MISTRA
SUSTAINABLE CONSUMPTION
FRÅN NISCH TILL MAINSTREAM

# Analysis of the environmental impacts of 218 consumption items

Greenhouse gas emissions, land use and water use per SEK and kg.

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# Summary

A software application combining process and input–output analysis (EAP) was used to analyze 218 consumer products and services for environmental impacts over their life cycle. The results are available as carbon dioxide equivalents, land use and water use per kg and per SEK. The products and services were chosen either because they are consumed by many Swedish consumers today or because they may be consumed to a large extent in the future. This report presents the results from these calculations along with an explanation of how the software (EAP) works, as well as a description of where the data for the database update and the analyses came from. The report includes five appendixes containing the collected data, assumptions and results.

# Preface

The need for a transition to environmentally sustainable consumption patterns has intensified in recent years, highly motivated by an increasing concern for the impacts of climate change but also out of concern for the extensive use of land and water required to sustain current consumption practices. The research program “Mistra Sustainable Consumption – from niche to mainstream” (sustainableconsumption.se) addresses these challenges under its overall aim to contribute with knowledge that will enable society to make sustainable consumption practices that are rare today, so-called niche practices, more common. As a part of this research, the life-cycle environmental impacts of a large number of goods and services consumed by Swedish households were calculated. This report presents the results of these calculations as well as explanations for how the results were obtained.

The target group for this report is anyone interested in calculating the environmental impacts of private consumption as well as those interested in methods for such calculations. The Dutch software (EAP) that was used for a large part of the calculations is owned by the University of Groningen in the Netherlands. For more information about EAP and license opportunities, please contact Reneé Benders at r.m.j.benders@rug.nl.

# Content

# 1 Introduction and aim

Including consumers and consumption patterns in the quest to lower human-induced environmental impacts has been on the agenda for decades (see, e.g., Agenda 21 chapter 4 from 1992 as one of the first documents) (UN, 1992). Consumption patterns, particularly among rich people, remain problematic, however, not least from an environmental perspective. Over time, much new knowledge about consumption and consumption patterns has been revealed by scientists using a multitude of methods (e.g. Wang et al, 2019). The global sustainable development goals (UN, 2015) include the goal to ensure sustainable consumption patterns but in an update of these goals made in 2019 the conclusion was that an ever-increasing amounts of natural resources is used to support our economic activity and that the efficiency with which such resources are used remains unchanged at the global level (UN, 2019).

One of the research topics in the field of sustainable consumption that has evolved since the 1990s are ways of estimating the environmental impacts from consumption given a cradle-to-grave or a life-cycle perspective. This means that the environmental impacts of products and services consumed are considered during the entire production chain from mine or farm to waste handling. Such detailed calculations usually require large sets of data describing various emissions and resource use during processing, transport, packaging, etc. for each product and can be quite labor-intensive (Curran, 2016). Simplified methods, such as input-output analyses, have therefore been developed, and used for calculating, e.g., total emissions of greenhouse gases from household consumption (e.g. Palm et al. 2019).

One drawback of these simplified methods, however, is their lack of detail, which means that small changes in consumption cannot be environmentally monitored (Steinbach et al, 2018). Examples of such changes include buying less meat and more soy strips or buying more second-hand clothes and fewer new ones. In order to detect such changes, other methods are needed that can capture environmental impacts on a relatively detailed level while still not imposing a tremendous workload on those making the calculations.

This report presents results obtained through the use of a tool that enables these types of detailed but not too labor-intensive calculations. The resulting greenhouse gas emissions, land use and water use are presented for 218 consumption items, along with explanations about the methods and data used. The calculations have been selected based on available statistics of what Swedish households consume and will at a later stage be used for estimating how much the environmental load would change if consumption patterns change according to different assumptions. To this end, a number of calculations have also been made for products and services that can be considered more environmentally and/or socially sustainable in comparison with what is mainstream today in a country like Sweden. These are called niche products and practices and are further described in three reports (Kamb et al., 2018; Lehner et al. 2018; Thorson et al. 2018).

The report is structured as follows:

**Chapter 2** contains a description of the software used for most of the calculations, EAP, as well as its history.

**Chapter 3** contains a description of the data used to update the EAP databases prior to the analysis presented in this report. All the data used for the update are included in Appendix 1.

**Chapter 4** summarizes the assumptions made for the calculations, both inside and outside of EAP. A detailed account of the assumptions and results is presented in Appendices 2 and 3 while

Appendix 4 contains a summary of all analyses. A summary of the results per SEK only is also presented in Table 4 at the end of the report.

**Chapter 5** contains some suggestions for how the calculations could be improved as well as a description of further applications.

# 2 The Energy Analysis Program, EAP

## 2.1 Introduction

The EAP computer program was developed at the University of Groningen (the Netherlands) in the 1990s (Wilting, 1996). Originally, it was a tool to calculate direct and indirect energy consumption for the Netherlands. Later, greenhouse gas emissions as well as other emissions and land use were added. In the early 2000s, a Swedish version was developed in the context of an EU project. In 2006 and 2012, two updates for Sweden were developed in which energy and $CO_2$ emissions were implemented. For the 2019 update, three indicators are implemented: $CO_2$-equivalents, land use, and water use. The text below explains the hybrid method as used in the EAP computer program. The term "environmental impacts" is used to describe the three environmental indicators.

This section describes the method that is implemented in the EAP computer program to calculate the direct and indirect environmental impacts of an item of consumptive expenditure. There are, in principle, two methods for calculating the total life-cycle use of an item of consumptive expenditure: process analysis and input-output analysis. Process analysis makes use of a description, in physical terms, of the processes involved in the production cycle of the consumptive expenditure under consideration (IFIAS, 1974; Boustead and Hancock, 1979). The environmental impacts in the processes are then investigated in a detailed manner. Accordingly, process analysis is quite precise but also rather labor-intensive. Input-output analysis uses so-called input-output tables in which the transactions between economic sectors are expressed in monetary terms. One of the results of environmental impact input-output analysis is the cumulative environmental impact intensity of a sector. This intensity depicts the amount of direct and indirect environmental impacts that a sector "needs" per financial unit worth of supplies (Wilting, 1996). Input-output analysis is less accurate than process analysis, but it provides the opportunity to calculate complete cycles.

The method that is described here makes use of a hybrid approach; for a comprehensive justification, see Van Engelenburg (1994). The components of production cycles that are important in terms of environmental impacts are measured by means of process analysis. The rest of the cycle is calculated completely by means of input-output analysis. A proposal was previously made to develop a hybrid approach (Bullard et al., 1978).

## 2.2 Description of the method

The method used here can determine the life-cycle environmental impacts during the entire life cycle of an item of consumptive expenditure. The method has been streamlined into a step-by-step scheme. The eleven steps are:

***First step:*** *the cycle flow chart*

First, the life cycle of the item of consumptive expenditure has to be established. In the flow chart, all activities that are expected to reasonably contribute to the total environmental impacts are separately recorded. Figure 1 shows an example of a flow chart for the life cycle of a product.
In the manufacturing stages, when dealing with non-capital goods, a distinction is made between basic goods and residual goods. Basic goods are raw materials that are used in production whose nature and size are known. Residual goods are raw materials whose precise nature or size is

unknown[1]. The residual goods also include products and services that are indirectly used in production, such as office supplies and maintenance of the premises.

***Second step:*** *the mass balance*

In this step, an inventory is made of the basic goods used for production. As mentioned, basic goods concern raw materials and any other materials both for the product and for packaging. Basic goods can be registered in a mass balance. Particularly when the composition of an item of consumptive expenditure can be analyzed in terms of materials, it is possible to check whether the weight of the basic goods reasonably conforms to the total weight of the item of consumptive expenditure. For example, the weight of a refrigerator is determined by the combined weight of the materials present in it. Correspondingly, the mass balance can also be used to control the waste analysis. A check can be made to examine whether or not all basic goods are included in the waste processing.

***Third step:*** *the financial balance*

Certain components of production cycles cannot be expressed in physical units. To determine the environmental impacts of these components, the method makes use of financial units. A price is given to all components of the cycle, on the basis of the consumer price of the item of consumptive expenditure. Taking the margins of the relevant trade or service sectors into consideration, the selling price from the manufacturer can be fixed. This selling price is made up as follows:

- purchase price of the basic goods (see step 2)
- purchase price of energy
- depreciation
- net added value
- purchase price of residual goods (residual costs)

In the next steps, the appropriate environmental impacts are ascribed to the various components.

***Fourth step:*** *determining the environmental impacts of basic goods and packaging materials*

In the second step, the quantities of basic goods and materials that are used in the production of an item of consumptive expenditure are established. The environmental impacts as a consequence of the production of these basic goods is represented by the environmental impacts of these basic goods (in CO2-eq., m2 and liters per kilo). The environmental impact of a material is the total amount of environmental impacts emitted/used to generate one kilogram of that material, calculated from the raw materials to the final production of the material. For each of the basic goods in the mass balance, the environmental impact is calculated by multiplying the quantity by the environmental impacts. The total environmental impacts of the basic goods are obtained by summing up all of the basic goods in the mass balance.

***Fifth step:*** *determining the environmental impacts of the residual goods*

The value of the residual goods is established in step 3. This value is multiplied by the environmental intensity of the residual goods (in CO2-eq., m2 and liters per SEK) in order to ascertain the environmental impacts of the residual goods. The environmental intensity of the residual goods is calculated from input-output analysis on the basis of the deliveries to the producing sector. In this calculation, a correction is made for those goods that are regarded as

1 The residual goods also include materials whose environmental load is not known (see the fourth step for a definition of "environmental load").

basic goods. (Wilting, 1996) describes the method for calculating the environmental impacts of residual goods (see also the last section: Calculation of environmental intensities of residual goods).

***Sixth step:*** *determining the environmental impacts of capital goods*

Creation of the capital goods that are required to ensure production (buildings, machines, etc.) also have a certain environmental impact. The environmental impacts for the capital goods are determined via the environmental intensity of the depreciation on the capital goods (in CO2-eq., m2 and liters per SEK). This environmental intensity is determined by means of input-output analysis. The value of the depreciation is calculated at the financial balance (step 3).

***Seventh step:*** *determining the direct environmental impacts during production*

In the manufacturing sector, the direct environmental impact to produce the item of consumptive expenditure can be established by means of process analysis. If this cannot be ascertained, production statistics or the direct environmental intensity of the manufacturing sector (in $CO_2$-eq., $m^2$ and liters per SEK) can be used.

***Eighth step:*** *determining the environmental impacts of transport and trade*

The route from the manufacturer to the consumer normally takes place via a number of steps: transport and one or more intermediary organizations (trade, catering, repair firms, etc.). The environmental impacts of these organizations must also be established. In the case of transport, the weight of the item of consumptive expenditure and the distance travelled by each means of transport are taken into consideration. By using environmental intensities for each means of transport (in $CO_2$-eq., $m^2$ and liter per metric ton per km), the total environmental impact of the transport is calculated. Furthermore, the intermediary organizations (wholesale, retail trade, catering, etc.) have their environmental impact for delivering the item of consumptive expenditure to the consumer. In the financial balance (step 3), the margins for the various intermediary organizations are determined. By multiplying these margins by the respective environmental intensities (in $CO_2$-eq., $m^2$ and liters per SEK of margin), the total environmental impacts for the intermediary organizations can be calculated.

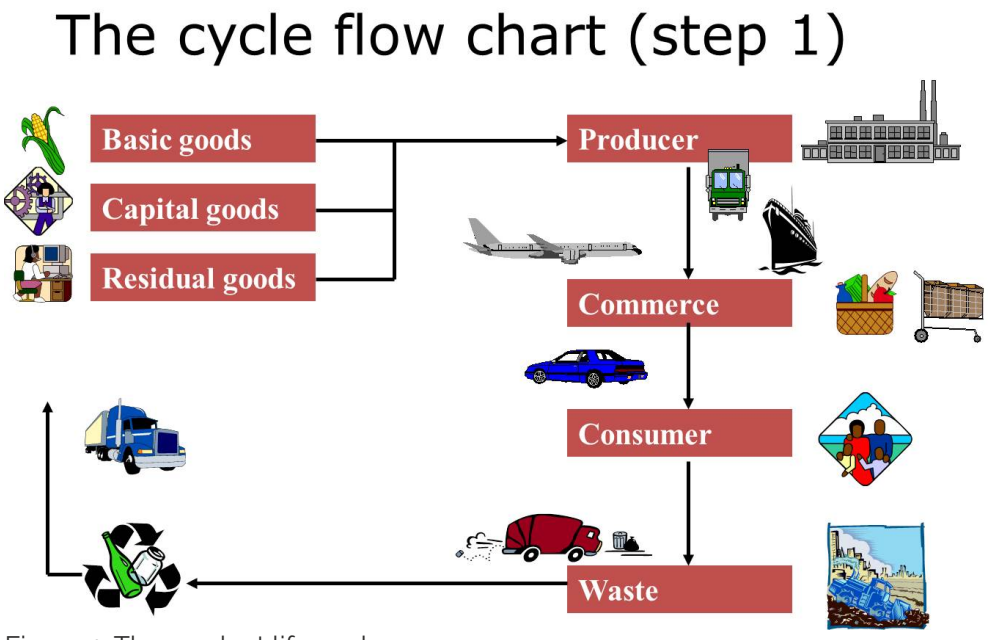


Figure 1. The product life cycle

***Ninth step:*** *determining the environmental impacts during domestic usage*

Some items of consumptive expenditure also have an environmental impact during their active working life in the household. A refrigerator uses electricity, a stove uses gas, a car uses gasoline and oil, which emit CO2, and so on. The total domestic environmental impact is determined via the use per unit and the economic life span of the item. The term "unit" can refer to a unit of time (year, month, etc.) or also to a laundry session or a meal.

***Tenth step:*** *determining the environmental impacts of waste processing*

During and after the domestic use of the item of consumptive expenditure, garbage is created. The processing of this waste has its environmental impact (collecting, dumping, etc.), but may also produce energy (burning, recycling), which has a negative impact on the CO2-equivalent. For the separate components of the item of consumptive expenditure, it is necessary to examine how the waste processing takes place. The quantities are multiplied by the environmental impacts (positive or negative) per type of waste processing (in CO2-eq., m2 and liters per kilograms).

***Eleventh step:*** *determining the total environmental impacts*

The total environmental impacts during the entire life span of the item of consumptive expenditure can be determined by adding up all the figures for environmental impacts obtained in the previous steps. To show this, the environmental impacts in the various steps can be entered into the flow chart of the cycle (Figure 1).

## 2.3 Remarks concerning the method

We have discussed a method to calculate the life-cycle environmental impacts of an item of consumptive expenditure. The method can be applied to most items without any difficulty. However, the method appears to be less applicable to some items of consumptive expenditure, particularly those in the services sector. In such cases, an ad hoc method would seem to be required to determine the environmental impacts.

It should be noted that in composing the financial balance, sector data are applied to an item of consumptive expenditure. This may lead to errors, since values for an average product from a sector will not be valid for all products from that sector.

In the formulation of the mass balance (step 2), the weight of the basic goods does not have to be equal to the weight of the item of consumptive expenditure (including packaging) in all cases. For a refrigerator, the total weight will correspond, within reasonable limits, to the weight of the materials used. However, to make a kilo of sugar, almost eight kilos of sugar beet are necessary.

The same point applies to the processing of waste.

In the method, the manufacturer's price is determined by means of the consumer price and the margins of the trade and services sectors. Since probably not all transport costs are included in these margins, the manufacturer's price can be too highly estimated. Therefore, it is advisable to compare the manufacturer's price that has been established in this way with the price recorded in the production statistics where possible. Taking into consideration the fact that a part of the margins may concern transport costs, a double counting may occur in the environmental impacts of transport. We assume, however, that the transport cost share is very small, and that any double counting will therefore be negligible in comparison to the whole.

## 2.4 Calculation of environmental intensities of residual goods

In the calculation of the environmental impacts of an item of consumptive expenditure, the hybrid method discriminates between basic goods and residual goods. Together, both types of goods constitute the inputs required in the production stage of that consumption item. Process analysis determines the environmental impacts of the basic goods. The environmental impacts of residual goods are determined by the contribution of the monetary value of the residual goods in the financial balance of the consumption item and by the environmental intensity of the residual goods of the production sector. The contribution of the residual goods in the financial balance of the product is a remainder. This remainder is the price of the product decreased by the purchase costs of the basic goods, inclusive energy, and the gross value added. The environmental intensity of the residual goods is a result of input-output analysis. The method for calculating this environmental intensity is described by Wilting (1996). Also see Figure 2 for a schematic overview.

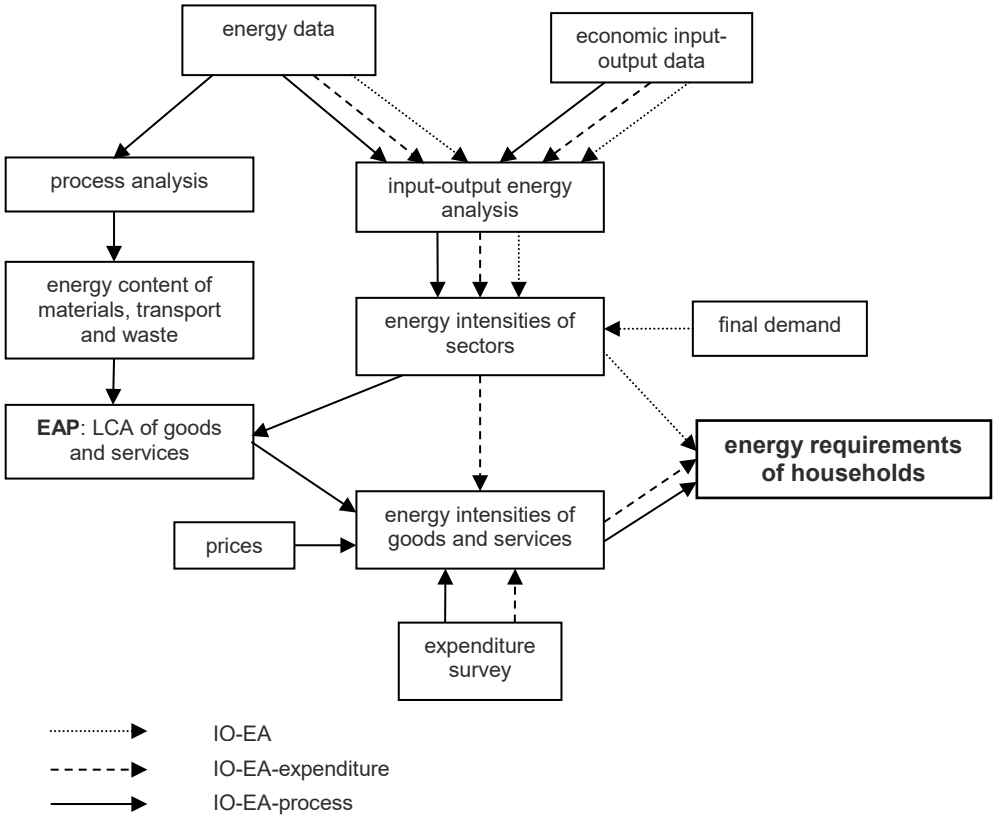


Figure 2 EAP Calculation scheme (Kok et al. 2006)

# 3 Updating the databases in EAP

A substantive effort was made to collect information for updating the databases in EAP with data from 2016 whenever possible. These updates are described below.

The databases updated were:

- Basic goods (278 options)
- Packaging (11 options)
- Manufacturers (59 options)
- Transport (26 options)
- Trade and services (149 options)
- Households (direct) (5 options)
- Waste processing (22 options)

For all these options, the environmental impacts in terms of greenhouse gas emissions, water use and land use were entered. All the data gathered for updating the EAP databases can be found in Appendix 1.

## 3.1 Basic goods, packaging, transport and waste processing

The main source for gathering information about environmental impacts from basic goods, packaging, transport and waste processing was the databases Ecoinvent, IDEMAT, Agribalyse and LCA food Denmark. Several of these databases were accessed by the LCA software SimaPro.

A set of criteria was established to ensure data comparability through different sources. These criteria were understood as the desired characteristics of the modelling choices behind each data point to ensure comparability. Occasionally, data points were selected that did not comply with one or more of these criteria due to data availability and data need. The list of criteria was as follows:

- A cradle-to-gate approach was used for basic goods, where gate is defined as the earliest manufacturing step for which data has been found available. This means that the data about environmental impacts from basic goods does not include processing, transport, etc. The environmental impacts from infrastructure, etc. until gate is included in the impacts.
- For packaging, manufacturing of the packaging materials was included.
- For transport, environmental impacts from energy use and infrastructure were included.
- Data older than year 2000 were not considered.
- The spatial representability in the *Basic goods* table took into account that the results aim at describing the impacts of consumption in Sweden. For numerous basic goods, Sweden relies on imports from other countries with, e.g., more suitable farming conditions. Consequently, data about both Swedish production and main countries of origin for Swedish imports were relevant to this study. Global or EU-wide data were also considered when country-specific data were not available, but the item was deemed to be particularly relevant for this project. Efforts were made to include data that would enable calculations of all products that are consumed in Sweden, e.g. common materials for

furniture, clothing, food, drinks and other household goods. As a result, it was possible to prioritize certain types of wood products and tree species.

- In addition to considering data relevant to current Swedish household consumption patterns, data needed for making calculations of the environmental impacts from niche products were also included. This meant that we included data about a number of basic goods such as legumes and seeds in order to make calculations of vegan or vegetarian products. The choice of basic goods to include was based on a survey of niche practices made within the research program (Kamb et al, 2019, Thorsson et al, 2019, Lehner et al, 2019).
- Economic allocation was chosen when the allocation method could be selected.
- The functional unit was set at 1 kg for *Basic goods*, *Packaging* and *Waste*. For *Transport*, the functional unit was 1 metric ton-km. In some cases, we converted the numbers in the databases to the desired functional unit.
  The impact categories chosen were global warming potential, land use and water resources depletion; see Table 1.

Table 1 – Impact methodologies chosen for each impact category

| Impact category | Method | Unit of measurement | Source |
|---|---|---|---|
| Global warming potential | Recipe 2016 | Kg $CO_2$ equivalents | Huijbregts et al., 2016 |
| Land use | Recipe 2008 | $m^2$ agricultural land occupation | Goedkoop et al., 2013 |
| Water resources depletion | Recipe 2016 | $m^3$ water | Huijbregts et al., 2016 |

According to these methodologies (Table 1), the climatic effect of the greenhouse gas emissions is assessed as their global warming potential, using $CO_2$ as a benchmark, and effects are considered over a 100-year period of time. This is the recommended approach by IPCC (IPCC, 1996). Land use impact is given as area of agricultural land occupation. Only rural land is considered and no differences are taken into account based on the type of usage (e.g. intensive farming, greenhouses or organic). Values under the impact category *water resources depletion* are calculated as the difference between the withdrawal of water volume from a certain water body for a given process and the volume that is returned into the environment after said process comes to an end. Different fractions of water returned into the environment are defined for different activities. Effluent water quality is not considered under this impact category. Further information on how this method works can be obtained from the primary source (Huijbregts et al., 2016).

In order to obtain comparable data about the environmental impacts from different types of edible meat in the *Basic goods* table, the data in some of the databases used were converted. In the databases, the environmental impacts were sometimes related to the live weight of the animal and sometimes to the carcass weight. Table 2 contains a list of the conversion factors used, along with their sources:

Table 2 Conversion factors expressed as [%] for different types of meat. Live weight (LW)

| Animal | LW to carcass | Carcass to boneless | Carcass to bone-in | Sources |
|---|---|---|---|---|
| Pork | 71 | 67.5 | 77.5 | Raines, xxxx |
| | | | | |
| Beef | 61 | 57.5 | 67.5 | Raines, xxxx |
| Lamb | 50 | | 72.5 | Raines, xxxx |
| Chicken | 70 | to breast: 25 | | Swanson et al., 1964 |
| Duck | Eviscerated: 73 | | | Swanson et al., 1964 |
| Rabbit | 60 | | | Mississippi State University, xxxx |

Metal products were understood as intermediate products provided by the metallurgic industry in order to facilitate further transportation and processing, mainly as coils of rolled metal. In the particular case of steel, several different types were included. The environmental impacts of metal products vary greatly depending on whether the raw material is obtained from mined ores or from scrap metal (Grimes et al., 2008). Under our database, both options are provided respectively as primary and secondary metals, and current market shares also are specified.

Gathering data about producer prices was necessary for updating the databases on *Basic goods* and *Packaging*. Producer prices are defined as "*the amount receivable by the producer inclusive of taxes on products except deductible value added tax and exclusive of subsidies on products*" (World Bank, 2019).

Several databases were screened for data that matched the gathered data set on environmental impacts for basic goods and packaging. Main databases on this section come from FAO (FAO, 2019) and Statistics Sweden (SCB, 2019a). In most cases, matches between both sets were not perfect, meaning that either country of origin, manufacturing processes or end product might not coincide identically. These differences were tracked.

In a few exceptional cases, producer price information was not found for a Basic Goods that was deemed particularly relevant for this study. In those cases, data was derived by averaging from supermarket prices and deducting a 25% margin.

## 3.2 Manufacturing, wholesale and retail

For environmental data regarding manufacturing, wholesale and retail environmental–economic accounts data were collected from the environmental accounts and the national accounts at Statistics Sweden. The functional unit for these data was 1 SEK. Data refer to year 2016 if not otherwise indicated. The following environmental data was used:

- Greenhouse gas emissions, production-based (Statistics Sweden, 2019b). Greenhouse gas emissions in $CO_2$ equivalents per industry. Includes $CO_2$, $CH_4$, $N_2O$, and F-gases. For $CH_4$,

$N_2O$ and F-gases, GWP factors with a hundred-year time horizon from IPCC's fourth assessment report are used (Forster et al., 2007).

- Land use and water use for year 2014, production-based (Statistics Sweden, 2019c). Land use and water use per industry. Land use and water use data come from the PRINCE model (Steinbach et al, 2018), which in turn used data from the Exiobase model (Stadler et al., 2018). Land use means cropland, pastures, forest areas and infrastructure land (roads and buildings). Water use means consumption of blue water in the agricultural, manufacturing, electricity and domestic sectors.
- Final use of electricity, fossil fuels and district heating, production-based (Statistics Sweden, 2019d). Final use (i.e., energy that is not further transformed) per industry. Greenhouse gas emissions, production-based (Statistics Sweden, 2019b). Greenhouse gas emissions per industry. Includes $CO_2$, $CH_4$, $N_2O$, and F-gases.
- Land use and water use for year 2014, production-based (Statistics Sweden, 2019c). Land use and water use per industry.
- Final use of electricity, fossil fuels and district heating, production-based (Statistics Sweden, 2019d). Final use (i.e., energy that is not further transformed) per industry.

The following economic data was used:

- Input–output tables, products times products (Statistics Sweden, 2019e). Two types of tables were used: a domestic input–output table, reflecting the inputs per product group of domestically produced products, and an imports input–output table, reflecting the inputs per product group of imported products. From these tables, data on the production value, the value added and the depreciation per product group were also used.
- Gross fixed-capital formation (Statistics Sweden, 2019f). This data refers to the total amount of assets or products invested in, per industry.
- Costs of electricity, fuels and district heating (Statistics Sweden, 2019g). Costs in purchaser's prices per industry of electricity (product group D35.1), fuels (product group C19, refinery products, exclusive of lubricants, and product group D35.2, gas), and district heating (product group D35.3).
- Margins from the wholesale and retail trade industries (Statistics Sweden, 2019h; Statistics Sweden, 2019i). Data from Structural Business Statistics regarding income by goods for resale, and regarding goods for resale. Income by goods for resale refers to the money the trader gets from selling goods, and goods for resale refers to the money the trader needs to pay for the goods that are later sold. The margin is the difference between these two.

# 4 Analyses of 218 consumption items

The 218 consumption items were analyzed by a single researcher in an effort to make the results comparable by e.g. using similar ways to assume disposal of waste for different products and similar transportation modes from similar countries. The results per SEK are displayed in Table 4 at the end of the report and all the data gathered in order to perform the analyses are presented along with the results in Appendices 2 and 3. Appendix 4 shows a summary all results per kg and per SEK. Most of the analyses (199) were performed in EAP but 19 analyses (see section 4.1) were performed outside of EAP (see section 4.2).

The selection of which items to analyze was determined by scrutinizing information in the Swedish household budget survey (HBS) (SCB, 2019j). In this survey, a large number of households were asked about how they spend their money and the expenditures were categorized according to COICOP codes (classification of individual consumption by purpose) (UN, 2018). We bought data from the latest household budget survey (2012) from Statistics Sweden, and then identified items with relatively large expenditures in the average Swedish household. Another criterion was that the chosen goods and services differed in environmental impacts according to our prior understanding. We added analyses of products and services that represent niche practices in the areas of food, furnishing and vacation according to previous surveys (Kamb et al., 2019; Lehner et al. 2019; Thorson et al. 2019). All in all, 17 analyses were performed on niche products and services.

Table 3: Results from calculations of the environmental impacts of 218 consumption items per SEK

| Category | Number of analyses | Kg CO2 ekv per SEK | | | Land use m2 per SEK | | | Water use liters per SEK | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Min | Max | Average | Min | Max | Average | Min | Max |
| Alcohol and tobacco | 6 | 0.0215 | 0.0149 | 0.0358 | 0.0089 | 0.0051 | 0.0138 | 6.2466 | 0.0494 | 23.4023 |
| Clothes and shoes | 30 | 0.0083 | 0.0013 | 0.0169 | 0.0040 | 0.0000 | 0.0172 | 1.1740 | 0.0000 | 6.7222 |
| Food | 69 | 0.0744 | 0.0012 | 0.3763 | 0.0527 | 0.0000 | 0.6058 | 7.2977 | 0.0015 | 80.5677 |
| Furnishings | 24 | 0.0418 | 0.0013 | 0.2270 | 0.0166 | 0.0000 | 0.1554 | 12.8766 | 0.0000 | 180.6519 |
| Health | 4 | 0.0192 | 0.0132 | 0.0267 | 0.0020 | 0.0014 | 0.0030 | 0.1266 | 0.0026 | 0.4122 |
| Information and communication | 5 | 0.0108 | 0.0003 | 0.0151 | 0.0012 | 0.0000 | 0.0016 | 0.0482 | 0.0000 | 0.2308 |
| Miscellanious goods and services | 27 | 0.0186 | 0.0046 | 0.0514 | 0.0024 | 0.0002 | 0.0202 | 3.0657 | 0.0012 | 32.0663 |
| Recreation. sports and culture | 28 | 0.0265 | -0.0163 | 0.2043 | 0.0099 | -0.0211 | 0.1580 | 12.7277 | 0.0001 | 112.9729 |

| Category | Number of analyses | Kg CO2 ekv per SEK | | | Land use m2 per SEK | | | Water use liters per SEK | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Min | Max | Average | Min | Max | Average | Min | Max |
| Restaurants and accomodation | 4 | 0.0209 | 0.0070 | 0.0280 | 0.0254 | 0.0120 | 0.0610 | 0.1507 | 0.0050 | 0.5160 |
| Transport | 16 | 0.0675 | 0.0002 | 0.1190 | 0.0293 | 0.0000 | 0.3216 | 5.0546 | 0.0000 | 1.8440 |
| Water and rent | 5 | 0.0384 | 0.0122 | 0.0744 | 0.0008 | 0.0001 | 0.0021 | 0.0583 | 0.0001 | 0.2643 |
| SUM | 218 | | | | | | | | | |
| | | | | | | | | | | |
| AVERAGE | | 0.0316 | | | 0.0139 | | | 4.4388 | | |
| MIN | | | -0.0163 | | | -0.0211 | | | 0.0000 | |
| MAX | | | | 0.3763 | | | 0.6058 | | | 180.6519 |

## 4.1 Analyses performed in EAP

It is possible to make analyses of both products and services in EAP. The analyses of products require information about price, taxes, transportation weight, materials and their weights, product origin, packaging and waste handling. After this information has been collected, an analysis can be performed quite quickly to provide assumptions about plausible manufacturing and trade sectors as well as transportation distances and modes. EAP can also be used to analyze services, which is much less time-consuming than analyzing products. In this case, only information about taxes must be collected beforehand and then a suitable sector(s) is chosen. In the case of products, results can be compared on a per-kg or per-SEK basis, while for the analyses of services, they can only be compared on a per-SEK basis. Appendix 2 contains all data gathered for analyzing products and services in EAP as well as the results. Below is a brief account of how we secured data for the analyses of products in EAP. The analyses in EAP start by giving the analyses an identity number. We used the COICOP numbers for the expenditure survey and made up our own numbers for niche products and services.

- Consumer *prices* were collected from relevant retailers and the prices were converted to 2016 values using a suitable consumer price index (Statistics Sweden, 2019k). Whenever official statistics about consumer prices for the selected items were found, we used those. For prices of clothes and shoes, we used data from a survey carried out in 10 different stores in Stockholm.
- *Consumer t*axes were found at the Swedish Tax Authorities (Swedish tax Authorities, 2019).
- *Transportation weight* was calculated as the weight of the product plus the consumer packaging. Many consumer products were weighed on a scale if the product packaging did not show the weight or the producer could not provide information. For the weight of the packaging materials, see below.
- The most suitable *manufacturer* was selected from the list of 59 options (see section 3).
- One of the most labor-intensive steps in the analyses was finding the types and weights of *basic goods* for the selected items. For some kinds of foods (such as tomatoes, beef, etc.) this was easy, but most consumer products are made up of many materials or basic goods. To identify these we used several methods: acquiring information from the producers; buying, dissembling and weighing products by ourselves; or using data from various published studies, including various life-cycle assessments. The analyses in EAP

do not require that 100% of the basic goods known to have environmental impacts are also allocated in the calculation of residual goods (see section 2). As part of the analysis of basic goods, we had to perform some extra analyses on basic goods not included in the original table (see Appendix 1). This was most common for foods composed of e.g. flour (but not grains) and oil (but not olives or sunflower seeds). We performed 20 such extra analyses in total.

- Packaging (consumer packages) also required some substantive investigation and the same methods as those used for basic goods were used for collecting information.
- *Transports* were calculated using default assumptions about distances and transportation modes. The assumptions made can be found in Appendix 2 under the sheet called Transportation. Transports by airplane were not included as our understanding was that these are very rare for the goods we analyzed.
- *Trade* included picking suitable wholesalers and retailers from the EAP database.
- *Consumption emissions were not included.* This is because such emissions would be covered anyway when matching the EAP results (per SEK) with household expenditures for electricity and fuel.
- *Waste handling* included both packaging and the products themselves, apart from items that are eaten, smoked or drunk. Assumptions about waste handling options (etc. recycle or burn) were based upon what the researcher making the analyses considered to be a plausible option for her own consumption.

## 4.2 Analyses performed outside EAP

For the analyses outside of EAP, a number of data sources were used (see below). Appendix 3 contains all of the calculations and assumptions used for the analyses made outside of EAP.

- *Consumer prices* were sought from official statistics whenever possible and were available for items such as fuels, rent and electricity. Other prices were collected from companies selling the items analyzed.
- *Environmental data* due to emissions for fuels and various forms of electricity generation were collected from the database IDEMAT and from the Swedish Environmental Agency (SEPA). This allowed both direct and indirect environmental impacts to be included.
- *Conversion factors* were collected from various reliable conversion calculators.
- In addition to this, a number of other data sources were used (see more in Appendix 3).

# 5 Suggestions for improvements and further application of the results

## 5.1 Suggestions for improvements

The work presented here, which includes updating the EAP database and calculating the environmental impacts of 218 consumer items, can certainly be improved. Some suggestions for improvements are provided below:

- More detailed environmental data from the food manufacturing sector. In the current version of EAP, all food manufacturing was calculated based on one dataset only.
- More updated household expenditure data. These data were used for selecting relevant items to analyze and are therefore important. Unfortunately, no such update is currently planned by Statistics Sweden.
- More environmental data about various plastics in the *Basic goods* table. When making the analyses presented here, we often had to choose a proxy for the many types of plastics used as inputs in manufacturing.
- More thorough analyses of items such as TVs, computers and cellular phones. In this study, the data about basic goods for such items were based on published studies dated some years back. Given that the turnover of electronic items is high, more up-to-date data about basic goods for such items would be desirable.
- A comprehensive sensitivity analyses of the results.

## 5.2 Further application of the results

Within the research program Mistra from Niche to Mainstream, the results presented here will be used to estimate the environmental impacts from household consumption in Sweden, from both the average household and households with different incomes, as well as single households with persons of different genders. These results will be compared to those that could be realized if all niche products and services were bought instead of the conventional ones, e.g., buying second-hand furniture instead of new furniture, buying plant-based foods instead of animal-based foods, or going on a charter tour by train instead of by plane. The aim is also to calculate the environmental impacts from consumption given current trends for food, furnishings and vacation.

The results above will show whether or not consuming those niche products and services that have been identified will suffice to lower environmental impacts from consumption to levels that can be considered sustainable.

Table 4: Results from analyses per SEK (Greenhouse gas emissions, land use and water use).

| COICOP code/nisch product | Description and EAP code if not the same as COICOP code | Kg CO2 ekv per SEK | Land use m2 per SEK | Water use liters per SEK |
|---|---|---|---|---|
| **ALCOHOL AND TOBACCO** | | | | |
| 02111 | Spirits and liqueurs | 0.0211 | 0.0138 | 12.6018 |
| 02121 | Wine from grapes | 0.0149 | 0.0122 | 23.4023 |
| 0213102 | Beer | 0.0358 | 0.0114 | 0.3350 |
| 02211 | Cigarettes | 0.0179 | 0.0055 | 0.8502 |
| 02213 | Other tobacco products | 0.0179 | 0.0051 | 0.2409 |
| 0221303 | Snus | 0.0213 | 0.0055 | 0.0494 |
| **CLOTHES AND SHOES** | | | | |
| 031220109 | Code 031220d. Jackets. women | 0.0169 | 0.0172 | 2.659 |
| 031210109 | Code: 0312101b. Jackets. men | 0.0145 | 0.0100 | 1.479 |
| 031210115 | Code 0312101e Socks. men | 0.0132 | 0.0073 | 1.970 |
| 031220104 | Code: 0312201a. Dresses. women. | 0.0116 | 0.0007 | 0.246 |
| 031210114 | Code 0312101d. T-shirt. men | 0.0113 | 0.0040 | 0.958 |
| 031310104 | Code: 031310c Scarves | 0.0110 | 0.0120 | 1.710 |
| 031210116 | Code 0312101f Jeans. men | 0.0104 | 0.0071 | 1.580 |
| 031210113 | Code 0312101c. Shirts men | 0.0097 | 0.0026 | 0.528 |
| 031220107 | Code 031220b. Skirts. women | 0.0094 | 0.0011 | 0.351 |
| 031220110 | Code 031220e. Sporting clothes women | 0.0088 | 0.0001 | 0.143 |
| 031230115 | Code.032130d Childrens socks | 0.0086 | 0.0036 | 0.970 |
| 031230111 | Code:031230b Childrens pyjamas | 0.0086 | 0.0047 | 1.146 |
| 031230114 | Code.031230c: Childrens t-shirt | 0.0083 | 0.0031 | 0.780 |
| 031220116 | Code 031220i. Jeans. women | 0.0083 | 0.0085 | 1.977 |
| 031220115 | Code 031220h. Underwear. women | 0.0082 | 0.0035 | 0.877 |
| 0313101 | Code:031310a. cloth. IO analysis | 0.0081 | 0.0014 | 0.016 |
| 0321103 | 0321103 Shoes. men | 0.0081 | 0.0012 | 6.722 |
| 031210108 | Code: 0312101a. Trousers. men | 0.0077 | 0.0080 | 1.831 |
| 031230117 | Code: 032130e Baby clothes | 0.0074 | 0.0065 | 1.474 |
| 0321303 | Code:0321303 Shoes children | 0.0074 | 0.0014 | 2.426 |
| 031220114 | Code 031220g. T-shirts. women | 0.0072 | 0.0035 | 0.766 |
| 031220112 | Code 031220f. Blouses. women | 0.0071 | 0.0024 | 0.528 |

| COICOP code/nisch product | Description and EAP code if not the same as COICOP code | Kg CO2 ekv per SEK | Land use m2 per SEK | Water use liters per SEK |
|---|---|---|---|---|
| 031230108 | Code: 031230a. Childrens pants | 0.0071 | 0.0051 | 1.144 |
| 031310202 | Code: 031310d Belts | 0.0069 | 0.0010 | 0.020 |
| 031220108 | Code 031220c. Pants. women | 0.0067 | 0.0041 | 0.898 |
| 031310103 | Code:031310b. Hats | 0.0066 | 0.0009 | 0.025 |
| 0321203 | Code: 0321203 Shoes Ladies | 0.0061 | 0.0005 | 1.999 |
| 0314 | Code: 0314. Cleaning. repairing clothes. IO analysis 1 | 0.0014 | 0.0000 | 0.000 |
| 0322 | Code: 0322 Shoe repair | 0.0014 | 0.0000 | 0.000 |
| NISCH PRODUCT | Code: N013: Second hand shoes and clothes | 0.0013 | 0.0000 | 0.000 |
| **FOOD** | | | | |
| 0111101 | Rice | 0.3129 | 0.0872 | 13.4178 |
| 0111204 | Soft bread | 0.0282 | 0.0420 | 0.0664 |
| 0111301 | Macaroni. noodles. and similar pasta products | 0.0923 | 0.1329 | 0.2533 |
| 0111302 | Pre-cooked dishes based on pasta and cereals | 0.0556 | 0.0836 | 15.5005 |
| 0111401 | Pastries | 0.0477 | 0.0450 | 4.0900 |
| 0111404 | Cakes and biscuits | 0.0413 | 0.0418 | 8.4962 |
| 0111405 | Sweet cake | 0.0426 | 0.0406 | 6.4491 |
| 0111408 | Sandwiches. pizzas. quiches. meat or fish pies. frozen or not | 0.0667 | 0.0303 | 2.6294 |
| 0111501 | Flours and other cereals | 0.0854 | 0.2304 | 7.5393 |
| 0111503 | Breakfast cereals | 0.0467 | 0.0792 | 18.7124 |
| 01121 | Beef and veal | 0.1408 | 0.1160 | 1.6215 |
| 01122 | Pork | 0.0670 | 0.0665 | 2.0944 |
| 01123 | Lamb and goat | 0.3763 | 0.6058 | 0.9588 |
| 01124 | Poultry | 0.0854 | 0.1580 | 3.3370 |
| 0112502 | Meat of pigs. cuts. salted. dried or smoked (bacon and ham) | 0.0426 | 0.0524 | 2.6182 |
| 0112506 | Meat. offal. blood and other parts of slaughtered animals' preparations | 0.1202 | 0.0704 | 0.7357 |
| 0112601 | Pre-cooked dishes based on meat | 0.1888 | 0.0839 | 20.5611 |
| 0113102 | Cod | 0.0648 | 0.0016 | 4.5313 |

| COICOP code/nisch product | Description and EAP code if not the same as COICOP code | Kg CO2 ekv per SEK | Land use m2 per SEK | Water use liters per SEK |
|---|---|---|---|---|
| 0113104 | Flatfish | 0.0487 | 0.0000 | 1.2314 |
| 01132 | Other seafood. fresh. chilled or frozen | 0.0801 | 0.0001 | 5.0057 |
| 0113401 | Other fish. prepared or preserved | 0.0545 | 0.0029 | 12.9981 |
| 0113403 | Livers. roes and offal of fish and of other seafood in all forms | 0.0316 | 0.0152 | 1.2129 |
| 0113404 | Pre-cooked dishes based on fish | 0.0343 | 0.0089 | 7.2603 |
| 01142 | Low fat milk | 0.1807 | 0.0437 | 20.6820 |
| 0114401 | Yoghurt. containing added sugar or other sweetening matter or flavoured or containing added fruit. nuts or cocoa | 0.1046 | 0.0313 | 10.9231 |
| 0114402 | Yoghurt | 0.1413 | 0.0334 | 14.2273 |
| 0114501 | Hard cheese | 0.1393 | 0.0225 | 0.8044 |
| 0114502 | Curd cheese | 0.2595 | 0.0418 | 1.4848 |
| 0114601 | Other milk products | 0.1230 | 0.0239 | 0.6856 |
| 0114701 | Eggs | 0.1218 | 0.1163 | 10.8862 |
| 0115101 | Butter | 0.1647 | 0.0309 | 1.7342 |
| 0115102 | Other butter products | 0.1185 | 0.0386 | 2.3142 |
| 0115201 | Margarin. not liquid | 0.0513 | 0.0371 | 1.5994 |
| 01153 | Oliveoil | 0.0413 | 0.1583 | 48.9936 |
| 01161 | Citrus fruits. fresh. chilled or frozen | 0.0252 | 0.0120 | 2.9008 |
| 01162 | Bananas. fresh. chilled or frozen | 0.0406 | 0.0140 | 5.6481 |
| 01163 | Apples. fresh chilled or frozen | 0.0073 | 0.0081 | 2.0314 |
| 01165 | Stone fruits fresh or chilled | 0.0110 | 0.0050 | 3.3860 |
| 0116601 | Berries (excluding grapes) | 0.0230 | 0.0054 | 3.7946 |
| 0116602 | Grapes | 0.0147 | 0.0158 | 0.1273 |
| 0116802 | Nuts and seeds. in shell or shelled | 0.0484 | 0.0512 | 6.7713 |
| 01171 | Leafy or stem vegetables. fresh. chilled or frozen | 0.0643 | 0.0487 | 0.8131 |
| 01172 | Cabbage. fresh or chilled | 0.0053 | 0.0019 | 0.0406 |
| 01173 | Fruit-bearing vegetables. fresh. chilled or frozen | 0.0247 | 0.0017 | 0.5706 |
| 1174 | Other vegetables. fresh. chilled or frozen | 0.0109 | 0.0089 | 0.2039 |

| COICOP code/nisch product | Description and EAP code if not the same as COICOP code | Kg CO2 ekv per SEK | Land use m2 per SEK | Water use liters per SEK |
|---|---|---|---|---|
| 01176 | Canned vegetables | 0.1910 | 0.0495 | 2.1899 |
| 01177 | Potatoes | 0.0119 | 0.0197 | 0.6418 |
| 0117803 | Potatoechips | 0.0338 | 0.0310 | 0.4619 |
| 01181 | Sugar. cane and beets | 0.0697 | 0.0724 | 5.4448 |
| 01183 | Chocolate | 0.0747 | 0.0756 | 3.2836 |
| 01184 | Confectionary products | 0.0421 | 0.0217 | 1.0295 |
| 01185 | Edible ices and ice cream | 0.1604 | 0.0408 | 1.0206 |
| 01191 | Sauces and condiments | 0.0452 | 0.0429 | 0.1510 |
| 01192 | Salt. spices and culinary herbs | 0.0340 | 0.0001 | 80.5677 |
| 01193 | Other food products | 0.0389 | 0.0147 | 0.2054 |
| 01211 | Coffee | 0.0998 | 0.1356 | 12.3763 |
| 01212 | Tea | 0.0401 | 0.0944 | 52.0761 |
| 01221 | Mineral or spring waters | 0.0762 | 0.0164 | 1.0866 |
| 01222 | Soft drinks | 0.0558 | 0.0125 | 0.4417 |
| 01223 | Fruit and vegetable juices | 0.0613 | 0.0505 | 24.1422 |
| NISCHPRODUCT | Code: N001 Tofu | 0.0149 | 0.0262 | 0.4650 |
| NISCHPRODUCT | Code: N002 Vegetarian pieces soya protein | 0.0406 | 0.0416 | 3.3172 |
| NISCHPRODUCT | Code: N003 Vegetarian pieces pea protein | 0.0380 | 0.0375 | 7.4287 |
| NISCHPRODUCT | Code: N004 Oat milk | 0.0382 | 0.0393 | 15.0792 |
| NISCHPRODUCT | Code: N005 Soya milk | 0.0418 | 0.0346 | 9.9538 |
| NISCHPRODUCT | Code: N006 Cooking class | 0.0075 | 0.0012 | 0.0015 |
| NISCHPRODUCT | Code: N010 Vegan cheese | 0.0369 | 0.0237 | 0.0775 |
| NISCHPRODUCT | Code: N011 Locally produced veggies outdoors | 0.0054 | 0.0083 | 0.1522 |
| NISCHPRODUCT | Code: N012 Veggies in urban basement | 0.0012 | 0.0000 | 0.0033 |
| **FURNISHINGS** | | | | |
| 051110301 | Code: 0511103a Chairs | 0.0131 | 0.0039 | 2.89 |
| 0511105 | Beds | 0.0192 | 0.0158 | 2.87 |
| 0511107 | Wardrobes. chests of drawers and bookcases | 0.0054 | 0.0213 | 7.56 |
| 0511108 | Garden furniture | 0.0505 | 0.0056 | 2.96 |

| COICOP code/nisch product | Description and EAP code if not the same as COICOP code | Kg CO2 ekv per SEK | Land use m2 per SEK | Water use liters per SEK |
|---|---|---|---|---|
| 0511112 | Pots. vases | 0.0074 | 0.0005 | 0.09 |
| 05121 | Carpets and rugs | 0.0974 | 0.1554 | 26.68 |
| 05131 | Repair of furniture. furnishings and floor coverings | 0.0122 | 0.0015 | 0.00 |
| 0521101 | Sheets and pillowcases | 0.1195 | 0.0165 | 3.80 |
| 0521102 | Blankets. pillows and bedspreads | 0.2270 | 0.0000 | 9.00 |
| 0531201 | Dishwashers | 0.0252 | 0.0041 | 2.04 |
| 0531202 | Clothes washing machines | 0.0477 | 0.0046 | 8.61 |
| 05313 | Panels. hobs. spit roasters. ovens. combined cookers and micro wave ovens | 0.0301 | 0.0059 | 4.37 |
| 0531501 | Vaccum cleaners | 0.0218 | 0.0050 | 3.15 |
| 0541103 | Cups and mugs | 0.0081 | 0.0005 | 0.09 |
| 0541104 | Bowl | 0.0076 | 0.0005 | 0.05 |
| 05413 | Kitchen utensils and articles | 0.0179 | 0.0010 | 15.30 |
| 0541 | Glassware. tableware. cutlery and household utensils | 0.0444 | 0.0178 | 12.07 |
| 0551 | Major tools and equipment | 0.0502 | 0.0015 | 17.99 |
| 0552 | Small tools and miscellaneous accessories | 0.0148 | 0.0011 | 0.14 |
| 0561 | Non-durable household goods | 0.0713 | 0.1278 | 180.65 |
| 05612 | Other non-durable small household articles | 0.0764 | 0.0042 | 8.73 |
| NISCH SERVICE | Code: N014 Reparing furnishing | 0.0122 | 0.00149 | 0.00149 |
| NISCH SERVICE | Code: N015 Renting furnishings | 0.02184 | 0.00233 | 0.00391 |
| NISCH PRODUCT | Code:N016 Second hand furnishings | 0.00134 | 0 | 0 |
| **HEALTH** | | | | |
| 0611101 | Pharmaceutical products | 0.0267 | 0.0030 | 0.0231 |
| 0613101 | Corrective eye-glasses | 0.0166 | 0.0014 | 0.4122 |
| 0613102 | Corrective contact lenses | 0.0201 | 0.0017 | 0.0684 |
| 062 | Out-patient services | 0.0132 | 0.0018 | 0.0026 |
| **INFORMATION AND COMMUNICATION** | | | | |
| 081 | Postal services | 0.0003 | 0.0000 | 0.0000 |
| 082 | Telephone and telefax equipment | 0.0110 | 0.0014 | 0.2308 |

| COICOP code/nisch product | Description and EAP code if not the same as COICOP code | Kg CO2 ekv per SEK | Land use m2 per SEK | Water use liters per SEK |
|---|---|---|---|---|
| 083110101 | Code: 08311010 Wired telephone service | 0.0151 | 0.0015 | 0.0037 |
| 083110102 | Code: 083112 Wireless telephone services | 0.0151 | 0.0015 | 0.0037 |
| 083110103 | Code: 083113 Internet access provision services | 0.0127 | 0.0016 | 0.0030 |
| **MISCELLANOUS GOODS AND SERVICES** | | | | |
| 1211 | Hairdressing salons and personal grooming | 0.0133 | 0.0021 | 0.0048 |
| 1213101 | Non-electronic appliances for personal care | 0.0102 | 0.0008 | 0.1071 |
| 1213102 | Personal hygiene | 0.0234 | 0.0202 | 32.0663 |
| 1213103 | Cosmetic products. cosmetics. perfume. deodorant | 0.0110 | 0.0054 | 24.1191 |
| 1213104 | Toiletpaper. paper tissues etc | 0.0514 | 0.0030 | 8.7882 |
| 1213105 | Feminine hygiene | 0.0264 | 0.0010 | 2.3276 |
| 1213106 | Diapers | 0.0376 | 0.0070 | 14.9784 |
| 12321 | Travel goods | 0.0046 | 0.0002 | 0.0499 |
| 1232 | Other personal effects | 0.0055 | 0.0003 | 0.0271 |
| 12412 | Child care services | 0.0062 | 0.0009 | 0.0012 |
| 1252 | Insurance connected with the dwelling | 0.0161 | 0.0014 | 0.0021 |
| 1253 | Insurance connected with health | 0.0161 | 0.0014 | 0.0021 |
| 1254 | Insurance connected with transport | 0.0161 | 0.0014 | 0.0021 |
| 1255102 | Insurance for pets | 0.0161 | 0.0014 | 0.0021 |
| 1262 | Other financial services. not elsewhere classified | 0.0092 | 0.0009 | 0.0016 |
| 211 | Unemploymen insurance and union membership fees | 0.0161 | 0.0015 | 0.0031 |
| 212 | Non-union membership fees | 0.0119 | 0.0014 | 0.0025 |
| 221 | Interest expenditures. accomodation | 0.0115 | 0.0011 | 0.0020 |
| 223 | Interest expenditures. study loan | 0.0115 | 0.0011 | 0.0020 |
| 225 | Interest expenditures. weekend cottage | 0.0115 | 0.0011 | 0.0020 |
| 231 | Cartax. road tax | 0.0198 | 0.0020 | 0.0026 |

| COICOP code/nisch product | Description and EAP code if not the same as COICOP code | Kg CO2 ekv per SEK | Land use m2 per SEK | Water use liters per SEK |
|---|---|---|---|---|
| 253 | Repairs on weekend cottages | 0.0122 | 0.0015 | 0.0028 |
| 25421 | Garbage collection weekend cottages | 0.0484 | 0.0020 | 0.0030 |
| 25431 | Water and sewage weekend cottages | 0.0387 | 0.0021 | 0.0028 |
| 25511 | Heat. vacation house | 0.0203 | 0.0002 | 0.2643 |
| 30 | Taxable benefits | 0.0166 | 0.0026 | 0.0060 |
| 266 | Property tax | 0.0198 | 0.0020 | 0.0026 |
| **RECREATION. SPORTS AND CULTURE** | | | | |
| 09111 | Equipment for the reception. recording and reproduction of sound | 0.0087 | 0.0023 | 1.2541 |
| 09112 | Equipment for the reception. recording and reproduction of sound and vision | 0.0252 | 0.0039 | 95.7159 |
| 0913 | Information processing equipment | 0.0090 | 0.0004 | 36.9803 |
| 0914101 | CD/DVD | 0.0134 | 0.0019 | 0.4309 |
| 0921101 | Camper vans. caravans and trailers | 0.0176 | 0.0016 | 0.9674 |
| 09221 | Musical instruments | 0.0126 | 0.0031 | 1.4904 |
| 0931101 | Videogames | 0.0109 | 0.0013 | 0.1749 |
| 0931102 | Toys and hobby items | 0.0172 | 0.0006 | 0.6251 |
| 0932101 | Shoes intended for a specific sport | 0.0139 | 0.0029 | 2.5136 |
| 0932103 | Sporting goods. not fishing gear | 0.0119 | 0.0022 | 1.1515 |
| 0932104 | Fishing gear | 0.0136 | 0.0001 | 0.1315 |
| 0932107 | Charcoal | -0.0163 | 0.0106 | 14.1689 |
| 0934102 | Products for pets | 0.0051 | 0.0002 | 0.0605 |
| 0935102 | Veterinary services. I/O analysis | 0.0106 | 0.0014 | 0.0020 |
| 0941102 | Recreational and sporting services - participation | 0.0203 | 0.0042 | 0.0059 |
| 09421 | Cinemas. theatres. concerts | 0.0167 | 0.0018 | 0.0030 |
| 09423 | Television and radio licence fees and hire of equipment | 0.0122 | 0.0015 | 0.0028 |
| 0943 | Loteries etc | 0.0155 | 0.0016 | 0.0028 |
| 0951 | Books | 0.0090 | -0.0080 | 35.6064 |
| 0952101 | Newspapers | 0.0158 | -0.0211 | 112.9729 |

| COICOP code/nisch product | Description and EAP code if not the same as COICOP code | Kg CO2 ekv per SEK | Land use m2 per SEK | Water use liters per SEK |
|---|---|---|---|---|
| 0952102 | Magazines and periodicals | 0.0124 | -0.0166 | 51.9814 |
| 096110102 | Package domestic holiday | 0.0796 | 0.0002 | 0.0001 |
| 0966102 | Package international holiday | 0.2043 | 0.0068 | 0.0426 |
| NISCH SERVICE calculated outside of EAP | Package tour in Sweden. 50% renewable fuel | 0.0344 | 0.0930 | 0.0002 |
| NISCH SERVICE calculated outside of EAP | Package tour in Sweden. train with hotel | 0.0149 | 0.0143 | 0.0050 |
| NISCH SERVICE calculated outside of EAP | Package tour abroad. 50 % renewable fuel | 0.1177 | 0.1580 | 0.0427 |
| NISCH SERVICE calculated outside of EAP | Train abroad with hotel | 0.0214 | 0.0060 | 0.0385 |
| NISCH SERVICE calculated outside of EAP | Stay at home holyday | 0.0150 | 0.0019 | 0.0039 |
| **RESTAURANTS AND ACCOMODATION** | | | | |
| 1111 | Resturants . cafés and the like | 0.02423 | 0.01428 | 0.00496 |
| 1121101 | Hotels | 0.02423 | 0.01428 | 0.00496 |
| Extra analyses based on information from Statistics Sweden on Hotels and Meals abroad. Results from an multiregional IO analysis. | Hotels abroad | 0.007 | 0.012 | 0.077 |
| Extra analyses based on information from Statistics Sweden on Hotels and Meals abroad. Results from an multiregional IO analysis. | Meals abroad | 0.028 | 0.061 | 0.516 |
| **TRANSPORT** | | | | |
| 07111 | New motor cars | 0.0356 | 0.0026 | 1.8440 |
| 07112 | Second-hand motor cars | 0.0002 | 0.0000 | 0.0000 |
| 0712 | Motor cycles. mopeds. scooters | 0.0434 | 0.0023 | 7.7049 |

| COICOP code/nisch product | Description and EAP code if not the same as COICOP code | Kg CO2 ekv per SEK | Land use m2 per SEK | Water use liters per SEK |
|---|---|---|---|---|
| 0713 | Bicycles | 0.0208 | 0.0012 | 0.8442 |
| 0721 | Parts and accessories for personal transport equipment | 0.0250 | 0.0019 | 60.3441 |
| 0722101 | Petrol | 0.2512 | 0.0005 | 0.0005 |
| 0722102 | Diesel | 0.2753 | 0.0006 | 0.0005 |
| 0722103 | Lubricants | 0.0285 | 0.0001 | 0.0001 |
| 0723101 | Repair. car | 0.0176 | 0.0016 | 0.0201 |
| 0724101 | Other transportation services | 0.0218 | 0.0023 | 0.0039 |
| 0731102 | Trainticket | 0.0005 | - | - |
| 0732102 | Busticket | 0.0796 | 0.0002 | 0.0001 |
| 0732103 | Taxi | 0.0070 | 0.0000 | 0.0000 |
| 0735101 | Combined trip | 0.0093 | - | - |
| NISCH PRODUCT calculated outside of EAP | petrol (85% ethanol from swedish wood) | 0.1450 | 0.0754 | 0.0006 |
| NISCH PRODUCT calculated outside of EAP | Diesel with 50% ethanol | 0.1190 | 0.3216 | 0.0007 |
| **WATER AND RENT** | | | | |
| 0411 | Rentals paid by tenants | 0.0162 | 0.0002 | 0.0214 |
| 043 | Maintenance and repair of the dwelling | 0.0122 | 0.0015 | 0.0028 |
| 044 | Water supply and miscellaneous services relating to the dwelling | 0.0381 | 0.0021 | 0.0028 |
| 451 | Electricity | 0.0511 | 0.0002 | 0.2644 |
| 0455 | Heat energy | 0.0744 | 0.0001 | 0.0001 |

# 6 List of Appendices

# 7 References


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## About the research program

*Mistra Sustainable Consumption – From niche to mainstream* is a transdisciplinary research program consisting of:

**Researchers from** the KTH Royal Institute of Technology, Lund University, Chalmers University of Technology,the Swedish University of Agricultural Sciences, Luleå Technical University, Karolinska Institute, Uppsala University and Statistics Sweden. KTH is the programme host.

**Societal partners:** Camino, ICA, Oatly, Food for Progress, Max burgers, IKEA Sweden, Hemtex, ReTuna, Stena Line, Ving, Centralens Resebutik, Visita, The City of Gothenburg, The City of Malmö, The City of Lund, The West Sweden Tourist Board, Region Västra Götaland, The Swedish Consumer Agency, The Swedish Environmental Protection Agency, The National Food Agency, The Swedish Society for Nature Conservation, The Swedish Tourist Association, and The National Museums of World Culture.

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