INDICATORS AND METHODS FOR MEASURING TRANSITION TO CLIMATE NEUTRAL CIRCULARITY

Task 5: Case-study group 1

Report for: DG RTD, Directorate B – Healthy Planet, Unit B1: Circular Economy & Biobased Systems

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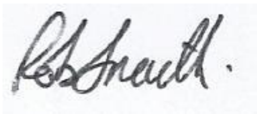

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1. INTRODUCTION

The transition to a circular economy (CE) needs to occur on multiple levels, from households and individual consumers to national and cross-border ecosystems. Measuring and monitoring the development of this transition is an ambitious task and is ideally supported by indicators relevant to all steps in that process.

This case-study is one of 19 developed for a research project into "*Indicators and methods for measuring transition to climate neutral circularity, its benefits, challenges and trade-offs*". It provides a detailed summary of the development and testing programme conducted for Group 1 of the 'Food, Water and Nutrients' sub-policy area during Task 5 of the project. The main purpose of this case-study is:

1. Provide an overview of the testing and monitoring method adopted for each indicator.
2. Outline the key results and performance of each indicator.
3. Highlight any challenges or lessons learnt from the identification, planning, delivery and analysis of the relevant methodology for each indicator.

The aim of Task 5 is to take the learnings of all other Tasks thus far and develop and test the new indicators identified in Tasks 3 and 4 as having potential to enable a deeper understanding of the 3 facets of circularity for the five key approaches. This case-study is a direct output of Task 5.

This case-study focuses on the following three indicators outlined in Table 1.

Table 1. Overview of case-study group 1

URN		Indicator name	Methodology	Level of implementation				
				EU	National	City / Region	Companies	Household
FWN1	**1**	Presence of guidance (labelling) on climate impact of food product categories.	• Desk-based research • Stakeholder engagement		X		X	
FWN2	**2**	Presence of requirements for organic products in public procurement of food.	• Desk-based research • Stakeholder engagement • Web-scraping tool			X		
FWN3	**3**	Sustainable Calorie intake per capita gap of animal-based food consumption	• Statistical analysis	X				

2. INDICATOR 1 – PRESENCE OF GUIDANCE (LABELLING) ON CLIMATE IMPACT OF FOOD PRODUCT CATEGORIES

The initial indicator proposed was the possibility for consumers to know food products and their regions through labelling. During the initial tasks of the study, the proposed indicator was amended to **the presence of guidance (labelling) on the climate impact of food product categories**, and more specifically the share of products sold by a retailer with a label (on-pack or on-shelf) containing information for consumers about a product's climate impact.

The production, processing and transportation of food create environmental impacts, including climate impacts. The food system is recognised as one of the sectors with the highest Greenhouse Gas (GHG) reduction potential through CE strategies, including through consumption-side and product design measures (Wang, et al., 2022). The food system is responsible for around 21-37% of global GHG emissions (IPCC, 2019), and agriculture is responsible for around 11% of European Union (EU) GHG emissions (European Environment Agency, 2022). Making the food system more circular can go hand in hand with cutting GHG emissions (Ellen MacArthur Foundation, n.d.). It has been estimated that a circular food system could reduce annual global food related GHG emissions by 49% in 2050 (Ellen MacArthur Foundation, 2019). In the EU, 40% of agricultural land use is influenced by the 10 largest food companies and retailers (Ellen MacArthur Foundation, 2021).

The European Commission (EC) work programme for 2023 (European Commission, 2022) announced a proposal for a framework regulation on sustainable food systems, as anticipated by the 2020 Farm to Fork Strategy (European Commission, 2020). The intention was to include rules on the sustainability labelling of food products, with 77% of respondents to a public consultation in 2022 agreeing that an EU sustainability label should be mandatory (European Parliament, 2024). Although an EC proposal was expected in late 2023, it has not yet been specifically mentioned in any EC work programmes, and it is still uncertain when such a proposal will be tabled.

This indicator can bring several benefits, including:

- Encouraging major retailers to consider the climate impact of food products, incentivising them to rethink their product selection and general responsibility for the sustainability of the food products they sell.
- Encouraging food producers to move towards more circular production methods.
- Being a potentially useful tool to guide consumers to refuse or reduce consumption of high-impact foods and select lower climate-impact products.
- Complementing the indicator in the new EU CE monitoring framework on GHG emissions from production activities (kg per capita), by highlighting CO_2e equivalent emissions related to food.

2.1 KEY METHODOLOGY

2.1.1 Testing method

It should be noted that the practical implementation of climate labelling for food products is still limited in the EU. In the identified cases where retailers are exploring the use of climate labelling, the labels are either still being developed or trialled (e.g. in Denmark, the Netherlands and Sweden), or climate is included as one aspect of broader environmental labels that are being rolled out across product ranges (e.g. in Belgium and France). This means actual data on the share of food products carrying a climate-specific label is not yet readily available.

The indicator was proposed to be tested at the retailer level. Based on the anticipated lack of actual data available to test the indicator in depth, the proposal was for the team to contact retailers and other stakeholders (via email or online interviews) with expertise in the area of climate and sustainability labelling of food, to gather information on past and current experience with climate (and broader environmental) labelling of food. In terms of temporal boundary, if retailers held relevant data, it would be gathered for the most recent available year.

2.1.2 Data collection method

The key data requirements for this indicator are the total amount of food retail sales by a retailer (in EUR or local currency), together with the share (percentage) of those sales that bear a label adhering to the indicator's definition of a climate label (see Section 2.2.1 for proposed definition).

Since the use of climate labelling for food is not yet widespread or mature in implementation in EU Member States (MS), the team's data collection attempt first involved research to identify labels currently in use that could be categorised as climate labels. This was based on desk / internet research to identify existing practices, including sources useful to propose a definition of a climate label (Klimato, 2020) (Edenbrandt & Lagerkvist, 2021) and documents related to EU policy around the topic (see introductory section). A study by the European Parliamentary Research Service (European Parliamentary Research Service, 2023) and presentations from a European Parliament workshop (European Parliament, 2023) were helpful in leading to identifying information recent trials and existing practices.

This was followed by contact with stakeholders (via online interview and email) active on the development of climate (or climate-related) labelling, including companies involved in research on the topic (ADEME in France and CONCITO in Denmark) and retailers who have already demonstrated an interest in environment-related labelling of food products (Axfood in Sweden and Colruyt in Belgium). These contacts helped to consolidate and complement the information found during the desk / internet research on existing labelling and recent label trials. The approach described here matches the data collection plan developed for the indicator, namely to use desk research and stakeholder engagement methods. Please view Appendix 5.1 for a summary of the interview notes and email responses.

The data model for the indicator is rather simple and is described in Section 2.1.3 below.

2.1.3 Calculations

The input data for the proposed calculation method are:

- Input data 1: Total retail sales (in EUR or local currency).
- Input data 2: Sales of products bearing a label adhering to the definition of a climate label (in %).

The output data would be the share of climate labelled products as percentage of retail sales, derived using the following basic calculation:

$$sales\ of\ products\ bearing\ a\ climate\ label\ \div total\ retail\ sales = share\ of\ climate\ labelled\ products\ (\%)$$

It is proposed to gather the data at the large retailer level (perhaps initially only for retailers with a certain % share of sales) for each MS.

2.1.4 Timeline

Table 2 below provides an overview of the key tasks in the timeline for the preparation of this indicator case study.

Table 2. Timeline for preparation of FWN1

WC	18-Dec	25-Dec	01-Jan	08-Jan	15-Jan	22-Jan	29-Jan	05-Feb	12-Feb	19-Feb	26-Feb	04-Mar	11-Mar	18-Mar	25-Mar
Task 1 - Desk research															
Task 2 - Outreach to stakeholders & develop interview /															
Task 3 - Stakeholder interviews / email questions															
Task 4 - Conduct analysis															
Task 5 - Write up case study															
Review period															
Key deliverables										Interview questions / templates				Initial draft case study	Draft case study

Legend

Task progress

Christmas holiday

Review period

Key deliverable

2.1.5 Data gaps and mitigation

As explained above, climate labelling of food products in the EU is still rather limited, although some retailers are currently exploring climate labelling or have conducted initial trials. This means that data on the share of products that carry a climate label is not yet being specifically gathered by retailers, meaning the data is not yet available to test the indicator. To mitigate this, in the interviews with stakeholders, the team asked whether the data either is already, or would be relatively easily, available. Since the responses to this were broadly positive (see Section 2.2), in the team's view retailers should be able to collect and share the necessary data relatively easily in the future.

Table 3. Overview of identified data gaps, limitations and mitigation efforts

	Description of data gap	Mitigation efforts	Level of confidence
1	Current lack of data on number or share of products carrying a climate label	Discussion with stakeholders on whether the data is feasible to collect, or would be feasible to collect in future	High

2.1.6 Quality review of analysis

Sense-checking was done continuously throughout the testing and reporting phase with weekly meetings of the project team. The findings of the desk / online research of the team were checked and validated during the discussions with stakeholders, which broadly confirmed that the information found was accurate and provided a satisfactory picture of the current breadth and status of the use of climate-related labels on food products in the EU. The stakeholders selected were knowledgeable on the topic of environment- and climate-labelling, and on the activities of retailers in this area, and therefore were deemed by the project team to be reliable sources of information. The analysis in this document was prepared by one member of the team working on the food, water, and nutrients indicators group, sense-checked by another member of the team, and then passed to the project lead for final quality review.

2.2 KEY ANALYSIS RESULTS

2.2.1 Analysis

Defining a 'climate label'

It is useful to first discuss the framing / definition of the indicator, in particular defining what should be considered a **climate label**. A clear definition is needed to provide accurate measurement under the indicator of the share of products bearing a climate label (once data is available). The team's initial research identified several sources that offered descriptions or definitions of climate labels. For example, (Klimato, 2020) states that labels should tell consumers not just what a product contains, but also the cost to the planet of making it. The same source suggests that food industry climate labels can be based on calculations of GHG emissions presented as kg CO_2e (kilograms of CO_2 equivalent), based on values obtained through life cycle assessments (LCAs) that take into consideration the different stages of production. Another source points out that carbon labels should provide consumers with information about the climate impact of products, allowing them to identify low(er)-carbon alternatives (Edenbrandt & Lagerkvist, 2021). A third source (Blomqvist, 2009) suggested that a labelling scheme should be: marketed towards consumers, based on standards or rules that have to be fulfilled to use the label, and certified by someone other than the producer. Climate labels specifically must address the problems of climate change as one of their main rationales.

The team's initial research also identified a variety of different potential approaches to climate labelling of food products, including:

- A label stating the actual / estimated kg or g CO2e emissions per unit of product.
- A broader environmental label including climate impact as one of the factors considered.
- "Traffic light" or other scale-based labelling, (e.g. categorising products as red / amber / green or on a scale of 1-5 based on their climate impact (i.e. based on emissions calculations, but not using the quantity of emissions as the actual number on the label)).

- Statements about carbon footprint in comparison to other products.
- "Net zero" or "fossil free production" statements.
- Labels on the product pack or labels on the retailer shelf carrying the product.

One recognised expert on labelling argues that positive and negative labelling can be equally effective in promoting eco-friendly choices, that graded labels (e.g. scales) tend to be more effective than either positive or negative labelling, and that relative (e.g. traffic light) labelling is more effective than absolute (numerical) scores (Thøgersen, 2023). In addition, the labels should be applied to a large share of products in a category, and categories should include meaningful substitutes for consumers (Thøgersen, 2023). A climate label should also be applicable to any type of food product, since the purpose of such labelling should be to inform on the climate impact of food products within categories (e.g. for meat, beef versus chicken), but also between categories (e.g. dairy versus plant-based milk) to encourage broader shifts towards less climate-impactful food products (CONCITO, 2024).

Based on this research, the team developed the following draft definition for a climate label:

> *A label, on-pack or on-shelf, that contains information for consumers about a product's climate impact, (e.g. in the form of CO_2 equivalents (CO_2e) / carbon labelling) or a broader environmental impact label with climate impact as one of the factors.*

This definition was shared with the stakeholders contacted during the research, to gather views on its appropriateness. Two stakeholders suggested that a climate label definition should focus on labels that are based on calculations of CO_2 or CO_2e per kg, since this gives a more accurate representation of climate impact specifically (CONCITO, 2024) (Axfood, 2024). However, it may be preferable to use this underlying figure to determine a product's position on a common graded scale, rather than including the actual CO_2e emission amount on the label, since a graded scale is simpler and easier for consumers to understand (Thøgersen, 2023). One stated that other environmental (and possibly non-environmental) aspects could also be included in a label, but that the climate impact should at least be noted separately in a visible way (CONCITO, 2024), not grouped into a single environmental score. Another interviewee suggested that the term climate label should not encompass broader environmental impact labels, since it only refers to climate, and pointed out that the EU product environmental footprint (PEF) method includes 16 impact categories, including climate (Colruyt, 2024). Finally, one interviewee (ADEME, 2024) felt that a broader definition may be useful, to encompass more labels; this matches with the plan for the eco-label due to be introduced in France for food (and textiles) during the course of 2024 (see below). Whilst these responses perhaps point more towards using a narrower definition of climate label for the indicator (e.g. a label based on calculations of CO_2e) the team recommends further research on this to set a solid climate label definition before the indicator is introduced.

Current use and recent trials of climate labels

Although climate-specific labelling of food products is relatively uncommon at present, some retailers have either trialled, intend to introduce, or are already using some form of climate-related or broader environmental impact labelling. The main examples identified are summarised in Table 4 below and briefly discussed underneath.

Table 4. Summary of identified environmental and climate labels for food products

Country	Retailer and label name	Type of label	Status (trial / planned / in place)	Calculation basis	Products labelled
Belgium	Retailer: Colruyt Label: Eco-Score	Includes climate as one of several factors Scale (A-E)	In place	Life-cycle analysis + bonus / malus	Over 80% of products, including 4,800 own-brand and 10,000 other-branded products (not packed water, soft drinks or

Country	Retailer and label name	Type of label	Status (trial / planned / in place)	Calculation basis	Products labelled
					fruits and vegetables)
France	Label: Mandatory eco-label for food	Includes climate as one of several factors Overall score and colour scale	Planned for 2024	Product environmental footprint + additional considerations	-
Denmark	Retailer: Netto Label: Skyen ('The Cloud')	Climate-specific	Six-month trial in 2021	The Big Climate Database (climate footprint data)	Small proportion of products: top 25% of products overall, and top 25% of products within a given category
The Netherlands	Retailer: De Aanzet organic grocery store (Amsterdam)	Includes climate as one of several factors Price cards and receipts showing 'hidden' costs (climate, underpaid wages, land use and water)	In place	Calculations by True Price social enterprise	-
Sweden	Label: 'Svenskt sigill' ('Swedish seal') and 'Klimatcertifierad' ('climate certification')	General food sustainability label with add-on climate certification element	In place	Climate certification based on primary production (e.g. choice of feed, fertilizers, energy efficiency)	-

The **Belgian** retailer Colruyt uses the Eco-Score label on numerous own-brand and other-brand products. The Eco-Score is based on a life-cycle analysis score (including climate change impact, together with ozone layer depletion, ionising radiation, land, water & energy use, land, water & air pollution, and resource depletion), with added bonus / malus points (on production method, packaging, origin and biodiversity), to give an overall score on a scale of A (very low environmental footprint) to E (high footprint) (Colruyt, 2024). Hundreds of producers have provided data to allow Eco-Scores to be calculated for their products (Snoeck, 2021).

In **France**, a mandatory eco-label is due to be introduced for food (and textiles) during 2024. That label, mandated by the 2021 national Climate & Resilience Law (Ministère de la Transition Écologique et de la Cohésion des Territoires, 2021), will be based on the product environmental footprint (PEF) method with some additional considerations such as biodiversity also taken into account. The label will contain an overall final score (with climate as one of the factors, likely accounting for some 20-40% of the product's total score, depending on the product type) and a colour-coded scale. For example, vegetables will likely have a score somewhere around 0-10, dairy products 20-50, and meat 100 or more (ADEME, 2024).

In **Denmark**, the retailer Netto trialled a climate-specific label, Skyen ('The Cloud'), in two of its stores (in Horsens and Copenhagen) over a six-month period in 2021. The trial involved adding a small cloud symbol to the shelves carrying products with the lowest climate impact. The label was applied to the top 25% of products overall, and the top 25% of products within a given category (so for example the top 25% of meat products had the label applied, although meat as a whole may not be in the top 25% of overall products) (Trendwatching, 2021). Data from the Big Climate Database (CONCITO, n.d.) which contains data on the climate footprint of 503 food products, was used to identify which products should have the Skyen label. The database does not contain information specific to individual products, but rather average figures for food types (e.g. apple juice, pasta, partly-skimmed milk, chicken breast, frozen broccoli, onion etc.); this average approach keeps the time and resource needed for the database relatively light (CONCITO, 2024). Results of the Netto Skyen trial included sales of beef falling by 4% and beef cold cuts by 6% compared to sales in other stores (Thøgersen, 2023). Based on the trial, the Salling Group, which owns and operates Netto in Denmark, advocates for a Danish climate label using a scale and colour model (e.g. A (green) to E (red) based on individual products' CO_2e footprint) to be used across all food categories (Salling Group, n.d.). Indeed, the National Food Authority's climate labelling group has suggested that a Danish label should be on a green to red scale, with all products placed somewhere on the scale; Danish retailers are awaiting the outcome of this national process before making further moves on climate labelling (CONCITO, 2024).

One organic grocery store in **the Netherlands** (De Aanzet in Amsterdam) has introduced increased prices to account for the hidden costs of production and distribution, including climate impacts (as well as land use and water impacts, and underpaid wages) based on work by the social enterprise True Price (True Price, 2024). Price cards in the store show a breakdown of those extra costs (for example in 2020 the price of a cauliflower was increased by €0.06 for climate tax, as well as by €0.03 for underpaid wages, €0.18 for land use and €0.01 for water); customer receipts list the total extra costs as '*verborgen kosten*', or hidden costs, separate from the regular price (Trendwatching, 2020).

In **Sweden**, food retailers and the food industry have agreed a common methodology to develop a database including climate-specific data which all actors would be able to use for any purpose, including as the basis for climate labelling. A third-party auditor will check that companies follow the common method, otherwise they will not be able to claim the figures as official. The database itself is still under development. Additionally, the well-established 'svenskt sigill' ('Swedish seal') general food sustainability label also offers an add-on 'climate certification' ('Klimatcertifierad') element, for producers that wish to have greater recognition of the climate impact of their products (based on aspects of primary production such as choice of feed, fertilisers and energy efficiency) (Svenskt Sigill, 2023).

The EU LIFE-funded project ECO FOOD CHOICE (ADEME, 2024), which will run until 2028, has the overall aim to present the EC with an environmental labelling system validated and recognised by a range of stakeholders. The project includes: construction of European databases using a harmonised methodology for life-cycle inventories of food products; development of methods and tools to translate life cycle inventory scores into environmental scores accounting for all the environmental impacts of food products; and testing label formats in supermarkets, canteens and online platforms in France, Germany, the Netherlands and Spain, to assess the impact of labelling on consumers and farmers.

Overall, these examples point to the need for climate labels to: be based on a sound methodology (such as the EU PEF method for life-cycle analysis (European Commission, 2021)) and databases with climate impact data (national or possibly in future EU-wide) to determine the use of the label and potential score of products; be simple for consumers to understand (e.g. a colour scale, grading or numerical score); and be used across product categories to enable comparison between the widest possible range of products.

Data availability for measurement of the indicator

No publicly available data has been found by the team to measure the indicator at present.

One of the retailers contacted during the research, Axfood in Sweden, has a target for sustainability-labelled products to account for at least 30% of its sales by 2025 (Axfood, 2021); in 2021, 28.1% of sales were sustainability-labelled products (Axfood, 2021). However, it should be noted that this includes several types of sustainability labels, not all of which include climate impact as a factor (Axfood, 2024). During an interview, the retailer confirmed that although the data to measure the proposed indicator is not immediately available, it could be obtained relatively easily, based on data about the products carrying a sustainability label, plus information on which of those labels include climate impacts as a factor (Axfood, 2024).

The Belgian retailer Colruyt, contacted via email, responded that over 80% of its food products carry the Eco-score label, including 4,800 own-brand products and 10,000 other-branded products (Colruyt, 2024). This includes a wide range of products, although not currently packed water, soft drinks or fruits and vegetables (although the latter will be added once some methodological issues are resolved).

During the trial run in two Danish Netto stores, the percentage of the products carrying the label was not recorded, although one interviewee confirmed that it was a “small proportion” of products (CONCITO, 2024).

2.2.2 Limitations

One of the key issues to be resolved before introducing this indicator will be to **develop a clear definition of a climate label**. Whilst initial discussions with stakeholders suggest that perhaps a narrow definition of a label (e.g. only those based specifically to calculations related to CO_2e) may be preferable, the team recommends further research on this. In addition, the introduction of many different climate labels could lead to confusion and rejection/mistrust of labels by consumers. A minimum level of standardisation of recognised labels could be considered, e.g. based on the type of label, calculation method and/or compliance with the requirements of the (proposed) Green Claims Directive on the substantiation of environmental claims.

As noted, climate-specific labelling of food products is relatively uncommon at present, although there are available examples of broader environmental labels and trials of climate-specific labels. Based on the **limited data** found during the testing phase, it has not been possible to fully test the indicator at this stage. However, based on the inputs from stakeholders so far, it is the team’s view that if the indicator is pursued, it should be relatively simple for the data to be gathered and reported by retailers (see Section 2.2.1).

2.2.3 Performance

The Task 4 RACER assessment in Table 5 below refers to the original indicator proposed, which was **the possibility for consumers to know products and their regions through labelling**. However, the Task 5 assessment refers to the indicator that was eventually assessed, on **climate labelling**.

On **relevance**, the indicator would be complementary to existing EU level indicators (in particular the new EU CE monitoring framework indicator on GHG emissions from production activities). It would contribute to a better and broader understanding of circularity in the food sector. Including an indicator on climate labelling of food in an expanded suite of CE indicators could provide an indication of the motivation of retailers to communicate the climate impacts of the products they sell, and the provision of such information to consumers can also help to shift consumption, and associated production, towards less climate-impactful products and methods. In addition, should the EC in the future propose a framework regulation on sustainable food systems (see the introduction to this chapter), such a label could help to contribute to its objectives.

On **acceptability**, the stakeholders contacted during the testing phase (two companies involved in research on the topic and two retailers) were broadly supportive of climate labelling and the introduction of a related indicator. In addition, research is ongoing on the topic, some MSs are looking towards national labels (e.g. France and Denmark) and climate impact databases (e.g. Sweden), and some retailers are already implementing or trialling labelling that considers climate impacts (e.g. Colruyt in Belgium). This suggests that the idea of climate labelling of food is gaining traction. Motivation to report the indicator, however, may need to be further assessed to have a full picture of acceptability; some retailers may be relatively motivated to introduce and therefore monitor climate labels (ADEME, 2024) (Axfood, 2024) (CONCITO, 2024) whilst others are more sceptical or may prefer broader environmental or eco-labelling (Colruyt, 2024). In addition, there may be some opposition to climate labelling from producers of more climate-impactful products such as meat and dairy (CONCITO, 2024).

On **credibility**, methodologies already exist to support the implementation of climate labels (such as PEF and life-cycle analysis) as well as databases existing and in development in several MS (such as Agribalyse in France and The Big Climate Database in Denmark). The methodology used for a climate label should ensure differentiation can be made between more and less climate-impactful products within a product category, for example by including as much granularity as possible on the climate impacts associated with different production methods (such as open grazing versus intensive livestock farming, use of land deforested for agricultural use, organic production and so on). More research would be needed to fully define what constitutes a climate label, as this will be key to ensuring the credibility of an indicator to measure the use of climate labels.

On **ease**, although the required data is not yet readily available, only two simple parameters are required (i.e. products carrying a climate label, and overall sales) that would be relatively easy to collect, and the cost of data collection to retailers should be low.

On **robustness**, provided a sound definition of climate label is developed, bias within the data should not be a significant issue. Although data is not yet widely available, the methodology for collecting the data and for measuring the indicator should be rather simple, should the indicator be pursued.

Table 5. RACER evaluation

Stage of project	RACER criterion					Score
	Relevance	Acceptability	Credibility	Ease	Robustness	
Task 4 (original RACER assessment)	2	3	2	3	3	13
After Task 5 (following testing)	3	2	2	3	2	12

Please view Appendix 5.1 for the RACER assessment matrix. This indicates what a score of '1', '2' and '3' mean across each criterion and helped to ensure consistent decision making across the team and Tasks.

2.3 CHALLENGES AND LESSONS LEARNED

2.3.1 Challenges

The main challenge faced in attempting to practically test the indicator was the lack of current data, meaning that no actual calculations could be made. Although some food labelling initiatives exist, these currently focus more on broader environmental labelling with climate as one of the factors considered, and experiences with climate-specific labels have so far been limited to smaller trials. This meant it was not possible to test the indicator with actual data. However, based on the discussions held with stakeholders to gather their thoughts on the indicator, it appears that at least some retailers are interested in the idea of climate labelling, and would be able to gather the data needed relatively easily in future, in particular since the indicator only requires data on a limited number of simple parameters (i.e. products carrying a climate label, and overall sales). It is worth noting that the retailers contacted were large; Axfood has around 20% of the food market in Sweden (Axfood, 2024) and Colruyt accounts for around 31% of retail food sales in Belgium (Rompaey, 2023).Whilst this focus was useful due to the market share of those retailers, engaging with SMEs during further development of the indicator could uncover challenges and opportunities that would apply to smaller retailers, which could potentially pose barriers to the wider adoption of climate labelling.

An additional challenge relates to the compliance and enforcement of future climate labelling standards. The effectiveness of climate labels will depend on the creation of robust compliance mechanisms and enforcement strategies to ensure that relevant labelling standards are adhered to, so that the indicator can be measured accurately. Setting up these approaches could, at least initially, pose a challenge to both the relevant authorities and the retailers. The requirements of the (proposed) Green Claims Directive could play a role here.

2.3.2 Lessons learned

A couple of points emerge from the team's research that would be useful to consider in future or further assessment of the indicator.

Firstly, as noted in Section 2.2, a **clear definition of what constitutes a climate label** will be needed. The team recommends further research to be carried out on the types of climate labels available and being trialled, and also to determine whether broader environmental labels that include climate as one of several factors should be included in the scope of the definition. It would also be useful to take into consideration which **underlying calculation methods** labels may be based on (e.g. whether to include in scope only labels based on existing recognised methodologies such as PEF and life-cycle analysis) or to also allow labels to be based on other methodologies. These elements will allow for the creation of a clear definition, to allow the indicator to be measured as accurately as possible in the future.

The research on this indicator also indicates that it will be important to ensure that future **climate labels are clear and accessible**, to ensure that the complex environmental information behind the label is represented in a way simple enough for consumers to understand. Climate labels that are easily understood will be more effective in guiding consumers towards making more sustainable food choices without requiring extensive background knowledge.

On **data collection**, the team believes that retailers (in particular larger retailers) would be able to collect and report the necessary data relatively easily in future, even though it is not specifically collected at present, since only a limited number of simple parameters are needed (i.e. products carrying a climate label, and overall sales). It would nevertheless be useful to do some further outreach to retailers, also to SMEs, to gather additional views on the ease of collecting the necessary data, and the willingness of retailers to participate and support MS authorities in reporting of the data.

2.4 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that this indicator is considered for further development, with significant work required to facilitate its progress.

The team considers that the indicator is suitable for further development, with further work still required to facilitate its development and implementation.

Following the testing of this indicator, it was found that its original name 'Presence of guidance (labelling) on climate impact of food product categories' was fit for purpose and that no variation was needed.

On **robustness**, the indicator should be robust provided a sound definition of climate label is developed to underpin it, in particular because climate-specific labelling of food products is still relatively uncommon. A sound definition should be the only real guidance needed for retailers to collect the data needed. However, efforts could be made to have a minimum level of standardisation of recognised labels, to limit confusion and rejection/mistrust of labels by consumers. In addition, compliance and enforcement checks to ensure that the climate labels reported meet the final climate label definition would be beneficial, also to ensure the **objectiveness** and **replicability** of the indicator and that only labels meeting the definition are included in the data. The requirements of the (proposed) Green Claims Directive could play a role here. In addition, from the team's research it seems that relevant stakeholders (notably retailers) may be broadly supportive of climate labelling and the introduction of a related indicator, in particular since some MS are already looking towards national climate labels (e.g. France and Denmark) and climate impact databases (e.g. Sweden), and some retailers are already implementing or trialling labelling that considers climate impacts. However, it would be useful to undertake some broader stakeholder consultation to gauge support amongst a wider group of retailers, also including SMEs to see if there are any particular issues that could affect them.

On **reliability**, methodologies already exist to support the implementation of climate labels and there are underlying databases in place or in development in several MS.

On **relevance**, the indicator would be complementary to existing EU level indicators and would contribute to a better and broader understanding of circularity in the food sector. In particular, it could complement well the indicator in the new EU CE monitoring framework on GHG emissions from production activities (kg per capita), since it would help to highlight CO_2e equivalent emissions related to food.

On **directness**, the data needed to measure the indicator (products bearing a climate label, and total sales) are rather direct and require only limited manipulation. On **availability**, although the required data is not yet readily available, retailers should be able to collect and report with relatively low effort and cost.

The main recommendations of the team, summarised in Table 6 below, relate to the need for:

- A sound definition of climate label and the necessary research to develop this, including research into which underlying calculation methods labels may be based on.
- Further outreach to stakeholders – in particular retailers, including SMEs – to gauge both the likely availability of data in the future and the acceptability of the indicator with key stakeholders.
- Testing and (if testing proves successful) introduction of the indicator.

Table 6: Summary of recommendations for indicator FWN1 – Climate labelling of food

Type of recommendation	Recommendation	Timeline	Key stakeholders or partners	RACER criteria addressed
Additional research and development of brief guidance on definition of 'climate label'	Research to create a sound definition of 'climate label', and potentially which underlying calculation methods climate labels should be based on	Short (c. 1 year)	EC / contracted consultants – oversee / conduct research. Organisations involved in developing environmental and climate labels for food (e.g. ADEME, CONCITO) – provide expert input. Retailers – give views on proposed definition.	Relevance Credibility Ease Robustness
Stakeholder outreach / consultation	Consult stakeholders on future availability of data and acceptability of the indicator	Short (0.5 – 1 years)	EC / contracted consultants – oversee / conduct consultation. Retailers, including SMEs – give views in response to consultation.	Acceptance Ease
Introduce indicator	Test and introduce the indicator	Medium (1.5 – 5 years)	EC – incorporate indicator into monitoring framework. Retailers – collect and provide data to MS to report. MS – reporting of data to EC.	Relevance Acceptance Credibility Ease Robustness

3. INDICATOR 2 – PRESENCE OF REQUIREMENTS FOR ORGANIC PRODUCTS IN PUBLIC PROCUREMENT OF FOOD

Public institutions have a significant influence on the food system due to the down-stream and up-stream impacts of their procurement decisions; being able to influence both the diets of a significant amount of people in settings such as hospitals, elderly care, schools, public canteens etc. and the supply of goods due to their demand. Thus, it is essential that public institutions align their purchasing with EU strategies including the Farm to Fork and the EU Green Deal (European Commission, 2019; European Commission, 2020). One key aspect in the Farm to Fork strategy is the emphasis on organic agriculture due to its positive environmental and health effects.

The indicator **presence of requirements for organic products in public procurement of food** is intended to capture the extent to which procurement by city/regional level public authorities requires procured food to be organic. Higher performance in this indicator can lead to increasing total consumption of organic food and positive implications on social, environmental, and economic facets of the CE of food (Ferrari, Jugend, Armellini, Macedo Barbalho, & Monteiro de Carvalho, 2023; Fogarassy, Nagy-Pércsi, Ajibade, Gyuricza, & Ymeri, 2020; Lindström, Lundberg, & Marklund, 2020; Stefanovic, 2022).

There are many benefits to monitoring this indicator, for example:

- Keeping track of alignment between public institutions purchases and EU strategies including the Farm to Form strategy and the EU Green Deal.
- Signalling to public institutions the desirability of organic in public procurement,
- Higher performance in this indicator is expected to lead to higher demand for organic food, resulting in positive environmental, social, and economic outcomes.

3.1 KEY METHODOLOGY

3.1.1 Testing method

This indicator was tested at the local and regional authority level. The actors most relevant to contact differ between countries and their procurement arrangements. Two case studies were identified to test the feasibility of the indicator and data availability: Lund Municipality in Sweden, and Generalitat de Catalunya (GdC), Spain. These case studies were chosen to represent different geographical and socio-economic European contexts, and since the project team had capacity to overcome potential language barriers with inhouse knowledge in Swedish and Spanish/Catalan. Moreover, the two case studies represent different levels of governance. While Lund represents the municipal level, GdC represents the regional level.

Stakeholders were contacted via email and telephone. A survey was considered. However, given the non-standardisation of data and processes between local actors, direct engagement was deemed to allow for more contextual questions necessary to find the appropriate information. Initial interviews were held with Lund Municipality and GdC respectively to get their insight and data relating to the indicator. Further stakeholder outreach was done after the interviews to get more detailed insights to the feasibility of the indicator and access to data (see Table 7).

3.1.2 Data collection method

Data required for this indicator is tender documents specifying the requirements for food for the previous year. Alternatively, if already available, data on total number of food products procured by the organisation, and data on the total number of food products that are required to be organic. Output data is share of total food products for a given year (if available for the previous year) that are required to be organic. For increased granularity, the share can also be weight (kg), cost, or number of organic products purchased.

The data collection process started with desk-based research and concurrent stakeholder outreach to understand the procurement contexts and processes for the case studies. Most of the outreach was done in relation to the Swedish case study, as the GdC case study allowed for testing a web scraping tool with an existing database. The methodology for the web scraping tool is consistent with the cities and regions (CR) indicators, CR1, CR4, and CR8, and can be found in Appendix 5.3. Key words in English were derived from the EU Green Public Procurement (GPP) criteria and were translated to Catalonian. The key words were used as input to the web scraping tool. The key words can be found in Appendix 5.4.

The main stakeholders that were consulted are described in Table 7.

Table 7. List of consulted stakeholders

Stakeholder	Relevance	Derived information
The Swedish Procurement Agency	When searching in the National Agency for Public Procurement statistics service (The Swedish Procurement Agency, n.d.) there is a possibility to filter for "Krav på att merparten av de relevanta inköpen ska överensstämma med förordning (EG) nr 834/2007 om ekologisk produktion och märkning av ekologiska produkter" (translates to "Requirement that the majority of the relevant purchases should conform with Regulation (EC) No 834/2007 on organic production and labelling of organic products").	When consulting the data quality declaration report (The Swedish Procurement Agency, 2023) and phoning the Procurement Agency's question service, it became apparent that there are significant data gaps for the sustainability data, with a 90% non-response rate.
Ekomatcentrum	A non-profit organisation that produces yearly statistics on the share of organic food in the public sector, by surveying 290 municipalities and 21 regions (Ekomatcentrum, 2023). They produce a national **share of organic in publicly purchased food** (37% in 2022) as well as percentages for the separate municipalities and regions.	The data used to write the report was not publicly available but gathered through a survey methodology and by collaborating with Matilda Food Tech, a private company that do not have open access data. There are several private companies and platforms in Sweden.
Lund Municipality procurement officers	Case study. An interview was held with two procurement officers who had limited knowledge of the questions asked. They assisted in reaching out to their colleagues and sent two framework contracts for food, and Lund's food plans. IEEP then called the contact person on these documents who specifically worked on food procurement.	The Lund employee who worked specifically with procurement of food in Lund and shared valuable information about the processes of food procurement in Sweden, and data sets for the requirements for products that are in Lund municipality's currently valid framework contracts for food products (i.e. a snapshot), as well as data for all food that was procured in the municipality, including whether or not it was organic. She also shared the insight on the SILO project.
Årstalistan	This is a separate service that procurement authorities can use to procure food from. Lund uses Årstalistan to procure fruits and vegetables and thus does not have their own framework contracts for these items. Årstalistan was investigated to complement the procurement data supplied from Lund.	Årstalistan were consulted via email and the list of products offered on 20/02/24 was retrieved and imported into the Excel to complement the data supplied by Lund municipality.
SILO	SILO stands for Statistics Collection of Food Purchases for the Public Sector (MATtanken, 2024). It is an EU funded project gathering data about public purchases of food to a database that will be publicly available **as of April 9, 2024**. The project is gathering data for the previous year, including data on	The project manager for SILO was consulted via telephone and shared that they had developed the data to be as easy as possible for municipalities to capture what was being procured. For these reasons, they recommended to look at actual procured products, rather

Stakeholder	Relevance	Derived information
	whether the food was organic. They do so by sending an email to the municipalities requesting their annual purchasing data for t-1. They will gather statistics annually and aim to eventually expand to collect procurement data also for regions and potentially government agencies.	than procurement requirements or criteria.
Head of Sustainability at Axfood	The Head of Sustainability of Axfood was mainly consulted for FWN1. Given the synergies between the FWN indicators and their background as member of the Swedish parliaments Committee on the Environment and Agriculture, their current role, and agronomy study background, they were consulted also for the RACER assessment of FWN2.	Shared insight on the suitability of organic as a CE indicator, see more under 3.2.3.
Generalitat de Catalunya (GdC)	Case study. An interview was held with GdC together with indicators CR1, CR4, and CR8.	There is no specific indicator for food at the local level. They measure the extent to which social value and environmental clauses are present in tenders as a whole.

3.1.3 Calculations

After the data sets were derived from Lund municipality, the formulas to calculate the data outputs were developed. Calculations were made using both the data on requirements and on purchases. For the requirements, the following formula was used:

$$\frac{(Total\ no\ of\ organic\ products\ in\ FWC+Årstalistan)}{(Total\ no\ of\ products\ in\ FWC+Årstalistan)} = Share\ of\ requirements\ for\ organic\ foods\ in\ Lunds\ procurement$$

The data on purchases was more detailed which allowed to calculate the share of organic in terms of number of products, weight, and cost, offering more granularity to the analysis as per the formulas below.

$$\frac{(Total\ number\ of\ organic\ products\ purchased\ in\ t-1)}{(Total\ number\ of\ products\ purchased\ in\ t-1)} = Share\ of\ purchased\ organic\ food\ products\ that\ were\ organic\ (number)$$

$$\frac{(Total\ weight\ of\ organic\ products\ purchased\ in\ t-1)}{(Total\ weight\ of\ products\ purchased\ in\ t-1)} = Share\ of\ purchased\ organic\ food\ products\ that\ were\ organic\ (kg)$$

$$\frac{(Total\ cost\ of\ organic\ products\ purchased\ in\ t-1)}{(Total\ cost\ of\ products\ purchased\ in\ t-1)} = Share\ of\ total\ cost\ for\ food\ spent\ on\ organic\ food\ (SEK)$$

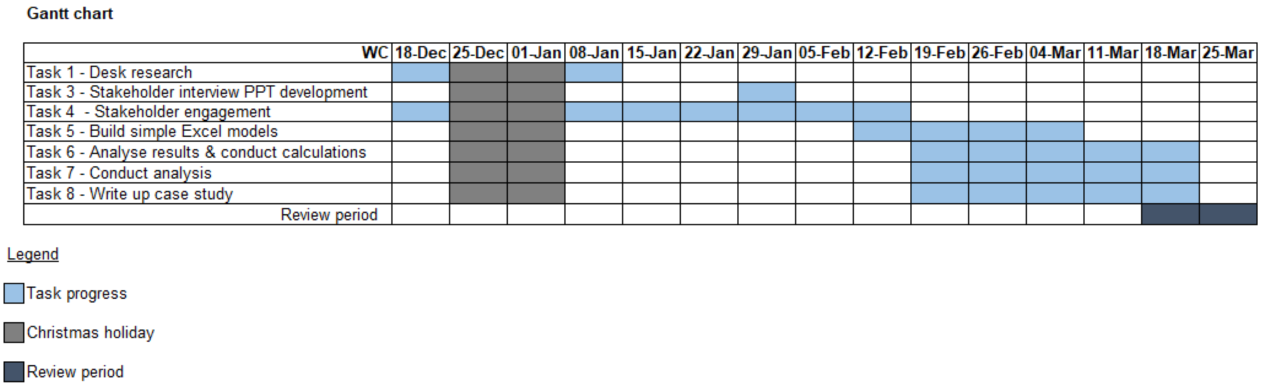
For the GdC case study, the following calculation was used to calculate the share of the tender documents that matched for the key words:

$$\frac{(Total\ no\ of\ scraped\ tenders\ under\ the\ CPV\ codes\ for\ food)}{(Total\ no\ of\ scraped\ tenders\ with\ a\ match\ for\ the\ identified\ key\ words)} = Share\ of tenders\ that\ match\ the\ key\ words$$

3.1.4 Timeline

This indicator has progressed according to the timeline in Figure 1.

Figure 1. Gantt chart for FWN2



3.1.5 Data gaps and mitigation

The initial approach to request access to the procurement documents and use the web-scraping tool to scan for key words providing insights on the requirements for organic food was3 a more feasible path for the GdC case study than for the Lund one. The consulted food procurement officer in Lund made it explicit that even though a keyword such as “Ekologisk” (organic in Swedish) is found in a framework contract, it says little about the actual requirements. This was confirmed when manually scanning two of the framework contracts for Lund. For example, in the framework contract for Food Wholesales, a translated quote is “*The contracting authority has allocated historical organic purchasing volume between organic and conventional products where both alternatives are requested*”. The web-scraping tool would here find the key word “organic”, but it only states that both organic and conventional foods are requested. In summary: the key words may appear if they refer vaguely to requirements, or if they just refer to a general context.

Thus, rather than scanning the procurement documents, the consulted stakeholder in Lund made explicit that it is more fruitful to look at the list of food in the framework contracts and their requirements. For Lund, they had these in Microsoft Excel sheets used for the calculations. However, they made clear that other municipalities use very different formats as there is no standardised approach. But, specifically for the Lund case study, it seemed like a feasible path.

The procurement data provided by Lund municipality included all their framework contracts for food apart from for fruits and vegetables, as this was procured via a service called “Årstalistan”[1]. Årstalistan were contacted for complementary data to get a comprehensive data set for all of Lund’s procured food. However, the data sets differ in their temporal boundary as Årstalistan changes weekly whereas the framework contracts’ products are set for the whole contract period. This could be managed by creating an average of the previous year’s assortment of organic versus conventional foods. Additionally, the temporal boundary of the indicator does not necessarily match the temporal boundary of the framework contracts (see Table 8).

Considering the challenges with the data on requirements, Lund municipality shared their data on the procured food for 2023, including whether or not it was organic. For Catalonia, data gaps include margin of error in use of CPV codes.

[1] Lund municipality does not have any own framework contracts for fruits and vegetables, but public actors within the municipality call off from https://arstalistan.se/ [accessed 2024-02-23].

Table 8. Overview of identified data gaps, limitations, and mitigation efforts.

	Description of data gap	Mitigation efforts	Level of confidence
1.	Sweden: Data gap for web scraping tool: non-standardisation makes this unreliable for the Swedish case.	Stakeholder engagement with Lund municipality, alternative strategy.	High
2.	Sweden: Not all food is procured using the same type of contract. The Excel derived from the municipality only show requirements for their own framework contracts.	Contacted Årstalistan that Lund municipality uses for their requirements for organic food and retrieved their data.	High
3.	Sweden: Årstalistan changes their assortment a few times weekly. Thus, the temporal boundary differs from the data supplied by Lund and the one supplied by Årstalistan, as the former are framework contracts spanning years whereas the latter is a snapshot.	Although not conducted during the team's testing, a potential mitigation effort would be to request the product range for every day of the previous year and use the annual average share of organic products.	Medium
4.	Sweden and Catalonia: The temporal boundary of annual measurements for t-1 might be mismatched with the data as the framework contracts don't necessarily run over full years. The framework contract for Food Wholesaler for example is valid from 2021-02-01 to 2024-01-31.	Although not necessary for 2023, for the years where framework contracts change during the year, the two consecutive contracts' shares of organic products could be weighted with the respective time they were active within the year.	High
5.	Sweden and Catalonia: direct procurement can be done outside of framework contracts for procurement below certain values.	The procurement officer in Lund was asked how much food was procured using direct procurement, i.e. outside the framework contracts and Årstalistan. Although they did not answer, the data on requirements would need to be complemented with potential data on requirements put forth in any direct procurement.	High
6.	Catalonia: Margin of errors associated with the use of CPV codes in the Catalonia case due to minor/low value contracts, direct awards or human error.	Ricardo reached out to GdC to follow up on the interview and ask for an estimation of the error but did not get a response. Standardisation and / or an estimation of the error could mitigate this data gap.	Medium
7.	Sweden and Catalonia: Even if the tenders require organic products, there may be limitations in monitoring and verifying supplier compliance with these requirements. This gap could lead to discrepancies between reported data on	Although not conducted during the team's testing, a potential mitigation effort would be to ask the key stakeholders for an estimate on supplier compliance and weigh this with the percentage of organic of the procured food.	Medium

	Description of data gap	Mitigation efforts	Level of confidence
	organic procurement and the actual characteristics of the products delivered.		

3.1.6 Quality review of analysis

To ensure robust and high-quality analysis of the data, we conducted the following QA procedure:

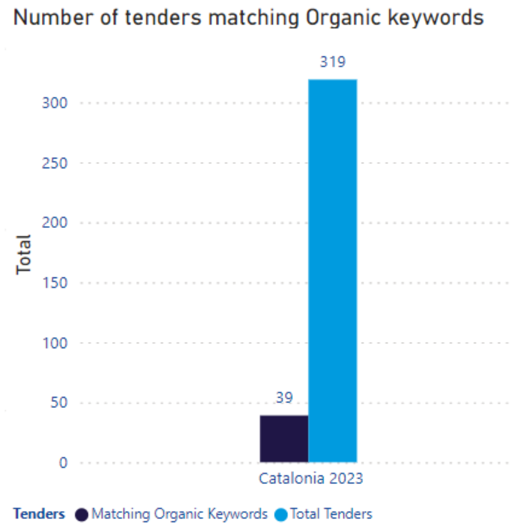
- Prior to work beginning, the Project Director reviewed the proposed research methodology and ensure that the data collection plan is fit for purpose. Only once the research team had addressed any comments from the review process did they proceed to the data collection phase.
- Sense-checking was performed continuously throughout the testing and reporting phase with biweekly meetings between IEEP and Ricardo, in addition to weekly working meetings between colleagues at IEEP involved in the project.
- The consulted stakeholders were asked for input on how to best design this indicator, what they thought about the feasibility of our current approach, and if they had any further recommendations. As displayed in Table 7, the stakeholders represent different levels (e.g. local, national) and areas of expertise (e.g. national data gathering, local procurement, industry). The calculations for the data from Lund were developed in collaboration between colleagues at IEEP and Ricardo. The web scraping tool was used also for the CR group of indicators on public procurement, allowing for continuous exchange and sense checking between colleagues at Ricardo and IEEP.
- An IEEP colleague made an initial quality review of the case study report. Followingly, Ricardo performed two further review steps with two different colleagues. All comments and responses were documented in “DG-RTD - Comments log_v1.1 FWN2”.

3.2 KEY ANALYSIS RESULTS

3.2.1 Analysis

When testing the web scraping tool on the Catalonia case, the tool found 319 tenders for 2023, of which 39 had a match for one or more of the identified key words, giving a share of 12.23 % matching one or more of the identified key words for organic food (see Figure 2). The extent to which this corresponds to the share of tenders stipulating requirements for organic food is discussed in Section 3.2.2.

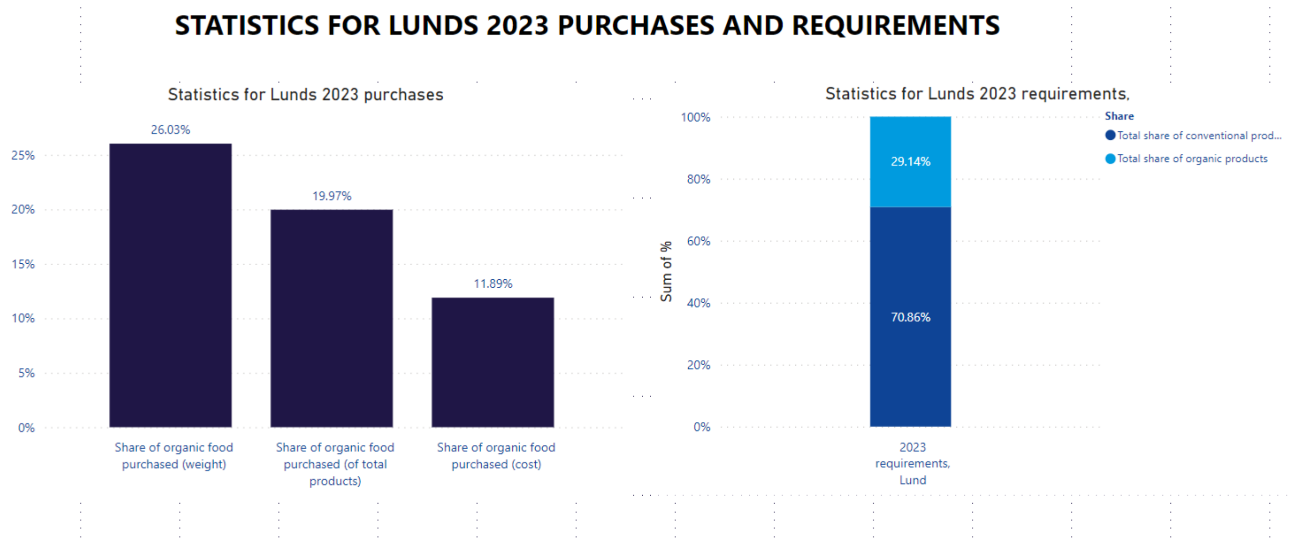
Figure 2. Catalonia - Share of total procurement documents that stipulate requirements for organic food



For the Swedish case, both the *requirements* in the framework contracts and Årstalistan, and the actual *purchases* were analysed. The data shows that 29.27% of the food products in Lund's food framework contracts were required to be organic; the same share for Årstalistan was 28.05%. Considering both Årstalistan and the framework contracts (i.e. all of Lund's procured food products) the share of organic food was 29.14% (see Figure 3).

The data for purchased food enabled some more detailed analysis as the share of organic food could be analysed in terms of the total amount of food products, total cost, or total weight. These three metrics give somewhat different results. While the percentage of purchased food products in Lund that were organic in 2023 was 19.97%, the portion of expenditure for organic food was only 11.89%, and organic food accounted for 26.03% of the total weight (see Figure 3). Interestingly, this indicates that Lund municipality bought organic food that was relatively cheaper per kilogram (kg) than the conventionally grown food. This is further supported by the average prices per kg, where the organic food products have an average price of 110 SEK/kg, and the conventional ones have an average of 116.3 SEK/kg. It also shows adherence to requirements, at least in the case of Lund, results in a higher proportion of organic food compared to the purchase data, both in terms of weight, number of products, and expenditure.

Figure 3. Share of organic food in Lund municipality's purchases by weight, number of products, and cost (left). Share of organic food in Lund municipality's requirements (right).



Please view Appendix 5.5 and 5.6 for the raw Catalonia and Lund data.

3.2.2 Limitations

GdC have developed a guide for public procurement which includes a request that tenders include information detailing how they provide regional, seasonal, healthy, and organic food. These requirements are broader than merely "organic" and are classified as environmental clauses (clausules ambientales). This broader scope makes it more challenging to distinguish and measure requirements for organic food as a subset of environmental clauses. The criteria are flexible so that they can be applied in diverse contexts. Examples of criteria can be found in Appendix 5.7. In addition to the EU organic labelling, GdC use certifications requirements in relation to the Consell Català de la Producció Agrària Ecològica (CCPAE) labelling. The variability in organic certification standards may lead to inconsistencies in what is considered an organic product across different MS. Although the EU organic label can function as a foundation for measuring this indicator, consideration should also be made to how context specific labels such as KRAV (Sweden) should be incorporated in the data. For example, KRAV labelled products adhere to both EU organic standards and further requirements from KRAV (KRAV, 2024).

Another limitation with applying the web scraping tool to GdC is the lack of standardisation in naming for tender documents. The code for the web scraping tool was written to find a specific naming convention for the requirement specification document in the tenders. In the cases where this document could not be found, the web scraping tool instead downloaded all the tender documents and scraped them for the key words. The web scraping tool found 319 tenders. For 72 of these, the tool managed to find the requirement PDF. However, it scanned a total of 2,175 PDFs for the indicator meaning it scraped multiple PDFs for a large majority of the tenders, potentially skewing the data and reducing precision.

There are also limitations to the extent that the match with key words in the web scraping process corresponds to requirements (i.e., the accuracy of the indicator). As indicated in the Excel sheet "FWN2 expedient check" in DGRTD_[FWN2]_[CATALONIA DATA]_V02.00, some tender documents have a high number of matches for the key words whereas many only have one or two matches. To address these limitations, a number of tenders should be manually scanned to evaluate the identified key words capture requirements.

Moreover, the web scraping tool might not fully capture indirect procurement or procurement through intermediaries, where public sector organisations purchase from suppliers who then procure from other sources. Lund Municipality's procurement from Årstalistan is one example of this, and we got the information that Lund was using Årstalistan only through direct stakeholder engagement.

As the Swedish case informed FWN2 to take the direction to recommend looking at purchases rather than requirements (see Conclusions and recommendations), the additional step of manually checking the tender documents and the accuracy of the key words match was not done for FWN2. However, if the EC decides to proceed with the web scraping methodology, this step is highly recommended. Further information about this step can be found in the cities and regions case study reports for CR1, CR4, and CR8, as these indicators were more focused on the web scraping tool and proceeded with this step.

Finally, market fluctuations and various economic factors might affect the availability and cost of organic products, influencing procurement decisions independently of procurement policies or requirements. These external factors may not be fully accounted for in the data on requirements but could significantly impact the outcome in terms of how much organic food is procured.

3.2.3 Performance

On **relevance**, in terms of the indicator's contribution to understanding true circularity, there are several aspects to consider. A sole indicator is always a simplification of many complex interactions contributing to circularity. There is a lot of variation in organic food systems across the EU, and organic is not necessarily a good indicator of circularity. For example, if tonnes of disposable plastic are used to replace pesticides in organic agriculture. An argument for the circularity of organic food is the use of organic manure as fertiliser. Axfood's sustainability manager (see Table 7) pointed out that there is room for improvement in the requirements for EU organic to make it more compatible with CE definitions, and emerging but wide concepts such as regenerative agriculture[2]. Catalonia is working on a law on sustainable agricultural production (PAS) which incorporates agro-ecological principles. Although there are other concepts to consider, coupled with other indicators, share of organic food in public procurement is deemed to be of good relevance. This, since organic is a well-known and well-established concept in agriculture across different European contexts.

If the indicator is changed to measure actual purchases rather than requirements, the **acceptability**, **credibility**, and **robustness** is deemed to be good. Notably, in relation to **acceptability**, the stakeholders in Lund were happy about the SILO project, and the SILO project manager shared that a lot of people were relieved that this data was going to be collected on a national level, as municipalities were currently burdened by multiple requests for similar types of data. Since there is a common framework for EU organic food that is well-spread (although not perfect as pointed out by stakeholders) the indicator is easy to understand and communicate to stakeholders. The **robustness** is good for Sweden, but further investigations would be needed to evaluate data availability in other European contexts.

Finally, with regards to **ease**, in Sweden it could be argued that it is good since national statistics will be available as of April 2024. But, as this is not the case for all European contexts, the data is rather deemed to not be readily available, but easy to collect.

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[2] The terminology of "regenerative agriculture" is for example used by the Ellen McArthur Foundation: https://www.ellenmacarthurfoundation.org/topics/food/overview [accessed 2024-03-07].

Table 9. RACER evaluation

Stage of project	RACER criterion					Score
	Relevance	Acceptability	Credibility	Ease	Robustness	
Task 4 (original RACER assessment)	3	3	3	2	3	14
After Task 5 (following testing)	3	3	3	2	3	14

Please view Appendix 5.1 for the RACER assessment matrix. This indicates what a score of '1', '2' and '3' mean across each criterion and helped to ensure consistent decision making across the team and Tasks.

Note that the indicator was altered after the Task 4 RACER assessment. The original assessment was done for an indicator "Percentage of sustainable purchase of priority products/services within food, water and nutrients sector" that later developed into the indicator as currently formulated. It was changed to "organic" to increase level of specificity and increase the chances of finding available and reliable data to test for this indicator.

As for the target facet area, this indicator was tested as a snapshot of the current (or, more precisely t-1) state of the environmental layer of impact.

3.3 CHALLENGES AND LESSONS LEARNED

3.3.1 Challenges

The web scraping tool was more suitable for the Catalonia case study as the tenders were readily available in one database. However, as described in the limitations section, there are difficulties in applying the web scraping tool as key words such as organic can be mentioned in the procurement documents without being a requirement, risking the reliability of the outcomes. Thus, keywords need to be carefully designed to only encompass requirements for organic food. In the case of Sweden, one potential approach could involve using demand ID numbers. However, from the stakeholder interview it became apparent that the municipalities in Sweden do not have a standardised approach and common terminology, even if guidance is offered by the national procurement agency and the EU (The Swedish Procurement agency, n.d.).

The web scraping tool was not easily applicable in Sweden due to the absence of a single easily accessible database for tenders. Another challenge in measuring requirements was combining the different data sets from Lund's own framework contracts and Årstalistan, that was used for fruits and vegetables, given their different formats and temporal boundaries. This could be relatively easily managed for Lund by merging the data sets as demonstrated in DGRTD_[FWN2]_[LUND DATA]_V01.00. However, the food procurement officer in Lund warned of challenges of measuring requirements at an aggregated level considering the various procurement solutions and formats utilised by different procurement actors. The challenges were addressed by further stakeholder engagement to gain deeper insights. See further description in the list of consulted stakeholders in Table 6 and the data gaps and mitigation efforts in Table 8.

Public sector organisations, especially at the local or regional level, often face capacity and resource constraints that hinder their ability to prioritise and manage sustainable procurement requirements, including organic procurement, effectively. This might include limitations in budget, expertise, and access to suppliers. The availability of organic products in the market and their price compared to non-organic alternatives can fluctuate due to various factors. These fluctuations might challenge the consistent procurement of organic products within budget constraints. The success of integrating organic products into public procurement also depends on the acceptance and demand from end-users. Building awareness and changing consumer preferences towards organic food within institutions like schools and hospitals can be challenging. All three factors above highlight the need for a systemic approach and aligning economic and administrative incentive structures with sustainability objectives.

3.3.2 Lessons learned

A key lesson learnt is that looking at actual purchases rather than requirements has the potential to enhance relevance, acceptability, credibility, ease, and robustness of an indicator on public procurement of organic food.

Relevance in the sense that it measures the actual outcome, therefore a tangible impact. Although a requirement for organic food does say something about the ambition, it does not necessarily correlate with the outcome. This can be exemplified by the Lund case study. Different procuring units within Lund municipality can choose from the products in the framework contracts and Årstalistan. The foods in the framework contracts mirror the requirements put forth by the municipality, but only acts as a "shopping basket" for the procuring units within the municipality. Moreover, there are different types of procurement. In addition to the framework contracts, actors can use direct procurement if the purchase is lower than a certain value, not taking into account the requirements set in the framework contract. Measuring procured food overcomes many of the challenges associated with measuring requirements.

Measuring procured food within Lund for a given year overcomes many of the challenges and captures the combined influence of supply and demand on the share of organically procured food.

Acceptability is improved because several actors that were consulted highlighted the burden on municipalities being swamped with requests for data. Since it is publicly available data, they are legally obliged to provide it (at least in Sweden) but depending on the data requested it can be a time-consuming effort, potentially undermining acceptability. Ekomatcentrum and SILO both measure the share of organically procured food, rather than requirements. A relevant question is whether an indicator on *requirements* for organic food says something that actually purchased food does not, thereby justifying the original approach. An indicator on requirements reflects the ambition of the municipality, local or regional actor, whereas one on actually purchased food is more directly tied to the outcome and its impacts. For progress towards more organic food in public procurement, one can argue that both are important. However, the actually purchased food incorporates both the ambition and the practical implications of it together with other factors and actor's choices.

Ease is facilitated by the existing data collection efforts on publicly purchased food (e.g. (Ekomatcentrum, 2023). The 90% non-response rate for the data on requirements for organic food from the Swedish Procurement Agency indicate the potential problems with measuring requirements. In addition, the data gaps and challenges associated with using requirements as the indicator speaks in favour for instead measuring actually procured food. The fact that other actors collect this data and have been doing so for decades, and that municipalities appear to have it readily available, also suggest that the credibility and robustness is higher for the purchase data compared to the requirement data.

In summary, the benefits of measuring actual purchases outweigh those of measuring requirements in terms of data availability and reliability. Streaming data collection with existing actors enhances acceptability, making *actually procured* food a more suitable indicator than *requirements* for organic food.

3.4 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that this indicator is considered for further development, with minor work required to facilitate its progress.

It is recommended that this indicator is recommended for further development.

Arguably, the share of publicly purchased food is a more accurate indicator than presence of requirements, as it measures the tangible outcome of procurement and circumvents the system boundary issues and issues with non-standardisation of the initial indicator. The identified challenges can largely be overcome by making the change from "presence of requirements for organic food in public procurement" to "share of organic food in public procurement". The project manager at SILO who compiled the national statistics said that their work had been surprisingly straightforward. Additionally, the municipalities were described to be appreciative of SILO's work as they were compiling data that was often demanded from the municipalities by various actors, thus, it should reduce the municipalities' work burden from sharing similar data with a wide range of actors.

For this indicator to work, procuring units (probably different actors in different countries) would need to collect data on their purchases and whether they are organic. In the case studies, this already appears to largely be the case, speaking in favour for the indicator's availability, reliability, robustness, and replicability. As the method relies on procuring units reporting accurate data however, the quality of the aggregated data depends on the quality of the supplied data. Moreover, this indicator has clear synergies with, and adds granularity to, the existing indicator "Green public procurement" in the EU CE monitoring framework. Since organic food is a core criterion in the EU GPP criteria for food, catering services and vending machines (European Commission, 2019), there is already guidance in place to support this indicator with the tenderer supplying necessary data and verifications.

Table 10. Summary of recommendations for FWN2

Type of recommendation	Recommendation	Timeline	Key stakeholders or partners	RACER criteria addressed
Further scoping	Scope which other MS have national statistics like in the case of Sweden and identify best practice in terms of methodology for data gathering. In the case of Sweden, it appears survey methodology / requesting the data in an email is a successful approach.	Short	Local and national stakeholders working with procurement of food and/or data collection	Ease Acceptability Robustness
Data collection	Collect national data where existing (e.g. Sweden as of April 2024), and sub-national data by surveying municipalities and/or other relevant procurement actors for data on all of their procurement of food for the previous year, including whether it was organic and if possible, including numbers on cost, quantity (kg), and products.	Short	Local and national stakeholders working with procurement of food and/or data collection	Ease Robustness
Data modelling	Use data to create statistics on share of organic food both as share of total food cost, weight, and products as described under 3.1.3.	Short	Statistics team at Eurostat	Robustness
Update EU organic label	Update the EU organic label to be more in line with recent developments in CE for food to create better alignment between the indicator and CE objectives, as well as increase acceptability for this indicator.	Medium	Legislators, researchers	Acceptability Credibility Relevance

4. INDICATOR 3 - SUSTAINABLE CALORIE INTAKE PER CAPITA GAP OF ANIMAL-BASED FOOD CONSUMPTION

Diet plays a fundamental role in the circularity of our food systems, as they closely align with the objectives outlined in the Farm to Fork strategy (European Commission, 2020) and the Circular Economy Action Plan (CEAP) (European Commission, 2020). Nonetheless, the challenge lies in determining the most suitable metrics to measure its impact. A wealth of research and scientific findings emphasise the deep connection between human diets, human health, and environmental sustainability (Tilman & Clark, 2014) (Horrigan, Lawrence, & Walker, 2002) (Dora, et al., 2015) (Conrad, et al., 2018). Policymakers in the EU must recognise that issues such as overconsumption and malnutrition exclusively are not exclusively public health concerns but also contribute to environmental degradation and economic inefficiency, in parallel to food waste. The EAT-Lancet report (EAT-Lancet Commission, 2019) advocates for diets rich in plant-based foods and fewer animal-sourced products, citing benefits for both health and the environment. Yet, there remains a pressing need for universally accepted scientific targets that account for healthy dietary patterns within the boundaries of our planet. In particular, There is a call for detailed metrics to monitor the consumption trends of animal-based foods across time and among EU Member States (MS), aligning with the goals of the Farm to Fork strategy and the Sustainable Development Goals (Dora, et al., 2015). Assessing animal-based calorie consumption per capita accurately estimates the variance from recommended levels, indicating potential surpluses or deficits. Moreover, initiatives such as the EU school scheme (European Commission, n.d.), which promotes the distribution of milk, fruit, and vegetables to students, underscore the importance of fostering healthier dietary habits from an early age. By developing indicators like the Sustainable Calorie Intake (SCI) gap to track the consumption of animal-based products, progress can be effectively monitored over time and across regions, with significant implications for achieving balanced diets and reducing the environmental footprint associated with overconsumption. Ultimately, by aligning dietary patterns with WHO guidelines and making strategic shifts in nutritional profiles, material and carbon footprints can be reduced and healthier lifestyles and sustainable food systems can be promoted.

This indicator can bring several benefits, including:

- Enabling the EU to track over time and across regions the progress towards an optimal level (EAT-Lancet Commission, 2019) of animal-based products, which is a cornerstone for sustainable food systems.
- Reducing the overconsumption of animal-based food products. Creating and monitoring a metric on animal-based food consumption imbalance hints at a reduction in excessive consumption of these food categories towards a more balanced diet, thus reducing associated consumption of natural resources and environmental degradation.
- Supporting the progress and monitoring of health-related aspects, such as healthy diets in line with WHO guidelines (WHO, 2004).
- Helping to monitor the effectiveness of other EU policies, such as the EU Green Deal and the Farm to Fork Strategy, aiming at ensuring “food security, nutrition and public health, making sure that everyone has access to sufficient, safe, nutritious, sustainable food"3.

4.1 KEY METHODOLOGY

4.1.1 Testing method

The indicator assesses the difference between actual per capita caloric intake from animal products and a balanced diet's benchmark value.

This indicator is developed nationally among EU MS (EU 27) and annually, over an 11-year time frame. The indicator considers major food categories related to animal-based protein sources and fats. Dairy foods are also included for a more comprehensive view of food derived from animal sources and their ecological footprint.

The data source is FAOSTAT Food Balance Sheets (FBS) website (FAO, 2024) and the indicator was programmed on STATA, a statistical software allowing to compute econometric and statistical analyses,

[3] https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en

among others. From FAOSTAT FBS, data was downloaded regarding calorie intake from animal-based products (unit) for 10-year time series (t=2010, …, 2021) and selected a set of European MS (I= 1, ..., 27). Then, data was synthesised through computation on STATA into a unique value representing animal-based calorie intake per capita per day ($\text{Kcal}_{(i,t)}^{meat}$,i=1,…,27). After, difference was computed between each meat and the benchmark value from the literature were computed. According to the EAT Lancet Report, there are scientific targets for a planetary health diet, with possible ranges, for an intake of 2,500 kcal/day. The definition is taken from the EAT-Lancet Commission and (Willett, et al., 2019) for the benchmark value, the animal-based amount of kcal per capita per day in a balanced diet.

As anticipated in the testing methodology, data was downloaded from FAOSTAT food balances was regarding calorie intake from animal-based products (unit) for a specific year (t= 2021) and a set of European MSs selected (I= 1, ..., 27). The information related to the selected sample of countries, the time series, the variable of interest and the different items: area year item unit value. The items selected from FAOSTAT FBS are the following: *Bovine Meat, Mutton & Goat Meat, Pigmeat, Poultry Meat, Meat, Other, Offals, Edible, Butter, Ghee, Fats, Animals, Raw, Cream, Fish, Liver Oil, eggs, Milk, Fish* (all typologies).

Then, the dataset was cleaned to keep only selected variables necessary to compute the indicator, which are *area (*MSs*), year, item (*food items*) unit, value* (kcal per capita per day). For simplicity, such variables were renamed and described to keep track of any particular characteristics (floating or string variables, frequencies, mean values, and so on). Checks were made for missing values (using the *tabmiss* command), and none existed. The data were collapsed to generate the sum of mean calorie intake per capita per day in each specific country.

The animal-based calorie intake per capita for each country in the sample was calculated by adding up the values related to the calorie intake for each product in the animal-specific sector each year[4]. Once done, each country value was compared (I= 1, …, 27) in a specific year (t=2010, …, 2021) to the benchmark value as obtained from the EAT Lancet report (EAT-Lancet Commission, 2019) which provides scientific targets for a planetary health diet, with possible ranges, for an intake of 2500 kcal/day. For animal-based products, the benchmarks in kcal per day are the following: Whole milk or equivalents 153; Beef, lamb and pork 30; Chicken and other poultry 62; Eggs 19; Fish 40 Saturated oils 96. These are summed to generate the benchmark value ACI*.

Then, the team generated the Sustainable Calorie Intake Gap indicator, SCI gap, by subtracting each $ACI_{i,t}$ to ACI* (*by country (year), sort: gen gap = kcal – bmk*). To provide an alternative indicator, the team developed a Surplus indicator, identified as the SCI gap in percentage points (*gen percsurplus = (gap*100/bmk) if gap > 0*). The data were stored in Excel to give accessibility to all stakeholders.

Given FAOSTAT availability, data over the past 11 years can be collected simultaneously and immediately. Updating in the following years would happen annually. According to our model, the input variable used was the average calorie intake per capita per day from animal-based products (unit) for a specific year (t= 2010, …, 2021) and a set of European MS were selected (I= 1, ..., 27).

The calculations completed, the following output variables were obtained:

- Animal Calorie Intake (ACI) - Total animal calorie intake per capita for each country annually.
- Animal Calorie Intake Benchmark (ACI*) - Benchmark value.
- Sustainable Calorie Intake (SCI) Gap – The final indicator represents the difference between the actual animal-based calorie intake and the benchmark value (ACI*) for each country annually.
- Percentage Surplus (PercSurplus) – Expressed in percentage points, for each MS annually. As an example, if PercSuplus in Denmark in 2017 is equal to 156, it means that the animal-source calorie intake per capita in Denmark in 2017 is, on average, 156% higher than the optimal value recommended for a sustainable, healthy diet.

[4] https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31788-4/fulltext

4.1.2 Calculations

The present section sums up the formulas used to obtain the SCI Gap indicator:

$$SCI_{gap} = ACI_{i,t} - ACI^{*}$$

Where:

$$ACI = \sum_{1}^{t} (Kcal_{poultry}; Kcal_{cattle}; Kcal_{goat}; Kcal_{pig}; Kcal_{dairy}; Kcal_{eggs}; Kcal_{fish})$$

ACI **= Benchmark value for sustainable animal-based calorie intake per capita = 1. 27 EU country unit*

t= 1… T time unit in years

To calculate the *ACI** for animal-based products, the benchmark values in kilocalories (kcal) per day according to the EAT-Lancet (2019), are:

- Whole milk or equivalents – 153 kcal per day.
- Beef, lamb and pork – 30 kcal per day.
- Chicken and other poultry – 62 kcal per day.
- Eggs – 19 kcal per day.
- Fish – 40 kcal per day.
- Saturated oils – 96 kcal per day.

As mentioned in the previous section, the values reported above are taken by EAT Lancet Report (Willett, et al., 2019).

These values were re then summed to obtain the aggregated Benchmark value ACI*

4.1.3 Timeline

Table 11 presents an outline of the time employed and steps followed to deliver the SCI gap indicator.

Table 11. Timeline for preparation of FWN3

WC	18-Dec	25-Dec	01-Jan	08-Jan	15-Jan	22-Jan	29-Jan	05-Feb	12-Feb	19-Feb	26-Feb
Task 1 – Developing the definition and food categories included in the indicator											
Task 2 – Cross checking Literature for the benchmark value											
Task 3 – Exploring available datasets for the indicator											
Task 4 – Developing the code to run on Stata to develop the indicator											
Task 5 – Running the model on Stata tool and extracting results in Excel											
Task 6 – Computing indicators and analysing the results											
Task 7 – Checking for robustness of the indicator through literature											
Task 8 – Write up case study											
Review period											
Key deliverables							Initial draft case study				Draft case study

4.1.4 Data gaps and mitigation

FAOSTAT Food Balance Sheet gives a thorough picture of the outline of a country's food supply and related trends over an identified reference period. As its methodological note (FAO, n.d.), which explains how the dataset is built, makes clear, food availability reported in FAOSTAT includes any loss or waste reported at the retail or consumer level. Due of this, total food availability and its related calorie intake may tend to be overestimated. Also, data points are not granular, therefore differentiation according to sex, age, cultural/specific dietary patterns and relevant sociodemographic characteristics is not possible.

However, it is important to note that alternative data sources have their limitations as well (e.g. households' survey data are collected only for a short period of time, may overlook certain underrepresented subgroups, exclude consumption occurring in institutional settling such as schools, prisons and hospitals, and fail to adjust for food wastage at the retail and household level). Thus, when considering a comprehensive dataset including EU 27 countries over an extended period, the approach chosen to develop this indicator is considered an adequate proxy for the desired indicator.

Table 12. Overview of identified data gaps, limitations and mitigation efforts

	Description of data gap	Mitigation efforts	Level of confidence
1	Differentiate for sex, age groups and cultural behaviours	Use of proxy data	High

4.1.5 Quality review of analysis

The team first ensured that the inputted data were calorie intake per capita per day for each country in the sample (*Item* and *country*). Checks were made that the *year code* was selected correctly for each country and each item. As the analysis runs on STATA, the team also ensured to destring all the relevant variables in order to compute the data appropriately. Checks were made for gaps and missing data (*tabmiss* command), and there were none. The study was compared with similar approaches (Our World in Data, 2023), and the results are consistent.

4.2 KEY ANALYSIS RESULTS

4.2.1 Analysis

Figure 4 presents the main results for this indicator.

Figure 4. Historical trends in both SCI_GAP and PercSurplus for all countries

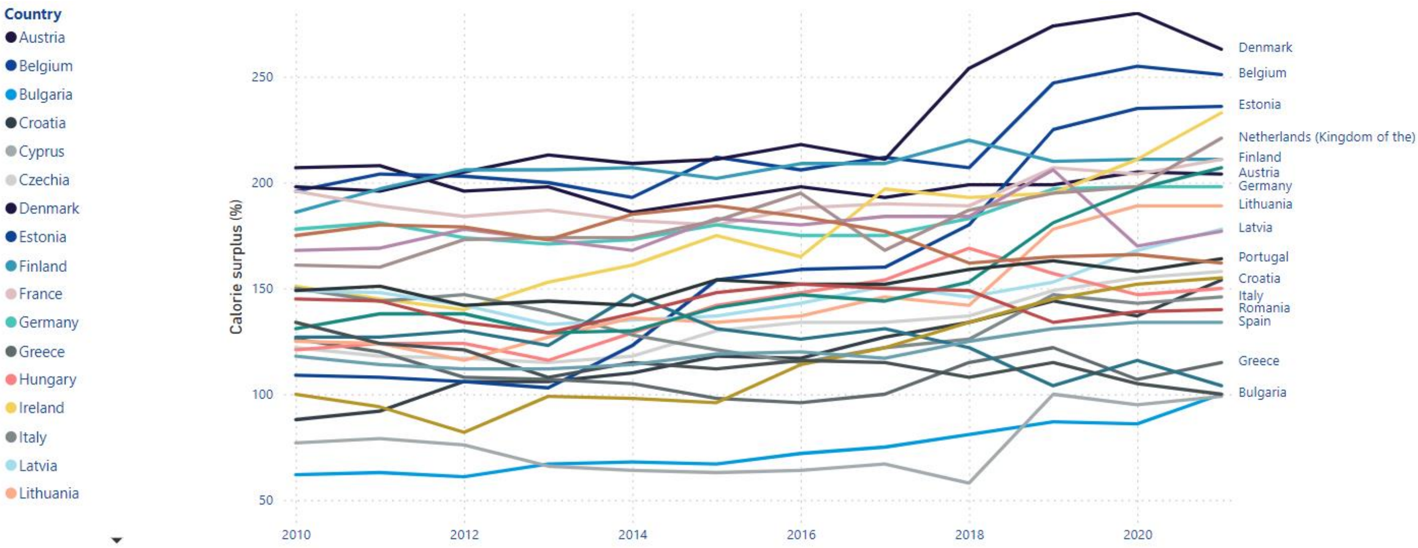

Table 13 shows the historical trend of the SCI GAP indicator for all EU27 countries considered in this analysis, over an 11-year span. As the table shows, differences can be noted between countries and within countries over time. Concerning differences within countries, there are noticeable examples where some Member States consume more animal-sourced food than others. For instance, in 2021, Belgium, Denmark and Estonia were the top consumers, ranging from 952 (Ireland) to 1052 (Denmark) daily animal-sourced kcal per capita. By contrast, in the same year, Cyprus , Slovenia and Bulgaria recorded the lowest consumptions, in terms of kcal per unit per day, registering 395, 400 and 402 kcal/unit/day, respectively.

Concerning differences within each country over time, different trends can be observed. Austria, for example, recorded 828 kcal per capita per day in 2021; it decreased to 770 kcal per day per day in 2019 but it increased again to 817 kcal/capita/day in 2021. Spain showed quite a constant increase, recording a value of 470 kcal/per capita/day in 2011, dropping to 456 in 2012, and then gradually increasing to reach 535 kcal/per capita/day in 2021. On the contrary, Sweden has been one of the EU countries that recorded a decrease, even if nonmonotonic, over the decade. Individuals consumed, on average, 700 kcal/capita/day in 2011; the value increased to 754 kcal/capita/day in 2015 and gradually decreased to 648 kcal/capita/day in 2021.

It is key to consider that differences in consumption patterns and behaviours might stem from sociodemographic characteristics, GDP per capita, and several economic indicators that are not included in this analysis. Nevertheless, Table 13 provides a first glance at existing differences and results across Europe and over time.

Table 13. Historical trends in SCI_GAP indicator for EU27 countries, from 2010 to 2021 (kcal per capita per day, absolute values)

Country/Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Austria	828	832	783	792	743	770	791	773	797	798	818	817
Belgium	783	816	811	800	773	847	826	849	830	989	1018	1003
Bulgaria	247	251	245	267	270	270	286	300	325	347	344	402
Croatia	352	369	425	422	442	470	468	508	538	575	547	615
Cyprus	307	316	303	264	255	253	258	266	231	401	379	395
Czechia	489	474	469	460	471	518	535	536	547	595	618	632
Denmark	790	785	818	852	837	843	870	846	1018	1096	1119	1052
Estonia	437	432	423	412	493	617	635	640	719	901	940	942
Finland	743	787	825	826	828	807	834	837	879	839	846	845
France	784	757	734	747	729	722	751	761	757	826	816	845
Germany	714	724	695	683	693	718	700	698	730	787	794	793
Greece	504	478	432	428	422	391	385	398	462	487	428	459
Hungary	484	496	497	463	517	568	593	615	676	629	589	602
Ireland	604	582	559	610	646	702	658	787	771	782	843	933
Italy	598	578	586	556	513	484	462	486	503	588	571	584
Latvia	597	592	569	531	540	548	572	605	585	613	672	712
Lithuania	501	497	465	507	543	535	547	582	567	711	757	755
Luxembourg	672	675	712	693	673	733	718	735	737	826	682	707
Malta	510	509	519	492	587	523	506	524	489	416	466	417
Netherlands (Kingdom of the)	645	642	694	695	698	728	779	671	749	780	791	885
Poland	525	553	552	515	520	562	587	577	612	725	786	826
Portugal	597	603	570	575	568	614	609	607	634	652	633	657
Romania	579	578	534	518	553	592	609	601	597	535	555	561
Slovakia	401	374	330	398	390	384	458	490	537	578	607	619
Slovenia	535	495	482	432	460	449	464	461	434	459	420	400
Spain	470	456	449	449	454	477	480	468	499	523	537	535
Sweden	700	718	714	692	742	754	737	707	646	662	664	648

Table 14. Historical trends in PercSurplus indicator for EU27 countries, from 2010 to 2021 (kcal per capita per day, percentage points).

Country/Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Austria	207	208	196	198	186	192	198	193	199	199	205	204
Belgium	196	204	203	200	193	212	206	212	207	247	255	251
Bulgaria	62	63	61	67	68	67	72	75	81	87	86	100
Croatia	88	92	106	106	110	118	117	127	134	144	137	154
Cyprus	77	79	76	66	64	63	64	67	58	100	95	99
Czechia	122	118	117	115	118	130	134	134	137	149	155	158
Denmark	198	196	205	213	209	211	218	211	254	274	280	263
Estonia	109	108	106	103	123	154	159	160	180	225	235	236
Finland	186	197	206	206	207	202	209	209	220	210	211	211
France	196	189	184	187	182	180	188	190	189	207	204	211
Germany	178	181	174	171	173	180	175	175	183	197	198	198
Greece	126	120	108	107	105	98	96	100	115	122	107	115
Hungary	121	124	124	116	129	142	148	154	169	157	147	150
Ireland	151	145	140	153	161	175	165	197	193	195	211	233
Italy	150	144	147	139	128	121	115	122	126	147	143	146
Latvia	149	148	142	133	135	137	143	151	146	153	168	178
Lithuania	125	124	116	127	136	134	137	146	142	178	189	189
Luxembourg	168	169	178	173	168	183	180	184	184	206	170	177
Malta	127	127	130	123	147	131	126	131	122	104	116	104
Netherlands (Kingdom of the)	161	160	173	174	174	182	195	168	187	195	198	221
Poland	131	138	138	129	130	141	147	144	153	181	197	207
Portugal	149	151	142	144	142	154	152	152	159	163	158	164
Romania	145	144	134	129	138	148	152	150	149	134	139	140
Slovakia	100	94	82	99	98	96	114	122	134	145	152	155
Slovenia	134	124	121	108	115	112	116	115	108	115	105	100
Spain	118	114	112	112	114	119	120	117	125	131	134	134
Sweden	175	180	179	173	185	189	184	177	162	165	166	162

Likewise, Table 14 shows the same historical trends in percentage values, which are the results of the PercSurplus indicator. Overall, according to the indicator, the majority of EU countries have increased their animal-source food consumption over the past decade, increasing the deviation from an optimal level for a healthy diet.

Countries like Croatia, Estonia, Slovakia and Belgium have extensively increased their gap over time, as Table 14 shows. Conversely, countries such as Austria, Italy, Greece, and Sweden have succeeded in maintaining a stable surplus of calories or have experienced a marginal reduction over time. For instance, Slovenia saw a decrease from 134% to 100% within the span of eleven years. Overall, all the countries are overconsuming, and the percentages deviate significantly from a zero-gap target.

The data underscores a general uptrend in consumption, highlighting significant discrepancies between countries. While some MSs have witnessed substantial increases in their consumption gaps, suggesting a shift away from optimal dietary levels, others have managed to stabilise or marginally reduce their gaps.

Please view Appendix 5.8 for the raw data, and Appendix 5.9 for the SCI Gap calculations.

4.2.2 Limitations

Some limitations are associated with the use of the indicator. One limitation is the name and definition of the indicator. Defining the indicator as a “gap” indicator could create ambiguity. In fact, the term “gap” could suggest a deficit to be filled (in terms of calorie intake), while the empirical evidence has so far shown an excess of animal-based calorie intake over time. Changing the perspective of the indicators, and thus addressing the dietary imbalance rather than a gap, would be more appropriate. As mentioned before, limitations pertain to the fact that adjustments cannot be made for socio-demographic characteristics such as age, gender, and activity levels. As calorie needs vary across different demographic groups, refining the analysis by weighing in such factors could provide a more accurate indicator. Moreover, while dietary patterns within the different MSs may appear relatively uniform, especially when compared to global dietary patterns, variations in cultural and dietary habits can still occur across the different MSs. This variability highlights the need for a nuanced approach to analysing dietary patterns might still arise.

The use of a standardised food composition database may also be a limitation. The nutritional composition of food items may vary depending on the region, and also on the agricultural practices and processing methods used. Relying on standardised food composition databases may not reflect these nuances, leading to discrepancies in estimated calorie intake and nutritional quality.

4.2.3 Performance

According to the RACER assessment, the performance can be described as follows:

- **Relevance:** The SCI Gap indicator has the potential to be highly supportive towards gaining a better understanding of true circularity, as, by its definition and computation methodology, it relates to animal-source food overconsumption, which threatens sustainability in food chains and planetary boundaries (Woodside, Lindberg, & Nugent, 2023) (Willett, et al., 2019). Monitoring the difference between the actual consumption level and an optimal level clearly supports opportunities to rethink and redesign sustainable diets among households, at least. It fully aligns with the CEAP and the Farm to Fork Strategy.
- **Acceptance:** There was no specific stakeholder engagement, but internal processes reveal that the benefits of measuring are clear.
- **Credibility:** Methodologies have been proposed or exist, as Our World in Data also reports, but the EU still lacks a transparent methodology for this indicator. However, it is easy to understand and communicate, as individuals can quite easily track calorie intake.
- **Ease:** The required data is readily available on FAOSTAT food balance sheets; thus, the cost of data collection has been very low.
- **Robustness:** Datasets are readily available, and FAOSTAT provides data reported based on well-established methodologies. While the benchmark value is derived from the LANCET seminal report. SCI gap is a composite indicator, as it is derived from the sum of all animal-source calorie intake, which is then subtracted to an optimal value ACI*. Still, the team considers it a proxy indicator as differences in EU MS dietary patterns, sex, age, occupation, or any relevant sociodemographic characteristics are not available.

With regard to its **target facet area**, the SCI gap indicator states the current level of circularity, given that it reports, in a specific year, the difference between the actual level of consumption and the optimal, sustainable one. The indicator also addresses the progress over time, monitoring the trend along an 11-year time series. In terms of environmental impact, it is clearly related to the material footprint and resource consumption, so it indirectly keeps track of those. Regarding social impacts, it is directly related to the health effects and the risk of undertaking excessive animal-based diets.

Table 15. RACER evaluation

Stage of project	RACER criterion					Score
	Relevance	Acceptability	Credibility	Ease	Robustness	
Task 4 (original RACER assessment)	3	2	3	3	2	13
After Task 5 (following testing)	3	2	3	3	2	13

Please view Appendix 5.1 for the RACER assessment matrix. This indicates what a score of ‘1’, ‘2’ and ‘3’ mean across each criterion and helped to ensure consistent decision making across the team and Tasks.

4.3 CHALLENGES AND LESSONS LEARNED

4.3.1 Challenges

A few challenges are associated with the monitoring process of this indicator. No data gap in terms of missing observation in the dataset was registered; therefore, the indicator could be easily monitored among MS and in the selected time series. It is essential to ensure that the benchmark value is updated over time should any further, more consistent study arise. Bearing that in mind, the study recognises that socio and cultural factors, here not included for data availability reasons, are critical to track nuances of regional or local dietary habits within Member States. Moreover, it is also relevant to consider that dietary patterns can be significantly affected by policy changes and market dynamics. Monitoring the indicator without considering these external factors might limit the understanding of underlying trends.

4.3.2 Lessons learned

As outlined in section 4.2.2, the name of the indicator could spread some ambiguity, especially because of the word “gap”. This is because “gap” hints at a deficit to be filled, while the testing showed that there is rather a consumption surplus. To ensure to record both surplus and potential future deficits in animal-based calorie intake, the indicator could be reframed as an Animal-Based Dietary Imbalance Index. This may better identify the objective of the indicator, which is to assess the difference between actual animal-based food consumption and the optimal value identified according to the Lancet report (which is ultimately low but not equal to zero). It is also important to consider the relationship with relevant food waste metrics (see discussion in Section 4.4 below). Moreover, it is worth mentioning that, given that this indicator does not differentiate among individuals’ sex, age categories, employment aspects, physical activities, and other socio-demographic characteristics, relevant complementary metrics on these aspects should accompany the SCI gap indicator (or Animal-based Dietary Imbalance Index) to increase its robustness and consistency. In that case, EU statistics on income and living conditions (EU-SILC) (Eurostat, n.d.) provide relevant information derived from the Household Budget Surveys (HBS). The object of the EU-SILC is timely and comparable cross-sectional and longitudinal data observing income, poverty, social exclusion, and living standards. HBS are EU national surveys reporting data on household expenditure on goods and services. Their core focus is to compute weights for the consumer price index in each MS. Acknowledging that benchmark values may need updates in light of new studies highlights the need for flexibility and adaptability in this indicator development. This underscores a broader lesson about the importance of remaining open to evolving scientific evidence and methodologies to ensure the indicator remains relevant and effective.

4.4 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that this indicator be considered for further development, with significant work required to facilitate its progress.

Considering various factors, this indicator holds promise for further refinement and application across the EU. Accessible datasets, readily available through FAOSTAT, are based on established methodologies and provide a solid foundation for their implementation. The benchmark value is drawn from the influential LANCET report and adds a layer of scientific credibility and relevance to the measure. The SCI gap represents a composite measure that assesses the deviation of actual animal-based calorie intake from an optimal benchmark (ACI*) and offers a valuable tool for evaluating dietary patterns across the EU.

However, it should be noted that this serves as a proxy indicator, lacking differentiation among EU MS dietary patterns and demographics such as sex, age, and occupation. Nevertheless, the data exhibit comparability with similar findings, such as those presented in Our World in Data, without any significant outliers observed in MS trends.

In addition, due to the ambiguity flagged above, the indicator name should be changed to Animal-Based Dietary Imbalance Index (henceforth Imbalance Index), which provides greater clarity on the scope and objective of the indicator.

The Imbalance Index has the potential to be highly supportive towards gaining a better understanding of true circularity, as it relates to animal-source food overconsumption, which is undermining sustainability in food chains and planetary boundaries. Monitoring the gap between the actual consumption level and an optimal level supports opportunities to rethink and redesign sustainable diets among households. It fully aligns with the CEAP and the Farm to Fork Strategy. The Imbalance Index is built upon quantitative, numerical data and offers a clear objective measure that minimises the potential for subjective interpretation.

On the directness of the data available to assess the indicator, as a sustainable calorie intake indicator gap, the data specifically include all animal-sourced calorie intake, which is necessary to consider when discussing balanced diets within planetary boundaries. The process of manipulating data for the Imbalance Index was intentionally kept to a minimum to maintain the integrity of the data. The method involved selecting animal-sourced foods and tallying their calorie content for each country annually. Subsequently, calculating the difference was straightforward and involved subtracting the benchmark value, which is derived by aggregating the benchmark values for animal-sourced foods as outlined in the Lancet Report

This streamlined approach underscores the efficiency and clarity of the Imbalance Index as a tool for policy and research. The absence of a need for additional datasets highlights the indicator's self-sufficiency and the robustness of its methodology. Moreover, the minimal requirement for data cleaning, attributed to the high-quality standards of FAOSTAT data, reinforces the reliability and usability of the indicator. The internal processes of FAOSTAT ensure the data's quality, significantly reducing the likelihood of missing values and outliers and, by extension, minimising the need for extensive data cleaning.

The replicability of the Imbalance Index is a significant advantage, largely due to the accessibility and availability of the necessary data. FAOSTAT hosts the data on its publicly accessible, unrestricted website. This accessibility is further facilitated by the data being readily available on the FBS website.

On average, the imbalance increased in the EU over the calculated period, signalling significant overconsumption of animal-source food products in the last decade. When examining the SCI gap as a percentage, the surplus in calorie intake has exceeded double the optimal value in various instances across different countries. While this indicator brings, as a caveat, the fact that it does not account for food waste, which could alter the actual individual calorie intake, it still highlights the unsustainability of resource consumption in EU households dietary patterns, showing no signs of improvement over time. This underscores the substantial opportunity for policy enhancements on healthy diets within planetary boundaries.

On data collection and reporting, using FAO Food Balance Sheets will require improving synergies with FAOSTAT EU-related statistics. At the same time, it would be worth considering the implementation of a similar approach in Eurostat. Data requirements are mostly needed to integrate socio-demographic correcting characteristics (group age, labour supply, sex, cultural behaviours). One way to include these factors could be to complement the indicator with the EU Statistics on Income and Living Conditions (EU-SILC). EU-SILC aims to collect "*timely and comparable cross-sectional and longitudinal multidimensional microdata on income* *distribution, poverty and social exclusion*". An alternative approach would be to derive the results from EU Household Budget Survey statistics through its infrequent collection poses a challenge for annual monitoring.

Regarding potential synergies with the new EU monitoring framework, the Imbalance Index could complement the information provided by food waste and consumption footprint metrics. Food waste reduction is critical to conserving resources and minimising greenhouse gas emissions from food production. The Imbalance Index, which overlooks food waste, thereby offers a complementary perspective. If the food waste metric decreases over time, but the Imbalance Index is shown to be persistent, for instance, this would hint at the fact that overconsumption in terms of calorie intake might not derive from food waste but rather from persisting unhealthy diets. Concerning the indicator consumption footprint, it estimates the environmental impacts of EU and Member States consumption, and it covers the food sector, among others. Healthy, sustainable diets can support CE strategies by changing consumption patterns in the food sector, thus decreasing the EU's consumption footprint.

Table 16. Summary of recommendations for indicator FWN3

Type of recommendation	Recommendation	Timeline	Key stakeholders or partners	RACER criteria addressed
Development of guidance	Develop comprehensive guidance at the EU level to harmonise the integration of dietary data into the EU monitoring framework.	Medium (1.5 – 5 years)	Eurostat, EU Member States	Ease Acceptability Robustness
R&D	Foster collaboration and data sharing between Eurostat and FAOSTAT to enrich Food Balance Sheets with more granular data.	Medium (1.5 – 5 years)	FAO, Eurostat	Acceptability Credibility Robustness
R&D	Integrate sociodemographic factors to refine dietary analysis.	Long (> 5 years)	Eurostat, EU Member States	Credibility Robustness
R&D	Enhance the granularity of data collection methods to capture food waste at the consumer level in the Food Balance Sheets.	Long (> 5 years)	FAO and Eurostat	Robustness

5. APPENDIX

5.1 INDICATOR 1 – INTERVIEW NOTES AND EMAIL RESPONSES

See the following MS Word documents provided alongside this report:

- “DGRTD_FWN1_Email response from Colruyt 150324_V01.00”.
- “DGRTD_FWN1_Interview notes Asa Domeij Axfood 270224_V01.00”.
- “DGRTD_FWN1_Interview notes Gregoire Richard ADEME 230224_V01.00”.
- “DGRTD_FWN1_Interview notes Michael Minter CONCITO 260224_V01.00”.

5.2 ALL INDICATORS - RACER ASSESSMENT MATRIX

Criterion	Description	1 (Poor)	2 (Neutral)	3 (Good)
Relevance	Refers to whether the indicator is closely linked to the objectives to be reached.	Does not support a better understanding of true circularity.	Supports a better understanding of true circularity.	Highly supportive towards gaining a better understanding of true circularity.
		Supports no value-added circular opportunities.	Supports lower value-added opportunities (i.e. metrics related to waste generation, recycling, waste management, etc.)	Supports higher value-added opportunities (i.e. all R-strategies above remanufacturing) and wider systemic change (e.g. indicators that encourage PSS or circular design).
		Not linked to the project objectives and/or European policy objectives (existing or upcoming).	Linked to the project objectives, but not to European policy objectives (existing and/or upcoming).	Fully aligned with project objectives and European policy objectives (existing and/or upcoming).
Acceptance	Refers to whether the indicator is perceived and used by key stakeholders (such as policymakers, civil society, and industry).	Poorly accepted by key stakeholders, e.g. due to the use of confidential data.	Relatively accepted by key stakeholders as the benefits of measuring are clear.	Key stakeholders are motived to report this indicator, due to mandatory legislative requirements (current or upcoming), potential commercial benefit or being in the public interest.
Credibility	Refers to whether the indicator is transparent, trustworthy and easy to interpret.	No defined methodology associated with this indicator and/or interpretation of the indicator is ambiguous.	Methodologies have been proposed or currently existing, but not for this particular indicator (e.g. in a research article).	There is an EU defined methodology.
		Difficult to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are not familiar with).	Moderately easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are aware of but are not confident in practical use).	Easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders already use and are confident in applying).
Ease	Refers to the easiness of measuring and monitoring the indicator.	No defined methodology associated with this indicator and/or interpretation of the indicator is ambiguous.	Methodologies have been proposed or currently existing, but not for this particular indicator (e.g. in a research article).	There is an EU defined methodology.
		Difficult to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are not familiar with).	Moderately easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are aware of but are not confident in practical use).	Easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders already use and are confident in applying).
Robustness	Refers to whether data is biased and comprehensively assesses circularity.	No consistent methodology and dataset are available.	A consistent methodology and dataset available.	A consistent methodology and dataset available.
			A composite/aggregated indicator (based on multiples dimensions).	A one-dimensional indicator.
			A proxy indicator.	

5.3 INDICATOR 2 - METHODOLOGY REPORT FOR WEB-SCRAPING TOOL

5.3.1 Overview

The objective of the project is to automate the extraction of procurement data from a public procurement website, specifically focusing on downloading PDF documents related to specific CPV (Common Procurement Vocabulary) codes, excluding minor contracts due to the absence of downloadable PDF documents. The process involves three primary stages:

- Scraping the website for procurement information based on CPV codes.
- Downloading relevant PDF documents for each procurement notice.
- Performing PDF analysis to extract specific information.

5.3.2 Web Scraping Process

The web scraping process is initiated by loading the target procurement website and navigating through it to extract procurement notices based on predefined CPV codes. This process is detailed in the **04_scrapper_ALL_CPV.py** script.

Key Steps:

- **Setup:** Selenium WebDriver is used to automate browser interactions, with ChromeDriver configured to handle downloads.
- **Accept Cookies/T&Cs:** The script navigates to the search page of the procurement website and programmatically accepts cookies or terms and conditions to proceed.
- **CPV Codes Iteration:** The script iterates over a list of CPV codes, performing searches to gather procurement notices related to these codes.
- **Data Extraction:** For each CPV code, the script scrapes relevant data from the search results, including expedient codes, tender procedures, and links to detailed notice pages.
- **Exclusion of Minor Contracts:** Notices tagged as 'minor contracts' are excluded from the process due to the lack of downloadable PDF documents.

5.3.3 PDF Download Process

Following the initial scraping, the **05_scrapper_download_pdf.py** script is used to download PDF documents associated with each non-excluded procurement notice.

Key Steps:

- **Iteration Over Notices:** The script iterates over the previously scraped data, visiting each notice's detail page.
- **PDF Links Identification:** It identifies links to downloadable PDF documents based on the document type (e.g., "Plec de prescripcions tècniques:").
- **PDF Download:** Relevant PDF documents are downloaded and saved in a structured directory based on CPV codes and expedient codes.

5.3.4 PDF Analysis

The **06_pdf_analysis.py** script analyses the downloaded PDF documents, extracting specific information for further processing.

5.3.5 Fuzzy Matching

Fuzzy matching techniques are applied where exact matches between data fields are not feasible due to variations in naming conventions or typos. This approach enhances data matching accuracy beyond simple string comparisons.

5.3.6 Exclusions

Exclusions are primarily based on the tender procedure type. Procurements labelled as 'minor contract' are excluded from the PDF download process because these notices typically do not provide downloadable PDF documents. This exclusion criterion ensures the efficiency of the process by focusing resources on procurements with accessible PDF documents.

5.3.7 Conclusion

This report outlines the methodology employed to scrape, download, and analyse procurement data from a public procurement website. The process is designed to be automated, with specific exclusions applied to improve the efficiency and relevance of the data collected. The scripts used in this project are modular, allowing for adjustments based on specific requirements or changes in the target website's structure.

5.4 INDICATOR 2 – KEY WORDS FOR WEB-SCRAPING TOOL

FWN2 Key Words

Case Study	-	-	Catalonia
Language	English	ESP	Catalan
	CPV code: 150000000 Food, beverages, tobacco and related products		Codi CPV: 150000000 Aliments, begudes, tabac i productes relacionats
	Food and meal services		Serveis de menjar i àpats
	Ecological		Ecològic
	Organic		Orgànica
	Organic production		Producció ecològica
	Organic products		Productes ecològics
	Regulation (EU) 2018/848		Reglament (UE) 2018/848
			Reglament (UE) 834/2007
	EU organic		ecològic de la UE
			Consell Català de la Producció Agrària Ecològica (CCPAE)

5.5 INDICATOR 2 – RAW DATA FOR CATALONIA

See MS Excel document "DGRTD_FWN2_Catalonia Data_V01.00" provided alongside this report.

5.6 INDICATOR 2 – RAW DATA FOR LUND

See MS Excel document "DGRTD_FWN2_Lund Data_V01.00" provided alongside this report.

5.7 INDICATOR 2 – EXAMPLE OF CRITERIA FROM CATALAN CASE

Machine Translated by Google

Generalitat de Catalunya
Departament d'Economia i Hisenda
Direcció General
de Contractació Pública
Subdirecció General de Regulació
i Supervisió de la Contractació Pública

Models of food clauses

As technical prescriptions:

"At least X percent of the fruit served for dessert will be short-circuit.

Those products that do not have more than one intermediary1 between cultivation and consumption in the dining room will be understood as short circuit. This consideration can be accredited by the means established in Decree 24/2013, of January 8, on the accreditation of the proximity sale of agri-food products and, it can also be accredited through other possible means that demonstrate compliance with 'those conditions.

The percentage will be calculated in relation to the volume of product supplied."

"The fruit and vegetables served as a main dish will be exclusively seasonal.

"Seasonal product" means the fruit or vegetable that includes specific months of cultivation and harvesting, and that has an optimal production period.

"X food products or X percentage of the food products that are part of the contracted service will be fresh."

"The fish served as a main course will be exclusively fresh.

Fresh fish is considered to be that which, whole or prepared, is not processed. Products packed in a vacuum or in a modified atmosphere are included, which have not been subjected to any treatment other than refrigeration to guarantee their preservation2 ."

"The fish served as a main dish will be of controlled and sustainable origin.

To accredit this provenance, the fish must have an MSC, Friend of the Sea or equivalent type of certification."

"The eggs will be organic or Group 1.

Accreditation with the corresponding label."

"At least X agri-food products or X percentage of agri-food products that are part of the contracted service must be of organic agricultural production.

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[1] Retail establishments, groups of agricultural producers when they sell products that come from non-associated producers, rural tourism establishments, catering establishments including collective catering, when they sell products directly to consumers, are considered intermediaries finals, in accordance with article 2.g of Decree 24/2013.

[2] Definition established in annex 3.5 of Regulation 853/2004 of the European Parliament and of the Council of April 29, 2004, which establishes specific hygiene rules for food of animal origin.

5.8 INDICATOR 3 – RAW DATA

See MS Excel document "DGRTD_FWN3_raw_data_V01.00" provided alongside this report.

5.9 INDICATOR 3 – IMBALANCE INDEX CALCULATIONS

See MS Excel document "DGRTD_FWN3_Imbalance Index_V01.00" provided alongside this report.

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