ITT
Institute for Technology and Resources Management in the Tropics and Subtropics

Technology Arts Sciences
TH Köln

Project III

Model showing the dependency of the loss of buying power of a standard family caused by rising costs for energy

Name: Fabian Eickmeier
Enrolment Number: 11152769
E-Mail: fabian.eickmeier@smail.th-koeln.de

Name: Iván Segura Rodríguez
Enrolment Number: 11152375
E-Mail: ivan.segura_rodriguez@th-koeln.de

Name: Bala Subramanyam Panchangula Chinna
Enrolment Number: 11152408
E-Mail: bala_subramanyam.panchagnula_chinna@smail.th-koeln.de

Name: Souha Sayhi
Enrolment Number: 11152325
E-Mail: sayhi.souha@smail.th-koeln.de

Name: Bit Chan Choi
Enrolment Number: 11146610
E-Mail: bit_chan.choi@smail.th-koeln.de

Course: P1170 - Project III
Examiner: Prof. Dr. Ulrich Daldrup
Prof. Dr. Ramchandra Bhandari
Date of Submission: 17th February 2023

Abstract

The aim of this report is an analysis of how deeply a rise in energy cost affects a standard German four-person household by developing a tool that can be used in an uncomplicated way to estimate the annual expenditures. By entering the current electricity, gas, gasoline and diesel prices for a household, the tool presents the corresponding yearly costs in total as well as divided by product groups. To do so, a detailed breakdown of the energy consumption of a four-person household is conducted. This breakdown includes the obvious energy applications in a household, like the refrigerator or lighting, but also an analysis of the hidden energy costs in day-to-day consumption goods. To decide which goods are to be taken, the German Consumer Price Index is used.

Table of Contents

Table of Figures

Table of Tables

Introduction

Background and Problem/ Research Gap

Since the beginning of 2022 and with the start of the Russian attack on Ukraine, prices are skyrocketing. However, the war is more like a trigger than the actual reason for the enormous increase in prices. As Figure 1 - Price Development for Energy shows, the energy prices for the end-users were rising for 22,5% in 2022 compared to 2021 (Bundesregierung, 2022) (DESTATIS, www.destatis.de, 2022). But the simple consideration to multiply the risen cost with the standard electricity use of a German household falls too short. There are also price increases in consumption goods like food or beverages, in clothing and services. For that reason, it is necessary to find out the amount that energy costs have in these products to also assess the rise in hidden energy costs that every household in Germany experiences.

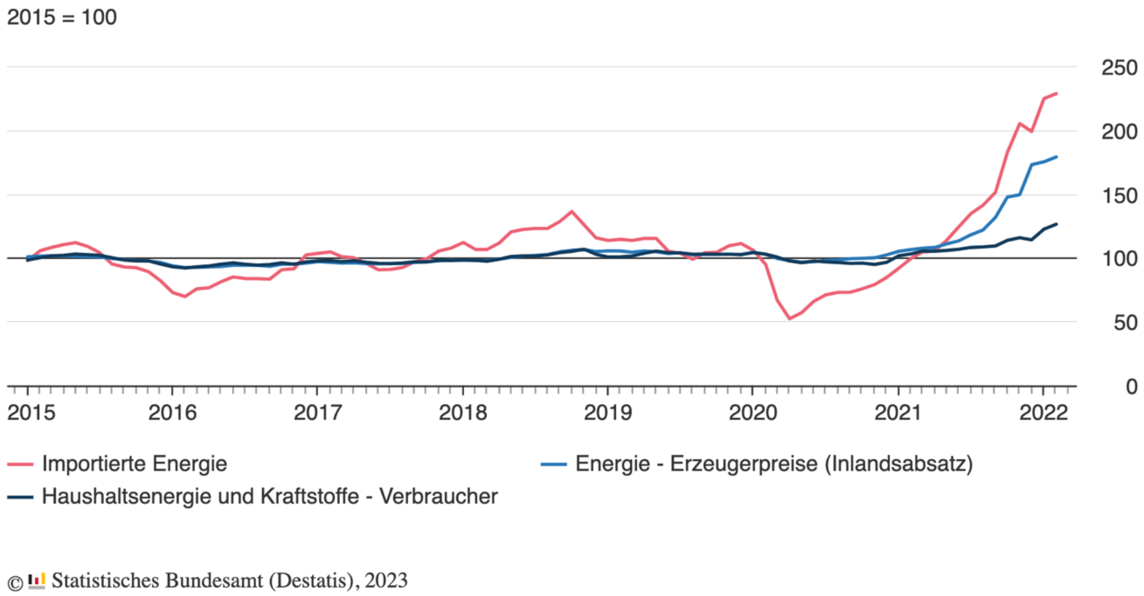

Figure 1 - Price Development for Energy (Bundesregierung, 2022) (DESTATIS, www.destatis.de, 2022)

Objectives

This research paper's objective is to define the combined increment of expenditure of visible energy costs and hidden energy costs. The aim is to create a simple tool (Figure 2 - Example of the Calculation T) to compare how much the annual cost for energy rises with a given price of electricity, gas, gasoline and diesel. The tool will then display the total annual costs, the annual costs for direct electrical consumption in the household, the yearly costs of gas, the yearly costs for energy that is hidden in clothing, the yearly cost of energy that is hidden in services, the yearly energy cost due to mobility, the annual hidden energy costs of fresh foods as well as the annual cost for energy in manufactured foods and beverages. At last step, the percentage of energy cost of the total annual net income is calculated, to set the findings in relation.

In the end, it shows how the increment in energy cost does not only affect the direct bill of the electricity and gas provider, as well as the cost for gasoline, but it affects every part of consumption that a household has. For that reason, a more holistic approach is used to identify the full cost increment.

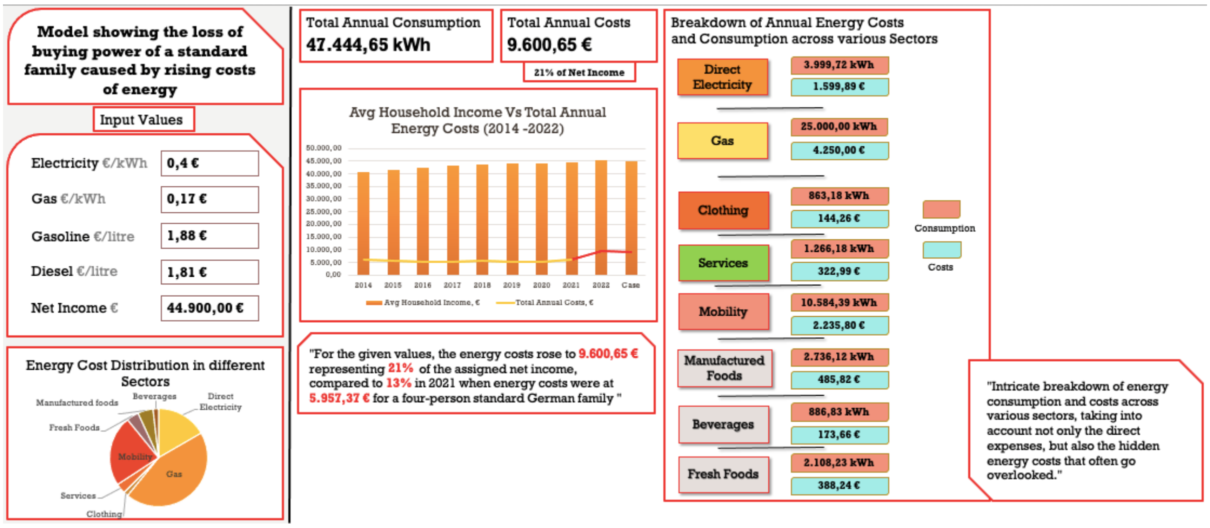

Figure 2 - Example of the Calculation Tool

Scope and Structure

To fit the scope of this research paper to the workload of the module as well as the time frame of one semester, it was decided to focus on the most important energy consumptions that a private household in Germany has. To back this up, the Consumer Price Index (CPI) for Germany was used (DESTATIS, 2019). Based on it, it was possible to create a weighting of goods and decide which product, service, or consumable to put into the research and which one to leave out. This work is about building a foundation for possible further research work.

For this case study, an average four-person household was chosen to be analyzed. Besides that, for many of the calculations, assumptions had to be made which will be explained in the annex to create a maximum of transparency.

The tasks were divided among group members according to the defined categories in order that every member of the group could work on detail in his/her category. This approach was decided because it gave the maximum level of knowledge per part, instead of all members working on the same part.

Conceptual Frame

Literature Review

The literature review showed that in the current discussion there is a lack of holistic approaches to the topic of energy costs. Even though there is a huge amount of quantitative data about energy consumption, energy prices, average consumption of different models like single-households, two-person or four-person households, the difference between free standing houses and apartment houses, the average kilometer travelled per person, etc., there is almost no data on hidden energy costs like in food, clothes, beverages or services like restaurants or mechanics.

Choice of Building Blocks

Based on the previous section, three different building blocks were distinguished for this research paper. In the first building block, the model that is chosen for this research is defined. The second building block defines the average standard consumption of the modelled household in combination with assumptions that are made regarding consumption patterns. The third building block is an analysis of hidden energy costs in consumption goods, service goods and clothing.

Building Block 1: Model Debate

For modeling, we decided to take a German standard four-person household. The household is a family with two children that still go to school. The family is living in a free-standing house and owns two cars. Both parents are working and get to work by car. The family is going on vacation twice a year in summer and winter. The modeled family is earning a combined annual Average Brut Income of 56.580,00€ (DESTATIS, Laufende Wirtschaftsrechnungen, 2021).

The next step is defining the household to be analyzed and its consumption patterns. Here a combination of qualitative data on German household consumption with assumptions, based on literature, made to fill the information gaps is used to model an authentic consumption overview.

After defining consumption patterns, that include food, beverages, clothing, services, and mobility, an analysis of hidden energy costs is made to detect the factual energy costs in several goods of daily usage.

Building Block 2: Theory Debate

This paper is based on quantitative data to find out about consumption patterns and consumption behaviors of German households. For data collection, governmental and scientific report data is collected as well as provider or producer data. A standard family is composed based of statistical data combined with assumptions listed in this report.

To process the data, mathematical tables are designed to on the one hand show clearly all the applications, products, and services that are considered and on the other hand to give a detailed information about the annual consumption of every specific product as well as a combined consumption quantity of the different product groups. The final outcome of mathematical tables was an algorithm showing the effect of energy unit prices as input on the family income and on its purchase power in particular.

Synthesis

Combining the modeling and the theoretical approach, the combined energy consumption of a standard German four-person household is estimated. The combined consumption is composed of the direct energy consumption of the household like electric appliances, gas for heating or gasoline for individual mobility as well as hidden consumption in fresh or manufactured food, in beverages, in clothing or in services.

For the calculation of direct consumption, only the consumed quantity of energy is considered. This refers to electric applications, gas consumption and individual mobility by car. Here, the energy used to manufacture for example the car, refrigerator or heating system is not considered. Only the amount of energy in kWh of electricity, gas, and gasoline.

For the product categories fresh foods, manufactured foods, beverages, services and clothing the approach differs. In fact, the consumption of the whole good or service is assumed. Because of that, the amount of energy to produce and transport the good per unit is calculated and this amount is then accounted as consumed by the household.

Methodology

Data Needs

To conduct this research, it is necessary to have detailed information on the standard four-person household in Germany in means of consumption as well as standard of living, income, and behavioral patterns. Furthermore, information about the share of costs that go back to energy in everyday consuming products, clothes and services must be determined. When no scientific source is available, these gaps in scientific data must be filled by accountable journalistic data or producer/provider information. If none of these are available, assumptions must be made to finalize specific calculations.

Data Acquisition Methods

For data acquisition, secondary quantitative data is used. The highest priority lies on reports by official sources like governmental institutions, accountable NGOs or national providers of energy. Literature search is done online.

Data Analysis Methods

The analysis of data is done in the tables designed for this research paper. The structure of analysis uses the following steps:

1. Acquisition of data.
2. First processing of data, detection of data holes.
3. Filling the data holes with assumption if needed.
4. Application of the researched energy consumption on a defined consumption quantity that is defined for that specific good.
5. Combination of all goods or services in a specific product group to a total value for that product group.
6. Implementing the calculated values to the tool on the front page to feed into the total annual burden of a household.

Assumptions

To estimate the energy consumption of a household, two kinds of energy were considered: direct and hidden (or embodied). In the case of the study, we assumed that direct energy refers to the use of electric appliances in the house, natural gas for heating purposes and gasoline consumption for mobility. For electricity and gas, the energy requirements through the year of different technologies were considered. For mobility, an evaluation of mobility patterns was conducted, assuming two gasoline cars and their use for applications such as work, education, shopping, personal business, and leisure. All assumptions made and data used regarding direct energy consumption behavior for a four-person German standard household are shown in the Annex.

The hidden energy is considered as the required sum of energy to produce a good or service consumed by the standard family. We assumed that main hidden energy consumptions are part of four categories: food (fresh and manufactured), beverages, clothing and services. For each category, different products or services were identified using the German CPI. Afterwards the quantity of energy required to produce that specific good is calculated. Then, it was possible to estimate the quantity of energy required for each unit of product or service, considering different types of energy. The quantity of embodied energy consumed by the standard family in a year, therefore, is the product of the quantity of energy required to produce these consumables and the yearly consumption of them. Yearly consumption was obtained using data from German database Statista of the Statistical Department (Statistisches Bundesamt) (DESTATIS, www.destatis.de, 2022), Data from the IEA (IEA, 2023) and own assumptions based on behavioral observations. All assumptions and data used to calculate hidden energy consumption for a four-person German standard household and sourced data are shown in Annex.

Once the total annual energy consumption of the household is estimated, it is possible to calculate the total cost by multiplying each energy source with its relative cost. However, although in the case of direct energy this was assumed as a unique average value for the household, hidden energy costs are affected by different sectors and a worldwide context. As a baseline, it was considered that only electricity and gas costs can vary according to different sectors. In that way, three different sectors were defined: residential, business and industrial. Business and industrial energy costs were calculated as a percentage of residential cost, which can be modulated on the front page of the developed tool. The percentage was estimated from the analysis of previous trends, considering around 75% of energy costs in residential sector for business and around 50% for industry. Business prices were considered for the production of foods, beverages and services, due to the disparities in producing them. In the case of clothing, as this is a more energy intensive sector that usually is located abroad European Union (EU), it was considered industry energy prices to compensate average lower energy costs.

For comparing different years, the annual income as well as the price for electricity, gasoline, gas, and diesel are considered. What is not considered is the change in energy consumption. We assume that the change in consumption is neglectable.

Limits

There are a few limiting factors that are recognized during the process. Due to the restricted time period of one semester, the depth of research had to be cut at a certain point. This refers specially to manufactured goods from outside the EU as well as service goods.

For manufactured goods, the limitation lies in the complexity of production chains. These gain in complexity rapidly per production step. Many businesses intern information, like energy cost per unit of a product, are complicated to research in online or literature research only. Because of that, the risk of calculation errors increases strongly with manufactured goods.

Another limitation was the difference in energy cost, especially outside the EU. The purpose of the developed tool is to easily show the difference in annual financial burden according to a rise in energy cost. Since this paper also takes into consideration how much energy cost lies in consumable products and these products are often produced outside the EU, the national energy cost of the production land must be taken into consideration as well. But this directly conflicts with the idea of an easily appliable tool.

For services, a limitation was reached by experiencing the complexity to assess how much of the cost of a service goes back to energy cost. Reasons that are recognized are that not all service providers – especially smaller businesses – do a detailed assessment of their expenditures and apportions the energy cost on one unit of their service.

The data and especially prices for electricity, gas, and gasoline permanently change. Because of that, the result of this research must always be seen as a description of a certain time frame. This is the reason why the developed tool offers to put in the current prices. This paper also is designed around a four-person household. If households of different sizes use this tool, the result might be slightly off.

Case Study

This report assesses the total energy costs of a German standardized four-person household. The aim is to not only analyze the direct electricity usage of a household, which can easily be detected by looking at the electric meter at the end of the year, but to reveal the full expenditure a four-person household has because of energy costs. For that reason, the research does not stop at assessing the costs for gas and gasoline. In this report, every notable form of energy consumption is analyzed, beginning with food, divided into fresh food, manufactured food, and beverages, followed by clothing and services.

The necessity of this report is based on the fact that the financial burden families must pay for energy and electricity steadily rises. Especially with the Russian war on Ukraine the prices for fossil primary energy sources exploded. But besides the number on the energy bill, also the analysis of hidden energy costs, which are found in every single product a family uses, is highly relevant. It reveals the true increment of expenditure that evolves from increasing energy prices.

The work followed a very linear approach. To get a first feeling for energy consumption, a list of applications in a standard household was made in cooperation with the whole team. From this point on, the different topics were researched individually. Every member elaborated a specific category of goods or products. In weekly meetings, the results were discussed and issues were solved to ensure a steady progress. After the tables were finished the results of their calculations were fed into the algorithm that is used to calculate the real annual costs for every type of good and to display it in the tool on the front page.

Results and Discussion

The findings of this research paper are impressive. It shows that a standard four-person household pays up to 9.600,65€ every year for the total of all energy costs after using average energy costs in Germany in 2022 as input, representing 21% of from the average net income of the household (44.900,00€).

The energy costs are broken down between the different categories as presented by Figure 3- Annual Energy Cost distribution between the different categories. The highest energy costs are gas expenditure followed by mobility and electricity, which represent the direct energy expenditures. The biggest part of the bill goes for gas expenditure. The yearly gas consumption of a household using gas for heating and warm water sums up to 4.250,00€. For mobility the family pays an annual 2.235,80€ which is mainly driven through the cost of gasoline. For direct energy consumption in the household like light, the refrigerator, the coffee machine and so on, it sums up to a yearly total amount of 1.599,89€. These three positions depict the direct energy consumption in form of gas, gasoline, and electricity. In total that makes 8.085,69€ annually for direct energy consumption and therefore the biggest part of the energy expenditure.

But also, the hidden energy costs are impressive. Hidden energy costs with a total of 1.514,96€ are minor compared to direct energy costs, broken down into 485,82€ for manufactured food, 388,82€ for fresh food, 173,66€ for beverages and 144,26€ for clothing.

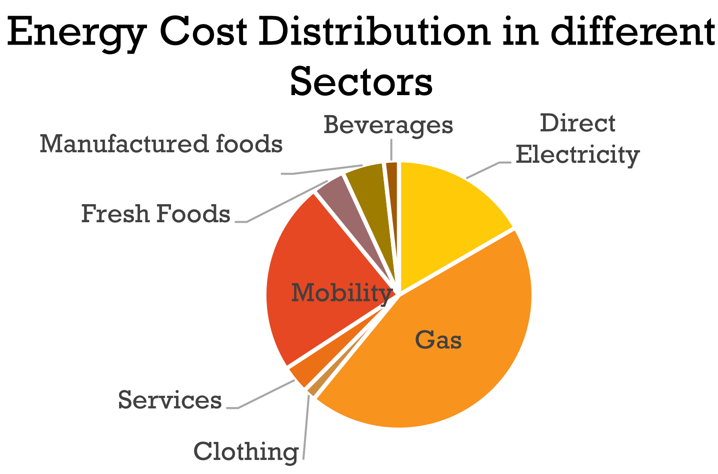

Figure 3- Annual Energy Cost distribution between the different categories

The results of this paper are remarkable. Considering that energy prices are rising faster (e.g. 61% between 2021 and 2022) than income which increased only by 3% between the same years (Figure 4), the power of purchase of families will decrease since the income increase cannot compete with energy prices increase. A standard family would not be able to buy as before since its purchase power will decrease by 2.465,28€ between 2021 and 2022, calculated by subtracting the difference between income 2022-energy cost 2022 and income 2021-energy cost 2021.

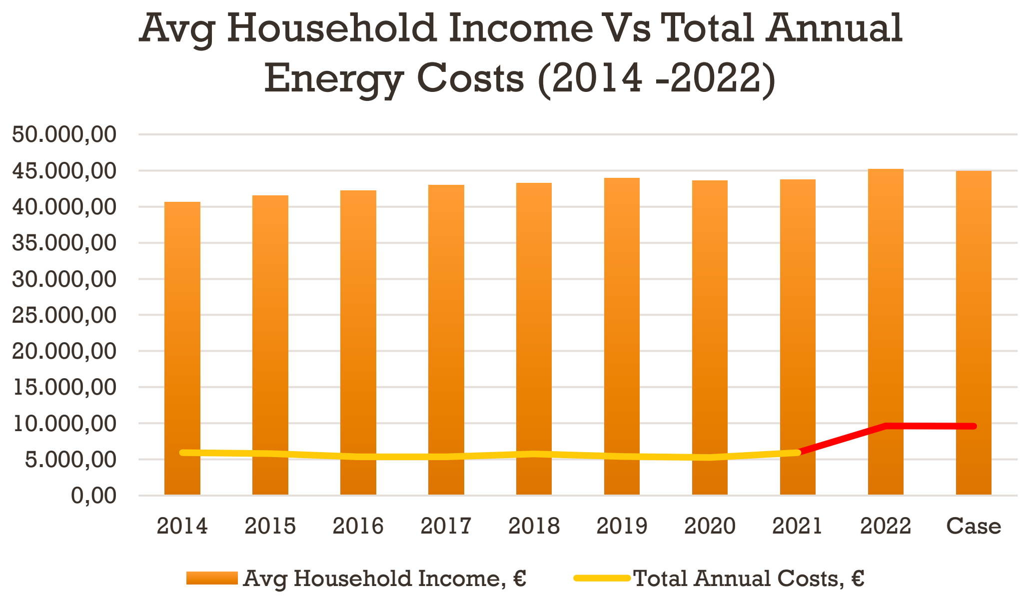

Figure 4- Average Household Income vs Total Annual Energy Costs (2014-2022). Graph from developed tool.

As shown by Table 1, more than 50% of energy consumption is gas, followed by gasoline (25%) and electricity (13%). The main energy sources follow the trend of annual energy costs.

Table 1- Energy Resources and their Breaking Down per category

			Source of energy					
	Total	**Unit**	**Gas**	**Electricity**	**Diesel**	**Gasoline**	**LPG**	**Others**
Yearly Direct Electricity Consumption	3.999,72	kWh/a	0,00	3.999,72	0,00	0,00	0,00	0,00
Yearly Heating Gas Consumption	25.000,00	kWh/a	25.000,00	0,00	0,00	0,00	0,00	0,00
Yearly Clothing Energy Consumption	863,18	kWh/a	55,25	253,95	366,66	15,15	0,00	172,17
Yearly Services Energy Consumption	1.266,18	kWh/a	167,38	788,95	0,00	206,69	96,44	6,72
Yearly Mobility Energy Consumption	10.584,39	kWh/a	0,00	0,00	0,00	10.584,39	0,00	0,00
Yearly Fresh Food Energy Consumption	2.108,23	kWh/a	486,01	405,28	594,40	318,45	0,00	304,09
Yearly Manufactured Food Energy Consumption	2.736,12	kWh/a	1.336,82	377,57	534,35	436,83	0,00	50,56
Yearly Beverages Energy Consumption	886,83	kWh/a	343,14	163,18	49,25	321,96	0,00	9,30
TOTAL	47.444,65	kWh/a	27.388,59	5.988,65	1.544,66	11.883,46	96,44	542,85
		STotal/Total (%)	**58%**	**13%**	**3%**	**25%**	**0%**	**1%**

In the actual scenario, electricity was used mainly for electrical appliances, lighting and cooking. Whereas gas was used mainly for heating and water heating.

Moreover, two other scenarios were considered. In the first one, only electricity was used for all the appliances at home, from lighting to heating. In the second scenario, only gas is used for the whole appliances, including heating and cooking. Comparison between the three scenarios is illustrated in Table 2 below. Comparing the different scenarios, scenario 3 has the least amount of total annual energy consumption, however it had the highest cost and share of income (23%). Scenario 1, which suggests mixing gas for heating and electricity for cooking, shows the lowest energy consumption and slightly higher energy costs and share of income compared to scenario 2. Scenario 1 was considered as the most common in German households.

Table 2- Comparison of the three scenarios

	Total Annual Energy Consumption (kWh/a)	*Annual Energy Cost (€)*	*% of Annual Energy Cost from Total net income*	*Available Income After annual Energy Cost (€)*
Scenario 1: Gas for heating+electricity for cooking	47.444,65	9.600,65	21,4%	35.299,35
Scenario 2: Gas for heating+cooking	47.749,65	9.561,65	21,3%	35.338.35
Scenario 3: Electricity for heating+cooking	34.744,65	10.270,65	23%	34.629,35

Conclusion and Recommendations

The goal of this report is to show how the rise of energy costs affects a standard family in Germany. For this purpose, a tool was created that shows the annual cost of direct as well as hidden energy cost depending on the current cost for electricity, gas, gasoline, and diesel. Total annual energy costs are compared to the mean annual income to present to what extent the household was burdened in the specific analyzed period. To assess the annual costs, a mixture of statistical data analysis and assumptions is used.

As it can be seen in Figure 3- Annual Energy Cost distribution between the different categories, the intensity in that a specific sector burdens a standard family moneywise differs heavily. Especially the three sectors gas, mobility, and direct electricity consumption are standing out. With a gap, these are followed by manufactured foods, fresh foods, beverages, services, and clothing.

By looking at these results, it shows that the most effective lever to tackle the rising energy costs is to lower the quantity of gas, mobility and direct electricity consumption.

Here are a few recommendations for households to lower the consumption in these sectors:

Gas: as gas is mainly used for heating and for hot water production, it is obvious that a change in heating related behavior is the most effective way to lower these costs. One recommendation would be to only heat one room that is used instead of heating the whole house. For example, during the day only the bureau or kitchen, in the evening the living room and during the night, if necessary, the bedroom. Also keep the doors shut, so the heat stays in this room. Also waste heat should be used. So, keeping the oven door open after baking can help heating up the kitchen.

Mobility: for mobility a change in behavior regarding traveling makes sense. For example, switching from commuting via car to work to taking the train or even the bike can make a big difference in the energy bill at the end of the month. And taking the bike more often can also have a health benefit.

Direct Electricity: to lower the direct electricity consumption might be the most complicated change. This is because direct electricity consumption is composed of a huge variety of usually low-consumption applications. Still, it can make a difference to be aware of using patterns. For example, switching off power strips when not in use. Turn off the TV and light when leaving the room. Closing the door of the refrigerator every time after something is taken out or preparing coffee for all household members that want one instead of doing it separately. But still, all these recommendations only have a small effect on their own. Because of that, for direct electricity consumption many small steps are necessary.

Since the burden of the other sectors is lower, recommendations to save notable amounts of money are hard to realize. Approaches could be to only buy local food, to avoid high prices on transportation costs or to go to the restaurant less often. But because the annual costs that relate only to energy are a few hundred euros per year, a notable lowering is difficult to achieve and not as effective as the first three sectors. Another point that must be taken in consideration is that this rise in energy cost that every household is experiencing at the moment is not only a result of individual behavior of the households. Of course, the number one reason is the war that Russia started. But also, politics must be aware of unlikely and unpredictable events like wars or the COVID-pandemic. Reactions like the Gas-Price-Cutoff (Gaspreisbremse) (Bundesregierung, 2022) are examples. But this is only a reaction to the current situation. To avoid these rises in private energy expenditure, politics must act and not only react for these situations.

Bibliography

Bundesregierung. (24. December 2022). *bundesregierung.de*. Von Price caps for electricity, gas and heat : https://www.bundesregierung.de/breg-en/search/energy-price-brakes-2156430 abgerufen

DESTATIS. (2019). Preise - Verbraucherpreisindex für Deutschland - Wägungsschema für das Basisjahr 2015. Von: https://www.destatis.de/DE/Themen/Wirtschaft/Preise/Verbraucherpreisindex/Methoden/Downloads/waegungsschema-2015.pdf?__blob=publicationFile

DESTATIS. (2021). *Laufende Wirtschaftsrechnungen.* Statistisches Bundesamt .

DESTATIS. (29. Mar 2022). *www.destatis.de*. Abgerufen am Jan 2023 von Energiepreise: Hohe Steigerungen auf allen Wirtschaftsstufen: https://www.destatis.de/DE/Presse/Pressemitteilungen/2022/03/PD22_N016_61.html

IEA. (2023). *Germany*. Von iea.org: https://www.google.com/search?q=difference+web+page+web+site&rlz=1C5CHFA_enDE802DE802&oq=difference+web+page+web+site&aqs=chrome..69i57j0i10i22i30i625j0i22i30i625l2j0i8i13i30i625l2j0i8i13i30l3.4632j0j7&sourceid=chrome&ie=UTF-8 abgerufen

Annex

Annex 1. Direct household energy consumption.

Direct electricity consumption		
Appliance	**Assumptions**	**References**
Lighting	LED lighting of 12W, 10 lights per house and 3 hours per day	Verbraucherzentrale Rheinland-Pfalz, 2016
Gaming console	150 W and 2 hours per day	Vattenfall, n.d.
Clock radio	1 W and 5 hours per day	Joteo, n.d.
TV	Efficiency A+, 48W and 4 hours per day	Verbraucherzentrale Rheinland-Pfalz, 2016
Smartphone	20 W and 2 hours per day	Own Iphone
Laptop	60W and 3 hours per day	Own Laptop
Hair dryer	1.750 W and 10 minutes per day	Marsh, 2022
Printer	40 W and 10 minutes per month	EnergyUse Calculator, n.d.
Wifi Router	6 W and 24 hours per day (disconnected during holidays)	EnergyUse Calculator, n.d.
Iron	1.100 W and 10 minutes per day	EnergyUse Calculator, n.d.
Vacuum Cleaner	1.400 W and 10 minutes per day	EnergyUse Calculator, n.d.
Toaster	1.200 W and 5 minutes per day	EnergyUse Calculator, n.d.
Food mixer	500 W and 256 hours in a year	AHAM, 2018
Fridge-refrigerator	500 W and estimating 15 minutes work each hour (also holidays)	Nguyen & Wagener, 2021
Coffee machine	800 W and 15 min per day	Own Coffee machine
Dishwasher	280 loads per year of 1,5 to 4 hours and 1,2 to 1,5 kWh	Verbraucherzentrale Rheinland-Pfalz, 2016
Microwave	800 W and 1 hour per week	Heath, 2017
Oven	2.500 W and 2 hours per week	Marsh, 2022
Extractor hood	116 W and 1 hour per day	Verbraucherzentrale Rheinland-Pfalz, 2016
Standby	40 W for all house as average and 22 hours per day	Pano, 2017
Fan	50 W, with 5 h per day during 40 days and 10 h during 30 days	Verbraucherzentrale Rheinland-Pfalz, 2016
Water heater	11 kW with 3 minutes per day (only kitchen purposes)	Durchlauferhitzer Ratgeber, 2022
Washing machine	220 washes per year, assuming 780 W and 1 hour per wash	Verbraucherzentrale Rheinland-Pfalz, 2016
Dryer	160 times per year, assuming 1300 W and 1 hour per use	Verbraucherzentrale Rheinland-Pfalz, 2016
Cooking stove	Assumed 395 kWh per year	Gasag, 2021
Direct gas consumption		
Heating	Average consumption of 25.000 kWh per year	Bosch, n.d.
Further comments		
It was estimated that people stay at home 335 days per year, having 30 days of holidays per year		

Annex 2. Indirect household energy consumption.

Annex 2-1. Fresh food.

Category	Product	Process	Energy form	Energy (MJ/kg)	Comments	References
Fruits	Apple	Processing and storage	Electricity	0,56	Assumed electricity and mainstream food system in EU	Van Hauwermeiren et al., 2007, as cited in Ladha-Sabur et al., 2019
		Farming	Diesel-Oil	0,08	Calculated from share of diesel in apple farming	Akdemir et al., 2012
		Farming	Electricity	0,46	Calculated from share of electricity in apple farming	Akdemir et al., 2012
		Farming (fertilizers)	Natural gas	0,85	Calculated from share of fertilizers in apple farming. Assumed fertilizers are 90% natural gas	Akdemir et al., 2012; Fadare et al., 2010
		Transport	Gasoline-Oil	0,54	Assumed gasoline in mainstream food system in EU	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
	Grapes	Processing and storage	Electricity	0,56	Assumed electricity and mainstream food system in EU	Van Hauwermeiren et al., 2007, as cited in Ladha-Sabur et al., 2019
		Farming (fertilizers)	Natural gas	0,70	Calculated from share of fertilizers in grape farming. Assumed fertilizers are 90% natural gas	Karimi & Moghaddam, 2018; Fadare et al., 2010
		Farming	Electricity	0,17	Calculated from share of electricity in grape farming	Karimi & Moghaddam, 2018
		Farming	Diesel-Oil	0,11	Calculated from share of diesel in grape farming	Karimi & Moghaddam, 2018
		Transport	Gasoline-Oil	0,80	Assumed gasoline for short distance (700 km)	Xu et al., 2009, as cited in Ladha-Sabur et al., 2019
	Banana	Farming (fertilizers)	Natural gas	0,09	Calculated from share of fertilizers in banana farming. Assumed fertilizers are 90% natural gas	Akcaoz, 2011; Fadare et al., 2010
		Farming	Electricity	0,27	Calculated from share of electricity in banana farming	Akcaoz, 2011
		Farming	Diesel-Oil	0,04	Calculated from share of diesel in banana farming	Akcaoz, 2011
		Processing and storage	Electricity	0,56	Assumed electricity and mainstream food system	Van Hauwermeiren et al., 2007, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,80	Assumed gasoline for short distance (700 km)	Xu et al., 2009, as cited in Ladha-Sabur et al., 2019
		Transport	Marine Fuel	2,75	International sea vessel trip	Smith et al., 1999, as cited in Ladha-Sabur et al., 2019
		Transport	Diesel-Oil	0,21	Refrigeration energy for sea cargo, assuming diesel. Considered 6.000 km.	Cleland et al., 1981, as cited in Ladha-Sabur et al., 2019
Vegetables	Potato	Processing	Electricity	0,55	Assumed electricity and mainstream food system without packaging	Lillywhite et al., 2013, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	1,07	Assumed gasoline in mainstream food system in EU	Smith et al., 1999, as cited in Ladha-Sabur et al., 2019
		Farming (fertilizers)	Natural gas	0,95	Calculated from share of fertilizers in potato farming. Assumed fertilizer are 90% natural gas	Pishgar-Komleh et al., 2012, Fadare et al., 2010

		Farming	Diesel-Oil	0,25	Calculated from share of diesel in potato farming	Pishgar-Komleh et al., 2012
	Tomato	Processing and storage	Electricity	0,10	Assumed electricity and mainstream food system in EU	Van Hauwermeiren et al., 2007, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	1,07	Assumed gasoline in mainstream food system in EU	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Farming (fertilizers)	Natural gas	0,25	Calculated from share of fertilizers in tomato farming. Assumed fertilizer are 90% natural gas	Kulekci & Sari, 2020., Fadare et al., 2010
		Farming	Diesel-Oil	0,16	Calculated from share of diesel in tomato farming	Kulekci & Sari, 2020.
	Carrot	Processing and storage	Electricity	0,21	Assumed electricity and mainstream food system in EU	Van Hauwermeiren et al., 2007, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	1,07	Assumed gasoline in mainstream food system in EU	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Farming (fertilizers)	Natural gas	0,47	Calculated from share of fertilizers in black carrot farming. Assumed fertilizer are 90% natural gas	Čelik et al., 2010, Fadare et al., 2010
		Farming	Electricity	0,43	Calculated from share of electricity in black carrot farming	Čelik et al., 2010
		Farming	Diesel-Oil	0,28	Calculated from share of diesel in black carrot farming	Čelik et al., 2010
	Cucumber	Transport	Gasoline-Oil	1,20	Transportation conventional food system within EU	Xu and Flapper, 2011, as cited in Ladha-Sabur et al., 2019
		Farming (fertilizers)	Natural gas	0,30	Calculated from share of fertilizers in cucumber farming. Assumed fertilizer are 90% natural gas	Pahlavan et al., 2011, Fadare et al., 2010
		Farming	Diesel-Oil	1,20	Calculated from share of diesel in cucumber farming	Pahlavan et al., 2011
		Farming	Electricity	0,76	Calculated from share of electricity in cucumber farming	Pahlavan et al., 2011
	Onion	Transport	Gasoline-Oil	1,20	Transportation conventional food system within EU	Xu and Flapper, 2011, as cited in Ladha-Sabur et al., 2019
		Farming (fertilizers)	Natural gas	0,17	Calculated from share of fertilizers in onion farming. Assumed fertilizer are 90% natural gas	Elhami et al., 2021, Fadare et al., 2010
		Farming	Diesel-Oil	0,41	Calculated from share of diesel in onion farming	Elhami et al., 2021
		Farming	Electricity	1.35	Calculated from share of electricity in onion farming	Elhami et al., 2021
Milk	Milk	Processing	Electricity	0,20		Foster et al., 2006, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	0,46	Thermal energy assumed as natural gas	Foster et al., 2006, as cited in Ladha-Sabur et al., 2019
		Packaging	Electricity	0,45		Foster et al., 2006, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	1,40	Within EU (195 km)	Xu and Flapper, 2011, as cited in Ladha-Sabur et al., 2019
		Farming	Electricity	0,10	Calculated from share of electricity in dairy farm	Hosseinzadeh-Bandbafha et al., 2018
		Farming	Diesel-Oil	0,44	Calculated from share of diesel in dairy farm	Hosseinzadeh-Bandbafha et al., 2018

		Cow fodder	Natural gas	2,81	Calculated from share of fertilizers (90% natural gas) required in growing cow fodder and energy content of animal feed in dairy production	Forip et al., 2012; Hosseinzadeh-Bandbafha et al., 2018; Fadare et al., 2010
		Cow fodder	Diesel-Oil	1,59	Calculated from share of diesel in growing cow fodder and energy content of animal feed in dairy production	Forip et al., 2012; Hosseinzadeh-Bandbafha et al., 2018
Eggs	Eggs	Farming	Electricity	0,31	Calculated from share of electricity in poultry farm management	Sasanya et al., 2022
		Farming	Diesel-Oil	4,42	Calculated from share of diesel in poultry fam management	Sasanya et al., 2022
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Poultry fodder	Diesel-Oil	0,81	Calculated from share of diesel in poultry feed production and energy content of feed in egg production (assumed similar to wheat)	Sasanya et al., 2022; Paris et al., 2022
		Poultry fodder (fertilizer)	Natural gas	1,43	Calculated from share of fertilizer (90% natural gas) in poultry feed production and energy content of feed in egg production (assumed similar to wheat)	Sasanya et al., 2022; Paris et al., 2022, Fadare et al., 2010
Meat	Beef	Processing	Electricity	0,31	Value per kg of dress carcass weight in Europe	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	0,54	Value per kg of dress carcass weight in Europe. Assumed natural gas as thermal energy	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,34	Assumed gasoline in mainstream food system in EU	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Farming	Electricity	7,82	Calculated from average share of electricity in beef meat production in EU	Bas Paris et al., 2022
		Farming	Diesel-Oil	19,14	Calculated from average share of diesel in beef meat production in EU	Bas Paris et al., 2022
		Cow fodder	Natural gas	1,41	Calculated from share of fertilizers (90% natural gas) required in growing cow fodder and energy content of animal feed in beef meat production	Forip et al. (2012); Bas Paris et al., 2022; Fadare et al., 2010
		Cow fodder	Diesel-Oil	0,79	Calculated from share of diesel in growing cow fodder and energy content of animal feed in beef meat production	Forip et al. (2012); Bas Paris et al., 2022
	Poultry	Processing	Electricity	1,01	Value per kg of dress carcass weight in Europe	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	0,58	Value per kg of dress carcass weight in Europe. Assumed natural gas as thermal energy	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,45	Assumed gasoline for short distance (700 km)	Xu et al., 2009, as cited in Ladha-Sabur et al., 2019
		Farming	Electricity	0,26	Average value for broiler systems in EU	Paris et al., 2022
		Farming	Natural gas	2,31	Average value for broiler systems in EU. Assumed natural gas as thermal energy	Paris et al., 2022
		Poultry fodder	Diesel-Oil	0,81	Calculated from share of diesel in poultry feed production (assumed similar to wheat) and energy content of feed in egg production (assumed similar to meat)	Sasanya et al., 2022; Paris et al., 2022
		Poultry fodder (fertilizer)	Natural gas	1,43	Calculated from share of fertilizer (90% natural gas) in poultry feed production (assumed similar to wheat) and energy content of feed in egg production (assumed similar to meat)	Sasanya et al., 2022; Paris et al., 2022, Fadare et al., 2010
	Pork	Processing	Electricity	0,47	Value per kg of dress carcass weight in Europe	Wang, 2014, as cited in Ladha-Sabur et al., 2019

		Processing	Natural gas	0,93	Value per kg of dress carcass weight in Europe. Assumed natural gas as thermal energy	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,45	Assumed gasoline for short distance (700 km)	Xu et al., 2009, as cited in Ladha-Sabur et al., 2019
		Farming	Electricity	2,24	Average value for pork production in Germany. Direct electricity consumption per kg of meat.	Paris et al., 2022
		Farming	Diesel-Oil	1,45	Average value for pork production in Germany. Direct diesel consumption per kg of meat.	Paris et al., 2022
		Pork fodder	Diesel-Oil	0,81	Assumed similar to poultry feed production	Sasanya et al., 2022; Paris et al., 2022
		Pork fodder (fertilizer)	Natural gas	1,43	Assumed similar to poultry feed production	Sasanya et al., 2022; Paris et al., 2022, Fadare et al., 2010
Fish	Fresh fish	Processing	Electricity	0,13	Fresh fillet production	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Diesel-Oil	0,01	Fresh fillet production	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,81	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Fishing	Gasoline-Oil	0,04	Vessel with 10-20 GT catch capacity and fresh fish operation and landing	Fatehah et al., 2016
		Fishing	Diesel-Oil	0,43	Vessel with 10-20 GT catch capacity and fresh fish operation and landing	Fatehah et al., 2016
		Fishing	Marine Fuel	15,62	Vessel with 10-20 GT catch capacity and fresh fish operation and landing	Fatehah et al., 2016
	Frozen fish	Processing	Electricity	0,61	Frozen fillet production	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Diesel-Oil	0,01	Frozen fillet production	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,93	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Fishing	Gasoline-Oil	0,04	Vessel with 10-20 GT catch capacity and fresh fish operation and landing	Fatehah et al., 2016
		Fishing	Diesel-Oil	0,43	Vessel with 10-20 GT catch capacity and fresh fish operation and landing	Fatehah et al., 2016
		Fishing	Marine Fuel	15,62	Vessel with 10-20 GT catch capacity and fresh fish operation and landing	Fatehah et al., 2016

Annex 2-2. Manufactured food.

Category	Product	Process	Energy form	Energy (MJ/kg)	Comments	References
Bread and cereals	Bread	Processing	Electricity	0,27	Value for bread production in EU	Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	2,50	Value for bread production in EU	Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	1,00	Transportation conventional food system within EU	Xu and Flapper, 2011, as cited in Ladha-Sabur et al., 2019
		Ingredient (wheat)	Natural gas	1,53	Calculated from share of fertilizers for wheat production and assuming 80% of bread content is wheat. 90% of fertilizer is natural gas	Paris et al., 2022; Fadare et al., 2010
		Ingredient (wheat)	Diesel-Oil	0,86	Calculated from share of diesel in wheat production and assuming 80% of bread content is wheat	Paris et al., 2022
		Ingredient (wheat)	Electricity	0,29	Estimated for flour milling. Assumed that 80% of bread is wheat	Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
	Biscuits	Processing	Electricity	1,13		Threkelsen et al., 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	4,19	Assumed natural gas for thermal energy	Threkelsen et al., 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Ingredient (wheat)	Natural gas	0,96	Calculated from share of fertilizers for wheat production and assuming 50% of biscuit content is wheat. 90% of fertilizer is natural gas	Paris et al., 2022; Fadare et al., 2010
		Ingredient (wheat)	Diesel-Oil	0,54	Calculated from share of diesel in wheat production and assuming 50% of biscuit content is wheat	Paris et al., 2022
		Ingredient (wheat)	Electricity	0,18	Estimated for flour milling. Assumed that 50% of biscuit content is wheat	Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
		Ingredient (butter)	Electricity	0,40	Assumed that butter is 33% of biscuit content. Value from butter production	See Butter
		Ingredient (butter)	Diesel-Oil	0,54	Assumed that butter is 33% of biscuit content. Value from butter production	See Butter
		Ingredient (butter)	Gasoline-Oil	0,62	Assumed that butter is 33% of biscuit content. Value from butter production	See Butter
		Ingredient (butter)	Natural gas	1,34	Assumed that butter is 33% of biscuit content. Value from butter production	See Butter
		Ingredient (sugar)	Electricity	0,15	Assumed that sugar is 17% of biscuit content. Value from sugar production	See Sugar

		Ingredient (sugar)	Diesel-Oil	0,16	Assumed that sugar is 17% of biscuit content. Value from sugar production	See Sugar
		Ingredient (sugar)	Gasoline-Oil	0,13	Assumed that sugar is 17% of biscuit content. Value from sugar production	See Sugar
		Ingredient (sugar)	Natural gas	0,53	Assumed that sugar is 17% of biscuit content. Value from sugar production	See Sugar
	Cake	Processing	Electricity	0,73		Threkelsen et al., 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	1,78	Assumed natural gas for thermal energy	Threkelsen et al., 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Ingredient (wheat)	Natural gas	0,48	Calculated from share of fertilizers for wheat production and assuming 25% of average cake content is wheat. 90% of fertilizer is natural gas	Paris et al., 2022; Fadare et al., 2010
		Ingredient (wheat)	Diesel-Oil	0,27	Calculated from share of diesel in wheat production and assuming 25% of average cake content is wheat	Paris et al., 2022
		Ingredient (wheat)	Electricity	0,09	Estimated for flour milling. Assumed that 25% of average cake content is wheat	Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
		Ingredient (sugar)	Electricity	0,26	Assumed that sugar is 29% of cake content. Value from sugar production	See Sugar
		Ingredient (sugar)	Diesel-Oil	0,27	Assumed that sugar is 29% of cake content. Value from sugar production	See Sugar
		Ingredient (sugar)	Gasoline-Oil	0,22	Assumed that sugar is 29% of cake content. Value from sugar production	See Sugar
		Ingredient (sugar)	Natural gas	0,90	Assumed that sugar is 29% of cake content. Value from sugar production	See Sugar
		Ingredient (butter)	Electricity	0,18	Assumed that butter is 15% of cake content. Value from butter production	See Butter
		Ingredient (butter)	Diesel-Oil	0,25	Assumed that butter is 15% of cake content. Value from butter production	See Butter
		Ingredient (butter)	Gasoline-Oil	0,28	Assumed that butter is 15% of cake content. Value from butter production	See Butter
		Ingredient (butter)	Natural gas	0,61	Assumed that butter is 15% of cake content. Value from butter production	See Butter
		Ingredient (milk)	Electricity	0,12	Assumed that milk is 16% of cake content. Value from milk production.	See Milk
		Ingredient (milk)	Diesel-Oil	0,32	Assumed that milk is 16% of cake content. Value from milk production.	See Milk
		Ingredient (milk)	Gasoline-Oil	0,22	Assumed that milk is 16% of cake content. Value from milk production.	See Milk
		Ingredient (milk)	Natural gas	0,52	Assumed that milk is 16% of cake content. Value from milk production.	See Milk

		Ingredient (egg)	Electricity	0,05	Assumed that eggs are 15% of cake content. Value from eggs production.	See Eggs
		Ingredient (egg)	Diesel-Oil	0,78	Assumed that eggs are 15% of cake content. Value from eggs production.	See Eggs
		Ingredient (egg)	Gasoline-Oil	0,11	Assumed that eggs are 15% of cake content. Value from eggs production.	See Eggs
		Ingredient (egg)	Natural gas	0,21	Assumed that eggs are 15% of cake content. Value from eggs production.	See Eggs
	Pasta	Processing	Electricity	0,70		Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	1,70	Assumed natural gas for hot water heating.	Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Ingredient (wheat)	Natural gas	1,53	Calculated from share of fertilizers for wheat production and assuming 80% of pasta content is wheat. 90% of fertilizer is natural gas	Paris et al., 2022; Fadare et al., 2010
		Ingredient (wheat)	Diesel-Oil	0,86	Calculated from share of diesel in wheat production and assuming 80% of pasta content is wheat	Paris et al., 2022
		Ingredient (wheat)	Electricity	0,29	Estimated for flour milling. Assumed that 80% of pasta content is wheat	Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
Rice	Rice	Processing	Electricity	0,20	Considered parboiled rice from India.	Van Alfen, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Diesel-Oil	3,10	Considered parboiled rice from India. Natural gas for thermal energy	Van Alfen, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Marine Fuel	1,40	Sea cargo from Asia to Europe	Hendrickson, 1996, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,40	Assumed gasoline truck for short distance	Arendt and Zanini, 2013, as cited in Ladha-Sabur et al., 2019
		Farming	Diesel-Oil	0,37	Calculated from share of diesel energy in wetland paddy cultivation	Muazu et al., 2015
		Farming (fertilizer)	Natural gas	1,17	Calculated from share of fertilizer in wetland paddy cultivation. 90% of energy content of fertilizer is natural gas	Muazu et al., 2015; Fadare et al., 2010
Sugar	Sugar	Processing	Electricity	0,21	Refining sugarcane	Van Alfen, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	2,89	Refining sugarcane. Assumed natural gas as thermal energy	Van Alfen, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Diesel-Oil	0,58	Refining sugarcane	Van Alfen, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Transport	Marine Fuel	2,75	General international transportation through sea vessel	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019

		Farming	Electricity	0,68	Calculated from share of electricity in sugarcane production	Karimi et al., 2008
		Farming	Diesel-Oil	0,37	Calculated from share of diesel in sugarcane production	Karimi et al., 2008
		Farming (fertilizer)	Natural gas	0,22	Calculated from share of fertilizer in sugarcane production. 90% of energy content of fertilizer is natural gas	Karimi et al., 2008; Fadare et al., 2010
Butter	Butter	Processing	Electricity	0,60		Van Alfen, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	0,80	Assumed natural gas as thermal energy	Van Alfen, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Ingredient (milk)	Electricity	0,60	Assumed that milk is 81% of butter content. Value from milk production	See Milk
		Ingredient (milk)	Diesel-Oil	1,64	Assumed that milk is 81% of butter content. Value from milk production	See Milk
		Ingredient (milk)	Gasoline-Oil	1,13	Assumed that milk is 81% of butter content. Value from milk production	See Milk
		Ingredient (milk)	Natural gas	3,27	Assumed that milk is 81% of butter content. Value from milk production	See Milk
Cheese	Cheese	Processing	Electricity	1,21	Average cheese production in EU	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	2,11	Average cheese production in EU. Assumed natural gas as thermal energy	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	1,70	Transport within Europe. Assumed gasoline truck	Xu et al., 2009, as cited in Ladha-Sabur et al., 2019
		Ingredient (milk)	Electricity	4,34	Assumed 90% of cheese is milk and it is required 6.5 kg of milk per kg of cheese (average from different animals). Value from milk production	See Milk
		Ingredient (milk)	Diesel-Oil	11,83	Assumed 90% of cheese is milk and it is required 6.5 kg of milk per kg of cheese (average from different animals). Value from milk production	See Milk
		Ingredient (milk)	Gasoline-Oil	8,19	Assumed 90% of cheese is milk and it is required 6.5 kg of milk per kg of cheese (average from different animals). Value from milk production	See Milk
		Ingredient (milk)	Natural gas	19,14	Assumed 90% of cheese is milk and it is required 6.5 kg of milk per kg of cheese (average from different animals). Value from milk production	See Milk
Yogurt	Yogurt	Processing	Electricity	1,20		Foster et al., 2006, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	0,46	Assumed natural gas as thermal energy	Foster et al., 2006, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Ingredient (milk)	Electricity	0,67	Assumed 90% of yogurt production is milk. Value from milk production	See Milk
		Ingredient (milk)	Diesel-Oil	1,82	Assumed 90% of yogurt production is milk. Value from milk production	See Milk

		Ingredient (milk)	Gasoline-Oil	1,26	Assumed 90% of yogurt production is milk. Value from milk production	See Milk
		Ingredient (milk)	Natural gas	2,94	Assumed 90% of yogurt production is milk. Value from milk production	See Milk
Processed meat	Sausage	Processing	Electricity	1,18	Average pork sausage	Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	3,33	Average pork sausage. Assumed natural gas as thermal energy	Carlsson-Kanyama and Faist, 2000, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,37	Small distance gasoline truck (200 km) within Germany for sausage delivery	Arendt and Zanini, 2013, as cited in Ladha-Sabur et al., 2019
		Ingredient (pork)	Electricity	2,71	Assumed 100% of sausage production is pork. Value from pork production	See Pork
		Ingredient (pork)	Diesel-Oil	2,26	Assumed 100% of sausage production is pork. Value from pork production	See Pork
		Ingredient (pork)	Gasoline-Oil	0,45	Assumed 100% of sausage production is pork. Value from pork production	See Pork
		Ingredient (pork)	Natural gas	2,36	Assumed 100% of sausage production is pork. Value from pork production	See Pork
Cooking oil	Olive oil	Processing	Electricity	0,24	Obtained from cooking oils	Andersson et al., 1998, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	3,00	Assumed boiler works with natural gas	Andersson et al., 1998, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Farming	Electricity	0,24	Calculated from share of electricity in olive production	Balafoutis et al., 2014
		Farming	Diesel-Oil	0,19	Calculated from share of diesel in olive production	Balafoutis et al., 2014
		Farming (fertilizer)	Natural gas	0,71	Calculated from share of fertilizers (90% natural gas) in olive production	Balafoutis et al., 2014; Fadare et al., 2010
	Sunflower oil	Processing	Electricity	0,24	Obtained from cooking oils	Andersson et al., 1998, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	3,00	Assumed boiler works with natural gas	Andersson et al., 1998, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Farming	Diesel-Oil	1,12	Calculated from share of electricity in sunflower production	Oguz & Yener Onur, 2022
		Farming (fertilizer)	Natural gas	2,86	Calculated from share of fertilizers (90% natural gas) in sunflower production	Oguz & Yener Onur, 2022
Fruit jam	Jam	Processing	Electricity	0,49		Carlsson-Kanyama & Faist, 2000, as cited in Ladha-Sabur et al., 2019

		Processing	Natural gas	2,01	Assumed natural gas as thermal energy	Carlsson-Kanyama & Faist, 2000, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Ingredient (fruit)	Electricity	0,31	Assumed 35% of jam is fruit. Values from fruit production. Not considered international fruits	See Fruits
		Ingredient (fruit)	Diesel-Oil	0,03	Assumed 35% of jam is fruit. Values from fruit production. Not considered international fruits	See Fruits
		Ingredient (fruit)	Gasoline-Oil	0,23	Assumed 35% of jam is fruit. Values from fruit production. Not considered international fruits	See Fruits
		Ingredient (fruit)	Natural gas	0,27	Assumed 35% of jam is fruit. Values from fruit production. Not considered international fruits	See Fruits
		Ingredient (fruit)	Marine Fuel	0,00	Assumed 35% of jam is fruit. Values from fruit production. Not considered international fruits	See Fruits
		Ingredient (sugar)	Electricity	0,49	Assumed 55% of jam is sugar. Values from sugar production	See Sugar
		Ingredient (sugar)	Diesel-Oil	0,52	Assumed 55% of jam is sugar. Values from sugar production	See Sugar
		Ingredient (sugar)	Gasoline-Oil	0,41	Assumed 55% of jam is sugar. Values from sugar production	See Sugar
		Ingredient (sugar)	Natural gas	1,71	Assumed 55% of jam is sugar. Values from sugar production	See Sugar
Chocolate	Chocolate	Processing	Electricity	1,44	Average chocolate	Wojdalski et al., 2015, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	6,70	Average chocolate. Assumed natural gas as thermal energy	Wojdalski et al., 2015, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Farming	Diesel-Oil	2,17	Calculated from share of diesel in cacao production	Pérez Neira, 2016
		Farming (fertilizer)	Natural gas	4,64	Calculated from share of fertilizers (90% natural gas) in cacao production	Pérez Neira, 2016
		Transport	Marine Fuel	2,75	Value for general sea vessel in international transportation	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019

Annex 2-3. Beverage.

Category	Product	Process	Energy form	Energy (MJ/kg)	Comments	References
Coffee	Coffee	Processing	Electricity	0,52	Considered roasted coffee	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	2,00	Considered roasted coffee. Assumed natural gas as thermal energy	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Transport	Marine fuel	2,75	Value for general sea vessel in international transportation	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Farming	Diesel-Oil	1,67	Calculated from share of diesel oil in arabica coffee (Brazil) production	De Muner et al., 2015
		Farming (fertilizer)	Natural gas	7,35	Calculated from share of fertilizers in arabica coffee (Brazil) production. 90% of fertilizers assumed natural gas	De Muner et al., 2015; Fadare et al., 2010
Tea	Tea	Processing	Electricity	0,88		Sharma et al., 2019
		Processing	Diesel-Oil	19,70	Assumed diesel as thermal energy used in India production	Sharma et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km)	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Transport	Marine fuel	2,75	Value for general sea vessel in international transportation	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Farming	Diesel-Oil	0,65	Calculated from share of diesel in tea production	Soheili-Fard & Salvatian, 2015
		Farming (fertilizer)	Natural gas	2,07	Calculated from share of fertilizers in tea production. 90% of fertilizers assumed natural gas	Soheili-Fard & Salvatian, 2015; Fadare et al., 2010
Mineral water	Mineral water	Processing	Electricity	0,13	Bottled water	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	0,20	Bottled water. Assumed natural gas as thermal energy	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,60	Transport within Europe with gasoline truck	Carlsson-Kanyama, 1998, as cited in Ladha-Sabur et al., 2019
Tap water	Tap water	All	Not defined	0,01	Negligible, it was not considered for calculation	Mo et al., 2010
Soft drinks	Soft drinks	Processing	Electricity	0,13		Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	0,20	Assumed natural gas as thermal energy	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km). Assuming 1 kg = 1 l	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Ingredient	Electricity	0,09	Soft drink are mainly water, which is negligible. Sugar is considered 10% content. Values from sugar production	See Sugar

		Ingredient	Diesel-Oil	0,09	Soft drink are mainly water, which is negligible. Sugar is considered 10% content. Values from sugar production	See Sugar
		Ingredient	Gasoline-Oil	0,08	Soft drink are mainly water, which is negligible. Sugar is considered 10% content. Values from sugar production	See Sugar
		Ingredient	Natural gas	0,31	Soft drink are mainly water, which is negligible. Sugar is considered 10% content. Values from sugar production	See Sugar
Fruit juice	Fruit juice	Processing	Electricity	0,25	Unconcentrated juice production, assuming 1 kg = 1 l	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	0,90	Unconcentrated juice production, assuming 1 kg = 1 l. Assumed natural gas as thermal energy	Wang, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km). Assuming 1 kg = 1 l	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Ingredient	Electricity	1,75	Assuming not international fruit, using 2 kg of fruit per kg of juice. Values from fruit production	See Fruits
		Ingredient	Diesel-Oil	0,19	Assuming not international fruit, using 2 kg of fruit per kg of juice. Values from fruit production	See Fruits
		Ingredient	Gasoline-Oil	1,34	Assuming not international fruit, using 2 kg of fruit per kg of juice. Values from fruit production	See Fruits
		Ingredient	Natural gas	1,54	Assuming not international fruit, using 2 kg of fruit per kg of juice. Values from fruit production	See Fruits
Liquor	Liquor	Processing	Electricity	0,80	Distilled spirits	Cleland, Earle and Boag, 1981, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	20,00	Distilled spirits. Assuming natural gas as thermal energy	Cleland, Earle and Boag, 1981, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km). Assuming 1 kg = 1 l	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Raw materials	Electricity	0,01	Values for raw materials used in distilled liquor in Mexico. Estimated to show is negligible compared to process	Martínez et al., 2020
		Raw materials (fertilizer)	Natural gas	0,14	Values for raw materials used in distilled liquor in Mexico. Estimated to show is negligible compared to process	Martínez et al., 2020
Wine	Wine	Processing	Electricity	0,53		Cleland, Earle and Boag, 1981, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	1,39	Assumed natural gas as thermal energy	Cleland, Earle and Boag, 1981, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km). Assuming 1 kg = 1 l	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Ingredient	Electricity	0,70	Calculated from grapes, assuming 1,25 kg of grapes per liter of wine. Values from grape production	See Grapes

		Ingredient	Natural gas	0,87	Calculated from grapes, assuming 1,25 kg of grapes per liter of wine. Values from grape production	See Grapes
		Ingredient	Electricity	0,21	Calculated from grapes, assuming 1,25 kg of grapes per liter of wine. Values from grape production	See Grapes
		Ingredient	Diesel-Oil	0,14	Calculated from grapes, assuming 1,25 kg of grapes per liter of wine. Values from grape production	See Grapes
		Ingredient	Gasoline-Oil	1,00	Calculated from grapes, assuming 1,25 kg of grapes per liter of wine. Values from grape production	See Grapes
Beer	Beer	Processing	Electricity	0,34	German beer production	Van Alfen, 2014, as cited in Ladha-Sabur et al., 2019
		Processing	Natural gas	1,03	German beer production. Assumed natural gas as thermal energy	Van Alfen, 2014, as cited in Ladha-Sabur et al., 2019
		Transport	Gasoline-Oil	0,75	Assumed gasoline for general product with short distance within EU (400 km). Assuming 1 kg = 1 L	Smith et al., 1997, as cited in Ladha-Sabur et al., 2019
		Farming	Diesel-Oil	0,33	Water negligible, barley is the second main raw material. Content is 73 g per liter. Value from barley farming	Ziaei et al., 2015
		Farming (fertilizer)	Natural gas	0,32	Water negligible, barley is the second main raw material. Content is 73 g per liter. Value from barley farming	Ziaei et al., 2015, Fadare et al., 2010

Annex 2-4. Clothing.

Category	Product	Process	Energy form	Energy (MJ/kg)	Comments	References
Clothes	T-Shirts	Production (Fiber production - cotton)	Electricity	3,20	Value from production on textiles	Laursen et al., 2007, Velden et al., 2013
		Production	Natural gas	6,33	Value from production on textiles	Laursen et al., 2007, Velden et al., 2013
		Production	Diesel-Oil	8,21	Value from production on textiles	Laursen et al., 2007, Velden et al., 2013
		Production	Electricity	50,00	Value from production on textiles	Laursen et al., 2007, Velden et al., 2013
		Manufacturing (Spinning)	Electricity	6,30	Value from "Life cycle assessment of cotton T-shirts in China"	Zhang et al., 2015
		Manufacturing (Knitting)	Electricity	1,30	Value from "Life cycle assessment of cotton T-shirts in China"	Zhang et al., 2015
		Manufacturing (Dyeing)	Electricity	3,90	Value from "Life cycle assessment of cotton T-shirts in China"	Zhang et al., 2015
		Manufacturing (Dyeing)	Coal	90,00	Assumed that 1kg of Coal contains 20MJ of energy.	Zhang et al., 2015
		Manufacturing (Make-up)	Electricity	6,30	Value from "Life cycle assessment of cotton T-shirts in China"	Zhang et al., 2015
		Manufacturing (Make-up)	Coal	72,00	Assumed that Coal 1kg contains 20MJ of energy	Zhang et al., 2015
		Transport (From China to Germany)	Marine fuel	24,20	Primary energy consumption for transportation is 24MJ.	Steinberger et al., 2009
		Transport (Distribution in Germany)	Gasoline-Oil	3,40	Primary energy consumption for transportation is 3,4MJ.	Steinberger et al., 2009
	Jeans	Production (Fiber production - cotton)	Electricity	1,19	Calculating the energy per kg using a weight of jean pairs of 0.63 kg	Hedman, 2018
		Manufacturing (Dyeing, Sizing and Finishing)	Natural gas	4,19	Calculating the energy per kg using a weight of jean pairs of 0.63 kg. Assumed 38.3 MJ/m3 natural gas	Hedman, 2018
		Manufacturing (Heating)	Natural gas	29,18	Calculating the energy per kg using a weight of jean pairs of 0.63 kg. Assumed 38.3 MJ/m3 natural gas	Hedman, 2018
		Manufacturing (Cutting)	Electricity	0,80	Calculating the energy per kg using a weight of jean pairs of 0.63 kg.	Hedman, 2018
		Manufacturing (Sewing)	Electricity	2,80	Calculating the energy per kg using a weight of jean pairs of 0.63 kg.	Hedman, 2018
		Manufacturing (Laundry)	Electricity	13,09	Calculating the energy per kg using a weight of jean pairs of 0.63 kg	Hedman, 2018

		Manufacturing (Other processes)	Electricity	31,37	Calculating the energy per kg using a weight of jean pairs of 0.63 kg	Hedman, 2018
		Manufacturing (Other processes)	Diesel-Oil	70,38	Calculating the energy per kg using a weight of jean pairs of 0.63 kg. Assumed 43 MJ/kg diesel	Hedman, 2018
		Manufacturing (Storage)	Natural gas	0,10	Calculating the energy per kg using a weight of jean pairs of 0.63 kg	Hedman, 2018
		Manufacturing (Storage)	Electricity	0,02	Calculating the energy per kg using a weight of jean pairs of 0.63 kg	Hedman, 2018
		Transport (From China to Germany)	Marine fuel	24,20	Value assumed from T-Shirt transport	Steinberger et al., 2009
		Transport (Distribution in Germany)	Gasoline-Oil	3,40	Value assumed from T-Shirt transport	Steinberger et al., 2009
	Jacket	Production (Fiber production - PES)	Electricity	5,40	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Production (Fiber production - PES)	Diesel-Oil	2,20	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Production (Fiber production - Polyamide)	Electricity	5,40	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Production (Fiber production - Polyamide)	Diesel-Oil	2,20	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Production (Fiber production - Cotton)	Electricity	1,69	Assuming weight jacket of 0.444 kg, value from jacket production	Hedman, 2018
		Production (Yarn production)	Electricity	34,38	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Manufacturing (Weaving)	Electricity	88,56	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Manufacturing (Dyeing)	Electricity	0,25	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Manufacturing (Dyeing)	Diesel-Oil	30,00	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Manufacturing (Confectioning)	Electricity	32,18	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Manufacturing (Confectioning)	Natural gas	0,02	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Transport (From China to Germany)	Marine fuel	24,20	Value assumed from T-Shirt transport	Steinberger et al., 2009
		Transport (Distribution in Germany)	Gasoline-Oil	3,40	Value assumed from T-Shirt transport	Steinberger et al., 2009
	Socks	Production (Fiber production - Polyamide)	Electricity	5,40	Value from "LCA study of Swedish clothing"	Sandin et al., 2019

		Production (Fiber production - Polyamide)	Diesel-Oil	2,20	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Production (Yarn production)	Electricity	11,88	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Manufacturing (Knitting)	Electricity	14,94	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Manufacturing (Dyeing)	Electricity	2,52	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Manufacturing (Dyeing)	Diesel-Oil	30,00	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Transport (From China to Germany)	Marine fuel	24,20	Value assumed from T-Shirt transport	Steinberger et al., 2009
		Transport (Distribution in Germany)	Gasoline-Oil	3,40	Value assumed from T-Shirt transport	Steinberger et al., 2009
	Shoes	Production (Fiber production - Polyamide)	Electricity	5,40	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Production (Fiber production - Polyamide)	Diesel-Oil	2,20	Value from "LCA study of Swedish clothing"	Sandin et al., 2019
		Production (Fiber production - Cotton)	Electricity	1,25	Assuming weight jacket of 0.6 kg, value from shoe production	Hedman, 2018
		Production (Yarn production)	Electricity	8,59	Value from "The environmental performance of footwear"	Zottin, 2019
		Manufacturing (Fabric Mill)	Electricity	2,19	Value from "The environmental performance of footwear"	Zottin, 2019
		Manufacturing (Dyeing)	Electricity	2,16	Value from "The environmental performance of footwear"	Zottin, 2019
		Manufacturing (Dyeing)	Diesel-Oil	158,42	Value from "The environmental performance of footwear"	Zottin, 2019
		Transport (From China to Germany)	Marine fuel	24,20	Value assumed from T-Shirt transport	Steinberger et al., 2009
		Transport (Distribution in Germany)	Gasoline-Oil	3,40	Value assumed from T-Shirt transport	Steinberger et al., 2009

Annex 2-5. Services.

Category	**Service**	**Energy form**	**Energy (kWh/year)**	**Comments**	**References**
Goods and services for vehicles	Maintenance and repair of vehicles	Gasoline	184,80	Based on annual energy input, considering 6% maintenance and 2 cars	Mrozik & Merkisz-Guranowska, 2020
		Electricity	6,72	Assumed electricity from others. Based on annual energy input, considering 6% maintenance and 2 cars	
Recreation, entertainment and culture	Recreation and culture	Electricity	104,20	Although diverse energy sources, considered electricity as more expensive source. Considered 2h/day of sport	Jalas & Juntunen, 2015
	Services during vacations	Electricity	239,73	Although diverse energy sources, considered electricity as more expensive source. Considered 2h/day of sport	
Restaurant and accommodation	Restaurant services	Natural gas	90,78	Study for pizza chain. Values calculated from average customer considering family goes out 4 times per month	Özgen et al., 2021
		LPG	96,44		
		Fuel	21,89		
		Electricity	0,15		
	Accommodation	Natural gas	76,60	Example of UK hotel. Values calculated from average customer. This is different from vacation services, and considers accommodation for personal, work or school trips	Filimonau et al., 2011
		Electricity	205,18		
Miscellaneous	Hairdressing and personal care	Electricity	239,73	Although diverse energy sources, considered electricity as more expensive. 1 hour/person during 7 days/year	Jalas & Juntunen, 2015

Annex 2-6. Mobility (direct gasoline consumption).

Mobility: gasoline car		
Purpose	**Assumptions**	**Reference**
Work	Considered two cars and 4.482 km per year each car	Follmer et al., 2019 (BMVI Mobility in Germany report)
Education	7,3 km per day for 187 school days in a year	
Shopping	Considered one car and 486,6 km per year	
Personal business	Considered one car and 576,6 km per year	
Leisure	Considered one car and 4.052,6 km per year (include holiday trips)	
Further comments		
Considered a gasoline car with a fuel consumption of 7,7 l/100 km and calorific value of gasoline is 8,9 kWh/l		

Annex 2-7. Product consumption.

Category	Product	Consumption	Unit	Comment	Reference
Fresh foods	Fruits	200,00	kg/year	Estimated from own appreciations and data from Statista for a four-person household in Germany	Statista, 2023
	International fruits	80,00	kg/year		
	Vegetables	400,00	kg/year		
	Milk	220,00	kg/year		
	Eggs	60,00	kg/year		
	Beef meat	40,00	kg/year		
	Poultry meat	52,00	kg/year		
	Pork meat	130,00	kg/year		
	Fish	56,00	kg/year		
Manufactured foods	Bread and cereals	280,00	kg/year		
	Rice	20,00	kg/year		
	Sugar	20,00	kg/year		
	Butter	25,00	kg/year		
	Cheese	90,00	kg/year		
	Yogurt	55,00	kg/year		
	Processed meat	68,00	kg/year		
	Cooking oil	70,00	kg/year		
	Fruit Jam	20,00	kg/year		
	Chocolate	36,00	kg/year		
Beverages	Coffee	10,80	kg/year		
	Tea	1,38	kg/year		
	Mineral water	490,80	l/year		
	Soft drinks	392,00	l/year		
	Fruit juice	152,00	l/year		
	Liquors	6,00	l/year		
	Wine	41,40	l/year		
	Beer	183,20	l/year		
Clothing	T-Shirt	1,43	kg/year	Considered 13 pieces with a weight of 110 g/piece	Forbrig et al., 2020; Statista, 2023
	Jeans	5,67	kg/year	Considered 9 pieces with a weight of 630 g/piece	
	Jacket	2,22	kg/year	Considered 5 pieces with a weight of 444 g/piece	
	Socks and underwear	1,92	kg/year	Considered 24 pieces with a weight of 80 g/piece	
	Shoes	4,80	kg/year	Considered 8 pieces with a weight of 600 g/piece	