Consumption
Compass: a summary of the methods used

(In Swedish: Konsumptionkompassen)
A digital tool for addressing consumption-based emissions at the local level

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Overview

The Consumption Compass is a free Excel-based tool, launched in April 2022, that provides consumption-based emissions estimates (CO2e) at the municipal and postcode level for all of Sweden’s municipalities.

The tool also supports data analysis, comparisons, and a decision-support function to help municipalities understand impacts of consumption at the local level and prioritize actions to reduce them. This document summarizes the methodological approaches behind the tool and briefly describes how the model for downscaling Sweden’s total consumption-based emissions (CO2e) to municipal and postcode levels has been set up. It also includes an overview of the data and data sources used.

Methods summary

The Consumption Compass downscales greenhouse gas emissions from consumption to municipality and postcode levels. At the national level, Statistics Sweden (SCB) provides statistics about Swedish households’ consumption using the Classification of Individual Consumption According to Purpose (COICOP) system. COICOP is a UN statistical classification system used internationally for estimating households’ consumption of different consumption categories. The COICOP categories can be used to relate to the total greenhouse gas emissions generated for producing and using the same consumption items (final consumption). In Sweden, there are 111 COICOP categories for which there are corresponding greenhouse gas emissions at the national level. This data is complemented by other datasets to allow breakdown from national to the postcode level. In doing this, two basic approaches are applied (see annex 1 for additional details):

A: Bottom-up approach, where the actual consumption has been measured, then greenhouse gas footprints estimated from that. The only dataset for which we have access to bottom-up data is on the use of personal vehicles. For this dataset, we have access to detailed data at the postcode level about distance driven on an annual basis as well as the type of fuels used. The emissions from the use of personal vehicles have been applied to direct emissions from personal vehicles (14% of total emissions). See Table 1 for references.

B: Top-down approach, where the data at the national or municipal level has been downscaled based on four different approximations, described below. See Table 1 for references and Annex 1 for additional details about which consumption categories have been calculated using each approach:

1. **MOSAIC profile data (48% of total emissions)**

60 COICOP categories are downscaled using so-called MOSAIC profile data on consumption within different lifestyle groups. This data is produced by the company InsightOne and builds on socio-economic data and survey-based estimates using the consumption patterns of 44 consumer profiles across Sweden. The dataset includes annual household spending per lifestyle group and has been used as the basis to distribute the emissions per postcode.

With regard to food-related emissions, these are calculated using a mixture of MOSAIC data and data from the online tool Klimatkalkylatorn. The Klimatkalkylatorn data builds on findings from consumer profiles generated when users respond to questions about their lifestyle and consumption habits. As of April 2022, Klimatkalkylatorn’s database contained over 800,000 user profiles across all of Sweden’s municipalities. To estimate food-related emissions, we build on expenditure data from MOSAIC, and data on households’ diets at the postcode level from the Klimatkalkylatorn database.

2. **Household expenditure survey (8% of total emissions)**

We downscaled 18 COICOP categories based on SCB’s household expenditure survey from 2009, then used these data to distribute the national emissions from the year 2019 for these 18 different COICOP groups to the municipal level on the basis of different municipality groups, according to the municipality classification system developed by the Swedish Association of Local Authorities and Regions (SKR). Then, we used per capita disposable income as a proxy to downscale these emissions to the postcode level, with the exception of two categories, for which disposable income is not a good proxy; that is, actual rental costs and rental costs paid by tenant-owners. For these two categories, consumption impacts were distributed equally per capita with the municipality class (i.e. not influenced by income) because statistics offer limited support for determining how income relates to residents’ choice of rental or owner-occupied accommodation in Sweden, where it is common that both low and high-income groups live in rental apartments.

3. **Other available datasets (22% of total emissions)**

Four COICOP categories have been downscaled by using other datasets. For electricity, district heating, and direct heating the data is available at the municipality level in kWh. The electricity and direct heating data at the municipal level have been downscaled to postcode level by using dwelling size as a proxy. The district heating data at the municipal level has been downscaled to postcode level by using the Swedish National Board of Housing, Building and Planning’s (Boverket’s) data about Energy declarations as a proxy. Air transport emissions have been calculated building

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3 [www.klimatkalkylatorn.se](http://www.klimatkalkylatorn.se)
on data from the Swedish Environmental Protection Agency about Sweden’s total air travel emissions at the national level. This data is distributed to the municipalities based on travel behaviour reported through the Klimatkalkylatorn data (currently over 800 000 user profiles collected at postcode level) and weighted by disposable income of each postcode as a proxy.

4. Income (8% of total emissions)

29 COICOP categories, for which no detailed data is available, have been downscaled to postcode level by using per capita disposable income as a proxy. Most of the COICOP categories distributed through this method contribute to lower levels of consumption-based emissions.

See Annex 1 for a detailed list of all consumption categories that belong to each one of the methodological approaches described above.

Data description and data sources

Table 1 summarizes the data and data sources used. All data is based on the year 2019 unless otherwise stated.

Table 1. Datasets used in the Consumption Compass [Konsumtionskompassen]

<table>
<thead>
<tr>
<th>Data name</th>
<th>Description</th>
<th>Geographical level</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOSAIC(^1) profile data</td>
<td>Socio-demographic data on 44 lifestyle profiles. Including income and expenditures on different items.</td>
<td>Postcode (more than 10 000 in Sweden)</td>
<td>InsightOne</td>
</tr>
<tr>
<td>Household expenditure on goods and services</td>
<td>Total Swedish expenditures (SEK) in COICOP(^2) classification</td>
<td>National</td>
<td>Statistics Sweden (SCB)</td>
</tr>
<tr>
<td>Household emissions on goods and services</td>
<td>Total Swedish emissions (kg CO2e) in COICOP classification.</td>
<td>National</td>
<td>SCB</td>
</tr>
<tr>
<td>Household expenditure survey</td>
<td>Average household expenditures (SEK). Concordance matrix to COICOP done in-house.</td>
<td>Municipal class (urban vs rural divide)</td>
<td>SCB (2009)</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Source</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Average grocery prices</td>
<td>Used to correct for variation of grocery prices between regions of same products.</td>
<td>Regional Pensioners Organization (PRO)</td>
<td></td>
</tr>
<tr>
<td>Total air travel emissions</td>
<td>Total air travel emissions of Swedish residents, including connecting flights and high-altitude effect.</td>
<td>National Swedish Environmental Protection Agency (SEPA)</td>
<td></td>
</tr>
<tr>
<td>Air travel distance</td>
<td>Yearly per capita distance (km) travelled by airplane.</td>
<td>Municipal Klimatkalkylatorn – an individual climate footprint calculator for Sweden (more than 800 000 responses) Data collected between 2017 and 2022.</td>
<td></td>
</tr>
<tr>
<td>Food diets</td>
<td>Data on the variation of food diets (i.e. the proportions of people with different types of diet).</td>
<td>Municipal InsightOne, based on data from the Swedish Transport Agency [Transportstyrelsen]</td>
<td></td>
</tr>
<tr>
<td>Direct car emissions</td>
<td>Emissions (kg CO2e) of household-owned cars</td>
<td>Postcode InsightOne</td>
<td></td>
</tr>
<tr>
<td>Number of household-owned vehicles</td>
<td>Number of household owned vehicles (motorbikes, tractors, etc)</td>
<td>Municipal InsightOne</td>
<td></td>
</tr>
<tr>
<td>Mileage of vehicles</td>
<td>Yearly mileage (km) of various household owned vehicles (motorbikes, etc)</td>
<td>National SCB</td>
<td></td>
</tr>
<tr>
<td>Energy consumption</td>
<td>Energy consumption (MWh)</td>
<td>Municipal SCB/STEM</td>
<td></td>
</tr>
<tr>
<td>Electricity consumption</td>
<td>Electricity consumption (MWh)</td>
<td>Municipal SCB</td>
<td></td>
</tr>
<tr>
<td>District heating consumption</td>
<td>Energy declaration (kWh)</td>
<td>Postcode Boverket</td>
<td></td>
</tr>
<tr>
<td>Direct heating emissions</td>
<td>Emissions (kg CO2e) from in-house/direct heating.</td>
<td>Municipal SCB</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------------------------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>Emissions factors</td>
<td>Per COICOP category (kg CO2e/SEK)</td>
<td>National SCB</td>
<td></td>
</tr>
</tbody>
</table>


2COICOP is the UN Classification of Individual Consumption According to Purpose.

## Annex 1

List of consumption categories for which associated greenhouse gas emissions have been estimated by the two different approaches described in the methods summary above.

**A. Bottom-up approach (14% of total emissions)**

For direct emissions from personal vehicles, actual consumption has been measured, then GHG footprints estimated from that measurement. This approach has been applied to direct emissions from personal vehicles.

**B. Top-down approach**

Where the data at the national or municipal level has been downscaled based on four different approximations, given below:

### 1. MOSAIC profile data. 60 consumption categories (48% of total emissions):

- 0111 bread and cereals
- 0112 meat
- 0113 fish and seafood
- 0114 milk, cheese and eggs
- 0115 oils and fats
- 0116 fruit
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0117</td>
<td>vegetables</td>
</tr>
<tr>
<td>0118</td>
<td>sugar, jam, honey, chocolate and confectionery</td>
</tr>
<tr>
<td>0119</td>
<td>salt, spices, sauces and homogenized baby food</td>
</tr>
<tr>
<td>0121</td>
<td>coffee, tea and cocoa</td>
</tr>
<tr>
<td>0122</td>
<td>mineral waters, soft drinks, fruit and vegetable juices</td>
</tr>
<tr>
<td>0211</td>
<td>spirits</td>
</tr>
<tr>
<td>0212</td>
<td>wine</td>
</tr>
<tr>
<td>02131</td>
<td>high-alcoholic beer</td>
</tr>
<tr>
<td>02132</td>
<td>low alcoholic beer</td>
</tr>
<tr>
<td>022</td>
<td>tobacco</td>
</tr>
<tr>
<td>0311</td>
<td>clothing material</td>
</tr>
<tr>
<td>0312</td>
<td>garments</td>
</tr>
<tr>
<td>0313</td>
<td>other articles of clothing and clothing accessories</td>
</tr>
<tr>
<td>0321</td>
<td>shoes and other footwear</td>
</tr>
<tr>
<td>0322</td>
<td>repair and hire of footwear</td>
</tr>
<tr>
<td>043</td>
<td>materials and services for the maintenance and repair of the dwelling</td>
</tr>
<tr>
<td>0511</td>
<td>furniture and furnishings</td>
</tr>
<tr>
<td>0512</td>
<td>carpets and other floor coverings</td>
</tr>
<tr>
<td>0513</td>
<td>repair of furniture, furnishings and floor coverings</td>
</tr>
<tr>
<td>0551</td>
<td>major tools and equipment</td>
</tr>
<tr>
<td>0552</td>
<td>small tools and miscellaneous accessories</td>
</tr>
<tr>
<td>0562</td>
<td>domestic services and household services</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>0611</td>
<td>pharmaceutical products</td>
</tr>
<tr>
<td>0711</td>
<td>motor cars</td>
</tr>
<tr>
<td>0721</td>
<td>spare parts and accessories for personal transport equipment</td>
</tr>
<tr>
<td>0722</td>
<td>fuels and lubricants for personal transport equipment</td>
</tr>
<tr>
<td>0731</td>
<td>passenger transport by railway</td>
</tr>
<tr>
<td>0732</td>
<td>passenger transport by road</td>
</tr>
<tr>
<td>0734</td>
<td>passenger transport by sea and inland waterway</td>
</tr>
<tr>
<td>0735</td>
<td>combined passenger transport</td>
</tr>
<tr>
<td>0736</td>
<td>other purchased transport services, removal and storage services</td>
</tr>
<tr>
<td>0811</td>
<td>postal services</td>
</tr>
<tr>
<td>0911</td>
<td>equipment for the reception, recording and reproduction of sound and pictures</td>
</tr>
<tr>
<td>0912</td>
<td>photographic and cinematographic equipment and optical instruments</td>
</tr>
<tr>
<td>0913</td>
<td>information processing equipment, PCs and misc. accessories calculators, typewriters</td>
</tr>
<tr>
<td>0914</td>
<td>recorded and unrecorded tapes, cassettes, diskettes and CD-ROMs, unexposed films</td>
</tr>
<tr>
<td>0915</td>
<td>repair of audio-visual, photographic and information processing equipment</td>
</tr>
<tr>
<td>0931</td>
<td>games, toys and hobbies</td>
</tr>
<tr>
<td>0932</td>
<td>equipment for sport, camping and open-air recreation</td>
</tr>
<tr>
<td>0933</td>
<td>plants and flowers, Christmas trees, specially treated soils, pots and potholders.</td>
</tr>
<tr>
<td>0941</td>
<td>recreational and sporting services, participation fee</td>
</tr>
</tbody>
</table>
0942 cultural services
0943 games of chance, service charges
0951 books including schoolbooks excluding stamp collections
0952 newspapers and periodicals
0953 miscellaneous printed matter
096 package holidays
111 catering services
112 accommodation services
1211 hairdressing salons and personal grooming establishments
1212 electric appliances for personal care
1213 other appliances, articles and products for personal care
1231 jewellery, clocks and watches incl. Repair

house heating

2. Household expenditure survey, 18 COICOP categories (8% of total emissions):

0411 actual rentals paid by tenants, exclusive of heating [Swe. Faktisk hyra i hyresrätter, kall hyra]
0412 rentals actually paid by tenant-owners [Swe. Bostadsrätt, nyttjandevärde kallhyra]
0452 gas
0453 liquid fuels, domestic heating and lighting oils
0454 solid fuels, coal, coke, briquettes, firewood, charcoal, peat and the like
0531 major household appliances whether electric or not
0532 small electric household appliances

0561 non-durable household goods as cleaning and maintenance products

0712 motorcycles

0713 bicycles

0723 maintenance and repair of personal transport equipment

0921 major durables for outdoor recreation

0922 musical instruments and major durables for indoor recreation

0923 maintenance and repair of other major durables for recreation and culture

0934 pets and related products

0935 veterinary and other services for pets

0954 stationery and drawing materials

1232 personal effects other. E.g. suitcases, perambulators, etc

3. *Other available datasets, 4 COICOP categories (22% of total emissions):*

0451 electricity

0455 heat energy purchased from district heating plants

0733 passenger transport by air

Direct heating emissions

4. *Income, 29 COICOP categories (8% of total emissions):*

023 narcotics
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0314</td>
<td>Cleaning, repair and hire of clothing</td>
</tr>
<tr>
<td>0421</td>
<td>Imputed rentals of owner-occupiers, exclusive of heating [Swe. Småhus, nyttjandevärde kallhyra]</td>
</tr>
<tr>
<td>0422</td>
<td>Imputed rentals for secondary residences, exclusive of heating [Swe. Fritidshus, nyttjandevärde kallhyra]</td>
</tr>
<tr>
<td>052</td>
<td>Household textiles</td>
</tr>
<tr>
<td>0533</td>
<td>Repair of household appliances</td>
</tr>
<tr>
<td>054</td>
<td>Glassware, tableware and household utensils</td>
</tr>
<tr>
<td>0612</td>
<td>Other medical products</td>
</tr>
<tr>
<td>0613</td>
<td>Therapeutic appliances and equipment incl. eyeglasses</td>
</tr>
<tr>
<td>0621</td>
<td>Outpatient medical services</td>
</tr>
<tr>
<td>0622</td>
<td>Dental services</td>
</tr>
<tr>
<td>0623</td>
<td>Paramedical services</td>
</tr>
<tr>
<td>063</td>
<td>Hospital services incl. medical fee</td>
</tr>
<tr>
<td>07241</td>
<td>Driving lessons, driving tests and driving licences</td>
</tr>
<tr>
<td>07242</td>
<td>Roadworthiness tests</td>
</tr>
<tr>
<td>07243</td>
<td>Toll bridge fee</td>
</tr>
<tr>
<td>07244</td>
<td>Parking</td>
</tr>
<tr>
<td>07245</td>
<td>Tax benefit cars and hire of personal transport equipment without drivers</td>
</tr>
<tr>
<td>0812</td>
<td>Telephone and telefax equipment</td>
</tr>
<tr>
<td>0813</td>
<td>Telephone and telefax services</td>
</tr>
<tr>
<td>101</td>
<td>Education</td>
</tr>
<tr>
<td>122</td>
<td>prostitution</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>12401</td>
<td>wet-nurses, crèches, play schools and other child-minding facilities</td>
</tr>
<tr>
<td>12402</td>
<td>care and help for elderly</td>
</tr>
<tr>
<td>12403</td>
<td>personal assistance in social protection</td>
</tr>
<tr>
<td>12404</td>
<td>individual social protection</td>
</tr>
<tr>
<td>125</td>
<td>insurance</td>
</tr>
<tr>
<td>126</td>
<td>financial services n.e.c</td>
</tr>
<tr>
<td>127</td>
<td>fees for legal services, employment agencies, etc.</td>
</tr>
</tbody>
</table>
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