

BE-SHIFT

Belgian Socio-psychological Interventions for Future Transformation

D1.1.1 (M7/July 2026): Sectoral analysis and prioritization for sufficiency in Belgium

Authors: Ruken Karakus, Saskia Manshoven, John van Oorschot, Marc Spiller, Inge Mayeres, Michiel Ritzen and Guillermo Borragán

This research is funded by the Belgian Federal Science Policy Office (BELSPO) and the Federal Public Service Health, Food Chain Safety and Environment (FPS Public Health) as part of the S4Policy programme.

TABLE OF CONTENTS

Table of contents 2
List of acronyms 3
Executive Summary 5
1. Contextual Background 7
1.1 Beyond efficiency: the need for demand reduction 7
1.2 Working definition of sufficiency in BE-SHIFT 7
1.3 Operationalising sufficiency through a sector-based framework 8
1.4 The relevance of sufficiency in the European and Belgian context 9
1.5 Objective of the deliverable 10
2. Pre-Selection of Sectors 10
3. Focus on the Belgian Context 12
3.1 Methodology of the Systematic Literature Review (SLR) 12
3.1.1 Review design 12
3.1.2 Search strategy 12
3.1.3 Eligibility criteria 13
3.1.4 Review workflow and dataset preparation 13
3.2 Findings from the Belgian evidence base 14
3.2.1 Descriptive overview of sectors and regions 14
3.2.2 Key findings from the Belgian evidence base 16
3.2.3 Insights from the reviewed grey literature 19
4. Sectoral Analysis 20
4.1 Shelter/Buildings sector 20
Economic importance and position in Belgian and European value chains 21
Societal relevance 21
Sustainability challenges and transition needs 22
Sufficiency intervention opportunities 22
4.2 Mobility sector 23
Economic importance and position in Belgian and European value chains 23
Societal relevance 24
Sustainability challenges and transition needs 25
Sufficiency intervention opportunities 26
4.3 Nutrition/Food sector 26
Economic importance and position in Belgian and European value chains 27
Societal relevance 28
Sustainability challenges and transition needs 28
Sufficiency intervention opportunities 29

4.4 Consumer products 30
Economic importance and position in Belgian and European value chains 30
Societal relevance 31
Sustainability challenges and transition needs 31
5. A Consolidated List of Interventions 32
What is the ASI-S framework? 33
5.1 Shelter/Buildings sector 33
5.2 Mobility sector 36
5.3 Nutrition/Food sector 40
5.4 Consumer products 43
5.5 Co-benefits, interlinkages and potential trade-offs 46
6. Conclusions and implications for the next deliverable 47
References 47

LIST OF ACRONYMS

Acronym	Meaning
ASI	Avoid–Shift–Improve
ASI-S	Avoid–Shift–Improve–Share
CAP	Common Agricultural Policy
CO_2	Carbon dioxide
D1.1.1	Deliverable 1.1.1
EEA	European Environment Agency
EEE	Electrical and electronic equipment
EERA	European Energy Research Alliance
ESPR	Ecodesign for Sustainable Products Regulation
ETS2	Emissions Trading System 2
EU	European Union
FEVIA	Federation of the Belgian Food Industry
GDP	Gross Domestic Product
GHG	Greenhouse gas
ICEDD	Institut de Conseil et d'Études en Développement Durable
IEA	International Energy Agency
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
KPIs	Key Performance Indicators
MaaS	Mobility-as-a-Service
NECP	National Energy and Climate Plan
NBB	National Bank of Belgium
OVAM	Openbare Vlaamse Afvalstoffenmaatschappij
PaMs	Policies and Measures
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses

RVO	Rijksdienst voor Ondernemend Nederland
SLR	Systematic Literature Review
SMEs	Small and medium-sized enterprises
toe	Tonnes of oil equivalent
VITO	Vlaamse Instelling voor Technologisch Onderzoek
VILT	Vlaams Infocentrum Land- en Tuinbouw
VMM	Vlaamse Milieumaatschappij
WP	Work Package

EXECUTIVE SUMMARY

This deliverable establishes the analytical foundations of the BE-SHIFT project by identifying the sectors in Belgium where sufficiency-oriented interventions have the greatest potential to reduce energy and material demand while maintaining human well-being. It responds to the growing recognition that achieving climate neutrality requires complementing energy efficiency and renewable energy deployment with demand-side approaches that address not only how energy and resources are supplied, but also the level, structure and drivers of consumption. Within BE-SHIFT, sufficiency is understood as a combination of policy measures, behavioural changes, infrastructures and everyday practices that reduce demand for energy, materials, land, water and other natural resources while ensuring equitable quality of life within planetary boundaries. The report first establishes the conceptual and policy relevance of sufficiency in both the European and Belgian contexts. It shows that Belgium's high levels of energy and material consumption, strong dependence on imported energy, expected growth in electricity demand, and persistent challenges in sectors such as buildings, mobility, food systems and consumer products make demand reduction an essential complement to technological decarbonisation. Rather than replacing efficiency measures, sufficiency broadens the policy perspective by addressing the underlying demand for services and resources.

To operationalise this concept, the report identifies four priority sectors where sufficiency interventions are both meaningful and actionable: shelter/buildings, mobility/transport, nutrition/food, and consumer products. These sectors were selected because they account for a large share of household-related environmental impacts, are closely linked to everyday consumption practices, and offer significant opportunities for governments to influence demand through policy instruments, governance, regulation, infrastructure and behavioural interventions. Industry is not treated as a separate sector because the focus of this deliverable is on systems that directly satisfy societal needs. Nevertheless, industry remains an important enabling actor by shaping the products, services and business models that support more sufficient consumption patterns, particularly within the consumer products sector. The evidence base combines a systematic literature review covering the period 2015–2025 with selected grey literature and policy documents to ensure that both scientific evidence and recent policy developments are represented. The literature is particularly well developed for nutrition, buildings and mobility, while consumer products and material sufficiency remain comparatively less explored. Geographically, the evidence is dominated by Belgium-wide analyses and studies conducted in Flanders, whereas comparatively fewer studies focus specifically on Wallonia. The review demonstrates that sufficiency in Belgium is rarely presented as an explicit policy objective. Nevertheless, many interventions that are fully consistent with sufficiency principles are already embedded within existing climate, energy, mobility, renovation, food and circular economy policies. Across all four sectors, the findings consistently show that meaningful demand reduction cannot be achieved through behavioural change alone. Effective interventions require integrated policy mixes that combine behavioural measures with supportive governance arrangements, regulatory frameworks, financial incentives, spatial planning, infrastructure investments and social equity considerations. In the built environment, this includes promoting renovation, adaptive reuse, efficient use of residential space and circular construction. In mobility, it involves reducing car dependency through modal shift, shared mobility and improved accessibility. Within food systems, it encompasses healthier and lower-impact diets, food waste prevention, sustainable food environments and stronger local food systems. For consumer products, the literature highlights extending product lifetimes, repair, reuse, refurbishment, remanufacturing and more resource-efficient consumption patterns.

Building on this evidence, the deliverable develops a consolidated framework of sufficiency intervention pathways organised according to the Avoid–Shift–Improve–Share (ASI-S) framework. Rather than defining individual policy instruments, these intervention pathways provide a structured

intermediate level between broad sectoral challenges and the concrete Policies and Measures (PaMs) that will be developed in subsequent work. The report further highlights important co-benefits, interactions and trade-offs between interventions, emphasising that sufficiency policies should be evaluated from a systems perspective that considers rebound effects, burden shifting, social equity and cross-sectoral synergies. Overall, this deliverable provides the analytical foundation for the subsequent phases of the BE-SHIFT project. It identifies the principal intervention pathways through which demand reduction can contribute to Belgium's climate and sustainability transition and establishes the basis for the next deliverable, which will systematically link these intervention pathways to concrete Belgian Policies and Measures (PaMs) and assess their implementation readiness using a dedicated PaM Readiness Metric.

1. CONTEXTUAL BACKGROUND

The energy transition is still predominantly framed as a transformation of energy supply systems, focusing on decarbonizing production through renewable energy deployment and technological innovation. However, this perspective often underestimates the critical role of energy demand (EERA, 2023). The IPCC highlights that demand-side measures are essential to achieving climate targets, yet it remains comparatively underdeveloped in policy frameworks, including behavioural and structural changes, which could reduce global greenhouse gas emissions by 40–70% in three end-use sectors (buildings, land transport, and food) by 2050. This demonstrates that managing demand is not a secondary component of climate mitigation but a central pillar of the transition (IPCC, 2023).

At the same time, energy demand is not only persistent but, in many cases, continues to grow or proves difficult to reduce because it is embedded in infrastructure, service provision systems, social norms, and lifestyles (Intergovernmental Panel On Climate Change (IPCC), 2023). This is due to structural drivers such as economic growth, increasing consumption of services, digitalization, and evolving lifestyles. Moreover, the ongoing electrification of end-uses, while essential for decarbonization, can lead to an increase in total energy demand if not accompanied by reductions in overall consumption levels. Energy demand is deeply embedded in infrastructures, technologies, and social practices, making it resistant to change without systemic interventions (Grabow et al., 2026).

1.1 Beyond efficiency: the need for demand reduction

Historically, energy efficiency has been the cornerstone of demand-side policy, aiming to provide the same level of energy services with lower energy inputs (European Commission, 2023). While efficiency improvements remain essential, growing evidence suggests that they are insufficient on their own to achieve the scale and pace of reductions required to meet climate objectives (Borragán et al., 2026). One important limitation is the presence of rebound effects, whereby efficiency gains lead to increased consumption that partially offsets expected energy savings. These effects may occur directly, through increased use of more efficient technologies, or indirectly, when financial savings are spent on other energy-intensive goods and services (Creutzig et al., 2021). Consequently, efficiency improvements do not always translate into proportional reductions in overall energy demand.

The scale of transformation required for climate neutrality, therefore, calls for approaches that go beyond efficiency alone. In this context, demand management and more specifically demand reduction, have emerged as increasingly important components of climate policy (Borragán et al., 2026). Demand management encompasses a broad range of strategies, from improving efficiency to actively reducing or reshaping consumption patterns and service demand.

Behavioural change is a key component of demand reduction. However, evidence shows that its effectiveness is significantly enhanced when combined with supportive policy interventions (Ivanova et al., 2020). Individual choices are influenced by broader socio-economic conditions, including infrastructure, pricing systems, regulations, institutional frameworks, and social norms. As a result, behavioural interventions alone are unlikely to achieve sustained impact unless they are embedded within enabling policy environments. Studies demonstrate that combining behavioural measures with structural policies, such as incentives, regulations, urban planning, and infrastructure provision, can deliver more substantial and durable reductions in energy demand (Ivanova et al., 2020).

1.2 Working definition of sufficiency in BE-SHIFT

Among the different approaches to demand reduction, sufficiency has gained increasing attention as a transformative pathway because it directly addresses the level and structure of demand. Rather than focusing solely on how energy is used, sufficiency also considers how much energy, material, and resource use is necessary to ensure human well-being within planetary boundaries.

The IPCC defines sufficiency as:

> *"A set of policy measures and daily practices that avoid demand for energy, materials, land, water, and other natural resources while delivering human well-being for all within planetary boundaries."*

This definition highlights three fundamental dimensions of sufficiency:

- Reducing or avoiding demand for resources (energy, materials, land, water).
- Maintaining or improving human well-being, without reducing quality of life.
- Remaining within planetary boundaries, meaning that ecological limits are respected.

Building upon this foundation, the BE-SHIFT project adopts a broader operational definition of sufficiency:

> *"Set of policy measures, behavioural changes, infrastructures, and daily practices that aim to avoid or reduce the demand for energy, materials, land, water, and other natural resources, while ensuring equitable human well-being and quality of life for all within planetary boundaries. It involves changes in consumption patterns, social norms, and economic activities that enable societies to meet human needs with lower levels of resource use and environmental impacts."*

For the purposes of this project, sufficiency is understood as analytically observable through changes in consumption patterns, service demand, and socio-technical arrangements, independent of specific sectoral contexts. The definition is intentionally content-neutral to ensure consistent application across sectors, focusing on outcomes (reduced resource demand and sustained well-being) rather than prescribing particular behaviours or technologies.

1.3 Operationalising sufficiency through a sector-based framework

To operationalise the concept of sufficiency within the BE-SHIFT project, it is necessary to identify the contexts in which demand for energy, materials, and resources is generated and where interventions can realistically influence consumption patterns. While sufficiency is defined through its outcomes, reduced resource demand while maintaining well-being, its implementation occurs through concrete systems of production, consumption, and service provision. These systems are commonly organised into sectors, which provide a practical framework for analysing resource use, identifying intervention opportunities, and assessing policy relevance.

Within BE-SHIFT, **sectors are** therefore not **understood** solely as economic activities, but **as socio-technical systems that shape how needs are met through the provision and consumption of services, goods, and infrastructures**. They represent clusters of consumption and production practices where sufficiency behaviours can emerge and where public authorities can realistically influence outcomes through policies, regulations, incentives, infrastructure investments, and governance arrangements.
For the purposes of this project, a sector is defined as:

> *"a cluster of consumption and production practices associated with the provision of specific services and societal functions, within which sufficiency-oriented interventions can be implemented and where governments can realistically influence behaviour through policies and measures"*

This definition enables a consistent assessment of sufficiency opportunities across different domains while maintaining a focus on actionable intervention pathways and policy design.

1.4 The relevance of sufficiency in the European and Belgian context

At the European level, sufficiency is increasingly recognised as a necessary complement to energy efficiency and renewable energy deployment. Recent studies demonstrate that sufficiency-oriented pathways can substantially reduce energy demand while maintaining high levels of well-being and increasing resilience to external shocks (Creutzig et al., 2021; Grubler et al., 2018; The Shift project, n.d.; Wiese et al., 2024). At the same time, sufficiency remains underrepresented in current policy frameworks, which continue to prioritise technological solutions over demand reduction (Best et al., 2022).

In Belgium, integrating sufficiency into the energy transition is particularly relevant given the country's high levels of energy consumption, strong dependence on imported energy resources, and persistent challenges in sectors such as transport or buildings. Belgium remains one of the most energy-import-dependent countries in Europe, with net energy imports accounting for approximately 89% of its total energy supply in 2024, reflecting a continued reliance on imported fossil fuels such as oil and natural gas (IEA, 2024).This structural dependence exposes the country to geopolitical risks, supply disruptions, and energy price volatility, while reinforcing the importance of reducing overall energy demand alongside efforts to decarbonise supply. Belgium's energy consumption patterns further highlight the relevance of sufficiency-oriented approaches. Despite recent improvements in energy efficiency, energy use remains comparatively high by European standards. In 2023, total energy consumption amounted to approximately 4.0 tonnes of oil equivalent (toe) per capita, around 43% higher than the EU average, while electricity consumption per capita was approximately 6200 kWh, 16% above the EU average (Energy Market, Belgium, 2024). Belgium's energy consumption levels are also higher than those of neighbouring countries such as France and Germany.

At the same time, ongoing electrification efforts in transport, heating, and industry are expected to increase electricity demand in the coming decades (IEA, 2026). While electrification remains essential for decarbonisation, relying solely on technological substitution risks increasing pressure on energy infrastructure, renewable energy deployment, grid expansion, and system integration requirements if overall demand levels continue to grow (IEA, 2026; Ma, 2024). Demand-side strategies that reduce the need for energy services can therefore play a critical role in limiting system costs and facilitating the transition.

Beyond energy, sufficiency is equally relevant from a resource perspective. Across Europe, a substantial share of environmental pressures and greenhouse gas emissions is driven by the extraction, processing, transport, consumption and disposal of materials embodied in products and services. The European Environment Agency estimates that household consumption accounts for the majority of life-cycle environmental impacts, including climate change, resource depletion and biodiversity loss, with housing, mobility, food and consumer products representing the dominant consumption domains (European Environment Agency., 2024). Similarly, the International Resource Panel concludes that the extraction and processing of natural resources are responsible for around half of global greenhouse gas emissions and more than 90% of biodiversity loss and water stress, highlighting the importance of reducing material demand alongside decarbonising energy systems. Consequently, sufficiency strategies that reduce the demand for both energy and material resources offer significant opportunities to decrease upstream and downstream environmental impacts while supporting circular economy objectives and improving long-term resource security (European Environment Agency., 2024).

Besides, despite recent progress in climate and energy policy, **current policy trajectories remain insufficient to place Belgium on a pathway consistent with climate neutrality by 2050**. Analyses of the National Energy and Climate Plan (NECP) indicate that existing measures alone are unlikely to deliver the magnitude of emission reductions required to meet long-term European climate objectives, particularly in demand-intensive sectors such as transport, buildings, and agriculture (European Commission, 2026a). These characteristics position Belgium as a particularly relevant case for exploring the role of sufficiency in achieving climate neutrality and broader sustainability objectives.

1.5 Objective of the deliverable

Against this background, the BE-SHIFT project seeks to identify and prioritise the sectors in which sufficiency-oriented interventions can most effectively contribute to reducing energy and resource demand in Belgium. The **objective of Deliverable D1.1.1** is therefore to 1) identify, 2) justify, and 3) prioritise the sectors where sufficiency measures have the greatest potential to deliver demand reduction while maintaining human well-being. The analysis provides the foundation for the subsequent identification of intervention pathways and policy measures within the BE-SHIFT project that will be explored in upcoming deliverables.

2. PRE-SELECTION OF SECTORS

The objective of this task is to identify and prioritise the sectors in Belgium where sufficiency-oriented interventions can most effectively contribute to reducing energy and resource demand while maintaining human well-being. Given the broad scope of sufficiency and its potential applicability across multiple domains of society, a pre-selection exercise was undertaken to define the analytical boundaries of the study and focus subsequent assessment efforts.

The pre-selection of sectors was informed by three complementary sources. First, it was guided by the scientific literature on demand-side mitigation and sufficiency, particularly the framework developed by the Intergovernmental Panel on Climate Change (IPCC), which identifies buildings (shelter), land transport (mobility), and food systems (nutrition) as key end-use domains where behavioural and structural demand-side measures can significantly contribute to greenhouse gas emission reductions (Kikstra et al., 2022). Second, the selection was informed by a review of Belgian and European policy contexts, considering the relevance of sectors in terms of energy consumption, resource use, emissions reduction potential, and the feasibility of implementing sufficiency-oriented interventions. The results of this reviewing process are disclosed in detail in section 3 of this report. Third, the selection was refined through discussions with experts from VITO and project partners, who assessed the applicability and actionability of sufficiency measures within the Belgian context.

Based on this process, four sectors were selected for further analysis:

- **Shelter / Buildings**: The need for shelter and comfortable living, encompassing residential and tertiary buildings, housing practices, floor space use, heating and cooling demand, and related consumption patterns.
- **Mobility / Transport**: The need for mobility and accessibility, including passenger transport demand, modal choices, commuting behaviour, travel practices, and access to people, services, and opportunities.
- **Food / Diet:** The need for healthy and sustainable nutrition, covering dietary choices, food consumption patterns, food waste, and broader food system interactions.
- **Consumer Products/Materials**: The need for consumer goods and related services, including electrical and electronic appliances, furniture and textiles, with a focus on product lifetime

extension, repair, reuse, remanufacturing and reduced material consumption patterns, rather than recycling, which mainly supports new production cycles.



Figure 1: Overview of sectors addressed in BE-SHIFT

These sectors were selected because:

- they represent domains where resource demand is directly linked to everyday consumption and service demand,
- where sufficiency-oriented behaviours and practices are observable, and where governments can realistically influence outcomes through policy instruments, regulations, incentives, infrastructure provision, and awareness measures, and,
- also, because these sectors collectively cover a substantial share of household-related environmental impacts and are widely recognised in the literature as offering significant demand-reduction potential.

While industry represents a major share of Belgium's final energy consumption and greenhouse gas emissions, it was not retained as a primary sector within this analysis. This decision reflects the conceptual focus of sufficiency on the provision of services and the satisfaction of human needs, rather than on production activities themselves. In industrial settings, most direct mitigation measures relate to improving production processes through energy efficiency, electrification, fuel switching, circularity or carbon capture, which fall outside the scope of sufficiency as defined in this report. Industrial sufficiency is nevertheless relevant in two important ways. First, companies can reduce demand associated with non-core activities, for example through more resource-efficient office infrastructure, employee mobility policies, workplace services or other forms of organisational consumption. Second, and more importantly, industry plays a critical enabling role by shaping the products and services offered to consumers. Product durability, reparability, sharing and rental business models, conscious marketing practices, and product-service systems can all facilitate more sufficient consumption patterns. These enabling functions are captured within the consumer products and materials sector considered in this study, rather than through the industrial production sector itself. This approach maintains a focus on the domains where governments can most directly influence consumption-related sufficiency while recognising the essential role of producers in enabling more sufficient lifestyles.

Consequently, the analysis focuses on sectors where sufficiency interventions are more directly observable, socially relevant, and actionable through demand-side policies and behavioural change mechanisms.

3. FOCUS ON THE BELGIAN CONTEXT

Following the conceptual and international overview presented in the previous sections, the remainder of this report focuses on the Belgian context. While the growing body of international sufficiency research provides valuable insights into potential intervention strategies, the effectiveness and feasibility of these interventions are highly **context-dependent**. A systematic literature review (SLR) was therefore conducted to identify, synthesise and assess the existing evidence on sufficiency-related policies, measures and interventions relevant to Belgium. The review provides the evidence base for the sectoral analyses presented in this report and supports the identification of intervention pathways and knowledge gaps across the four priority consumption domains.

3.1 Methodology of the Systematic Literature Review (SLR)

3.1.1 Review design

A SLR was conducted following a PRISMA-informed scoping review approach (Page et al., 2021) to ensure transparency, consistency, and reproducibility in the identification, selection, and analysis of relevant literature. The review aimed to identify behavioural, structural, governance, and policy interventions capable of reducing energy and resource demand while maintaining human well-being. Given the interdisciplinary and emerging nature of sufficiency research, the review adopted a broad perspective encompassing energy demand reduction, sustainable consumption, behavioural change, circular economy approaches, and governance mechanisms. The analysis focused on four IPCC-aligned consumption domains: shelter (buildings), mobility (transport), nutrition (food systems), and manufactured products (consumer goods).

3.1.2 Search strategy

The literature search was conducted using two complementary sources: Google Scholar and Semantic Scholar (accessed through the Publish or Perish software). The review covered the period 2015–2025 and aimed to identify literature related to sufficiency-oriented demand reduction strategies in Belgium. Search terms were developed around four dimensions:

(i) geographical scope (“Belgium”, “Belgian”, “Flanders”, “Flemish”, “Wallonia”, “Walloon”, “Brussels”)
(ii) policy and intervention dimensions (“policy”, “intervention”, “governance”, “regulation”, “incentives”, “taxation”)
(iii) sufficiency and demand-side concepts (“demand reduction”, “demand-side”, “sustainable consumption”, “behavioural change”, “behavioural change”, “low energy demand”, “lifestyle change”, “circular economy”), and
(iv) sector-specific terms related to buildings, mobility, transport, food, diet, products, and materials.

These dimensions were combined into both broad and targeted searches. The initial cross-sector search conducted in Google Scholar yielded 505 records and served as the primary literature pool. Additional searches were undertaken using combinations such as “Belgium AND sufficiency AND energy”, “Belgium AND housing AND low energy demand”, “Belgium AND mobility AND modal shift”, “Belgium AND transport AND behavioural change”, “Belgium AND food AND sustainability”, “Belgium AND diet AND demand reduction”, “Belgium AND circular economy”, and “Belgium AND materials AND reuse”. Together, these targeted searches generated approximately 3400 retrievals. Searches

returning more than 1000 records were considered overly broad and were therefore used primarily to identify highly relevant publications through relevance ranking and to refine subsequent searches rather than being screened in their entirety.

3.1.3 Eligibility criteria

Studies were included if they were published between 2015 and 2025, focused on Belgium or provided evidence directly relevant to the Belgian context (see inclusion criteria above), addressed at least one of the selected consumption domains, and examined demand-side mitigation approaches such as sufficiency, sustainable consumption, behavioural change, circular economy strategies, or resource demand reduction. To ensure policy relevance, studies were required to discuss interventions, governance mechanisms, policy instruments, barriers, drivers, or enabling conditions related to reducing energy and material demand. In addition to peer-reviewed publications, we also selected some grey literature sources, including policy reports and institutional studies that were very relevant for the Belgian context. Studies were excluded if they focused exclusively on energy supply, renewable energy generation, technological optimisation, or energy efficiency measures without a broader demand-reduction perspective, lacked relevance to the Belgian context, or constituted duplicate records identified across multiple searches.

3.1.4 Review workflow and dataset preparation

The review workflow built on the search strategy, eligibility criteria and screening process described in Sections 3.1.1–3.1.4. Search results were compiled in a structured database to facilitate deduplication, relevance screening, inclusion assessment and descriptive analysis. Each candidate record was assessed against the review criteria, including its publication type, relevance to Belgium, focus on policies or interventions, and relationship to at least one of the four selected consumption domains. The combined searches generated approximately 3905 retrievals, comprising 505 records from the initial cross-sector search and approximately 3400 retrievals from the targeted searches. Following deduplication, relevance ranking and preliminary filtering, 650 unique records were retained for title and abstract screening. Of these, 568 publications were included in the broader evidence database and coded to support the contextual analysis. A core set of 205 publications met all four principal inclusion criteria and was retained for the main analytical synthesis. For each retained publication, relevant information was extracted and coded according to sector, geographical scope, publication type, intervention focus, policy instrument, governance dimension, and the barriers and enabling conditions identified. This structured coding process enabled both a descriptive overview of the evidence base and a qualitative synthesis of the principal findings emerging across sectors and regions.

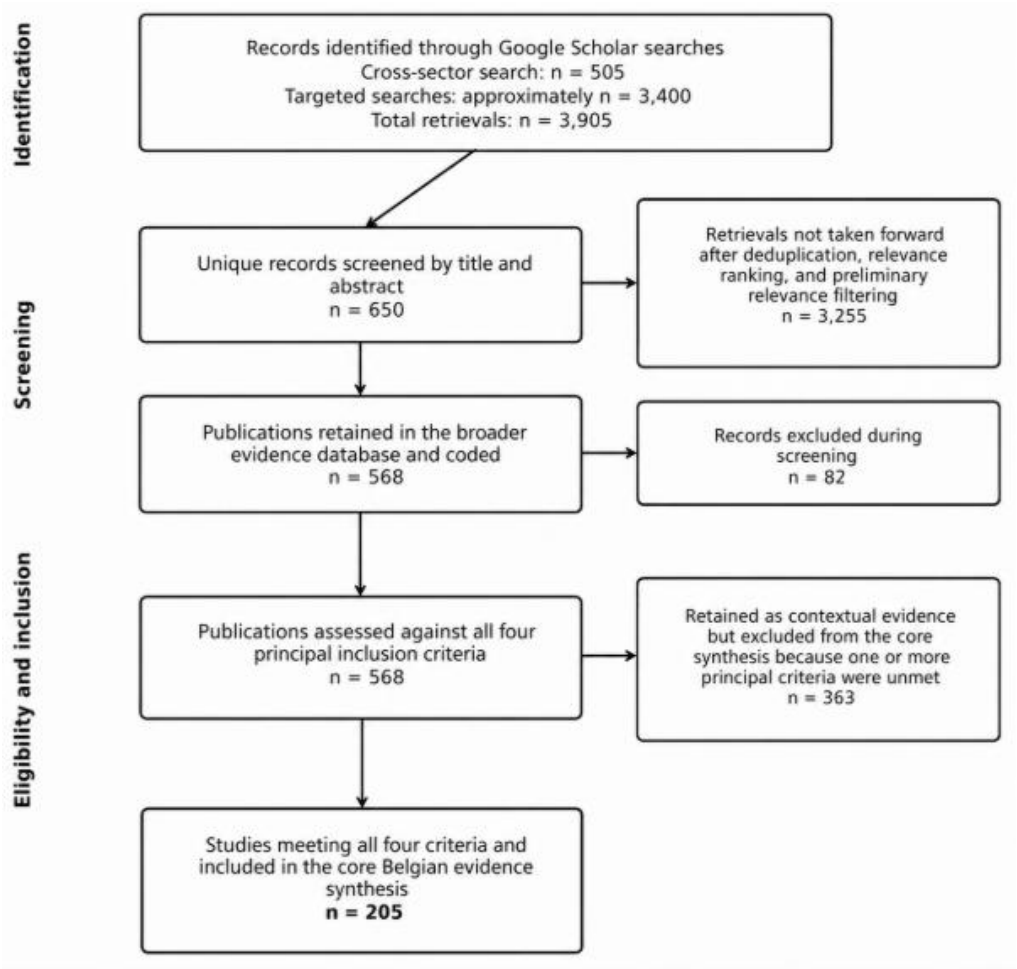


Figure 2: PRISMA-informed flow diagram of the literature review

3.2 Findings from the Belgian evidence base

3.2.1 Descriptive overview of sectors and regions

Table 1 shows that the evidence base identified through the systematic literature review spans the four priority sufficiency domains considered in this study. Nutrition/Food represents the largest evidence cluster (73 studies; 35.6%), followed by Shelter/Buildings (55 studies; 26.8%) and Mobility/Transport (51 studies; 24.9%). Materials/Products accounts for a smaller, although still substantial, share of the literature (26 studies; 12.7%). Overall, the distribution suggests that the Belgian literature on sufficiency-related interventions has predominantly focused on sectors where household consumption, behavioural change and public policy intersect. Food, buildings and mobility are comparatively well represented, reflecting sustained research interest in topics such as dietary transitions, residential energy demand, building renovation, travel behaviour and modal shift. By comparison, the Materials/Products domain appears less extensively covered, indicating that issues such as material demand reduction, product longevity, repair, reuse and circular consumption have received comparatively less attention within the Belgian sufficiency literature. This does not imply that these topics are absent from the broader circular economy literature, but rather that they are less frequently addressed explicitly from a sufficiency perspective.

Table 1: Frequency analysis of the sectors

Sector	Frequency	% of records
Nutrition/Food	73	35.6%
Mobility/Transport	51	24.9%
Shelter/Buildings	55	26.8%
Consumer Products	26	12.7%
Total	205	100%

Table 2 : Frequency analysis of the Belgian regions

Belgian region	Frequency	% of records
Belgium (country-wide)	139	67.8%
Flanders	45	22.0%
Brussels-Capital Region	18	8.8%
Wallonia	3	1.5%
Total	205	100%

The regional distribution of the literature (Table 2) indicates that most studies adopt a national or multi-regional perspective, with Belgium-wide or mixed Belgian studies accounting for the majority of the evidence base (139 studies; 67.8%). Among studies with a specific regional focus, Flanders is the most frequently represented (45 studies; 22.0%), followed by the Brussels-Capital Region (18 studies; 8.8%), while Wallonia is represented by only three studies (1.5%). The cross-tabulation further shows that sectoral evidence is predominantly generated at the national level, whereas Flanders and Brussels provide important sub-national case studies, particularly in the fields of mobility, food, buildings and circular economy. The comparatively limited number of Wallonia-specific studies suggests that regional evidence is unevenly distributed, highlighting a potential gap in the Belgian sufficiency literature. Nevertheless, because most publications consider Belgium as a whole or include multiple regions, the evidence base remains broadly relevant to the national context while indicating opportunities for more region-specific research, particularly in Wallonia.

The sector-by-region charts (Figure 3) show that national-level Belgian studies dominate across all sectors, especially in Nutrition/Food, mobility, and buildings. Flanders shows a visible concentration in Nutrition/Food, mobility, buildings, and cross-/multi-sectoral research, suggesting a relatively diverse regional evidence base. Brussels is most visible in mobility and products/materials, while Wallonia appears only marginally across the dataset.

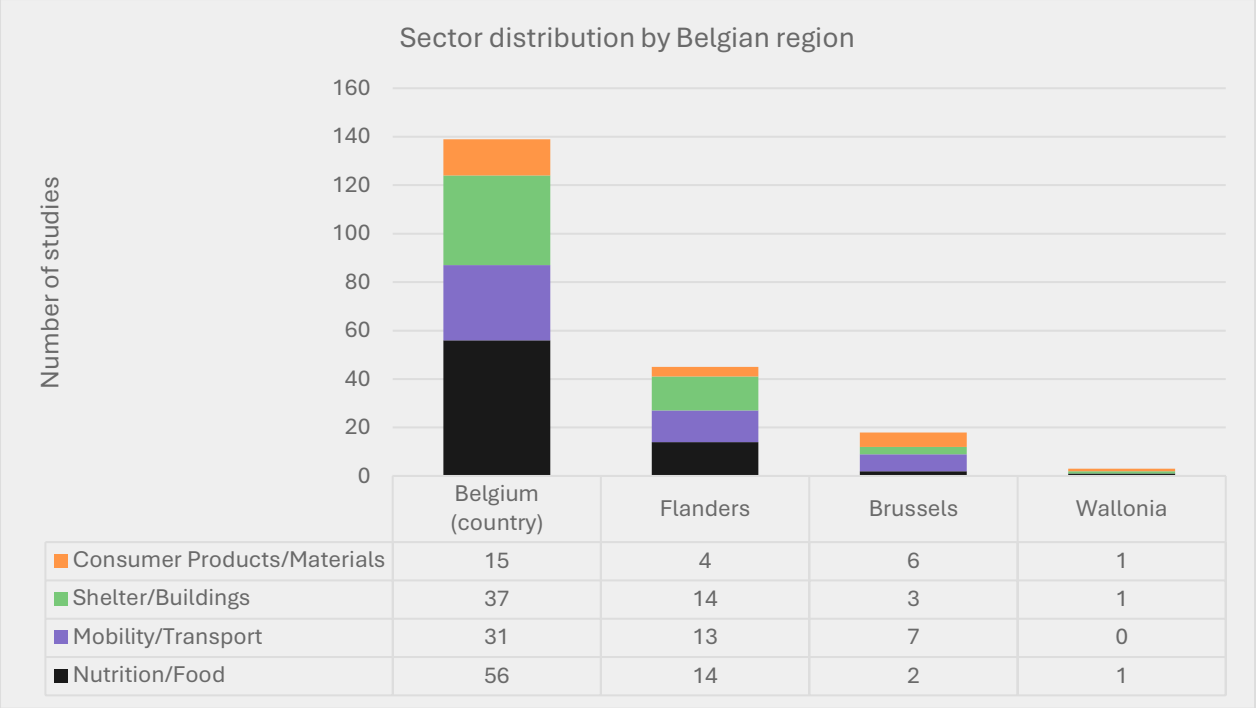


Figure 3: Sector composition of the studies by Belgian regions

Overall, the graphs indicate a mature but uneven evidence base: Belgian sufficiency research is strongest in food, buildings and mobility, and it is spatially concentrated in national/mixed, Flemish and Brussels contexts. There might be several reasons for this imbalance, such as such:

- Food-related studies tend to meet the screening criteria more directly, as they commonly combine a Belgian focus with intervention, behaviour, and sector-specific elements.
- Shelter/Buildings-related studies are often more technical, focusing on materials, energy performance, or renovation, which means fewer clearly aligned with PaMs or intervention-oriented criteria.
- Mobility research is well represented, but some studies may fall outside the screening scope because they address broader transport or logistics issues, or do not meet all criteria.
- Food research often connects explicitly to behaviour change, sufficiency, consumption, and policy, making it particularly well aligned with the review's screening focus.

This points to a need for more regionally balanced research and more explicit comparison of how sufficiency policies and measures operate across Belgium's different institutional and territorial settings.

3.2.2 Key findings from the Belgian evidence base

Given the review's focus on studies addressing policies, interventions and governance mechanisms related to sufficiency, the resulting evidence base is predominantly empirical and policy-oriented. The reviewed literature is characterised by a strong emphasis on case studies, modelling approaches and policy analyses rather than conceptual or theoretical contributions. Collectively, these studies examine how sufficiency-related transitions are enabled or constrained within specific Belgian institutional, socio-economic and governance contexts. Across the four consumption domains, the literature provides insights into the design, implementation and evaluation of policy measures, regulatory instruments, governance arrangements and behavioural interventions aimed at reducing

energy and material demand while maintaining well-being. This applied perspective is particularly valuable because the successful implementation of sufficiency policies depends not only on normative arguments for demand reduction, but also on evidence regarding behavioural responses, institutional capacity, policy feasibility and distributional implications.

➔ **Sectoral patterns and dominant themes**

Nutrition/Food is the most represented sector, indicating that the Belgian literature has devoted particular attention to dietary change, sustainable food environments, food governance and consumer behaviour. The prominence of this sector reflects the breadth of studies addressing food choices, food literacy, protein transitions, food labelling, food waste, food insecurity, alternative food networks and local food governance. Collectively, these studies frame sufficiency not simply as reduced consumption, but as a broader transformation of food practices, socio-technical systems and policy environments. They further suggest that effective food-related sufficiency measures must address affordability, health, social equity and institutional coordination if they are to move beyond information-based interventions. Shelter/Buildings forms the second largest evidence cluster. The literature focuses on renovation, energy performance, thermal comfort, photovoltaic self-sufficiency, heat pumps, circular building materials and building-stock transformation. For example, Gepts et al. (2025) illustrate that buildings-related sufficiency is closely linked to targeted renovation policies, household characteristics, ownership structures, local implementation capacity and technical feasibility (Gepts et al., 2025). More broadly, the evidence indicates that reducing demand in the built environment cannot be achieved through efficiency improvements alone, but also requires attention to renovation uptake, material use, comfort expectations and the social conditions that shape household energy practices. Mobility/Transport represents another major area of research, with studies examining car dependency, modal shift, public transport, cycling, telework, low-emission zones, Mobility-as-a-Service (MaaS), car sharing, mobility budgets and freight transport. The mobility literature is particularly valuable because it highlights the gap that can emerge between policies labelled as sustainable and their actual demand-side effects. For instance, Boussauw and Vanoutrive (2017b) argue that measures such as free public transport, commuter subsidies or rail-oriented development may have limited effects on reducing overall mobility demand if they reinforce unequal access, induce additional travel or leave car-dependent spatial structures unchanged (Boussauw & Vanoutrive, 2017). These studies provide strong evidence that **effective sufficiency policies must combine behavioural interventions with structural changes in infrastructure, spatial planning and fiscal incentives**. Materials/Products is the smallest of the four principal sectors, yet it provides an important link between sufficiency and circular economy strategies. The literature addresses topics such as household plastic packaging, material stocks, construction and demolition waste, reuse of building components, urban mining and end-of-life products, framing sufficiency in terms of reduced material throughput, reuse, recycling and stock efficiency. Although the comparatively smaller number of studies indicates that materials-related sufficiency is less developed as a distinct policy field than food, buildings or mobility, its cross-sectoral relevance is considerable, particularly where material strategies intersect with the built environment, infrastructure, logistics and broader consumption systems.

➔ **Geographical patterns and Belgian policy relevance**

The geographical distribution of the evidence is uneven. Belgium-wide or mixed Belgian contexts dominate the dataset, followed by Flanders, Brussels-Capital Region and Wallonia. This pattern indicates that the literature is strongest at national or mixed scales and in Flemish and Brussels contexts, while Walloon-specific evidence remains limited. The dominance of Belgium-wide studies is useful for identifying general policy-relevant patterns, but it may obscure regional differences in governance, infrastructure, housing stock, mobility systems and food environments. Flanders appears

as a particularly visible sub-national context, especially in studies of active mobility, commuting, cycling, renovation, food systems and circular practices. Brussels is strongly represented in urban mobility, low-emission zones, circular economy, active mobility and food governance. Wallonia, by contrast, appears only marginally in the extracted evidence, despite the importance of regional competences for housing, mobility, land-use planning and environmental policy. This imbalance limits the extent to which conclusions can be generalised across the Belgian federal context. For sufficiency policy, the finding is significant: a transition agenda that relies on regionally implemented measures requires a stronger empirical basis across all Belgian regions.

➔ **Contribution to understanding sufficiency policies and measures within Belgium**

The reviewed studies collectively show that sufficiency policies and measures in Belgium operate across three interrelated levels. First, they address individual and household practices, including travel behaviour, dietary choices, renovation decisions, food purchasing, car ownership and energy use. Second, they depend on enabling infrastructures, such as public transport networks, cycling facilities, renovation supply chains, food environments, circular material systems and energy technologies. Third, they are shaped by governance arrangements, including policy mixes, stakeholder coordination, financial incentives, regulatory frameworks and local implementation capacity. This multi-level contribution is visible across sectors. In Mobility/Transport, sufficiency measures depend on reducing car dependency through accessible alternatives, spatial planning and demand-management instruments. In Shelter/Buildings, they require renovation strategies that address social, technical and financial barriers while avoiding an exclusive focus on efficiency. In Nutrition/Food, they involve reshaping consumption environments, affordability, health-oriented guidance and food governance. In Materials/Products, they require circular design, reuse systems, procurement practices and material-efficiency policies. The evidence, therefore, demonstrates that **sufficiency is** not a single policy instrument but **a systemic transition logic** that must be translated differently across sectors.

A recurring finding is that **sufficiency measures are vulnerable to rebound effects, implementation barriers and unequal social impacts** when policy design remains too narrow. Mobility studies warn that modal-shift policies may increase total travel or benefit already advantaged groups if accessibility and demand reduction are not central. Shelter/Buildings studies show that renovation potential varies by household and building characteristics, implying that uniform incentives may be insufficient. Food studies point to the importance of socio-economic position, affordability and food environments. Materials studies show that circularity requires attention to material flows, lifecycle impacts and institutional conditions for reuse. These findings collectively argue for sufficiency policy mixes that combine behavioural, infrastructural, regulatory and distributive measures.

➔ **Research approaches and maturity of the field**

The maturity of Belgian sufficiency research is reflected in the breadth of applied evidence, but also in its uneven consolidation. The literature contains many studies that analyse specific interventions, sectors or local contexts, including behavioural studies, scenario and modelling work, policy analyses, technical assessments and case studies. This indicates a field with substantial empirical grounding and direct policy relevance. However, the evidence is less mature in terms of longitudinal evaluation, cross-sectoral comparability and systematic assessment of actual demand reduction. Many studies identify barriers, model pathways or describe policy contexts, while fewer provide robust evaluation of implemented sufficiency measures over time. This pattern suggests that **Belgian sufficiency research is moving from problem identification towards implementation analysis** but has not yet fully developed a cumulative evidence base for comparing policy effectiveness across sectors and regions. The strongest contributions lie in identifying why demand-side transitions are difficult: entrenched infrastructures, car-dependent spatial patterns, fragmented governance, renovation

barriers, socio-economic inequalities, consumer constraints and limited implementation capacity. The next stage of research would require more consistent indicators of sufficiency outcomes, comparative policy evaluation, and closer attention to whether measures produce absolute reductions in energy, material and mobility demand.

➔ **Gaps and implications for future research and policymaking**

Several gaps emerge from the evidence. First, Materials/Products is comparatively underrepresented, despite its importance for circular economy, construction, infrastructure and consumption-related sufficiency. Second, Wallonia is strongly underrepresented relative to Belgium-wide, Flemish and Brussels contexts. Third, there is a need for stronger integration across sectors, particularly because **sufficiency measures often interact**: housing location affects mobility demand, food systems depend on logistics and land use, and circular material strategies intersect with buildings and infrastructure. Fourth, more attention is needed to the implementation and evaluation of sufficiency policies, particularly to assess whether they deliver measurable reductions in environmental impacts through lower energy and material demand, more sustainable consumption patterns, or shifts towards lower-impact forms of service provision, rather than primarily generating efficiency gains, substitutions or increased awareness. For policymaking, the reviewed evidence implies that sufficiency should be designed as an integrated policy agenda rather than a collection of isolated measures. Policies are likely to be more effective when they combine demand reduction with accessible alternatives, financial and regulatory support, social equity safeguards and institutional coordination. The evidence also suggests that Belgian sufficiency policy must be regionally sensitive. National patterns are useful, but implementation depends on regional and local conditions, particularly in housing, transport or food governance.

➔ **Synthesis**

Overall, the reviewed evidence advances understanding of sufficiency policies and measures in Belgium by showing that **demand-side transitions are technically possible, socially conditioned and institutionally demanding**. The literature demonstrates strong applied knowledge in Nutrition/Food, Shelter/Buildings and Mobility/Transport, with a smaller but strategically important evidence base in Materials/Products. It also shows that sufficiency requires more than behavioural change → it depends on infrastructures, governance, equity and policy mixes capable of reducing demand while maintaining social wellbeing. Future research and policymaking should therefore focus on comparative regional evidence, longitudinal evaluation of implemented measures, stronger integration across sectors, and clearer indicators for assessing whether sufficiency policies deliver absolute reductions in resource use and emissions.

3.2.3 Insights from the reviewed grey literature

While the scientific literature provides evidence on the effectiveness, barriers and enabling conditions of sufficiency-oriented interventions, it does not fully capture the current policy landscape in Belgium. Many interventions relevant to sufficiency are implemented through national and regional climate, energy, mobility, renovation and circular economy strategies that are documented in policy plans, institutional reports and government programmes rather than in peer-reviewed publications. A complementary review of selected grey literature was therefore undertaken to identify these ongoing initiatives, assess their alignment with sufficiency principles, and contextualise the scientific evidence within Belgium's institutional and governance framework. The reviewed documents show that Belgium has established an extensive governance framework supporting the transition towards climate neutrality through coordinated action at federal and regional levels. National documents, including the National Energy and Climate Plan, the Belgian Long-Term Strategy for Greenhouse Gas

Emission Reduction, the Energy Outlook and the Low-Carbon Transition Scenarios, consistently identify reducing greenhouse gas emissions, decreasing dependence on imported fossil fuels, improving energy efficiency, accelerating electrification and expanding renewable energy as key transition priorities. At the same time, these documents conclude that currently announced policies remain insufficient to achieve Belgium's 2030 and 2050 climate objectives, particularly in non-ETS sectors such as transport, buildings and agriculture, highlighting the need for additional demand-side measures and stronger policy implementation. The regional policy documents further demonstrate how these strategic objectives are translated into concrete implementation measures. In Brussels, initiatives such as the Good Move mobility plan, the Regional Circular Economy Programme (PREC) and the RENOLUTION strategy combine active mobility, circular construction, material reuse and building renovation to reduce environmental impacts while improving urban liveability. In Flanders, the Flemish Energy and Climate Plan, the Long-Term Renovation Strategy, Circular Flanders initiatives and the Vlaams Materialenprogramma prioritise building renovation, renewable energy deployment, circular procurement, material recovery and reductions in the regional material footprint. Similarly, Wallonia's Air-Climate-Energy Plan (PACE) and Long-Term Renovation Strategy integrate large-scale building renovation, sustainable mobility, industrial decarbonisation and climate resilience within a common regional framework. Collectively, these documents demonstrate that many measures consistent with sufficiency principles are already embedded within existing Belgian policy frameworks, particularly in relation to reducing car dependency, accelerating renovation, extending product and building lifetimes, promoting circular material use and encouraging more sustainable consumption patterns. However, these measures are generally framed within climate, energy, mobility or circular economy policies rather than as explicit sufficiency strategies.

4. SECTORAL ANALYSIS

The transition towards sufficiency requires moving beyond broad societal sectors to identify concrete intervention pathways through which resource use, greenhouse gas emissions and other environmental pressures can be reduced while maintaining or improving quality of life. Building on the sectoral prioritisation presented in Section 2, this section provides an in-depth analysis of the four sectors identified as having the greatest potential for sufficiency interventions in Belgium: construction, mobility, nutrition and consumer products. Together, these sectors account for a substantial share of household consumption and associated environmental impacts. Each sector is first situated within its historical, economic and societal context, highlighting its role in Belgian and European value chains. Subsequently, the main sustainability challenges and structural transition needs are discussed. Finally, each section identifies the principal sufficiency intervention pathways that provide the basis for the more detailed Policies and Measures (PaMs) that will be developed in Task 1.3 of BE-SHIFT (in future deliverable 1.2.1).

4.1 Shelter/Buildings sector

The construction sector occupies a strategic position within Belgium's economy and society. It provides housing and infrastructure, supports employment throughout extensive value chains and plays a central role in achieving climate, energy and circular economy objectives. Unlike manufacturing sectors that produce standardised goods, construction primarily delivers unique, site-specific projects with lifetimes extending over many decades. Consequently, decisions taken today determine resource use, energy consumption and greenhouse gas emissions far into the future. Belgium's construction sector is simultaneously undergoing profound structural change: climate objectives, demographic developments, land scarcity and circular economy ambitions are gradually shifting attention **away from continuous expansion through new construction towards renovation**, **adaptive reuse, densification and more efficient use of the existing building stock**. Understanding these structural characteristics is essential for identifying meaningful sufficiency intervention pathways.

Economic importance and position in Belgian and European value chains

Construction and real estate development constitute a major component of the Belgian economy. In the fourth quarter of 2025, the construction of buildings subsector alone generated an annual turnover of approximately €36 billion, accounting for about **8.4%** of the total turnover. This subsector comprised nearly **38000 enterprises** and employed approximately **88000 people** (Statbel, 2026b). The Belgian construction sector is predominantly composed of small and medium-sized enterprises (SMEs) and self-employed contractors. Only a relatively limited number of large firms operate within the sector, while project delivery depends on long supply chains consisting of specialised contractors and subcontractors (FOD Economie, 2025; Statbel, 2026b). This fragmented structure often complicates collaboration, innovation, knowledge transfer and the large-scale implementation of new technologies, industrialised construction methods and circular business models (FOD Economie, 2025). Construction differs fundamentally from manufacturing industries because it primarily produces unique projects rather than standardised products. Consequently, productivity growth, economies of scale and process standardisation have historically progressed more slowly than in many manufacturing sectors. Digitalisation, automation and industrialisation of construction processes remain comparatively limited, while the project-based nature of construction continues to create barriers to material traceability, resource efficiency and the large-scale reuse of building components. Beyond its direct economic contribution, the sector enables employment, housing provision, infrastructure development and economic activity throughout numerous upstream and downstream value chains (Statbel, 2026b). It therefore occupies a strategic position not only within the Belgian economy but also within European value chains associated with construction materials, engineering services, machinery and building technologies.

Societal relevance

The built environment provides one of society's most fundamental needs: housing. Belgium contains approximately 4.7 million buildings comprising around 5.8 million dwellings, reflecting the widespread presence single-family housing (Statbel, 2025). The Belgian housing stock is characterised by a relatively high homeownership rate. Approximately 70.3% of dwellings are owner-occupied, while nearly 30% are occupied by tenants (Eurostat, 2025). Housing typologies remain dominated by ground-oriented dwellings. Only around 23% of Belgians live in apartments, with the majority residing in detached, semi-detached or terraced houses. Demographic developments are gradually reshaping housing demand. Average household size declined from 2.42 persons in 1996 to 2.24 persons in 2026, reflecting population ageing, increasing numbers of single-person households and changing family structures. Consequently, housing demand continues to increase even when population growth remains relatively modest. At the same time, Belgium exhibits a relatively high degree of housing under-occupation. In 2024, approximately **57.9% of the population lived in under-occupied dwellings**, whereas only 6.5% lived in overcrowded housing conditions (Eurostat, 2025). Belgian residents therefore enjoy comparatively large living spaces, with available estimates suggesting around 50–55 m² of residential floor area and approximately 1.2 rooms per person. These figures indicate that significant parts of the housing stock are no longer optimally aligned with current demographic structures and household composition. Housing availability is also increasingly influenced by declining construction activity. Annual new-build volumes have decreased from approximately 8.8 million m² in 2020 to around 6.6 million m², reflecting a considerable decline in building permits. Although renovation activity remains substantially larger than new construction, permitted renovation volumes have likewise shown signs of decline in recent years. Meanwhile, **housing development is gradually shifting from detached single-family housing towards apartment construction**. This transition is driven by increasing urbanisation, limited availability of developable land, demographic changes, rising land prices and public policies promoting densification and more efficient land use.

Sustainability challenges and transition needs

The long lifetime of buildings makes the construction sector particularly important for achieving climate neutrality. Since buildings remain in use for many decades, annual new construction represents only a very small fraction of Belgium's total building stock. Consequently, improvements in sustainability performance depend primarily on interventions within existing buildings rather than on new construction alone. More than 30% of environmental footprint comes from buildings, making it the sector with the highest environmental impact in the Belgium economy. The Belgian housing stock in particular faces significant energy and climate challenges. A substantial proportion of residential buildings was constructed before modern energy performance requirements were introduced, resulting in considerable renovation needs. Based on greenhouse gas inventories reported by the European Environment Agency and Belgian population statistics from Eurostat, direct greenhouse gas emissions associated with residential buildings – heating and cooling - amount to approximately **1.1 t CO_2-equivalent per capita annually**, placing Belgium among the higher-emitting EU Member States. (EEA, 2024). These emissions reflect the combined effects of an ageing building stock, relatively large dwelling sizes and historically limited energy efficiency. Public policy strongly shapes investment decisions within the sector. Spatial planning regulations, building permits, environmental legislation, energy performance requirements, taxation and housing incentives all directly influence housing production, renovation activity and land development. Consequently, policy reforms can substantially alter investment patterns and accelerate, or impede, the transition towards a more sustainable built environment (EEA, 2024). At the same time, the sector is progressively evolving into a renovation economy. Over recent decades, attention has shifted from greenfield development and continuous expansion towards renovation, refurbishment, adaptive reuse and maintenance of existing buildings (European Commission, 2026a). This transition is driven by climate policy, rising energy prices, resource scarcity and the ageing Belgian building stock. Simultaneously, circular economy ambitions increasingly encourage longer building lifetimes, greater material recovery and more efficient use of existing assets rather than continued expansion through new construction.

Sufficiency intervention opportunities

The structural characteristics of Belgium's construction sector point towards several promising sufficiency intervention pathways. **First**, because existing buildings dominate the national building stock, extending their useful lifetime through renovation, refurbishment and adaptive reuse offers substantially greater resource-saving potential than focusing exclusively on new construction. Prioritising renovation over demolition and replacement can simultaneously reduce material demand, embodied carbon emissions and land consumption. **Second**, demographic trends and widespread housing under-occupation indicate considerable opportunities to improve the utilisation of existing residential floor space. Measures encouraging downsizing, co-housing, flexible housing arrangements and better matching between dwelling size and household composition could reduce demand for additional construction while maintaining housing quality. **Third**, increasing urban density through infill development and redevelopment of existing urban areas can reduce land take, infrastructure requirements and transport demand while supporting broader sustainability objectives. **Finally**, circular construction approaches, including design for disassembly, component reuse, secondary material markets and longer building lifetimes, offer opportunities to reduce resource extraction and strengthen material circularity throughout the construction value chain.

Key take aways on the shelter/buildings sector

The Belgian construction sector is characterised by its substantial economic importance, fragmented industrial structure, long asset lifecycles and central role in providing housing and infrastructure. At the same time, demographic change, land scarcity, climate objectives and circular economy ambitions are fundamentally reshaping the sector. Rather than continued expansion through new construction, the future built environment will increasingly depend on renovation, adaptive reuse, densification and more efficient management of the existing building stock. These characteristics make construction one of the most strategically important sectors for implementing sufficiency, with interventions focused on extending building lifetimes, improving utilisation of existing housing, reducing material demand and supporting the transition towards a more circular and climate-neutral built environment.

4.2 Mobility sector

Mobility has played a fundamental role in Belgium's economic and territorial development since the nineteenth century. Belgium's early industrialisation was supported by extensive investments in railways, roads, canals and port infrastructure that enabled the transport of coal, steel, manufactured goods and labour between industrial regions and export markets. The country's dense transport network emerged as a strategic asset connecting industrial centres in Wallonia, the ports of Antwerp and Ghent, and later the expanding urban economies of Flanders. Belgium subsequently developed one of Europe's most intensive commuting systems, supported by railway infrastructure and public policies encouraging labour mobility. The National Bank of Belgium (NBB) notes that Belgium's central location, short internal distances and dense transport infrastructure remain key determinants of regional economic integration (Duprez & Nautet, 2019). The country currently possesses approximately 155000 km of roads, 3600 km of railways and 1500 km of inland waterways, making it one of Europe's most connected transport systems. Over time, mobility evolved from a purely infrastructural function into a broader socio-economic system enabling labour-market participation, access to services and territorial cohesion (Daubresse, 2022). However, this development also produced a highly **dispersed spatial structure and strong dependence on private vehicles** (Boussauw & Vanoutrive, 2017). Belgian transport scholars argue that transport policy historically prioritised accessibility and economic growth, creating tensions with sustainability objectives and reinforcing automobile dependence (Scerri et al., 2025; Van Eenoo et al., 2022). This automobile dependence has, however, also become a threat to accessibility itself. In particular, the high levels of road congestion in Belgium, especially in Flanders and the Brussels-Capital Region, and to a lesser extent in Wallonia, reduce the efficiency and reliability of the transport system, undermining the accessibility gains that car-oriented policies originally sought to achieve (Scerri et al., 2025)

Economic importance and position in Belgian and European value chains

Mobility is not merely a transport activity but a foundational enabling sector supporting virtually all Belgian value chains (Duprez & Nautet, 2019). It facilitates the movement of labour, goods, services and information between firms, households and international markets. Belgium's role as a logistics gateway within Europe depends heavily on its transport infrastructure and multimodal connectivity. The Federal Planning Bureau projects that freight transport volumes will increase from approximately 910 million tonnes in 2019 to more than 1.1 billion tonnes by 2040, while freight tonne-kilometres are expected to increase from 63.5 to 76.4 billion over the same period (Daubresse, 2022). International freight flows are projected to grow substantially faster than domestic flows, reflecting Belgium's deep integration into European supply chains and the strategic importance of its ports and logistics

infrastructure (Daubresse, 2022). Belgium's strategic position within European value chains is closely linked to its role as a logistics and maritime gateway. The Port of Antwerp-Bruges, Europe's second-largest seaport, serves as a major entry and exit point for goods moving between global markets and European production and consumption centres. Together with other ports such as Ghent, Zeebrugge, Brussels and Liège, it forms part of an integrated multimodal logistics network connecting maritime transport, inland waterways, rail freight and road transport. These logistics assets support key Belgian industries, including chemicals, pharmaceuticals, energy, manufacturing and food production, while also facilitating transit flows across the wider European market. As a result, the economic importance of mobility extends beyond the transport sector itself (see **Error! Reference source not found.**), underpinning the competitiveness and functioning of numerous upstream and downstream value chains (Daubresse, 2022; Duprez & Nautet, 2019).

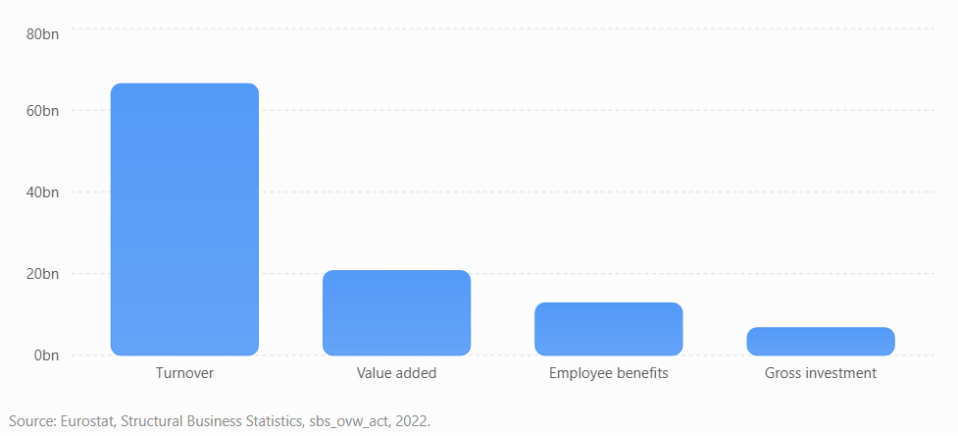


Figure 4: Belgium transportation and storage sector, 2022

Road transport remains dominant, accounting for **roughly 75%** of freight tonne-kilometres, while rail and inland waterways together account for around 25%[1]. Infrastructure quality is also closely linked to economic competitiveness. The IMF identifies t**ransport infrastructure, digitalisation and climate-related investments as critical for maintaining Belgium's productivity and competitiveness** (Hearne, 2025) **together with congestion pricing (see OECD[2])**. The report notes that Belgium faces significant investment needs and that fragmented governance structures reduce infrastructure investment efficiency (Hearne, 2025). Improving transport infrastructure governance is therefore considered essential for sustaining economic growth and supporting future value chains. Emerging mobility innovations also constitute a growing economic domain. Mobility-as-a-Service (MaaS), connected mobility, autonomous transport systems and digital mobility platforms are increasingly attracting public and private investment (Lebas, 2021), although still relatively limited in Belgium. Through participation in European research projects, pilot programmes and innovation networks, Belgian actors are actively contributing to the development and evaluation of future mobility solutions (Camps-Aragó et al., 2022; Cooper & Steenberghen, 2023; Delaere et al., 2024; Lebas, 2021).

Societal relevance

Mobility plays a central role in social inclusion, labour-market accessibility and regional cohesion. According to the NBB, approximately **15% of Belgian workers are employed in a region other than the one in which they live**, illustrating the importance of transport networks for connecting labour markets (Duprez & Nautet, 2019). Brussels functions as the primary employment hub, accounting for

[1] https://transport.ec.europa.eu/facts-funding/studies-data/eu-transport-figures-statistical-pocketbook/statistical-pocketbook-2025_en

[2] https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/09/oecd-economic-surveys-belgium-2024_578fb44b/c671124e-en.pdf

around 72% of interregional commuting flows[3]. Mobility therefore enables access to employment opportunities across regional boundaries and contributes directly to economic participation. However, mobility benefits are unevenly distributed, with higher-skilled workers generally exhibiting greater geographic mobility than lower-skilled workers (Delaere et al., 2024). At the same time, mobility generates significant societal challenges. Belgium faces some of Europe's most severe congestion problems. Research on smart and sustainable mobility estimates that motorway congestion generated around 170 km of traffic queues during the morning peak period in 2017, resulting in approximately 21500 hours lost and daily social costs approaching 600 000€ when morning and evening peaks are combined (RVO, 2020). More recent estimates from the Belgian Mobility Dashboard indicate that congestion cost the Belgian economy approximately €5.3 billion in 2024, equivalent to around 40 hours of delay per Belgian worker annually[4]. Congestion negatively affects productivity, quality of life, environmental performance and public health. Mobility behaviour studies as well as also statistics on the high share of car travel, further demonstrate the persistence of automobile dependence. Research conducted in Flanders shows that even residents of relatively well-connected urban neighbourhoods often continue to perceive cars as indispensable, despite exhibiting multimodal travel patterns (Van Eenoo et al., 2022). This suggests that mobility transitions are influenced not only by infrastructure availability but also by behavioural, cultural and lifestyle factors. Recent studies also highlight the social implications of digital mobility transitions. Although digital mobility services can improve accessibility and efficiency, they may unintentionally exclude vulnerable groups due to digital literacy barriers, affordability constraints and unequal access to technology (Delaere et al., 2024). Delaere et al. argue that transport poverty, socio-economic inequalities and the digital divide increasingly shape accessibility outcomes within contemporary mobility systems (Delaere et al., 2024).

Sustainability challenges and transition needs

Mobility is one of Belgium's most important transition sectors because it sits at the **intersection of climate policy, digitalisation and economic competitiveness**. Transport remains a major contributor to greenhouse-gas emissions and is therefore a key target of European decarbonisation strategies. The Federal Planning Bureau projects substantial reductions in transport emissions by 2040, largely driven by vehicle electrification, stricter vehicle standards and policy measures affecting company cars and fossil-fuel vehicles (Daubresse, 2022). Nevertheless, freight transport demand is expected to continue growing, creating challenges for achieving climate objectives while maintaining economic performance (Daubresse, 2022). Shared mobility has emerged as a promising pathway to reduce vehicle ownership, fuel consumption and urban space requirements. Research on Belgium's shared mobility potential indicates that greater adoption of car-sharing could reduce the national vehicle fleet and contribute to lower emissions and improved energy efficiency (Brabant et al., 2025). However, these benefits are not guaranteed, as behavioural rebound effects and shifts away from active or public transport may partially offset the anticipated environmental gains (Vlaamse Milieumaatschappij, 2018). Besides, public acceptance, behavioural change and regional disparities remain important barriers. Mobility-as-a-Service represents another important innovation pathway. The Belgian MaaS literature highlights the potential for integrated transport services to facilitate modal shifts away from private vehicle ownership, while emphasising the importance of governance, stakeholder coordination and public-private partnerships (Lebas, 2021). Future mobility systems are also increasingly shaped by autonomous vehicles, connected transport systems and intelligent transport infrastructure. Research conducted in Brussels indicates that autonomous public transport solutions receive relatively positive public acceptance and could contribute to reducing congestion, improving accessibility and supporting sustainable mobility objectives if implemented within

[3] https://www.steunpuntwerk.be/cijfers/vlaamse-arbeidsrekening

[4] https://www.mobilitydashboard.be/nl/congestion/cost-of-congestion/

appropriate regulatory and business frameworks (Camps-Aragó et al., 2022). Notably, congestion alone is estimated to impose economic costs equivalent to approximately 2% of Belgian GDP (Camps-Aragó et al., 2022).

Sufficiency intervention opportunities

The characteristics of Belgium's mobility system point towards several key sufficiency intervention pathways. **First**, reducing dependence on private car use through modal shifts towards public transport, cycling and walking can lower energy demand, emissions and congestion while improving public health. **Second**, avoiding unnecessary travel demand through spatial planning, digital services and teleworking can reduce transport volumes without compromising accessibility to employment or essential services. **Third**, shared mobility solutions, including car-sharing, bike-sharing and Mobility-as-a-Service, can increase vehicle utilisation rates while reducing the overall vehicle fleet and associated material demand. **Finally**, improving the accessibility, affordability and inclusiveness of sustainable transport systems can help ensure that mobility transitions contribute not only to climate objectives but also to social equity and territorial cohesion.

Key take aways on the mobility sector

Mobility occupies a strategically important position within Belgium's economy and society. Historically, it enabled industrialisation and territorial integration; today, it underpins logistics, trade, labour mobility and international competitiveness. At the same time, the sector faces major sustainability challenges arising from greenhouse gas emissions, congestion and persistent dependence on private vehicles. Belgium's dense transport infrastructure and central location within Europe ensure that mobility remains deeply embedded in national and European value chains. Achieving a more sustainable mobility system will therefore require not only technological innovation but also behavioural change, improved governance and sufficiency-oriented interventions that reduce transport demand, promote modal shifts, increase vehicle utilisation and improve equitable access to sustainable mobility.

4.3 Nutrition/Food sector

For the purposes of this report, the nutrition sector is understood as the broad agri-food system that supplies food and beverages to the Belgian population. It encompasses agriculture, livestock farming, horticulture, food processing, beverage production, retail and catering, thereby covering the entire value chain from primary production to consumption (Els Van de Velde, & Laura Lecluyse, 2025) . Food waste is included here insofar as it concerns prevention, redistribution and food use within households, retail, catering and food processing, because these pathways directly reduce avoidable food demand and resource use. Although food waste is an important sustainability challenge, waste generation and waste management associated with food are considered outside the scope of this sectoral analysis. The Belgian agri-food system fulfils one of society's most fundamental needs by ensuring food availability while simultaneously supporting employment, trade and industrial activity. At the same time, food production and consumption are associated with considerable environmental pressures, including greenhouse gas emissions, land use, biodiversity loss and resource consumption. Consequently, the sector represents a key domain for exploring sufficiency strategies that can simultaneously improve environmental sustainability, public health and food security.

Economic importance and position in Belgian and European value chains

Belgium's contemporary agri-food system has evolved considerably over the past two centuries. Around 1800, agriculture was largely characterised by small-scale, locally oriented farming. During the nineteenth century, increased grain imports and agricultural mechanisation stimulated farm specialisation towards livestock production, dairy farming, horticulture and specialised crop production. Following the Second World War, these developments accelerated through technological innovation, industrialisation, international trade and the Common Agricultural Policy (CAP), leading to increasing productivity and structural consolidation (VILT, n.d.). As a consequence, the number of Belgian farms declined dramatically from approximately 215 000 in 1950 to around 20 000 today (Vlaamse overheid, 2024). This structural transformation has been accompanied by increasing specialisation. Flanders has become one of Europe's most livestock-intensive regions, specialising in pig production, poultry, whereas Wallonia remains more strongly oriented towards dairy farming, beef production and grassland systems (Lucie Le Jeune & Eric Le Jeune, 2022; Vingerhoets et al., 2023). Although primary agriculture remains essential for domestic food production and rural land management, its direct economic contribution is relatively limited. **Agriculture, forestry and fisheries account for approximately 0.8% of Belgian GDP** while employing just over 1% of the workforce (Trade Economics, 2023). However, agriculture forms the foundation of a much larger agri-food value chain. The Belgian food and beverage industry has evolved into the country's largest manufacturing industry (see Figure 5). According to Fevia (2025), it represents 25.4% of industrial turnover, 22% of industrial employment (approximately 102 000 jobs) and 18% of industrial value added (FEVIA, 2025). Belgium also functions as an important food processing and export hub, with food exports reaching approximately €42.4 billion in 2025, more than half of which are destined for neighbouring countries including the Netherlands, France and Germany (FEVIA, 2025). Consequently, the Belgian agri-food sector is not only shaped by domestic consumption but also strongly integrated into European and global value chains.

This economic profile also explains why the intervention framework in Section 5.3 addresses not only consumer behaviour but also food processing, retail, catering, local food governance and alternative food-system models. In a sector that is both export-oriented and strongly embedded in international supply chains, sufficiency opportunities must therefore be considered across the full value chain: reducing avoidable demand, shifting consumption towards lower-impact diets, improving processing and distribution practices, and strengthening more resilient local and regional food systems.

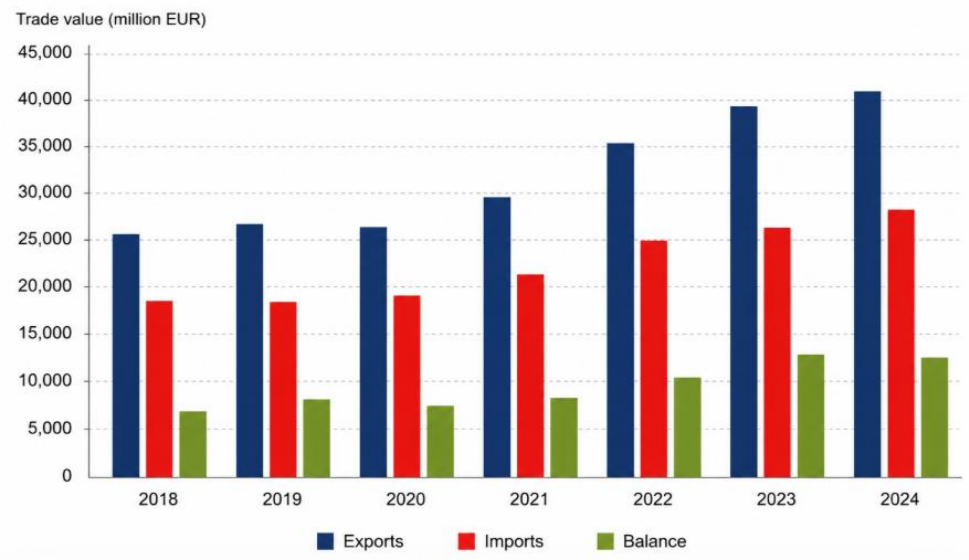


Figure 5: Trade balance of the Belgian food and beverage sector (FEVIA, 2025).

Societal relevance

Food is unique among the sectors analysed in this report because it fulfils an essential physiological need. The agri-food system therefore plays a fundamental role in ensuring food security, public health and social well-being. Belgian dietary habits have changed profoundly during the past century. Following the Second World War, food security became a political priority, and the Common Agricultural Policy encouraged increasing agricultural production through market support and farm subsidies (*A Brief History of European Agricultural Policy*, 2013; Hill, 1984). As food availability increased, diets gradually shifted from traditional staples such as potatoes, rye bread and buttermilk towards higher consumption of meat, dairy products, processed foods, restaurant meals and convenience foods. More recently, consumer interest has expanded towards organic, local and fair-trade products (Gracia & Albisu, 2001). Food affordability remains another important societal dimension. The share of household expenditure devoted to food has fallen dramatically over the past century, from approximately 60–80% during the nineteenth century to around 13% of total household expenditure today, making food and beverages the second-largest expenditure category after housing and energy (STATBEL, 2025a). Nevertheless, affordability challenges persist. In 2024, approximately 18% of the Belgian population (around 2.1 million people) was at risk of poverty, while more than 600 000 people relied on food assistance (FdSS, n.d.). Because food is indispensable for survival, vulnerable households often have limited flexibility in making food choices, highlighting the importance of ensuring that sustainable diets remain accessible and affordable. Nutrition is also closely linked to public health. Current dietary patterns characterised by relatively high consumption of animal products and processed foods have been associated with increased risks of obesity, cardiovascular disease, type II diabetes and certain cancers (Rockström et al., 2025). Consequently, improving dietary quality represents an important opportunity to simultaneously enhance public health and environmental sustainability.

These societal characteristics align with the later intervention pathways focused on food environments, affordability, food literacy and school food policies. Because food choices are shaped by availability, price, skills, cultural preferences and institutional settings, sufficiency in the nutrition sector cannot rely only on individual information campaigns. It requires enabling conditions that make healthy and lower-impact diets practical, socially acceptable and affordable across different income groups.

Sustainability challenges and transition needs

The environmental impacts associated with Belgium's food system extend far beyond national borders. Modern agri-food value chains rely on globally traded feed, fertilisers, ingredients and agricultural commodities. As a result, many environmental impacts linked to Belgian consumption occur outside Belgium. Research conducted for the Flemish Environment Agency estimates that approximately 85% of the carbon footprint associated with food purchased by Flemish households occurs outside Flanders, reflecting the global nature of food supply chains (Vercalsteren et al., 2017) . Conversely, more than two-thirds of greenhouse gas emissions generated by Flemish agriculture and the food industry are associated with products destined for export. Globally, agri-food systems are estimated to account for approximately one-third of greenhouse gas emissions, with livestock production representing the largest contribution within Europe (Leip et al., 2015; Mehner et al., 2026). Animal-based food production also places considerable pressure on land, water resources and biodiversity. These environmental challenges have led to increasing policy attention for the protein transition, which seeks to rebalance diets towards greater consumption of plant-based protein sources. Current Flemish and European strategies promote a shift from today's approximately 40% plant-based protein towards a target of 60% plant-based protein, thereby simultaneously improving environmental performance and public health (FlandersFood, 2026; Román, 2023). Food waste constitutes another major sustainability challenge. According to Bond Beter Leefmilieu, food waste accounts for approximately 8% of Belgium's greenhouse gas emissions (De Smet, 2023). Although

estimates remain uncertain, reducing food waste throughout the supply chain has become an important objective of both Flemish and European policy initiatives(European Commission, 2026a; Vlaamse overheid, 2023). In Flanders, the 2023 food loss monitor reported approximately 595,800 tonnes of food losses in the food industry, of which more than 95% were valorised through composting, anaerobic digestion, animal feed or other recovery pathways. At the consumption stage, food losses amounted to 8.7 kg per capita in retail and distribution, 8.8 kg per capita in horeca and catering, and 63.2 kg per capita in households. While household food waste declined by 9.5% compared with 2020, food industry losses increased by 4%, largely due to a poor potato harvest (OVAM, 2023). These trends highlight the remaining challenge in achieving the European Union's food waste reduction targets, which aim to reduce food losses in food processing and manufacturing by 10% and food waste in retail, food services and households by 30% by 2030, compared with 2020 levels (European Commission, 2026b). Finally, the sector faces growing pressures associated with environmental regulation. Measures aimed at reducing nitrogen emissions, particularly within livestock production, are expected to accelerate ongoing structural changes in Belgian agriculture and further reduce the number of farms in the coming decades (VMM, 2024). These transition needs correspond closely to the four intervention clusters developed in Section 5.3: dietary shifts and healthy consumption, food waste prevention and circular food use, healthy and sustainable food environments, and food system innovation and governance. Together, these clusters translate the sector's sustainability challenges into pathways that address both demand reduction and the conditions that enable sustainable nutrition practices.

Sufficiency intervention opportunities

The characteristics of Belgium's nutrition system point towards several important sufficiency intervention pathways. **First**, dietary shifts and healthy consumption offer significant opportunities to reduce greenhouse gas emissions, resource use and health risks by shifting towards lower-impact and healthier diets, aligning food intake with healthy sufficiency levels, optimising portion sizes, favouring seasonal and local choices where appropriate, and reducing highly processed or resource-intensive foods. **Second**, food waste prevention and valorisation of food losses and side streams can reduce unnecessary production and resource consumption by preventing household, retail and food-service waste. **Third**, healthy and sustainable food environments can make lower-impact choices easier through sustainable public procurement, healthier and more sustainable food provision in schools, workplaces and other public institutions, affordability measures, food access, cooking and preservation skills and food literacy. **Finally**, food system innovation and governance, including lower-impact protein alternatives and measures to reduce food waste through better retail and packaging practices, can help embed sufficiency in wider food-system transformation. Ensuring that sustainable diets remain affordable, accessible and socially acceptable is essential for achieving sufficiency without compromising food security or increasing social inequalities.

Key take aways on the nutrition sector

The nutrition sector encompasses a complex network of activities that produce, process, distribute and supply food to Belgian consumers. While primary agriculture represents a relatively small share of Belgium's GDP, the broader agri-food chain constitutes one of the country's largest industrial systems and plays a strategic role within European value chains. At the same time, current food production and consumption patterns generate substantial environmental pressures while contributing to important public health challenges. As a result, the sector offers considerable opportunities for sufficiency interventions centred on healthier dietary patterns, reduced food losses, improved resource efficiency and more sustainable consumption. Together, these approaches can contribute simultaneously to climate mitigation, biodiversity protection, public health and long-term food system resilience.

4.4 Consumer products

Consumer products encompass a broad range of goods purchased and used by households, including textiles and clothing, furniture, electrical and electronic equipment (EEE), household appliances and numerous other everyday products. These products fulfil essential societal functions related to housing, communication, education, health, work and leisure while accounting for a substantial share of material consumption, environmental impacts and waste generation (Manshoven et al., 2023) (Manshoven et al., 2023). In 2024, approximately 13% of Belgian household expenditure was devoted to consumer goods, including 4.7% for clothing and footwear, 5% for furnishings and household equipment, and 3.2% for information and communication technologies (Eurostat, 2026). As a highly open economy located at the centre of Europe, Belgium primarily functions as a logistics hub and consumption market for consumer goods rather than a major manufacturing country. Although domestic production remains important in several specialised market segments, most consumer products purchased by Belgian households are manufactured abroad through globally distributed value chains. Consequently, many environmental impacts associated with Belgian consumption occur outside Belgium, while consumption, repair, reuse and end-of-life management largely take place domestically (Manshoven et al., 2023). From a sufficiency perspective, three product groups are particularly relevant: electrical and electronic equipment, textiles and clothing, and furniture. Together they account for substantial material flows and environmental impacts while offering significant opportunities for extending product lifetimes, increasing reuse and repair, and reducing material demand.

Economic importance and position in Belgian and European value chains

Belgium historically maintained important manufacturing activities in electronics, textiles and furniture. While production of mass-market consumer goods has increasingly shifted to lower-cost regions, Belgian industries have specialised in higher-value products, innovation-intensive manufacturing and logistics. Electrical and electronic equipment (EEE) illustrates Belgium's dual role within European value chains. Apparent Belgian consumption amounted to approximately €16 billion in 2022, while domestic production represented only around €1.8 billion. Imports reached €37.9 billion and exports €23.7 billion, demonstrating Belgium's strong dependence on international supply chains and its important role as a European redistribution hub (Eurostat, 2026). According to the Belgian technology federation Agoria, Belgium nevertheless hosts several internationally recognised technology companies, including Melexis, Barco, IBA, Alstom Belgium, Nokia Bell and Nexans, that occupy specialised positions within European industrial value chains. The Belgian textile industry has

undergone a similar transformation. Historically centred on cotton production in East Flanders, flax in West Flanders and wool in the Vesder Valley, the sector increasingly specialises in technical textiles, interior textiles and higher-value clothing products (Buyse & Velghe, 2011; Coppejans-Desmedt, 1981). Today, approximately 91% of textile companies are SMEs, generating a turnover of €4.9 billion and employing around 15 000 people, while approximately 70% of production is exported, mainly to other European countries (Fedustria, 2026). Belgium also retains a significant furniture manufacturing sector rooted in woodworking and interior furnishing traditions. In 2025, the sector generated a turnover of approximately €6.1 billion, with activities concentrated in fibreboard production, custom-made furniture and building components, while mass-market furniture is largely imported (Fedustria, 2026). Overall, Belgium's position within consumer product value chains has shifted from large-scale manufacturing towards specialised production, logistics, distribution and end-of-life management. This increasing dependence on global supply chains exposes the country to fluctuations in international markets while simultaneously creating opportunities for developing circular value chains centred on repair, refurbishment and reuse.

Societal relevance

Consumer products fulfil a wide range of essential societal functions and increasingly shape participation in modern society. Electrical and electronic equipment has become indispensable for communication, education, employment, healthcare and access to public services. While Belgium performs well in the digitalisation of public services, digital inequalities remain substantial. Approximately **40% of the Belgian population is considered at risk of digital exclusion**, with age, education and income representing important determinants of digital participation (Koning Boudewijnstichting, 2024; STATBEL, 2025b). Textiles provide far more than physical protection. Clothing contributes to comfort, identity, self-expression and social participation. However, the emergence of fast-fashion business models has substantially shortened product lifetimes and accelerated consumption cycles, increasing both material throughput and waste generation (Duhoux et al., 2022; Manshoven et al., 2019, 2025). Furniture plays an equally important role in housing quality, comfort and wellbeing. Changing lifestyles, demographic developments and increased teleworking following the COVID-19 pandemic have altered furniture demand, while second-hand markets and social economy organisations such as Oxfam, Kringwinkel and Troc contribute to social inclusion by providing affordable household goods (Chng, 2026).

Sustainability challenges and transition needs

Consumer products account for substantial environmental impacts through material extraction, manufacturing, transport and end-of-life management, much of which occurs outside Belgium. Electrical and electronic equipment presents particular challenges because manufacturing relies on complex material combinations and numerous critical raw materials, including rare earth elements, cobalt, lithium and platinum-group metals (Carrara et al., 2020; FutuRaM Consortium, 2025). At the same time, rapidly increasing consumption places growing pressure on electronic waste systems. Belgium has developed a mature collection and recycling infrastructure through Recupel, which collected approximately 135 000 tonnes of electronic waste in 2024. Around 80% was recycled, 5% reused and 10% recovered through energy generation (Recupel, 2024). Textile production is associated with considerable greenhouse gas emissions, water use, land use, chemical pollution and resource consumption. Because most production occurs outside Europe, many of these environmental impacts are effectively outsourced through global supply chains (Manshoven et al., 2025). Recent European policy initiatives, including the EU Strategy for Sustainable and Circular Textiles and the Ecodesign for Sustainable Products Regulation (ESPR), seek to promote more durable, repairable and circular textile products (European Commission, 2022; European Commission, 2024c). Furniture production likewise requires substantial quantities of timber, metals, plastics, textiles and chemical substances. However, because furniture generally has relatively long service lives, it offers

particularly favourable opportunities for extending product lifetimes through maintenance, repair, refurbishment and reuse (EEA, 2024). Across all three product groups, Belgium also faces increasing strategic dependencies on globally distributed supply chains. Electronics depend heavily on imported critical raw materials and manufacturing capacity concentrated in Asia (Carrara et al., 2020). Textile production relies on imported fibres, fabrics and garments, while much of Europe's collected textile waste is exported for reuse or recycling, often with uncertain environmental outcomes (Lingas et al., 2023). Although furniture depends less on critical materials, its production nevertheless remains vulnerable to international raw material markets and supply disruptions.

Sufficiency intervention opportunities

The characteristics of Belgium's consumer product system point towards several important sufficiency intervention pathways. **First**, extending product lifetimes through improved durability, maintenance and repair offers one of the greatest opportunities for reducing material demand and associated environmental impacts across all consumer product groups. **Second**, increasing product utilisation through reuse, refurbishment, remanufacturing and second-hand markets can preserve product value while reducing demand for new products. **Third**, sharing and service-based consumption models, particularly for products that are infrequently used, can improve utilisation rates while reducing the number of products required to satisfy consumer needs. **Finally**, encouraging more conscious consumption patterns, including sobriety, avoiding premature replacement and prioritising quality over quantity, complements circular economy strategies by addressing material demand at its source.

Key take aways on the consumer products

Consumer products constitute an important component of household consumption in Belgium and remain deeply embedded within global production networks. While Belgium continues to host specialised manufacturing activities in electronics, textiles and furniture, the country increasingly functions as a logistics, distribution and consumption hub. Consequently, many environmental impacts associated with Belgian consumption of products occur abroad, whereas consumption, repair, reuse and end-of-life management primarily take place domestically. These characteristics make consumer products particularly well suited to sufficiency strategies centred on extending product lifetimes, increasing utilisation through repair and reuse, and encouraging more conscious consumption patterns. Together with circular economy measures, these interventions can reduce Belgium's material footprint while strengthening resource security, reducing dependence on global value chains and supporting the transition towards more sustainable consumption systems.

5. A CONSOLIDATED LIST OF INTERVENTIONS

Building on the sectoral analyses presented in Section 4, this chapter consolidates the identified sufficiency intervention pathways into a coherent intervention framework. The objective is to translate the broad sustainability challenges identified for each sector into a manageable set of intervention pathways that can subsequently be operationalised through concrete Policies and Measures (PaMs) in Task 1.3.

An *intervention* is understood here as a **strategic pathway for changing how societal needs are fulfilled**. Interventions therefore represent an intermediate level between the broad sectors analysed in Section 4 and the specific policy instruments that will be developed later in the project. Whereas interventions describe *what* should change (e.g. better utilisation of the existing housing stock) and shows the underlying sufficiency objective they are intended to support, PaMs describe *how* these changes can be realised through concrete regulatory, fiscal, informational or technological actions.

The intervention list was developed through an iterative process combining literature review, expert judgement and the sectoral analyses presented in the previous chapter. During this process, interventions with similar objectives were merged, overlapping concepts were consolidated, and interventions were reformulated at a comparable level of abstraction to ensure consistency across sectors. The resulting framework therefore does not aim to provide an exhaustive catalogue of possible actions but rather identifies the principal intervention pathways that are considered most relevant for achieving sufficiency in Belgium. For each sector, the interventions are grouped into thematic clusters reflecting their primary contribution to the sufficiency transition. This clustering facilitates the subsequent identification of PaMs while illustrating how different intervention pathways collectively contribute to reducing resource demand, as characterised using the Avoid–Shift–Improve–Share (ASI-S) framework.

What is the ASI-S framework?

The Avoid–Shift–Improve–Share (ASI-S) framework provides a complementary perspective for characterising how interventions contribute to sufficiency. The ASI-S framework provides a complementary perspective for characterising how interventions contribute to sufficiency. Originally developed as the ASI framework within sustainable transport policy (Creutzig et al., 2021), it has subsequently been extended in the sufficiency and circular economy literature with a fourth strategy, Share, to explicitly capture interventions that increase the utilisation of assets through shared use (Sandberg, 2021). Therefore, the framework distinguishes four complementary mechanisms through which resource use and environmental impacts can be reduced:

- **Avoid** interventions reduce or prevent the demand for energy, materials, land or mobility by avoiding unnecessary consumption or service provision.
- **Shift** interventions encourage transitions towards alternative ways of satisfying societal needs that require fewer resources or have lower environmental impacts (e.g. changing transport modes or housing typologies).
- **Improve** interventions increase the efficiency, utilisation, adaptability or lifetime of existing assets, thereby reducing the resources required to deliver the same level of service.
- **Share** interventions increase the utilisation of products, infrastructure or spaces by enabling multiple users to benefit from the same assets, thereby reducing overall resource demand.

The four strategies are complementary rather than mutually exclusive, and many interventions contribute to more than one category.

5.1 Shelter/Buildings sector

The shelter sector comprises **14 intervention pathways** (see Table 3), which together address the principal drivers of resource consumption associated with the built environment. Together, they span the entire building lifecycle, from reducing the demand for new construction and making better use of the existing building stock to extending building service life and creating the enabling governance, planning and material conditions for a sufficiency-oriented housing system. The interventions can be grouped into three complementary clusters.

- The first cluster, Demand reduction and better use of space, focuses on limiting the demand for additional buildings and land while improving the utilisation of existing housing and urban space. The interventions promote appropriately sized dwellings, compact urban development, shared living arrangements and resource-efficient building design, thereby reducing the need for new construction and the associated demand for land, materials and infrastructure.
- The second cluster, Extending lifetime and adaptability of the built environment, aims to maximise the value and service life of the existing building stock. Rather than replacing buildings when needs change, these interventions promote adaptive reuse, renovation, maintenance and flexible building design, allowing buildings to accommodate changing societal needs over longer time horizons while avoiding unnecessary demolition and reconstruction.
- The third cluster, Enabling systemic conditions, contains interventions that establish the planning, regulatory and environmental conditions required for a sufficiency-oriented built environment. These include integrated spatial planning, fiscal and regulatory incentives, operational energy demand reduction, circular and regenerative building materials, nature-based urban regeneration and development within ecological carrying capacity. Rather than targeting individual buildings, these interventions reshape the wider institutional and environmental context within which housing and construction decisions are made.

Table 3: *List of interventions for the shelter/building sector*

SHELTER/BUILDING		
Intervention ID	**Intervention name**	**Intervention description**
SHE-01	Limit residential floor area growth per capita	Creating housing units within in spatial limits: encourage compact housing typologies, promote apartment living in suitable locations, create shared amenities to reduce spacial needs
SHE-02	Better utilisation of the existing housing stock	Matching supply and demand by removing transaction barriers or introducing fiscal incentives for moving to appropriately sized dwellings
SHE-03	Compact urban development and infill	Densification and infill instead of expanding into green fields: redevelop brownfields, build on vacant urban plots, apply building (rooftop) extensions, encourage subdivision of buildings
SHE-04	Adaptive reuse of existing buildings	Revitalisation being preferred above demolishing - only when re-use is not feasible
SHE-05	Extend building service life	Extending a buildings service life - including all its integrated assets avoiding demolition and waste generation: applying renovation-first policies; demolition permits requiring circularity strategies; maintenance incentives, long-term building stewardship

SHE-06	Co-housing and shared living	Promoting different forms of co-housing and shared living
SHE-07	Design for adaptability	Designing building for adaptability including measures such as flexible floor plans, adaptable structures, design for disassembly, higher floor-to-ceiling heights, applying modular building principles
SHE-08	Transit-oriented and mixed-use spatial planning	Housing demand cannot be separated from access to mobility and services, therefore, spatial planning should include transit-oriented development, mixed-use urban areas, 15-minute city principles, concentration around public transport and services nodes
SHE-09	Resource-efficient building design	Avoiding unnecessary construction and raw material consumption applying circular building principles, material-efficient design (lightweight structures, share infrastructure, optimised structural design) and space efficient design (multifunctional space, flexible lay-outs)
SHE-10	Create enabling conditions for sufficiency-oriented housing choices	Create enabling regulatory, fiscal and planning conditions that support compact housing, adaptive reuse, subdivision of under-occupied dwellings, co-housing and renovation-first approaches.
SHE-11	Reducing energy demand and space conditioning	Reducing energy demand (lower heating setpoints, reduced cooling demand, smart occupancy management, shared energy services) and space conditioning (heat people instead of entire buildings, zone heating/cooling, occupancy-based operation, passive design before technological solutions)
SHE-12	Circular and regenerative building materials	Reduce extraction while supporting regenerative resource cycles (timber from regenerative forestry, bio-based materials, local material sourcing, reclaimed materials, low-material design strategies), as such buildings become repositories of resources and value
SHE-13	Nature-based urban regeneration	The built environment should contribute to ecosystem resilience and recovery (green roofs, living walls, urban forests, biodiversity corridors, native vegetation)
SHE-14	Development within ecological carrying capacity	The most fundamentally regenerative sufficiency measure encompass development limits based on ecological carrying capacity: carbon budgets, material consumption budgets, land-use caps)- 'how much can we build sustainably' versus 'how much urban interventions can local ecosystems support'

The classification according to the Avoid–Shift–Improve–Share (ASI-S) framework reveals a clear predominance of **Avoid** and **Improve** strategies within the shelter sector (see Table 4). Eight of the fourteen intervention pathways primarily aim to avoid resource demand by reducing the need for additional buildings, limiting land take, preventing unnecessary material consumption or avoiding

premature demolition. A further six interventions primarily focus on improving the utilisation, adaptability, operational performance and service life of the existing building stock. This distribution reflects the fundamental characteristics of the shelter sector, where buildings are long-lived assets and the greatest opportunities for sufficiency arise from making better use of existing buildings rather than continuously expanding the built environment. Three interventions additionally incorporate **Share** principles by increasing the collective use of housing, infrastructure and urban services through shared living arrangements, improved utilisation of existing dwellings and integrated spatial planning. No intervention is primarily classified as **Shift**, reflecting the fact that, unlike the mobility sector, shelter offers relatively few opportunities to substitute one mode of service provision for another. Overall, the assessment highlights that sufficiency in the shelter sector is achieved predominantly by avoiding unnecessary construction and improving the performance, utilisation and longevity of existing assets, with sharing acting as an important complementary strategy.

Table 4: *Sufficiency intervention pathways for the shelter (buildings) sector, organised by intervention cluster and Avoid-Shift-Improve-Share framework*

Intervention ID	Cluster	Avoid	Shift	Improve	Share
SHE-01	Demand reduction and better use of space	✓			
SHE-02				✓ (2)	✓ (1)
SHE-03		✓ (1)		✓ (2)	
SHE-06					✓
SHE-09		✓			
SHE-04	Extending lifetime and adaptability	✓			
SHE-05				✓	
SHE-07				✓	
SHE-08	Enabling systemic conditions	✓ (2)			✓ (1)
SHE-10				✓	
SHE-11		✓ (2)		✓ (1)	
SHE-12		✓ (2)		✓ (1)	
SHE-13				✓	
SHE-14		✓ (2)		✓ (1)	

5.2 Mobility sector

The mobility sector comprises **20 intervention pathways** (see Table 5), which together address the principal drivers of transport-related energy use, greenhouse gas emissions and resource consumption. The interventions span the entire mobility system, from avoiding unnecessary travel demand and promoting more sustainable transport modes to improving the utilisation of transport infrastructure and enabling systemic changes in mobility planning and governance. As with the shelter/building sector, the interventions can be grouped into three clusters:

- The first cluster, Reducing mobility demand while maintaining accessibility, focuses on reducing the need for motorised travel where access to work, services, education and social participation can be maintained. It includes teleworking and digital services, proximity-based spatial planning, reallocating public space away from private vehicles and supporting behavioural change.
- The second cluster, Shifting towards sustainable mobility, aims to replace higher-impact transport modes with lower-impact alternatives for both passenger and freight transport. These interventions promote public transport, active mobility, Mobility-as-a-Service (MaaS), rail and inland waterway freight, low-impact urban logistics and lower-carbon long-distance

travel. Collectively, they encourage a transition towards transport systems that require fewer resources while maintaining accessibility and economic activity.

- The third cluster, Sharing mobility and improving utilisation, focuses on increasing the utilisation of existing vehicles and logistics systems through car sharing, ride sharing, freight consolidation and improved freight load factors. Rather than expanding transport capacity, these interventions seek to maximise the use of existing assets, thereby reducing vehicle ownership, vehicle kilometres and associated material and energy demand.

Table 5: List of interventions for the mobility sector

MOBILITY		
Intervention ID	**Intervention name**	**Intervention description**
MOB-01	Reduce travel demand where accessibiltiy can be maintained	Promote teleworking, hybrid working arrangements, digital public services and virtual meetings to reduce commuting and business travel demand where these alternatives maintain access to work, services and social participation.
MOB-02	Proximity-based spatial planning (15-minute city principles)	Encourage mixed-use urban development where daily needs can be reached by walking, cycling or public transport, reducing the need for motorised travel.
MOB-03	Modal shift from private cars to sustainable transport	Encourage a shift from private car use towards public transport, walking, cycling and other lower-impact transport modes through improved accessibility, connectivity and service quality.
MOB-04	Active mobility (walking and cycling)	Expand cycling infrastructure, pedestrian networks, school streets and low-traffic neighbourhoods to encourage walking and cycling as preferred modes for short trips.
MOB-05	Shared vehicle services	Expand shared vehicle services, including station-based, free-floating and peer-to-peer car sharing, as alternatives to private vehicle ownership.
MOB-06	Ride sharing and carpooling	Promote shared vehicle occupancy for commuting and longer-distance trips through coordinated ride-sharing and carpooling schemes.
MOB-07	Integrated multimodal mobility services	Develop integrated ticketing, Mobility-as-a-Service (MaaS) platforms, mobility hubs and multimodal journey planning to facilitate seamless travel across transport modes.
MOB-08	Public transport service enhancement	Improve the frequency, reliability, accessibility and geographical coverage of public transport services, particularly outside major urban centres.
MOB-09	Modal shift from road freight to rail	Increase rail freight capacity and utilisation for long-distance freight transport to reduce emissions, congestion and road infrastructure demand.

MOB-10	Modal shift from road freight to inland waterways	Increase the use of Belgium's extensive inland waterway network for bulk and container transport where feasible.
MOB-11	Urban freight consolidation	Establish urban consolidation centres and coordinated last-mile logistics systems to reduce delivery vehicle kilometres and improve freight efficiency.
MOB-12	Cargo-bike and zero-emission urban logistics	Replace conventional urban delivery vehicles with cargo bikes and other zero-emission delivery solutions where operationally feasible.
MOB-13	Low-carbon long-distance mobility	Promote modal shifts from aviation and private car travel towards rail and other lower-impact transport modes, while encouraging digital alternatives to business travel where appropriate.
MOB-14	Freight load-factor optimisation	Improve freight vehicle utilisation by reducing empty trips and increasing load factors through digital logistics coordination and collaboration.
MOB-15	Parking reform and road-space reallocation	Reallocate urban space currently dedicated to private vehicle parking towards active mobility, public transport infrastructure and high-quality public space.
MOB-16	Mobility demand management and behavioural change	Strengthen coordination across governance levels while supporting mobility management programmes, awareness campaigns and behavioural interventions that reduce car dependency and encourage sustainable travel choices.
MOB-17	Light electric mobility	Promote light electric vehicles such as e-bikes, cargo bikes, speed pedelecs and light electric microcars as substitutes for conventional passenger cars, particularly for short and medium-distance trips.
MOB-18	Vehicle ownership reduction	Reduce the number of privately owned vehicles by promoting car-free households, mobility subscriptions, second-car replacement and access to shared mobility services instead of ownership.
MOB-19	Shared autonomous mobility services	Deploy autonomous vehicles primarily as shared mobility services integrated with public transport, replacing privately owned vehicles rather than adding new vehicle travel.
MOB-20	Manage car use through fair demand-management mechanisms	Use pricing as one possible demand-management mechanism to reduce excessive car dependency and encourage more sustainable travel behaviour, while ensuring that future PaMs consider affordability, territorial equity and the availability of viable alternatives.

The classification according to the Avoid–Shift–Improve–Share (ASI-S) framework reveals a more balanced intervention portfolio than that observed for the shelter/building sector (Table 6). Nevertheless, **Shift** remains the dominant strategy, reflecting the central role of modal change in achieving sufficiency within the mobility system. Eight intervention pathways are primarily classified

as **Shift**, promoting transitions from private cars towards public transport, active mobility, light electric mobility, rail and inland waterways, as well as lower-impact long-distance travel, including alternatives to aviation where feasible. These interventions are frequently complemented by **Avoid** or **Improve** strategies, recognising that modal change is most effective when combined with reductions in travel demand and improvements in transport systems.

The assessment also highlights the importance of **Avoid** strategies. Six interventions primarily seek to reduce mobility demand or car dependency through travel demand reduction, compact spatial planning, vehicle ownership reduction, parking reform, mobility demand management and road-user pricing. Rather than focusing solely on improving transport efficiency, these interventions address the structural determinants of travel demand and private vehicle use.

Share strategies are represented through four intervention pathways, including shared vehicle services, ride sharing, shared autonomous mobility services and collaborative freight logistics. These interventions increase vehicle occupancy and utilisation while reducing demand for private vehicle ownership and additional transport capacity.

Finally, three intervention pathways primarily focus on **Improve** strategies, enhancing the performance and utilisation of existing public transport, freight logistics and urban transport systems.

Overall, the ASI-S assessment demonstrates that sufficiency in the mobility sector relies on a balanced combination of demand reduction, modal shift, sharing and system optimisation. Compared with the shelter sector, mobility offers substantially greater opportunities to substitute travel modes and reorganise transport systems, making **Shift** strategies particularly prominent while still relying on complementary **Avoid**, **Share** and **Improve** interventions to maximise environmental benefits.

Table 6: *Sufficiency intervention pathways for the mobility sector, organised by intervention cluster and Avoid-Shift-Improve-Share framework*

Intervention ID	Cluster	Avoid	Shift	Improve	Share
MOB-01	Avoiding unnecessary mobility demand	✓			
MOB-02		✓ (1)	✓ (2)		
MOB-15		✓ (1)	✓ (2)		
MOB-16		✓ (1)	✓ (2)		
MOB-18		✓ (1)			✓ (2)
MOB-20		✓ (1)	✓ (2)		
MOB-03	Shifting towards sustainable mobility	✓ (2)	✓ (1)		
MOB-04		✓ (2)	✓ (1)		
MOB-07			✓ (1)		✓ (2)
MOB-08			✓ (1)	✓ (2)	
MOB-09			✓ (1)	✓ (2)	
MOB-10			✓ (1)	✓ (2)	
MOB-12			✓ (1)	✓ (2)	
MOB-13		✓ (2)	✓ (1)		
MOB-17			✓ (1)	✓ (2)	
MOB-05	Sharing mobility and improving utilisation	✓ (2)			✓ (1)
MOB-06				✓ (2)	✓ (1)
MOB-11				✓ (1)	✓ (2)
MOB-14				✓ (1)	✓ (2)

5.3 Nutrition/Food sector

The nutrition/food sector comprises **18 intervention pathways** (see Table 9), which together address sufficiency opportunities across food consumption, food waste prevention, food environments in public institutions, public procurement, processing side streams, local food systems, and alternative food networks. Compared with the previous version, the updated intervention list places stronger emphasis on healthy sufficiency levels, lower-impact diets, waste prevention before waste management, sustainable public procurement, portion-size optimisation, seasonal and local food choices, and community-based food-system models. Together, these pathways connect climate mitigation, resource demand reduction, public health, affordability and food-system resilience.

- The first cluster, Dietary shifts and healthy consumption, focuses on aligning food consumption with healthier and lower-impact sufficiency levels. This includes shifting towards plant-based, seasonal, and lower-impact diets, reducing overconsumption, optimising portion sizes, discouraging retail promotions that stimulate unnecessary purchases of perishable foods, and limiting highly processed or resource-intensive foods and drinks.
- The second cluster, Food waste prevention and valorisation of food losses and side streams, targets avoidable food losses across households, retail, and food services, and processing by improving planning, storage, stock management, redistribution, surplus recovery, and valorisation of processing side streams. It also includes flexible product and package sizes, such as smaller, modular and resealable packaging, to better match household needs and reduce food waste.
- The third cluster, Healthy and sustainable food environments, focuses on making healthier and lower-impact food choices easier and more accessible through sustainable public procurement, food environments in public institutions, affordability measures, food literacy, cooking skills and practical support for vulnerable groups.
- The fourth cluster, Sustainable food systems and governance, supports broader transformation through local food strategies, community-based initiatives, urban and peri-urban food production, short supply chains, and alternative food networks (Zwart & Mathijs, 2020), producer-consumer cooperation and more flexible marketing/cosmetic standards for agricultural produce, enabling auctions, processors, and retailers to accept and market fruits and vegetables that deviate from cosmetic standards but meet quality and safety requirements.

Table 7: List of interventions for the nutrition/food sector

NUTRITION/FOOD		
Intervention ID	**Intervention name**	**Intervention description**
NUT-01	Shift towards lower-impact and healthier diets	Encourage dietary patterns with reduced reliance on high-impact animal-based foods and greater use of plant-based, seasonal and lower-impact alternatives.
NUT-02	Align food intake with healthy sufficiency levels	Support adequate food intake by reducing overconsumption while maintaining nutritional quality, affordability and health outcomes.

NUT-03	Reduce household food waste	Help households avoid edible food waste through better meal planning, storage, portioning, purchasing habits and use of leftovers.
NUT-04	Reduce food waste in retail and food services	Reduce avoidable food waste in supermarkets, catering, restaurants and hospitality through better stock management, preparation, portioning and redistribution practices.
NUT-05	Food redistribution and surplus recovery	Redistribute edible surplus food from producers, retailers and food-service providers to maximise human consumption before alternative recovery pathways.
NUT-06	Promote lower-impact protein alternatives	Promote the development, availability and uptake of lower-impact protein sources as alternatives to conventional high-impact animal proteins.
NUT-07	Valorise food-processing side streams	Use by-products and side streams from food processing for food, feed or other high-value applications before lower-value disposal.
NUT-08	Use institutional food environments to normalise sufficient and lower-impact meals	Shape public and institutional food purchasing to prioritise healthy, sufficient, seasonal and lower-impact meals offered in schools, hospitals, public canteens and similar settings so that healthy, sufficient, seasonal and lower-impact options become the default or easiest choice
NUT-09	Portion-size and serving practice optimisation	Optimise portion sizes, serving formats and default options to reduce overconsumption and plate waste while preserving choice and nutritional quality.
NUT-10	Shift towards seasonal and lower-impact local foods	Encourage food choices that prioritise seasonal products and locally produced foods where these reduce environmental impacts while supporting resilient food systems.
NUT-11	Reduce highly processed and resource-intensive foods	Reduce consumption of foods and drinks with high environmental impacts and limited nutritional value, including but not limited to sugary drinks or highly processed products.
NUT-12	Improve food access, skills and literacy	Improve access to affordable healthy food while strengthening practical cooking skills, food planning and understanding of nutrition and sustainability.
NUT-13	Create healthy and sustainable institutional food environments	Shape schools, workplaces, care facilities and other institutions so that healthy, sufficient and lower-impact food and drink choices are convenient and normal.
NUT-14	Strengthen local food systems and short supply chains	Strengthen local food strategies, community food initiatives, direct producer–consumer connections and alternative distribution models that support sustainable, resilient and transparent food systems.
NUT-15	Urban and peri-urban food production	Support community gardens, edible landscapes, urban agriculture and peri-urban production that

		improve food awareness, resilience and short-chain supply.
NUT-16	Flexible marketing standards for agricultural produce	Encourage auctions, processors and retailers to accept and market fruits and vegetables that deviate from cosmetic standards but meet quality and safety requirements.
NUT-17	Responsible retail promotions	Discourage promotions that stimulate unnecessary purchases of perishable foods (e.g. large multi-buy offers) and encourage flexible portion sizes and dynamic pricing near expiry dates.
NUT-18	Flexible product and package sizes	Encourage retailers and food manufacturers to offer smaller, modular,reusable and resealable packaging formats to better match household needs and reduce food waste and packaging-related material demand where life-cycle impacts are favourable.

The classification according to the **Avoid–Shift–Improve–Share (ASI-S)** framework highlights the complementary roles of **Avoid** and **Shift** strategies within the nutrition/food sector (Table 10). **Avoid** strategies are central to reducing unnecessary resource demand by preventing overconsumption, reducing household and commercial food waste, limiting avoidable food losses throughout the supply chain, discouraging unnecessary purchases of perishable foods through responsible retail practices, and reducing the consumption of highly processed and resource-intensive foods and drinks. **Shift** strategies are equally important, promoting transitions towards healthier and lower-impact diets, seasonal and locally appropriate food choices, sustainable public procurement, healthier institutional food environments, lower-impact protein sources and more sustainable food-system practices.

Improve strategies strengthen the enabling conditions for sufficiency by enhancing food access, food literacy, practical cooking and planning skills, institutional procurement practices, food environments, processing efficiency and product and packaging design that better match household needs. These interventions improve the functioning of the food system and facilitate the adoption of more sustainable consumption patterns. **Share** strategies are less prominent than in the mobility and shelter sectors but remain important for strengthening collective food-system organisation through food redistribution, local food systems, short supply chains and urban food production. These interventions promote cooperation between producers, consumers and communities while increasing food-system resilience.

Overall, the ASI-S assessment demonstrates that sufficiency in the nutrition sector relies on a balanced combination of reducing avoidable food demand, shifting dietary patterns and food systems towards healthier and lower-impact alternatives, improving the performance and accessibility of food environments, and strengthening community-based approaches that enhance resilience, resource efficiency and cooperation.

Table 8: Sufficiency intervention pathways for the nutrition sector, organised by intervention cluster and Avoid-Shift-Improve-Share framework

Intervention ID	Cluster	Avoid	Shift	Improve	Share
NUT-01	Dietary shifts and healthy consumption	✓ (2)	✓ (1)		
NUT-02		✓ (1)		✓ (2)	
NUT-09		✓ (1)		✓ (2)	

NUT-10		✓ (2)	✓ (1)		
NUT-11		✓ (1)	✓ (2)		
NUT-03	Food waste prevention and valorisation of food losses and side streams	✓ (1)		✓ (2)	
NUT-04		✓ (1)		✓ (2)	
NUT-05		✓ (2)			✓ (1)
NUT-07				✓ (1)	✓ (2)
NUT-17		✓ (1)		✓ (2)	
NUT-18		✓ (2)		✓ (1)	
NUT-08	Healthy and sustainable food environments		✓ (1)	✓ (2)	
NUT-12			✓ (2)	✓ (1)	
NUT-13			✓ (1)	✓ (2)	
NUT-06	Food system innovation and governance		✓ (1)	✓ (2)	
NUT-14				✓ (1)	✓ (2)
NUT-15				✓ (2)	✓ (1)
NUT-16		✓ (1)	✓ (2)		

5.4 Consumer products

The consumer products sector comprises **16 intervention pathways** (see Table 9), which together address the principal drivers of material consumption, product replacement and waste generation associated with household consumption. The interventions cover the entire product life cycle, from reducing unnecessary consumption and extending product lifetimes to increasing product utilisation and creating the market conditions that enable more sufficiency-oriented consumption patterns. The interventions can be grouped into four complementary clusters:

- The first cluster, Reducing material demand, focuses on limiting the demand for new consumer products by discouraging unnecessary purchases, reducing fast-fashion turnover, avoiding non-essential electronic products and promoting more conscious consumption patterns. Together, these interventions directly target the principal driver of environmental impacts: the growing volume of products entering the economy.
- The second cluster, Extending product lifetimes, aims to maximise the useful life of products through maintenance, repair, refurbishment, software support and reuse. Rather than replacing products prematurely, these interventions retain the value embedded in existing products while reducing demand for new materials and manufacturing.
- The third cluster, Increasing product utilisation, focuses on increasing the utilisation of products already in circulation through sharing, rental, leasing and collaborative consumption models. These interventions recognise that many consumer products remain underutilised during their lifetime and that higher utilisation rates can significantly reduce the need for new production.
- The fourth cluster, Creating enabling market conditions, contains interventions that influence purchasing decisions, product design and market incentives through procurement practices, consumer information and sufficiency-oriented product policies. These interventions create the regulatory and market environment required to support the transition towards more sustainable consumption.

Table 9: List of interventions for the sector of consumer products

CONSUMER PRODUCTS		
Intervention ID	**Intervention name**	**Intervention description**
CPR-01	Reduce unnecessary consumption and product replacement	Encourage users to purchase fewer, higher-quality products and avoid unnecessary replacement through awareness campaigns, product information and fiscal incentives.
CPR-02	Extend product lifetimes	Promote maintenance, repair, spare-part availability and design for durability to maximise the useful life of products.
CPR-03	Expand second-hand and refurbishment markets	Strengthen reuse centres, second-hand retail, refurbishment businesses and online resale platforms to retain product value and reduce demand for new products.
CPR-04	Green and circular procurement and purchasing choices	Encourage households and organisations to choose durable, repairable and reusable products through product labelling, sustainable procurement and financial incentives.
CPR-05	Sufficiency-oriented product policy	Introduce fiscal, regulatory and informational measures that discourage premature product replacement while promoting durable, repairable and resource-efficient product design.
CPR-06	Product lifetime information	Provide users with clear information on expected product lifetime, repairability, durability and total cost of ownership at the point of purchase.
CPR-EEE-07	Extend software support and security updates	Require manufacturers to provide long-term software and security updates so that otherwise functional electronic devices remain usable for longer.
CPR-EEE-08	Avoid unnecessary electronic gadgets	Reduce the consumption of non-essential electronic products by encouraging non-electronic or lower-impact alternatives where they fulfil the same function.
CPR-EEE-09	Repair and upgrade before replacement	Promote battery replacement, memory upgrades and component repair before purchasing new devices through repair vouchers and improved access to spare parts.
CPR-EEE-10	Shared ownership of low-use appliances	Promote libraries of things, rental, leasing and product-as-a-service models for infrequently used electrical and electronic products.
CPR-TEX-11	Reduce fast-fashion turnover	Discourage ultra-fast fashion business models through fiscal measures, consumer information and minimum durability requirements.
CPR-TEX-12	Slow fashion and wardrobe sufficiency	Encourage consumers to purchase fewer garments, extend wearing time and increase garment utilisation

		through repair, swapping, rental, second-hand markets and capsule wardrobes.
CPR-TEX-13	Occasion wear sharing and rental	Promote rental, borrowing and clothing libraries for garments that are worn infrequently, such as formal wear, maternity wear and children's clothing.
CPR-FUR-14	Furniture reuse during household transitions	Facilitate furniture reuse during household transitions through reuse centres, matching platforms and second-hand markets.
CPR-FUR-15	Shared and modular furniture	Promote modular, multifunctional and shared furniture solutions in households, offices and public buildings.
CPR-FUR-16	Furniture refurbishment and remanufacturing	Promote furniture repair, refurbishment and remanufacturing before replacement, supported by circular procurement and specialised refurbishment businesses.

The classification according to the **Avoid–Shift–Improve–Share (ASI-S)** framework reveals the most balanced intervention portfolio among the four sectors analysed (Table 12). Unlike the shelter sector, where **Avoid** and **Improve** strategies predominate, or the mobility sector, where **Shift** interventions form the backbone of the transition, the consumer products sector combines all four ASI-S strategies in a relatively even manner.

Avoid strategies reduce material demand by discouraging unnecessary purchases, limiting premature product replacement and reducing consumption of resource-intensive products such as fast-fashion garments and non-essential electronic devices. **Improve** strategies play an equally important role by extending product lifetimes through maintenance, repair, refurbishment, software support, durable product design and greater product transparency. These interventions preserve the value embedded in existing products while reducing demand for new materials and manufacturing.

Share strategies focus on increasing the utilisation of products through second-hand markets, rental, leasing, libraries of things and other collaborative consumption models. These approaches are particularly relevant for products with low utilisation rates, such as electrical appliances, occasion wear and furniture. **Shift** strategies complement these interventions by encouraging transitions towards more sustainable purchasing decisions, circular procurement practices and alternative consumption models that prioritise durability, repairability and reuse over product replacement.

Overall, the ASI-S assessment demonstrates that achieving sufficiency in the consumer products sector requires complementary interventions operating across the entire product lifecycle. Rather than relying on a single dominant strategy, the sector combines demand reduction, lifetime extension, increased product utilisation and market transformation to reduce material consumption while maintaining the services and value that consumer products provide.

Table 10: Sufficiency intervention pathways for the sector of consumer products, organised by intervention cluster and Avoid-Shift-Improve-Share framework

Intervention ID	Cluster	Avoid	Shift	Improve	Share
CPR-01	Reducing material demand	✓			
CPR-EEE-08		✓			
CPR-TEX-11		✓ (1)		✓ (2)	
CPR-TEX-12		✓ (1)		✓ (2)	
CPR-02		✓ (2)		✓ (1)	

CPR-03	Extending product lifetimes	✓ (2)			✓ (1)
CPR-EEE-07		✓ (2)		✓ (1)	
CPR-EEE-09		✓ (2)		✓ (1)	
CPR-FUR-14				✓ (2)	✓ (1)
CPR-FUR-16		✓ (2)		✓ (1)	
CPR-EEE-10	Increasing product utilisation	✓ (2)			✓ (1)
CPR-TEX-13		✓ (2)			✓ (1)
CPR-FUR-15				✓ (2)	✓ (1)
CPR-04	Creating enabling market conditions		✓ (1)	✓ (2)	
CPR-05		✓ (1)		✓ (2)	
CPR-06			✓ (2)	✓ (1)	

5.5 Co-benefits, interlinkages and potential trade-offs

The intervention pathways presented in this chapter should not be considered in isolation. Many interventions generate multiple environmental, economic and social co-benefits, while simultaneously interacting with interventions in other sectors. For example, compact and mixed-use urban development can reduce transport demand, improve access to services, lower greenhouse gas emissions, reduce infrastructure requirements and contribute to healthier lifestyles. Similarly, extending the lifetime of buildings and consumer products reduces material extraction and waste generation while improving resource security and potentially lowering household expenditure. These multiple benefits reinforce the rationale for adopting sufficiency-oriented strategies as part of a broader sustainability transition (Creutzig et al., 2021; Intergovernmental Panel On Climate Change (IPCC), 2023).

The analysis also highlights **important interlinkages between sectors**. Several interventions reinforce one another across sectoral boundaries. Compact urban development, for example, supports active mobility and public transport while reducing infrastructure requirements. Shared housing arrangements may reduce demand for household appliances and furniture, whereas extending product lifetimes can decrease the demand for raw materials and manufacturing. Conversely, some interventions may generate additional pressures in other sectors. For instance, increased digitalisation can reduce travel demand while simultaneously increasing demand for electronic devices and digital infrastructure. These examples illustrate the importance of assessing interventions from a systems perspective rather than as isolated sectoral actions (Creutzig et al., 2021; Intergovernmental Panel On Climate Change (IPCC), 2023). A more in-depth analysis of the interrelationships, synergies and trade-offs between these interventions will be presented in the next Deliverable 1.2.1.

The expert consultations further emphasised that the effectiveness of individual PaMs depends not only on their direct impacts but also on how they influence behaviour and interact with other policies. A PaM developed under a particular intervention pathway may unintentionally reduce its overall effectiveness if it triggers **(1) rebound effects**, whereby efficiency gains, cost savings or time savings lead to increased consumption elsewhere, partially offsetting the expected environmental benefits (Sorrell et al., 2020). Likewise, interventions may induce **(2) social (or moral) licensing effects**, whereby undertaking one environmentally beneficial action creates a perceived justification for engaging in more environmentally intensive behaviour in another (Truelove et al., 2014). In addition, interventions should be assessed for the potential risk of **(3) burden shifting**, whereby environmental or social impacts are displaced rather than reduced. For example, reducing impacts within one sector may increase pressures elsewhere in the value chain, transfer impacts geographically through imports, or shift burdens between environmental domains such as climate change, biodiversity and resource

depletion (European Environment Agency, 2024). Avoiding such unintended consequences requires adopting both a life-cycle perspective[5] and a systems perspective when designing and evaluating sufficiency policies (Borragán et al., 2025). Consequently, the intervention pathways and associated PaMs should not be evaluated solely on the basis of their direct contribution to reducing resource use or greenhouse gas emissions. Their assessment should also consider potential co-benefits, interactions with other interventions, distributional implications, and the risks of rebound, social licensing and burden shifting. Accounting for these interactions will help maximise policy synergies, minimise unintended consequences and ensure that sufficiency interventions contribute effectively to Belgium's long-term environmental, economic and societal objectives.

6. CONCLUSIONS AND IMPLICATIONS FOR THE NEXT DELIVERABLE

This first deliverable has established the foundations of the BE-SHIFT project by identifying the principal sufficiency-relevant sectors and systematically reviewing the scientific and policy evidence available in the Belgian context. The review demonstrates that, although sufficiency is rarely articulated as an explicit policy objective, many interventions consistent with sufficiency principles are already embedded within existing climate, energy, mobility, renovation and circular economy strategies. Building on this evidence, the deliverable has identified and structured a comprehensive set of intervention pathways across the four priority sectors, providing the basis for their subsequent translation into concrete PaMs. The next deliverable (D1.1.2) will build on this foundation by establishing a systematic linkage between the intervention pathways identified in this report and the specific PaMs that can be implemented within the Belgian context. It will also develop and apply a PaM Readiness Metric to assess the implementation readiness of each measure, considering technical feasibility, governance and institutional capacity, behavioural acceptability, socio-economic implications and policy maturity. This will provide a structured basis for prioritising sufficiency-oriented measures according to both their potential contribution to the Belgian transition and their practical feasibility for implementation, thereby fulfilling the primary objective of the scoping phase of the BE-SHIFT project and laying the foundation for the subsequent modelling and stakeholder engagement activities.

REFERENCES

A Brief History of European Agricultural Policy. (2013). https://foodpolicyforthought.com/2013/05/28/a-brief-history-of-european-agricultural-policy/

Best, B., Thema, J., Zell-Ziegler, C., Wiese, F., Barth, J., Breidenbach, S., Nascimento, L., & Wilke, H. (2022). Building a database for energy sufficiency policies. *F1000Research*, *11*, 229. https://doi.org/10.12688/f1000research.108822.2

[5] European Commission. (2021). *Commission Recommendation on the use of the Environmental Footprint methods.*

Borragán, G., Dauwe, T., & Renders, N. (2025). A systems-based analysis of energy demand reduction and efficiency policies using fuzzy cognitive maps. *Energy Efficiency*, *18*(7), 88. https://doi.org/10.1007/s12053-025-10362-w

Borragán, G., Sanchez, M. O., & Renders, N. (2026). *Energy Demand Management to fulfilling EU climate commitments*.

Boussauw, K., & Vanoutrive, T. (2017). Transport policy in Belgium: Translating sustainability discourses into unsustainable outcomes. *Transport Policy*, *53*, 11–19. https://doi.org/10.1016/j.tranpol.2016.08.009

Brabant, M., Contino, F., Rixhon, X., & Coppitters, D. (2025). *How many cars do we need in Belgium?*

Buyse, L., & Velghe, D. (2011). De vlasnijverheid in Zuid-West-Vlaanderen: Synthese van een boeiend verhaal. *Tijdschrift Voor Industriële Cultuur*, *28*(115). https://doi.org/10.21825/tic.v28i115.8410

Camps-Aragó, P., Temmerman, L., Vanobberghen, W., & Delaere, S. (2022). Encouraging the Sustainable Adoption of Autonomous Vehicles for Public Transport in Belgium: Citizen Acceptance, Business Models, and Policy Aspects. *Sustainability*, *14*(2), 921. https://doi.org/10.3390/su14020921

Carrara, S., Alves Dias, P., Plazzotta, B., & Pavel, C. (2020). *Raw materials demand for wind and solar PV technologies in the transition towards a decarbonised energy system.* Publications Office. https://data.europa.eu/doi/10.2760/160859

Chng, C. (2026). *Social enterprises' role in furniture and mattress circularity*. RREUSE. https://cdn.nimbu.io/s/zx3wipv/channelentries/fhqaqwd/files/1777390258805/rreuse_social-enterprises_-role-in-furniture-and-mattress-circularity-report.pdf?d7spagb

Cooper, E., & Steenberghen, T. (2023). *D7.1 Final cross-site evaluation handbook including main impact categories and assessment KPIs related to measures*.

Coppejans-Desmedt, H. (1981). The Belgian textile industry on new roads through the adoption of a new mental attitude. In E. H. Kossmann, O. J. De Jong, A. Th. Van Deursen, W. Brulez, J. P.

Van De Voort, H. Coppejans-Desmedt, R. Jurriens, R. Abma, C. R. Emery, & J. A. Kossmann (Eds.), *The Low Countries History Yearbook: Acta Historiae Neerlandicae* (pp. 106–123). Springer Netherlands. https://doi.org/10.1007/978-94-009-7699-3_6

Creutzig, F., Niamir, L., Bai, X., Callaghan, M., Cullen, J., Díaz-José, J., Figueroa, M., Grübler, A., Lamb, W. F., Leip, A., Masanet, E., Mata, É., Minx, J. C., Mirasgedis, S., Mulugetta, Y., Budi, S., Pathak, M., Perkins, P., Roy, J., … Ürge-Vorsatz, D. (2021). *Demand-side solutions to climate change mitigation consistent with high levels of wellbeing*. *12*(36–46 (2022)). https://doi.org/https://doi.org/10.5281/zenodo.5163965

Daubresse, C. (2022). *Perspectives de la demande de transport à l'horizon 2040*.

De Smet, H. (2023). *België op één na grootste voedselverspiller van Europa*. Bond Beter Leef Milieu. https://www.bondbeterleefmilieu.be/artikel/belgi-op-n-na-grootste-voedselverspiller-van-europa

Delaere, H., Basu, S., Macharis, C., & Keseru, I. (2024). Barriers and opportunities for developing, implementing and operating inclusive digital mobility services. *European Transport Research Review*, *16*(1), 67. https://doi.org/10.1186/s12544-024-00684-8

Duhoux, T., Le Blévennec, K., Manshoven, S., Grossi, F., Arnold, M., & Mortensen, L. F. (2022). *Textiles and the Environment—The role of design in Europe's circular economy* (ETC/CE Report 2/2022). European Topic Centre Circular Economy and Resource Use. https://www.eionet.europa.eu/etcs/etc-ce/products/etc-ce-products/etc-ce-report-2-2022-textiles-and-the-environment-the-role-of-design-in-europes-circular-economy

Duprez, C., & Nautet, M. (2019). *Economic flows between Regions in Belgium: = Les flux économiques entre les régions de Belgique*.

EEA. (2024). *Addressing the environmental and climate footprint of buildings*. https://www.eea.europa.eu/en/analysis/publications/addressing-the-environmental-and-climate-footprint-of-buildings

EERA, E. E. R. A. (2023). *Energy demand reduction report*. https://www.eera-set.eu

Els Van de Velde, & Laura Lecluyse. (2025). *Monitoring the twin transition of industrial ecosystems AGRI-FOOD* [Daniela Kretz]. https://monitor-industrial-ecosystems.ec.europa.eu/sites/default/files/2023-12/EMI%20Agrifood%20industrial%20ecosystem%20report.pdf

Energy Market, Belgium. (2024). Enerdata. https://www.enerdata.net/estore/energy-market/belgium/

European Commission. (2023). *Energy Efficiency First*. Energy Efficiency First. https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-first_en

European Commission. (2026a). *Commission Assessment of the Final Updated National Energy and Climate Plan of Belgium*.

European Commission. (2026a). *EU Actions Against Food Waste*. https://food.ec.europa.eu/food-safety/food-waste/eu-actions-against-food-waste_en

European Commission. (2026b). *Food waste reduction targets*. https://food.ec.europa.eu/food-safety/food-waste/eu-food-waste-relevant-legislation/food-waste-reduction-targets_en

European Environment Agency. (2024). *Accelerating the circular economy in Europe: State and outlook 2024.* Publications Office. https://doi.org/10.2800/055236

Eurostat. (2025). *Housing in Europe – 2025 edition*. https://ec.europa.eu/eurostat/web/interactive-publications/housing-2025

Eurostat. (2026). *Eurostat: Household expenditure by category - Compare your country*. https://ec.europa.eu/eurostat/cache/visualisations/economy/household-expenditure

FdSS. (n.d.). *Voedselhulp in België*. Voedselhulp in België. Retrieved https://www.fdss.be/nl/voedselhulp/voedselhulp-in-belgie/

Fedustria. (2026, June 16). *Jaarverslag Fedustria 2025-2026*. Issuu. https://issuu.com/fedustriapub/docs/jaarverslag_fedustria_2025-2026

FEVIA. (2025). *De sub-sectors van de Belgische voedingsindustrie. Kerncijfers per sector Jaar 2024*. https://acrobat.adobe.com/id/urn:aaid:sc:EU:5e3c3893-b081-4177-9495-9265c0d13604?viewer%21megaVerb=group-discover

FlandersFood. (2026). *A strategic research and innovation plan to accelerate the protein shift in Flanders. Protein shift*. https://www.flandersfood.com/en/new-and-shifting-resources/protein-shift

FOD Economie. (2025). *Ectoraal panorama 2025 – Voorjaarseditie*. FOD. https://economie.fgov.be/nl/publicaties/sectoraal-panorama-2025

FutuRaM Consortium. (2025). *Urban Mine Platform*. https://www.urbanmineplatform.eu/

Grabow, S., Riepl, T., Thema, J., & Zell-Ziegler, C. (2026). Efficiency only? An analysis of avoid, shift and improve strategies in EU member states' long-term mitigation policy. *Energy Policy*, *208*, 114888. https://doi.org/10.1016/j.enpol.2025.114888

Gracia, A., & Albisu, L. m. (2001). Food consumption in the European Union: Main determinants and country differences. *Agribusiness*, *17*(4), 469–488. https://doi.org/10.1002/agr.1030

Grubler, A., Wilson, C., Bento, N., Boza-Kiss, B., Krey, V., McCollum, D. L., Rao, N. D., Riahi, K., Rogelj, J., De Stercke, S., Cullen, J., Frank, S., Fricko, O., Guo, F., Gidden, M., Havlík, P., Huppmann, D., Kiesewetter, G., Rafaj, P., … Valin, H. (2018). A low energy demand scenario for meeting the 1.5 °C target and sustainable development goals without negative emission technologies. *Nature Energy*, *3*(6), 515–527. https://doi.org/10.1038/s41560-018-0172-6

Hearne, E. (2025). Improving the Efficiency of Public Investment in Infrastructure in Belgium: Belgium. *Selected Issues Papers*, *2025*(020), 1. https://doi.org/10.5089/9798229004848.018

Hill, B. E. (1984). Mountains and lakes: The problem of surpluses. In *The Common Agricultural Policy*. Routledge.

IEA. (2024). *Efficiency Demand in Belgium*. IEA, Countries, Belgium,. https://www.iea.org/countries/belgium/efficiency-demand

IEA. (2026). *Electricity Report*. https://www.iea.org/reports/electricity-2026

Intergovernmental Panel On Climate Change (IPCC) (Ed.). (2023). Demand, Services and Social Aspects of Mitigation. In *Climate Change 2022—Mitigation of Climate Change* (1st ed., pp. 503–612). Cambridge University Press. https://doi.org/10.1017/9781009157926.007

Ivanova, D., Barrett, J., Wiedenhofer, D., Macura, B., Callaghan, M., & Creutzig, F. (2020). Quantifying the potential for climate change mitigation of consumption options. *Environmental Research Letters*, *15*(9), 093001. https://doi.org/10.1088/1748-9326/ab8589

Kikstra, J. S., Nicholls, Z. R., Smith, C. J., Lewis, J., Lamboll, R. D., Byers, E., Sandstad, M., Meinshausen, M., Gidden, M. J., & Rogelj, J. (2022). The IPCC Sixth Assessment Report WGIII climate assessment of mitigation pathways: From emissions to global temperatures. *Geoscientific Model Development*, *15*(24), 9075–9109.

Koning Boudewijnstichting. (2024). *Vier op de tien Belgen lopen nog steeds risico op digitale uitsluiting*. Koning Boudewijnstichting. https://kbs-frb.be/nl/vier-op-de-tien-belgen-lopen-nog-steeds-risico-op-digitale-uitsluiting

Lebas, A. (2021). *PUBLICATION DESIGN & COMMUNICATION*.

Leip, A., Billen, G., Garnier, J., Grizzetti, B., Lassaletta, L., Reis, S., Simpson, D., Sutton, M. A., de Vries, W., Weiss, F., & Westhoek, H. (2015). Impacts of European livestock production: Nitrogen, sulphur, phosphorus and greenhouse gas emissions, land-use, water eutrophication and biodiversity. *Environmental Research Letters*, *10*(11), 115004. https://doi.org/10.1088/1748-9326/10/11/115004

Lingas, D., Manshoven, S., Mortensen, L. F., & Paulsen, F. (2023). *EU exports of used textiles in Europe's circular economy* (ETC/CE Report No. 2023/4). European Topic Centre Circular Economy and Resource Use. https://www.eionet.europa.eu/etcs/etc-ce/products/etc-ce-report-2023-4-eu-exports-of-used-textiles-in-europe2019s-circular-economy

Lucie Le Jeune, & Eric Le Jeune. (2022). *Your solutions for sustainable agriculture from Belgium – Wallonia SERVICES AND PRODUCTS FOR AGRICULTURE-BREEDING-HORTICULTURE-FORESTRY*.

Ma, J. (2024). *Growing the grid: Transmission and distribution system expansions for deep electrification* [Computer software]. Zenodo. https://doi.org/10.5281/ZENODO.10688702

Manshoven, S., Christis, M., Vercalsteren, A., Arnold, M., Nicolau, M., Lafond, E., Mortensen, L. F., & Coscieme, L. (2019). *Textiles and the environment in a circular economy* (ETC/WMGE Report No. 6/2019). European Topic Centre Waste and Materials in a Green Economy. https://www.eionet.europa.eu/etcs/etc-wmge/products/etc-wmge-reports/textiles-and-the-environment-in-a-circular-economy

Manshoven, S., Smeets, A., Christis, M., Duhoux, T., Lingas, D., Grossi, F., Mortensen, L. F., & Clarke, J. (2025). *Textiles and the environment – The role of digital technologies in Europe's circular economy* (ETC CE Report No. 2025/6). European Topic Centre Circular Economy and Resource Use. https://www.eionet.europa.eu/etcs/etc-ce/products/etc-ce-report-2025-6-textiles-and-the-environment-2013-the-role-of-digital-technologies-in-europe2019s-circular-economy

Manshoven, S., Vercalsteren, A., Christis, M., De Jong, A., Schmidt, I., Grossi, F., Tenhunen, A., & Mortensen, L. F. (2023). *ETC CE Report 2023/8 Consumption and the environment in Europe's circular economy* (ETC CE Report No. 2023/8). European Topic Centre Circular Economy and Resource Use. https://www.eionet.europa.eu/etcs/etc-ce/products/etc-ce-report-2023-8-consumption-and-the-environment-in-europe2019s-circular-economy

Mehner, E., Reguant Closa, A., Herrmann, M., Nemecek, T., Stämpfli, A., Walther, B., & Douziech, M. (2026). Environmental and nutritional implications of replacing meat and dairy with alternatives. *Communications Sustainability*, *1*(1), 71. https://doi.org/10.1038/s44458-026-00075-1

OVAM. (2023). *Monitor voedselverlies 2023*. https://www.vlaanderen.be/publicaties/monitor-voedselverlies

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The

PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, n71. https://doi.org/10.1136/bmj.n71

Recupel. (2024). *Annual Report 2024*. Annual Report 2024. https://annualreport.recupel.be/our-results/

Rockström, J., Thilsted, S. H., Willett, W. C., Gordon, L. J., Herrero, M., Hicks, C. C., Mason-D'Croz, D., Rao, N., Springmann, M., Wright, E. C., Agustina, R., Bajaj, S., Bunge, A. C., Carducci, B., Conti, C., Covic, N., Fanzo, J., Forouhi, N. G., Gibson, M. F., … DeClerck, F. (2025). The EAT-Lancet Commission on healthy, sustainable, and just food systems. *Lancet*, *406*(10512), 1625–1700. https://doi.org/10.1016/S0140-6736(25)01201-2

Román, A. A. (2023). *EU protein strategy*. https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/751426/EPRS_BRI(2023)751426_EN.pdf

RVO. (2020). *Kansenrapport slimme/duurzame mobiliteit in België*.

Sandberg, M. (2021). Sufficiency transitions: A review of consumption changes for environmental sustainability. *Journal of Cleaner Production*, *293*, 126097. https://doi.org/10.1016/j.jclepro.2021.126097

Scerri, K., Martinez, L., Betancur Arenas, J., Keserü, I., & Attard, M. (2025). Understanding the barriers and facilitators of planning and implementing active mobility interventions in Brussels and Malta. *Cities & Health*, 1–18. https://doi.org/10.1080/23748834.2025.2494888

Sorrell, S., Gatersleben, B., & Druckman, A. (2020). The limits of energy sufficiency: A review of the evidence for rebound effects and negative spillovers from behavioural change. *Energy Research & Social Science*, *64*, 101439. https://doi.org/10.1016/j.erss.2020.101439

STATBEL. (2025a). *Belgium in figures*. STATBEL. https://statbel.fgov.be/sites/default/files/files/documents/EN_KERNCIJFER_2025_web.pdf

Statbel. (2025). *Gebouwenpark*. https://statbel.fgov.be/nl/themas/bouwen-wonen/gebouwenpark#news

STATBEL. (2025b). *ICT usage in households*. https://statbel.fgov.be/en/themes/households/ict-usage-households

Statbel. (2026b). *Structurele ondernemingsstatistieken*. https://statbel.fgov.be/nl/themas/ondernemingen/structurele-ondernemingsstatistieken

The Shift project. (n.d.). *The Shift project* [Project page]. The Shift Project. Retrieved https://theshiftproject.org/en/publications/sufficiency-europe/

Trade Economics. (2023). *Belgium—Employment In Agriculture*. https://tradingeconomics.com/belgium/employment-in-agriculture-percent-of-total-employment-wb-data.html

Truelove, H. B., Carrico, A. R., Weber, E. U., Raimi, K. T., & Vandenbergh, M. P. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. *Global Environmental Change*, *29*, 127–138. https://doi.org/10.1016/j.gloenvcha.2014.09.004

Van Eenoo, E., Fransen, K., & Boussauw, K. (2022). Perceived car dependence and multimodality in urban areas in Flanders (Belgium). *European Journal of Transport and Infrastructure Research*, *22*(1). https://doi.org/10.18757/ejtir.2022.22.1.6044

Vercalsteren, A., Boonen, K., Christis, M., Dams, Y., Dils, E., Geerken, T., Van der Linden, A., & Vander Putten, E. (2017). *Koolstofvoetafdruk van de Vlaamse consumptie* [Onderzoeksrapport MIRA/2017/03 VITO/2017/SMAT/R/1160]. https://www.friscris.be/nl/publications/koolstofvoetafdruk-van-de-vlaamse-consumptie(f021bfbf-eaef-42bb-a431-47f8ab84bfdf).html

VILT. (n.d.). *Terug in de tijd met...veld verkenners—200 jaar boeren voor onze dagelijkse kost!* Retrieved https://veldverkenners.be/storage/files/0c8e7513-922b-46d5-8309-dffd3069f32b/terug-in-de-tijd-met-veldverkenners.pdf

Vingerhoets, R., Spiller, M., De Backer, J., Adriaens, A., Vlaeminck, S. E., & Meers, E. (2023). Detailed nitrogen and phosphorus flow analysis, nutrient use efficiency and circularity in the agri-food

system of a livestock-intensive region. *Journal of Cleaner Production*, *410*, 137278. https://doi.org/10.1016/j.jclepro.2023.137278

Vlaamse Milieumaatschappij. (2018). *Milieuverkenning 2018: Achtergronddocument Oplossingsrichtingen voor het mobiliteitssysteem*.

Vlaamse overheid. (2023). *We reduce food waste*. https://www.vlaanderen.be/en/the-agency-for-facility-operations/sustainability-at-the-agency-for-facility-operations/we-reduce-food-waste

Vlaamse overheid. (2024). *Aan-tal landbouwbedrijven*.

VMM. (2024). *Wat betekent het stikstofdecreet voor elke varkenshouder?* https://lv.vlaanderen.be/beleid/klimaat-milieu/stikstofemissies/wat-betekent-het-stikstofdecreet-voor-elke-varkenshouder

Wiese, F., Taillard, N., Balembois, E., Best, B., Bourgeois, S., Campos, J., Cordroch, L., Djelali, M., Gabert, A., Jacob, A., Johnson, E., Meyer, S., Munkácsy, B., Pagliano, L., Quoilin, S., Roscetti, A., Thema, J., Thiran, P., Toledano, A., … Marignac, Y. (2024). The key role of sufficiency for low demand-based carbon neutrality and energy security across Europe. *Nature Communications*, *15*(1), 9043. https://doi.org/10.1038/s41467-024-53393-0

Zwart, T. A., & Mathijs, E. (2020). Exploring emergent practices in Alternative Food Networks: Voedselteams in Belgium. *Journal of Rural Studies*, *80*, 586–594. https://doi.org/10.1016/j.jrurstud.2020.10.049