is depicted in Figure 4-6 in the same way as in Figure 4-5. The fairly small main categories, 'hygiene', 'education' and 'communication', are not dealt with here. The relationship between the energy requirement for 'clothing and footwear' and net household income appears to be the same as the relationship between the energy requirement for 'education and recreation' and the net household income. There is no relationship between household expenditure on medical care and the energy requirement for medical care, because nearly all household expenditure on medical care is connected to health insurance. This is why the main category, 'medical care', is not dealt with here.

The spread for the main consumption categories clothing & footwear, education, recreation, household effects, transport and communication, which include some of the luxuries of life, is larger than the spread for the other categories which contain the more basic needs of life.

### **3.3 ► Energy requirement and number of members of a household or age of the first respondent**

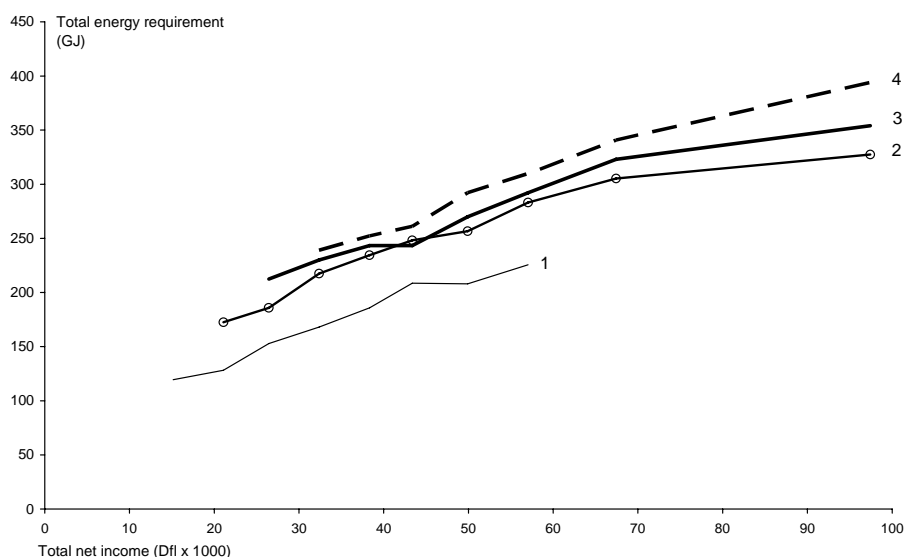
To investigate whether the energy requirement is dependent on the number of household members, apart from the dependence that can be explained by difference in net income, we plotted the total energy requirement against the net income for various numbers of household members (see Figure 4-7)<sup>3</sup>. This figure makes it clear that the largest difference in energy requirement, independent of the net household income, is found between a one-person household and several-person households (approx. 45 GJ). This difference is significant for the group as a whole. The difference between the total energy requirement of two-person and several-person households is not significant<sup>4</sup>.

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3 The minimum number of households in this analysis is put at 25 households per measurement point.

4 The deviation from the mean is calculated by dividing the standard deviation by the square root of N. The deviation from the mean of the total energy requirement varies between 3 and 10 GJ for the one-person households and between 5 and 7 GJ for two-person households. This means that the difference in the energy requirement of one-person and several-person households is significant but the difference between several-person households is not.

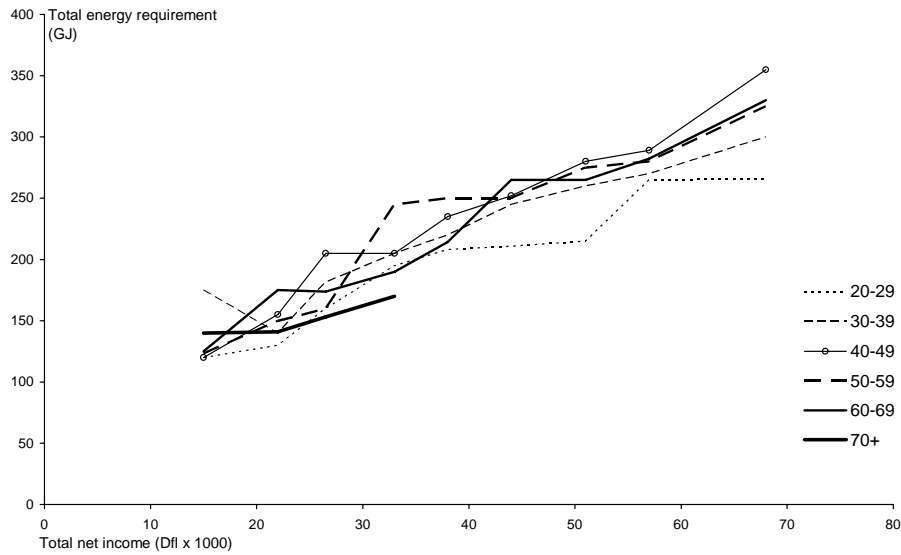
With respect to the households which have an income falling in the fifth income decile, a closer analysis has been made of the significant difference in the energy requirement of one-person and several-person households. The difference between one- and two-person households can be attributed mainly to the main consumption category, 'food' (approx. 13 GJ extra), and the categories, 'electricity', 'heating' and 'household effects' (7 to 8 GJ extra each). Because these are categories with high intensities, the energy intensity of the household expenditure rises from 5.8 to 6.4 MJ/Dfl. when the size of the household increases from 1 to 4 persons.



**Figure 4-7** The total energy requirement versus net household income for 1 to 4 household members.



Figure 4-8 shows the relationship between the total net household income and the total energy requirement for several age groups<sup>5</sup>. Age is defined as the age of the 'first respondent': the person in the household who is responsible for completing the questionnaires. We see that the relationship between energy requirement and net income is more or less the same for all age groups. The age group from 40 to 50 has the highest average energy requirement, but this group also has the highest average net income.



**Figure 4-8** Total energy requirement plotted against net household income in various age groups.

<sup>5</sup> The minimum number of households in this analysis is set at 20 households per measurement point.

## **4 ► Discussion**

This discussion will be handling a few explanatory notes to allow the results to be interpreted.

**a.** The expenditure survey has its limitations.

Expenditure on durable consumer goods (e.g. cars, furniture or floor-coverings) may peak in the year of survey for some of the households. For instance, a household in the expenditure survey purchasing a car in 1990 will have a high expenditure (and also a high energy requirement). The energy requirement of a household may be particularly high if the household moves in the year of the survey. In addition, the spread of the expenditure over products and services costing less than Dfl. 50 (surveyed only for two weeks) can be partly explained by the season in which the household had to write down these expenses (e.g. drinks may be a larger expense in summer). These effects will not influence the average results, but part of the spread in several consumption categories (e.g. transport) can be explained by this factor.

In the expenditure survey the household expenditure in some categories is underreported. The most underestimated expenses are those in connection with the hotel and catering industry, leisure, (alcoholic) drinks and smokers' requisites and motor fuels (CBS, 1992c). This may cause some limited underestimates of these consumption categories. The contribution of these categories -excluding motor fuels- to the total energy requirement is so small that it will not affect our results significantly. If we were to correct for the underestimated expenses connected with motor fuels, the total energy requirement would rise by an average of 4 GJ per household per year.

**b.** There is no one-to-one relationship between energy requirement and expenditure in several categories of household purchases. The energy intensities in our sources are based on average products and average prices. The expenditure survey places all the same kind of products in one consumption category. For instance, a hand-made (very expensive) chair is placed in the same category as a cheap chair. The first one probably has a much lower energy intensity than the latter. In this survey, a household which, in fact, shows a very energy-extensive lifestyle (e.g. buying as much as possible expensive biological food, hand-made furniture etc.) may be regarded as an energy-intensive household because of its high household expenditure. This uncertainty, however, will have no effect on most of the

results presented in this chapter since it will be averaged out over larger groups. However, there is one notable exception. It is conceivable that households with a higher income (or a higher expenditure level) systematically buy products that cost more per physical unit. The consequence of this is that the real elasticity of the energy requirement related to income (or expenditure level) can be smaller than the value computed here. However, the effect turns out to be very moderate. Vringer and Blok (1997) found a maximal decrease of the elasticity of the energy requirement related to net household income due to price income relationships, from 0.63 to somewhere between 0.56 to 0.60. For more details, see Appendix 4B.

**c.** Consumption of public services and a small part of the household consumption are not included. The total energy requirement calculated in this survey does not take all the energy requirements of households into account. A small part (7%) of the net household income is excluded before we made our calculation of the (total) household energy requirement. The demand on public services (including infrastructure) is excluded from this survey as well, because of the difficult individual allocation. The direct energy requirement of government services, defence, social insurances, religious organisations, homes for the elderly and schools, excluding infrastructure, amounts to about 65 PJ per year for the Netherlands (CBS, 1991), which is equivalent to 11 GJ per household per year. If we assume the total energy requirement to be twice the direct energy requirement, then we estimate the total energy requirement for the public services to be about 22 GJ per household. This means that if the energy requirement of the collective sector were included, the total average energy requirement of households would be about 10% higher than calculated here.

## **5 ► Conclusions**

Because at least 54% of the total energy requirement of households consists of an indirect energy requirement, there is a need for further research into this indirect energy requirement. Future energy policy will have to pay attention to the indirect energy requirement of households. The positive relationship between income and total energy requirement suggests that, with further increases in income levels, the average household energy requirement will probably rise as well. However, the large differences between the energy intensities of the various consumption categories indicate that the total household energy requirement can be reduced if we change our consumption patterns. The substantial spread in the total energy requirement of households within the same income category also supports this view. This analysis can form the basis for further research into ways of reducing household energy requirement. Attention needs to be given not only to the direct energy consumption (including the category 'petrol') but also to the consumption categories, 'transport', 'education' and 'recreation'. This is because these categories have a relatively large spread and form an important part of the indirect energy requirement of households.

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## **Appendix 4A ► Energy intensities and energy requirement of an average Dutch household**

This appendix contains Table 4A-2, showing the energy intensity (in MJ/Dfl.), calculated energy requirement (in GJ), expenditure (in Dfl.) and the deviation from the mean in the expenditures<sup>6</sup> (in %) for an average Dutch household. If the deviation from the mean is too large (> 20%), the expenditure and energy requirement are not given. If the deviation is larger than 15% the data are written in italics.

The data on energy intensities were taken from Kok et al. (1993) (food), de Paauw and Perrels (1993) (clothing & footwear, hygiene, medical care, education, recreation, communication, transport and petrol), Vringer and Blok (1993) (house) and Vringer et al. (1993) (household effects). The expenditure and the net income are taken from CBS (1992a).

The categories summarised here consist of approximately 350 consumption categories at the lowest level in the available version of the expenditure survey, including cumulative consumption categories (like the main consumption categories). The cumulative consumption categories are composed of one or more consumption categories at a lower level. For example, the main consumption category v11, 'food' (with two digits), is composed of all the consumption categories at the 3-digit level, which belong to the main consumption category, 'food'. These categories comprise 'bread, pastry and flour products' (v110), 'potatoes, vegetables and fruit' (v111), 'beverages & products containing sugar' (v113), 'oils and fats' (v115), 'meat, meat products and fish' (v116), 'dairy products' (v118) and 'other food products' (v119). The consumption categories at the 3-digit level are divided into one or more categories at the 4-digit level, and so on.

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<sup>6</sup> The deviation from the mean is calculated by dividing the standard deviation by the square root of N (here N = 2767).

The expenditure belonging to the category 'other expenditure' (v6), at a total Dfl. 658, is excluded from the energy requirement and energy intensity calculations (see 'Method') but included in the total expenditure.

Table 4A-1 shows the classification of the main categories in this study, along with the index numbers corresponding to Table 4A-2.

We stress that Table 4A-2 does not answer questions such as: 'What is the 'best buy' (i.e. the 'product' with the lowest energy requirement), because such a question can only be answered after a functional analysis of the expenditure has been performed.

**Table 4A-1** Main expenditure categories and their index numbers corresponding to CBS (1992a).

<b>Main consumption category</b>	<b>Index number</b>
Food	v11
Household effects	v22 - v2200 - v2290 - v2292 - v2295 - v229600 - v2291
House	v2200
Clothing & footwear	v33
Hygiene	v44 - v446
Medical care	v446
Education	v550
Recreation	v551 + v553 + v556
Communication	v5582
Transport	v557 + v558110 + v5582
Petrol	v558110
Heating	v2290 + v2292 + v2295 + v229600
Electricity	v2291



**Table 4A-2** Energy intensities and the energy requirement of an average Dutch household in 1990.

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
H224				45601	1	TOTAL NET INCOME
V1	1	6.0	239.8	40107	1	TOTAL EXPENDITURE
<b>v11</b>	<b>2</b>	<b>5.6</b>	<b>41.6</b>	<b>7408</b>	<b>1</b>	<b>Food</b>
v110	3	4.1	4.0	984	1	Bread, pastry and flour products
v1100	4	4.0	1.7	431	1	Bread and rusks
v110000	6	4.0	0.8	209	2	Wholemeal bread
v110100	6	4.0	0.5	133	2	White bread
v110200	6	3.9	0.1	38	2	Rusks and other sorts of bread
v110300	6	4.2	0.2	51	3	Bread with dried fruit
v1105	4	3.8	1.6	427	2	Cake, biscuits and pastry
v1107	4	5.9	0.6	97	2	Flour and dry goods
v110710	7	5.7	0.1	18	5	Wheatmeal
v110720	7	5.7	0.1	23	4	Rice
v110730	7	4.7	0.1	19	4	Pastry
v110740	7	5.9	0.0	3	7	Potato flour, starch
v110750	7	6.9	0.2	35	4	Other flour and dry goods
v1108	4	4.1	0.1	29	6	Bread and other products
v111	3	6.6	6.9	1035	1	Potatoes, vegetables and fruit
v1110	4	4.4	0.4	100	2	Potatoes
v1111	4	8.8	3.7	422	1	Vegetables
v11110	5	8.5	2.7	319	1	Fresh vegetables
v111100	6	7.1	0.5	71	2	Green (leafy) vegetables
v111110	7	9.4	0.3	35	3	Endive and lettuce
v111120	7	7.8	0.0	4	8	Spinach
v111130	7	4.4	0.1	33	3	Other (leafy) vegetables
v111200	6	5.2	0.3	49	2	Cabbage
v111210	7	4.6	0.1	29	3	Cauliflower
v111220	7	4.6	0.0	7	5	Sprouts
v111230	7	7.0	0.1	13	5	Other cabbages
v111300	6	5.2	0.2	30	4	Fresh pulses/leguminous plants
v111310	7	5.3	0.1	27	4	Green beans
v111320	7	4.0	0.0	4	10	Other fresh pulses/leguminous plants
v111400	6	8.0	0.3	39	2	Carrots and tubers
v111410	7	7.1	0.1	16	4	Carrots
v111420	7	6.7	0.1	13	4	Onions
v111430	7	11.1	0.1	10	4	Other carrots and tubers
v111500	6	11.5	1.5	130	2	Other fresh vegetables
v111510	7	15.3	0.4	25	3	Tomatoes
v111520	7	10.6	1.1	105	2	Other fresh vegetables
v11160	5	9.9	1.0	103	2	Preserved and dried vegetables
v111600	6	15.4	0.1	8	9	Dried vegetables
v111700	6	9.4	0.9	95	2	Other preserved vegetables

*The direct and indirect energy requirements of Dutch households*

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v111710	7	8.4	0.6	73	3	Vegetables canned or bottled
v111740	7	5.0	0.0	5	5	Sauerkraut
v111750	7	14.9	0.3	18	5	Frozen vegetables
v1120	4	5.2	2.7	509	1	Fruit
v11200	5	5.0	1.8	370	2	Fresh fruit
v112000	6	5.0	0.6	120	2	Apples and pears
v112010	7	5.1	0.5	102	2	Apples
v112020	7	4.4	0.1	18	5	Pears
v112100	6	4.8	0.3	71	4	Other indigenous fruits
v112110	7	4.2	0.1	22	5	Strawberries
v112120	7	4.8	0.0	7	13	Cherries
v112130	7	4.0	0.0	3	17	Berries and raspberries
v112140	7	4.6	0.0	5	10	Prunes
v112150	7	5.0	0.1	12	7	Peaches
v112160	7	6.4	0.1	10	8	Melons
v112170	7	4.8	0.1	14	6	Grapes
v112200	6	5.3	0.6	119	2	Citrus fruit
v112210	7	5.6	0.4	79	3	Oranges
v112220	7	4.7	0.1	27	5	Mandarins
v112230	7	5.0	0.1	14	6	Other citrus fruit
v112300	6	4.3	0.2	40	3	Bananas
v112400	6	5.0	0.1	19	6	Other fresh fruit
v11250	5	6.4	0.5	73	2	Preserved fruit
v112500	6	6.5	0.2	25	4	Jams and marmalades
v112600	6	6.9	0.1	12	6	Fruit, dried/candied
v112700	6	5.1	0.1	18	5	Fruit in juice
v112720	6	7.4	0.1	18	4	Fruit, compote/puree
v11280	5	5.2	0.3	65	3	Nuts etc.
v112810	7	5.1	0.3	54	3	Nuts and peanuts
v112820	7	5.5	0.1	11	5	Peanut butter
v1129	4	6.6	0.0	4	16	Potatoes, vegetables & fruit not specified
v113	3	4.6	6.1	1339	2	Beverages & products containing sugar
v1130	4	7.0	1.1	162	2	Sugar and confectionery
v113000	6	11.2	0.5	45	3	Sugar
v113100	6	4.6	0.1	12	6	Sugar products on bread
v113110	7	11.5	0.0	1	12	Treacle
v113120	7	2.6	0.0	8	8	Honey
v113130	7	6.6	0.0	3	8	Sugar products on bread
v113200	6	5.4	0.6	104	3	Confectionery
v1133	4	4.3	0.6	142	2	Chocolate
v113300	6	4.8	0.2	31	3	Chocolate paste/butter for bread
v113400	6	4.1	0.5	110	3	Other confectionery

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v1135	4	3.5	0.6	174	2	Coffee, tea and cocoa
v113500	6	3.4	0.5	141	2	Coffee
v113600	6	4.3	0.1	30	3	Tea
v113700	6	2.6	0.0	3	10	Cocoa
v1140	4	4.4	3.8	861	2	Beverages
v11400	5	7.3	2.0	270	2	Non-alcoholic beverages
v114010	7	6.1	0.1	19	5	Mineral and soda water
v114020	7	7.0	0.7	97	3	Fruit and vegetable juices
v114030	7	7.7	1.2	154	3	Other non-alcoholic beverages
v11410	5	3.0	1.7	573	3	Alcoholic beverages
v114100	6	3.6	1.5	424	3	Beer and wine
v114110	7	3.1	0.6	208	4	Beer
v114120	7	4.0	0.9	217	4	Wine
v114200	6	1.3	0.2	149	5	Spirits and liquors
v11430	5	4.1	0.1	18	8	Beverages not specified
v115	3	13.2	1.3	96	2	Oils and fats
v115000	6	11.0	0.7	65	2	Margarine
v115100	6	17.9	0.6	31	3	Other oils and fats
v115110	7	15.3	0.4	23	4	Fats for frying and deep frying
v115120	7	26.0	0.2	8	8	Salad oil
v116	3	7.1	10.1	1415	1	Meat, meat products and fish
v1160	4	7.7	5.9	760	2	Meat
v116000	6	5.7	0.9	157	3	Beef and veal, fresh
v116010	7	5.6	0.8	144	3	Beef, fresh
v116020	7	6.6	0.1	13	9	Veal, fresh
v116100	6	5.7	1.1	202	2	Pork, fresh
v116110	7	10.0	0.3	30	5	Pork, (fat), fresh
v116120	7	6.5	1.1	172	3	Other pork, fresh
v116200	6	9.3	1.8	191	2	Minced meat, fresh
v116300	6	9.0	0.4	43	5	Offal
v116400	6	9.3	0.5	51	5	Meat and meat products, frozen
v116500	6	8.2	0.2	21	8	Other meat products
v116510	7	9.8	0.1	7	14	Horse meat
v116520	7	7.3	0.1	13	9	Other meat products
v116550	6	7.7	0.7	95	4	Fresh meat, unspecified
v1166	4	6.0	2.4	407	2	Meat products and meat dishes
v116600	6	4.2	0.1	24	5	Smoked beef
v116700	6	5.4	0.6	111	2	Ham and bacon
v116710	7	5.1	0.4	84	3	Ham
v116720	7	6.5	0.2	27	4	Bacon
v116800	6	6.4	1.5	231	2	Other sausages and meat products
v116900	6	6.1	0.2	38	4	Ready-to-use meat dishes
v116910	7	7.0	0.1	9	5	Baked minced meat
v116920	7	4.9	0.0	8	13	Ready-to-use meat dishes

*The direct and indirect energy requirements of Dutch households*

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v116930	7	6.2	0.1	22	4	Canned or bottled meat
v116940	6	7.2	*	*	21	Other meat products not specified
v1170	4	5.9	0.8	139	3	Venison and poultry
v117010	7	1.7	*	*	24	Venison
v117020	7	6.0	0.8	136	3	Poultry
v1171	4	8.7	0.9	108	4	Fish
v117100	6	5.8	0.2	33	6	Fish, fresh
v117130	6	14.2	0.2	17	6	Fish, frozen
v117200	6	6.5	0.1	17	7	Herring
v117210	7	5.8	0.1	14	8	Herring
v117220	7	9.8	0.0	3	11	Herring, pickled
v117300	6	10.1	0.3	33	5	Other preserved fish
v117310	7	9.3	0.1	12	9	Fried fish
v117320	7	7.6	0.1	7	13	Dried and smoked fish
v117340	7	12.0	0.2	14	6	Preserved fish
v117500	6	8.7	0.1	8	11	Other fish
v1180	4	5.9	3.0	499	1	Milk and milk products
v118000	6	6.3	1.4	225	2	Milk
v118100	6	5.3	0.3	59	3	Yoghurt
v118200	6	6.0	0.6	96	2	Custard and porridge
v118300	6	5.4	0.4	68	2	Evaporated milk and cream
v118310	7	5.3	0.3	49	3	Coffee milk
v118320	7	5.5	0.1	20	4	Cream
v118350	6	5.3	0.2	32	5	Milk products with fruit juice
v118400	6	5.8	0.1	18	6	Other milk products
v1185	4	6.5	2.9	440	1	Butter, cheese and eggs
v118500	6	6.7	0.2	32	4	Butter
v118600	6	5.8	2.0	353	2	Cheese
v118700	6	11.1	0.6	54	2	Eggs
v1188	4	6.5	*	*	29	Other dairy products not specified
v119	3	4.5	7.1	1600	2	Other food products
v1190	4	6.8	1.5	219	2	Condiments, soup and oriental food
v119000	6	7.0	0.8	113	2	Condiments, spices and dressings
v119010	7	6.4	0.4	55	3	Salt, spices and condiments
v119040	7	7.6	0.4	58	3	Dressings, mayonnaise etc.
v119100	6	7.6	0.4	48	3	Soup and meat stock
v119250	6	6.9	0.4	59	5	Main course dishes, frozen/canned etc.
v1193	4	4.1	5.6	1369	2	Outdoor consumption
v119300	6	3.8	1.0	252	4	Beverages
v119310	7	3.8	0.3	74	5	Coffee
v119320	7	3.8	0.7	178	4	Other beverages
v119400	6	4.2	2.9	705	2	Meals etc. outdoor
v119410	7	4.3	0.6	130	4	French fries, rolls and snacks
v119420	7	4.1	1.8	436	3	Other meals, outdoor

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v119440	7	4.2	0.6	140	3	Other ready-to-use meals
v119500	6	4.1	0.3	76	4	Ice cream
v119550	6	4.1	1.4	336	5	Outdoor consumption not specified
v1196	4	5.4	0.1	12	12	Other food products and beverages
<b>v22</b>	<b>2</b>	<b>9.1</b>	<b>116.7</b>	<b>12835</b>	<b>1</b>	<b>Household effects</b>
v220	3	2.1	18.5	8666	1	Rent, maintenance and garden
v2200	4	1.2	9.1	7532	1	Rent and rental value
v220010	6	1.4	4.0	2891	2	Rent
v220020	6	1.1	4.8	4453	2	Rental value
v220040	6	1.2	0.2	203	3	Additional costs
v2202	4	6.9	2.3	335	4	Maintenance
v220200	6	4.5	0.6	136	5	Wallpaper and painting-costs
v220300	6	8.5	1.7	199	6	Other maintenance costs
v2210	4	3.1	0.8	273	5	Fixed equipment
v221000	6	2.7	*	*	25	Construction of fixed equipment
v221010	7	2.3	*	*	110	Construction of central heating
v221020	7	2.4	*	*	25	Boilers and geysers
v221030	7	3.1	*	*	27	Construction of other fixed equipment
v221100	6	3.2	0.7	228	5	Maintenance fixed equipment
v221110	7	2.2	0.0	6	20	Materials/maintenance central heating
v221120	7	8.0	0.6	72	7	Materials, maintenance of other fixed equipment
v221140	7	1.0	0.1	52	5	Servicing for maintenance of central heating
v221150	7	1.0	0.1	98	10	Servicing of other fixed equipment
v221400	6	1.7	0.0	29	4	Rent of fixed equipment
v2220	4	12.2	6.3	520	3	Garden and flowers
v222000	6	1.1	0.1	122	10	Rent and maintenance of garden
v222100	6	15.7	1.9	119	6	Other costs for garden
v222200	6	15.6	4.3	279	2	Indoor plants and flowers
v224	3	4.1	5.9	1451	3	Furniture, upholstery and linen
v2240	4	3.4	2.3	666	4	Furniture
v224000	6	3.2	1.2	388	6	Dining- and living-room furniture
v224010	7	3.2	0.3	88	13	Furniture (set), cabinet
v224020	7	3.2	1.0	300	6	Other dining- and living-room furniture
v224100	6	3.1	0.6	179	8	Bedroom and nursery furniture
v224110	7	3.2	*	*	21	Bedroom furniture (set)
v224120	7	3.2	0.4	119	8	Other bedroom and nursery furniture
v224140	7	2.3	0.0	14	14	Prams, buggies, baby-carriages
v224200	6	4.6	0.5	99	11	Other furniture
v224210	7	4.6	*	*	30	Garden-, kitchen- & study-furniture
v224220	7	6.1	0.2	32	8	Other garden-, kitchen- & camping-furniture

*The direct and indirect energy requirements of Dutch households*

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v224240	7	3.2	0.1	33	7	Other furniture
v2243	4	5.1	2.1	416	4	Upholstery
v224300	6	5.8	0.9	153	6	Curtains and blinds
v224310	7	4.8	0.1	14	12	Net curtains
v224320	7	4.5	0.3	65	7	Material for curtains, draw-curtains
v224330	7	7.1	0.5	74	8	Blinds and gauze-blinds
v224400	6	5.6	0.3	57	11	Floor covering and parquet
v224410	7	4.2	0.1	26	10	Linoleum and smooth floor coverings
v224420	7	6.7	0.2	31	19	Parquet
v224500	6	5.3	0.9	170	6	Carpets, etc.
v224600	6	1.0	0.0	36	13	Other furniture textiles
v2247	4	3.0	0.3	107	6	Decoration
v224700	6	3.0	0.1	45	8	Wall decoration
v224800	6	3.0	0.2	62	8	Statues, vases and baubles
v2249	4	4.6	0.9	196	4	Bedding and household linen
v224900	6	6.5	0.3	45	10	Mattresses
v225000	6	2.3	*	*	29	Blankets
v225200	6	3.7	0.4	108	5	Other bedding
v225210	7	4.8	0.3	55	6	Sheets and pillow-cases
v225220	7	2.4	0.1	48	6	Quilts, eiderdown
v225230	7	4.7	0.0	5	18	Other bedding
v225300	6	4.8	0.2	40	6	Household linen
v2255	4	4.1	0.3	67	16	Domestic decoration not specified
v226	3	3.5	3.7	1081	2	Household appliances and tools
v2260	4	5.2	1.7	317	4	Cutlery, kitchen utensils and appliances
v226000	6	3.0	0.1	50	7	Food processors and kitchen utensils
v226010	7	2.9	0.1	48	8	Electric food processors/utensils
v226050	7	4.2	0.0	2	20	Other food processors/utensils
v226100	6	4.1	0.2	56	8	Refrigerators and deep freezers
v226300	6	3.0	0.1	42	8	Pottery and glassware
v226330	6	6.8	1.2	169	5	Other cutlery and kitchen utensils
v2265	4	2.7	0.2	67	7	Cookers
v226500	6	2.4	*	*	21	Kitchen cookers
v226600	6	2.8	0.2	55	7	Other cooking-apparatus
v2267	4	2.4	0.0	19	18	Heating appliances (except central heating)
v226720	7	2.4	*	*	25	Gas-heaters
v226730	7	2.4	*	*	26	Other heaters and stoves
v2268	4	3.7	0.4	113	5	Lighting appliances
v226800	6	4.3	0.3	71	6	Lamps and armatures
v226900	6	2.6	0.1	42	7	Other lighting appliances
v226910	7	2.3	0.1	28	8	Bulbs and fluorescent lamps
v226920	7	3.1	0.0	14	12	Cords, plugs and switches
v2270	4	3.1	0.5	160	5	Cleaning appliances and tools

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v227000	6	3.1	0.4	128	6	Cleaning appliances & tools (electric)
v227010	7	3.1	0.1	25	7	Vacuum cleaners
v227100	7	3.1	0.3	97	7	Washing- machines and dryers (electric)
v227210	7	2.4	0.0	6	13	Electric irons
v227215	6	3.1	0.1	32	6	Cleaning appliances & cleaning tools (n-electric)
v227220	7	4.3	0.0	8	11	Washing and ironing requisites
v227310	7	2.6	0.1	21	7	Brushes, brooms, sponges etc.
v227340	7	3.6	0.0	3	16	Accessories for cleaning apparatus
v2275	4	4.0	0.5	129	5	Other household appliances and tools
v227500	6	2.9	*	*	24	(Alarm) clocks
v227510	7	2.6	*	*	28	Alarm clocks
v227520	7	2.9	*	*	28	Clocks
v227600	6	2.6	0.1	31	12	Sewing and knitting tools
v227610	7	2.2	0.1	23	16	Electric sewing machines
v227620	7	4.7	0.0	5	16	Needlework tools
v227630	7	2.3	*	*	27	Other textile apparatus and accessories
v227700	6	4.7	0.4	87	5	Other household appliances and tools
v227710	7	2.2	0.1	31	10	Other electric apparatus
v227730	7	6.0	0.3	56	6	Other tools and articles
v2278	4	1.1	0.0	29	7	Repair and hire of household appliances
v227800	6	1.1	0.0	27	7	Repair and maintenance of household appliances
v227900	6	1.1	*	*	24	Hire of household appliances
v2280	4	1.6	0.4	247	2	Fire- and burglary-insurance
v228000	6	1.6	0.4	247	2	Fire- and burglary-insurance
v229	3	54.4	88.6	1628	1	Heating and lighting
v2290	4	58.9	51.7	878	1	Gas
v229010	7	59.1	51.5	872	1	Natural gas
v229020	7	35.1	*	*	28	Calor and propane gas
v2291	4	48.0	28.1	585	1	Electricity
v229620	7	59.1	7.1	120	5	Coll. energy costs for central heating
v229640	7	49.7	0.7	13	6	Energy costs included in rent
v229700	6	5.4	0.1	15	7	Matches and candles
<b>v33</b>	<b>2</b>	<b>2.7</b>	<b>7.6</b>	<b>2816</b>	<b>2</b>	<b>Clothing &amp; footwear</b>
v330	3	3.0	6.3	2095	2	Clothing
v3300	4	3.0	1.4	475	3	Men's clothing
v330000	6	3.9	0.2	40	5	Men's coats
v330100	6	3.0	0.6	216	3	Suits, jackets and trousers
v330200	6	3.0	0.2	60	5	Cardigans and jersey/sweater
v330300	6	2.5	0.2	87	5	Shirts
v330400	6	3.9	0.1	16	9	Other outer wear
v330500	6	2.8	0.1	28	9	Nightgowns and underwear

*The direct and indirect energy requirements of Dutch households*

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v330550	6	3.0	0.1	29	7	Men's clothes not further specified
v3306	4	2.4	1.7	698	2	Women's clothing
v330600	6	3.0	0.2	66	5	Ladies' coats
v330700	6	2.1	0.8	402	3	Dresses, blouses, trousers and skirts
v330750	6	2.1	0.0	12	10	Ladies' stockings
v330800	6	2.7	0.3	108	4	Cardigans and jersey/sweater
v330850	6	5.2	*	*	32	Other outer wear
v330900	6	2.8	0.2	57	6	Nightgowns and underwear
v330950	6	3.0	0.2	52	5	Ladies' clothes not further specified
v3310	4	3.5	0.7	212	6	Boys' and girls' clothes
v33100	5	4.3	0.3	78	8	Boys' clothes
v331000	6	5.0	0.1	13	11	Boys' coats
v331100	6	4.9	0.1	25	10	Suits, jackets and trousers
v331200	6	3.4	0.0	14	16	Cardigans and jersey/sweater
v331300	6	2.7	0.0	14	16	Shirts
v331400	6	2.8	0.0	4	19	Other outer wear
v331500	6	7.8	0.0	6	18	Nightgowns and underwear
v331550	6	2.9	0.0	3	19	Boys' clothes not further specified
v33180	5	2.8	0.3	94	8	Girls' clothes
v331800	6	3.6	0.0	14	10	Girls' coats
v331900	6	2.4	0.1	49	9	Dresses, blouses, trousers and skirts
v332000	6	2.8	0.0	14	14	Cardigans and jersey/sweater
v332050	6	2.3	0.0	5	15	Other outer wear
v332100	6	4.2	0.0	9	15	Nightgowns and underwear
v332200	6	3.0	*	*	21	Girls clothes not further specified
v33250	5	3.2	0.1	39	11	Babies' clothes
v3327	4	3.0	1.5	488	3	Clothes unspecified (age, sex, unknown)
v3328	4	2.4	0.1	23	10	Clothing accessories men/boys
v3329	4	2.4	0.0	15	11	Clothing accessories women/girls
v3330	4	3.0	0.1	27	8	Clothing accessories etc. unspecified
v3331	4	5.2	0.8	146	5	Materials and charge for making clothes
v333100	6	5.9	0.5	77	7	Material for clothes
v3350	4	1.6	0.2	93	4	Men's footwear
v335000	6	1.6	0.1	48	5	Men's shoes
v335100	6	1.7	0.1	45	5	Other men's footwear
v3360	4	1.7	0.3	157	3	Women's footwear
v336000	6	1.6	0.1	84	4	Ladies' shoes
v336100	6	1.8	0.1	73	4	Other ladies' footwear
v3370	4	1.6	0.1	72	6	children's footwear
v33700	5	1.5	0.0	14	10	Boys' shoes
v33710	5	1.4	0.0	19	11	Girls' shoes
v33720	5	1.7	0.1	40	8	Other children's footwear
v337200	6	1.7	0.0	20	10	Other boys' footwear
v337300	6	1.7	0.0	18	11	Other girls' footwear



Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v337400	6	1.6	*	*	30	Infants' and babies' footwear
v3375	4	1.8	0.2	122	4	Footwear unspecified (age, sex unknown)
v3376	4	1.3	0.0	6	14	Hire of footwear
v3380	4	2.1	0.1	31	8	Shoe repairs and material
v338000	6	2.3	0.1	24	10	Shoe repairs
v338100	6	1.3	0.0	7	15	Repairing materials
v3382	4	2.0	0.5	237	4	Finery
v338200	6	2.8	0.2	68	5	Leather goods etc.
v338300	6	1.6	0.2	133	5	Jewellery and watches
v338400	6	1.9	0.0	21	8	Other finery
v338500	6	2.0	0.0	14	11	Repairs to finery
v339	3	2.4	0.0	4	19	Clothing, footwear & access; not specified
<b>v44</b>	<b>2</b>	<b>3.2</b>	<b>17.1</b>	<b>5561</b>	<b>1</b>	<b>Hygiene and medical care</b>
v440	3	3.5	2.1	770	3	Domestic services and cleaning
v4400	4	0.6	0.2	338	6	Domestic services
v440000	6	0.0	0.0	171	9	Wages for domestic staff/servants
v440100	6	3.0	0.1	25	8	Laundry, dry cleaning, dye-works
v440200	6	0.8	0.1	141	8	Other domestic services
v440230	7	0.1	0.0	41	7	Window-cleaning service etc.
v440240	7	1.1	0.1	100	11	Babysitting, nursery etc.
v4410	4	5.7	1.9	432	1	Cleaning articles
v441000	6	2.4	0.5	223	1	Water
v441100	6	6.8	1.0	150	3	Washing powders, detergents etc.
v441110	7	3.0	0.0	3	10	Household soap
v441200	7	6.9	0.9	126	3	Washing powders etc.
v441210	7	6.8	0.1	21	5	Detergents
v441300	6	7.2	0.4	59	3	Other cleaning articles and insecticides
v442	3	3.6	2.7	746	2	Physical care
v4420	4	6.0	1.7	273	3	General physical care
v442000	6	4.8	0.9	186	3	Toilet-articles
v442100	6	12.3	0.6	47	3	Toilet paper
v442200	6	4.8	0.1	27	5	Sanitary towels
v442300	6	4.0	0.1	14	12	Visits to (public) baths/toilet/sauna
v4430	4	2.0	0.7	343	2	Services of hairdressers
v443000	6	1.4	0.3	237	3	Hairdresser
v443100	6	3.5	0.4	106	3	Articles for hair-care
v443110	7	1.8	0.0	12	9	Electrical articles for hair-care
v443120	7	3.7	0.3	94	4	Other articles for hair-care
v4440	4	2.5	0.3	130	4	Cosmetics and perfumery
v444000	6	1.4	0.0	33	9	Chiropodist, manicurist, beauty-salon
v444100	6	2.9	0.3	96	4	Cosmetics and perfumery
v446	3	3.0	12.3	4046	1	Medical care

*The direct and indirect energy requirements of Dutch households*

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v4460	4	11.5	6.8	593	3	Medical care (excluding insurance)
v44600	5	1.7	0.6	331	3	Medicines, wound-dressings & prostheses
v44700	5	14.9	6.2	419	4	Medical care
v4490	4	1.6	5.5	3448	1	Health insurance
v449000	6	1.6	3.9	2429	2	Health insurance premium
v449100	6	1.6	1.6	1020	3	Other health insurance
<b>v55</b>	<b>2</b>	<b>5.2</b>	<b>56.5</b>	<b>10828</b>	<b>2</b>	<b>Education, recreation and transport</b>
v550	3	3.6	4.7	1293	2	Education
v5600	4	1.7	0.8	486	3	Schooling
v555000	6	0.2	0.0	42	7	School-, course-fee & professional training
v550100	6	0.2	0.0	167	5	Music-, dancing- and sports lessons
v550200	6	2.6	0.5	196	4	Study-books and educational appliances
v550300	6	3.6	0.3	81	7	Other educational costs
v5504	4	4.8	3.9	807	2	Stationery and reading
v550400	6	6.1	1.3	216	5	Stationery and the like
v550410	7	2.0	0.2	98	10	Typewriter, counting-machine / calculator
v550420	7	9.6	1.1	118	4	Other stationery
v550500	6	5.7	1.9	340	1	Newspaper and weekly papers
v550600	6	2.4	0.6	251	4	Books and magazines
v550610	7	2.4	0.4	168	5	Books
v550620	7	2.4	0.2	83	3	Journals, periodicals and magazines
v551	3	5.6	13.9	2468	3	Sports, games and holidays
v5510	4	2.6	0.8	303	8	Sports and games
v551100	6	0.9	0.1	100	5	Hire of sport-accommodation
v551200	6	3.5	0.3	94	5	Sportswear and camping clothes
v551210	7	4.2	0.1	18	9	Men's sportswear and camping clothes
v551240	7	4.2	0.1	13	14	Boys' sportswear and camping clothes
v551280	7	2.9	0.1	28	7	Ladies' sportswear and camping clothes
v551320	7	2.8	0.0	12	14	Girls' sportswear and camping clothes
v551350	7	3.5	0.1	24	8	Sportswear not specified
v551400	6	2.2	0.1	23	9	Sports shoes
v551410	7	2.1	0.0	7	13	Men's sports shoes
v551420	7	2.3	0.0	6	16	Boys' sports shoes
v551440	7	2.2	0.0	5	16	Ladies' sports shoes
v551450	7	2.3	0.0	6	20	Girls' sports shoes
v551500	6	3.7	*	*	28	Sports goods and games
v551510	7	7.6	*	*	83	Sailing- and motor-boats
v551530	7	1.7	0.1	42	8	Sports goods
v551570	7	1.8	0.0	15	11	Games
v5516	4	6.0	13.1	2166	3	Camping, weekend and holidays
v55160	5	3.8	0.6	155	16	Camping equipment and caravans
v551610	6	3.7	*	*	29	Caravans etc.

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v551620	6	6.2	0.2	40	9	Other camping equipment
v551640	6	1.3	0.0	33	13	Hire & maint. of camping equipment
v55170	5	2.3	0.1	40	5	Holiday insurance
v55180	5	4.9	0.4	91	6	Other weekend expenditure
v55190	5	5.6	1.7	300	4	Holidays in the Netherlands
v551900	6	4.6	0.5	113	6	Organised holiday trips
v551950	6	6.2	1.2	187	5	Other holiday costs
v55210	5	6.5	10.2	1568	3	Holiday abroad
v552100	6	6.1	4.0	661	4	Organised holiday trips
v552200	6	6.8	6.2	907	3	Other holiday costs
v55250	5	6.7	0.1	12	20	Holiday costs not specified
v553	3	2.7	4.8	1764	2	Other recreation
v5530	4	1.9	0.2	115	7	Music, singing and theatre
v553100	6	2.0	0.1	62	6	Entrance fees for concert, theatre
v553200	6	2.1	0.1	37	19	Musical instruments
v553300	6	1.4	0.0	17	12	Hire and repair of musical instruments
v5535	4	2.1	1.9	888	3	Radio, television and gramophones
v553500	6	2.2	0.2	72	8	Radios and amplifiers
v553510	7	2.5	0.0	14	10	Radios
v553520	7	2.2	0.1	42	13	Audio amplifier
v553530	7	1.8	0.0	16	10	Car radios including accessories.
v553600	6	2.3	0.3	131	7	Television sets
v553700	6	2.6	0.5	180	6	Gramophones and tape-recorders
v553710	7	2.7	*	*	24	Gramophones
v553720	7	2.5	0.1	52	7	Cassette- and tape-recorders
v553730	7	2.7	0.3	124	7	Videos
v553800	6	2.6	0.3	104	8	Sound-equipment (combined)
v553900	6	1.4	0.1	51	6	Hire/repairs audio/video equipment
v554000	6	1.9	0.3	163	5	Records, cassettes and compact disks
v554100	6	1.6	0.3	187	1	Other costs of radio and TV
v554110	7	1.2	0.2	146	1	Radio and television licence fee
v554120	7	3.1	0.1	41	2	Radio/tv programme magazine
v5542	4	3.7	2.4	641	3	Other recreation
v554200	6	5.8	0.1	23	9	Entrance fee to cinema
v554300	6	2.7	*	*	36	Film- and projection-equipment
v554400	6	1.6	0.1	37	9	Photo-cameras and accessories
v554410	7	1.6	0.0	28	10	Photo-cameras
v554420	7	1.7	0.0	9	15	Film- and photo-accessories
v554500	6	2.7	0.4	148	4	Other costs of photography and films
v554600	6	5.1	1.4	277	4	Pets
v554610	7	1.5	*	*	32	Purchase of pets
v554620	7	5.3	1.4	264	4	Costs of tending pets
v554700	6	1.7	0.0	6	15	Services supplied by clubs
v554800	6	2.0	0.2	77	5	Other entrance fees

*The direct and indirect energy requirements of Dutch households*

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v554900	6	2.1	0.1	32	10	Other hobbies
v555000	6	3.2	0.1	38	9	Party articles
v5551	4	2.8	0.3	120	5	Toys
v556	3	1.1	0.4	367	3	Smoking
v556000	6	1.2	0.0	18	14	Cigars
v556100	6	0.9	0.2	197	5	Cigarettes
v556200	6	1.3	0.2	146	4	Other tobacco articles
v556300	6	1.8	0.0	5	13	Smokers' accessories
v557	3	6.6	32.7	4935	2	Transport & communication
v5570	4	7.6	2.9	389	4	Public transport
v557000	6	7.4	1.7	233	5	Train
v557100	6	7.8	1.2	156	5	Other expenditure for public transport
v557110	7	1.1	0.0	18	13	Taxi
v557120	7	8.7	1.2	139	5	Other public transport
v5572	4	2.2	0.4	193	4	Bikes
v557200	6	1.9	0.2	125	5	Purchase of bikes
v557300	6	2.8	0.2	67	6	Bike accessories and repairs
v5574	4	2.3	0.1	60	18	Mopeds, motor-cycles etc.
v557400	6	2.1	*	*	25	Mopeds, motor-cycles and scooters
v557500	6	2.8	0.1	20	13	Repair of mopeds, motor-cycles, scooters
v557510	7	2.8	0.0	6	20	Repair of and accessories for mopeds
v557530	7	2.8	0.0	14	17	Rep. & access. motor-cycles/-scooters
v5576	4	2.4	4.9	2062	5	Cars
v5579	4	15.0	22.8	1519	2	Other costs of personal transport
v557900	6	4.4	0.1	31	6	Storage of car, motor-cycle, bike
v557910	7	5.5	0.1	24	7	Car/motor-cycle storage
v557920	7	0.4	0.0	7	12	Bike/moped storage
v558000	6	1.5	0.8	509	2	Insurance cars etc.
v558010	7	1.5	0.7	470	2	Insurance car
v558020	7	1.5	0.0	11	16	Insurance motor-cycle, scooter
v558030	7	1.5	0.0	13	9	Insurance moped and bike
v558040	7	1.5	0.0	16	9	Other insurance vehicles/vessels etc.
v558100	6	22.4	21.9	980	2	Petrol and motor oils
v558110	7	22.4	21.9	977	2	Petrol, oil for cars and motor-cycles
v558120	7	19.9	*	*	29	Other petrol and oil
v5582	4	1.9	1.4	712	2	Other transport & communication costs
v558200	6	1.0	0.6	560	1	Telephone
v558300	6	8.0	0.5	62	5	Postal expenses
v558400	6	3.7	0.3	90	9	Other transport and communication
v558420	7	2.3	0.1	63	11	Driving-lessons
v558430	7	6.8	0.2	27	16	Cargo services
<b>v66</b>	<b>2</b>			<b>658</b>		<b>Other expenses</b>
v661	3			365		Private insurances not mentioned before

Table 4A-2 Energy intensities and the energy requirement of an average Dutch household in 1990. (Cont.)

Index number	Level	Energy intensity (MJ/Dfl.)	Energy requirement (GJ)	Expenditure (Dfl.)	Deviation (%)	Consumption category
v661000	6			199		Insurances against damage and income loss n.b.m.
v661200	6			167		Life insurance, other endowment insurances
v662	3			293		Other expenditure not mentioned before
v662100	7			58		Family ceremonies
v662210	7			3		Pocket-money expenses unspecified
V662230	7			233		Various services not mentioned before

## **Appendix 4B ► Price - income relationships**

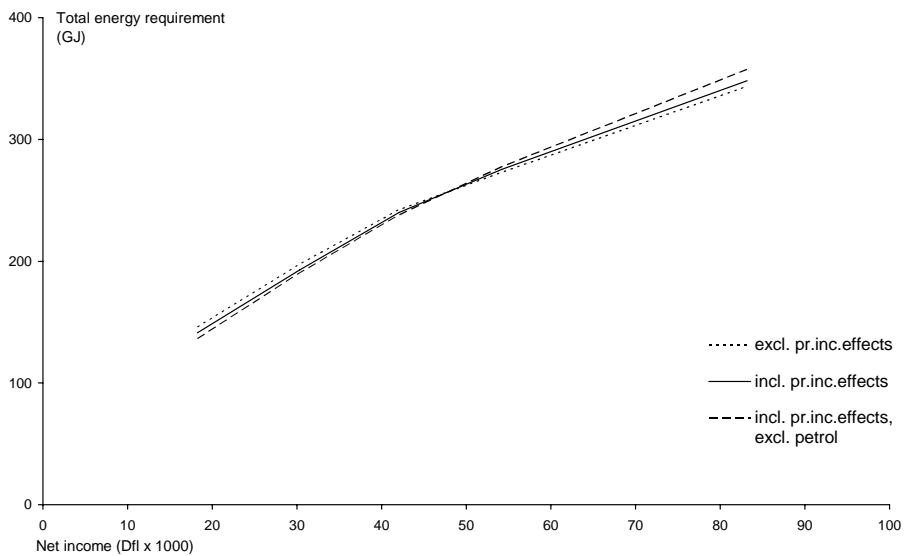
In this chapter we distinguished 350 product categories, together making up nearly the total household consumption pattern. To each category we assigned an energy intensity (MJ/Dfl.). This energy intensity value per category is assumed to be the same for all the income levels. In this chapter we found an important relationship between net household income and the direct and indirect energy requirement of households. The energy requirement elasticity related to income was found to be 0.63, i.e. a 1% increase in income results in a 0.63% increase in energy requirement. However, it is conceivable that households with a higher income systematically buy products that cost more per physical unit. For instance, they may pay on average more for one bread or one sofa with the same physical characteristics. Products with a higher price per physical unit may have a lower energy intensity than products with lower prices (see Chapter 2). The consequence of this possible price-income effect is that the real energy requirement elasticity related to income (or expenditure level) can be smaller than the value computed in this chapter.

In order to investigate to what extent our analysis is biased through this effect, we examined the relationship between income and the price per physical unit. On the basis of the household expenditure survey this was only possible for 82 categories, containing homogeneous products like shoes or bread. The other product categories of the expenditure survey are not suitable for this analysis. This because these categories contain products of which many possible variants are possible, like furniture.

For the 82 homogeneous (sub) consumption categories Statistics Netherlands (CBS) supplied data on physical amounts purchased and expenditures, depending on income levels, divided into deciles of quintiles (CBS, 1995). From these data the price per physical unit for the 82 consumption categories per household income level has been derived. The price elasticity of the examined 82 consumption categories together is on average found to be 0.16. This average price income elasticity is extrapolated to all 350 consumption categories, excluding the consumption categories of which the energy requirement is already calculated on a physical basis (house, electricity and natural gas). Then we find a maximal decrease of the elasticity of the energy requirement related to net household income from 0.63

to not lower than somewhere between 0.56 and 0.60<sup>7</sup> (see Figure 4-B1). Because all price - energy requirement relationships are ignored, the estimate made here shows the maximal effect of price income relationships to the total energy requirement. See for more details Vringer and Blok (1997).

This means that for complete consumption patterns only a small effect is found on the energy requirement elasticity related to income of taking into account the price elasticity related to income, while ignoring the price -energy requirement relation



**Figure 4B-1** Total energy requirement plotted against net household income, ex- and including the price-income effects and including the price-income effects but leaving out petrol.

<sup>7</sup> If the consumption categories which do contain several kinds of petrol are left out the analysis, the elasticity lowers from 0.60 to 0.56.